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IN THIS ISSUE: In 2013, the conference committee accepted 404 abstracts for presentation and rejected 47 abstracts. Authors of these abstracts were invited to submit a full paper. A total of 76 papers were received. 58 papers were selected for peer review. Finally, 39 papers were accepted for publication in this issue. The organization of this issue follows the ten conference tracks listed in the table of contents.
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Zachary Richardson and Eric Macdonald
Welcome to the inaugural issue of Landscape Research Record, published by the Council of Educators in Landscape Architecture (CELA). In 2013, the CELA Board approved and adopted a procedure to become fully responsible for publishing peer-reviewed conference papers annually and named the publication Landscape Research Record (LRR). LRR is a post-conference publication and published online only.

CELA was founded in 1920, and was formerly known as the National Conference on Instruction in Landscape Architecture. For nearly a century, CELA has been a crucial organization concerned with the content and quality of professional education in landscape architecture. Since its beginning, CELA has held annual meetings and published proceedings that document pedagogical exploration, contemporary research, and scholarly investigation. Annual meetings have morphed from early informal gatherings to the first themed conference in 1960. Proceedings of annual meetings were published by the host on a voluntary basis. The quality and procedure for review of submissions to the conference varied from year to year.

To ensure consistent annual conferences and publication of peer-reviewed conference materials, CELA launched the Conference Track System in 2008/2009. The system is composed of content areas chaired by scholarly experts representing the broad areas of the field. Today we have 17 chairs in charge of 11 content areas called “tracks.” Review quality has improved and the conference program has become more cohesive. Despite the improvement in conference programming and abstract review, publication of peer-reviewed conference papers still relied on conference hosts. Now LRR takes on that responsibility to ensure a comprehensive and consistent record of the valuable information presented at each CELA annual conference.

This first issue of LRR is a collection of peer-reviewed papers presented at CELA 2013 hosted by the University of Texas at Austin, with the theme “Space • Time / Place • Duration.” As Allan Shearer stated in his foreword for the CELA 2013 conference proceedings, “the relationships between space and time, between place and duration are foundational to the education, practice, and profession of landscape architecture." You will find the 39 papers in this issue, in various ways, reflect these intricate relationships. This issue is a testament to the contribution of a CELA annual conference to the discipline and profession.

Ming-Han Li
Texas A&M University
CELA Vice President for Research
Editor-in-Chief, Landscape Research Record
COMMUNICATION AND VISUALIZATION

Edited by Kevin Thompson and Joni Palmer
3D DIGITAL GRAPHICS IN LANDSCAPE ARCHITECTURE
PROFESSIONAL PRACTICE: CURRENT CONDITIONS IN A NUTSHELL

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1 ABSTRACT
3D digital graphics and representation have been a critical part in landscape architecture professional practice. However, few studies have been conducted to document how 3D digital graphics are currently being used. Some important questions are largely unknown. For example, who are the primary users of 3D digital graphics programs, and what are the most popular 3D software packages, and why. A better understanding of these questions is not only important to practitioners, but also to educators and software developers. This study tackles the above questions through a national online survey of landscape architecture firms. Five sets of questions were asked, including (1) background of the firm, (2) familiarity with 3D software programs, (3) current status of using 3D programs, (4) interest in using 3D programs in the future, and (5) desirable impact of 3D programs on landscape architecture professional practice. The survey was sent to all the American Society of Landscape Architects' members through SurveyMonkey. More than 400 firms responded (response rate 13%). Results show that currently landscape architecture professionals exhibit limited use of 3D technologies. The main barriers are the steep learning curve and daunting cost for license. However, majority of the respondents expressed the desire to take advantage of 3D modeling and visualization in their work. The reported main benefits of using 3D technologies include: the ease of communicating with clients and the general public, the ability to create polished and detailed landscape design representations, and time saving in receiving feedback on design and making amendments accordingly, compared to traditional physical models.

1.1 Keywords
3D digital graphics, landscape architecture, professional practice, visualization
2 INTRODUCTION
Landscape architects are often charged in tackling interdisciplinary design tasks, where visual communication becomes a key in demonstrating project outcomes to audience groups of all kinds. Development of 3D digital graphics was first led by architecture and industrial design, and then rapidly adopted in landscape architecture. Pervasive arguments for using 3D technologies are that they constantly innovate and may fundamentally change the way that design is perceived and communicated (Lange, 1994, 2001; Tress and Tress, 2009). As a result, an increasing number of landscape architects are applying 3D technologies in order to supplement the traditional 2D methods of design representation.

3D technologies have unique capabilities in creating visualizations that convey complex design ideas to the clients in a meaningful way. Moreover, current 3D technologies allow landscape architects to integrate various data sets and analyses (e.g. hydrology, visual impact assessment) into their work (Hanna, 1999). With the growth of environmental consciousness since the 1970s and the migration of public agencies’ data into digital formats, landscape architects are held accountable for using best available information to inform their design and fulfill environmental stewardship (Hanna, 1999).

Despite these encouraging aspects, some early studies found that the high cost and time commitment in learning have prevented designers from using 3D technologies (Paar, 2006). However, little research has been conducted on the current status of using 3D technologies in the realm of landscape architecture. Moreover, little is known about practitioners’ perceptions on whether 3D technologies are suitable for their work. The objective of this study is to reveal the current applications of 3D software use in landscape architecture profession practice in the United States. Through conducting a national online survey, we identified patterns of who are using 3D technologies, what tasks 3D technologies are used for, and practitioners’ needs and suggestions for future improvements.

3 MATERIALS AND METHOD
This study used online survey method for data collection. Survey questions were mostly close-ended. Room was provided where participants can share additional thoughts on their evaluations of 3D programs’ efficacy and opinions on the applicability of these programs to their work. Five sets of questions were asked, including (1) background of the firm, (2) familiarity with 3D software programs, (3) current status of using 3D programs, (4) interest in using 3D programs in the future, and (5) desirable impact of 3D programs on landscape architecture professional practice.

Because this research involves human subject, our survey instrument was reviewed and approved by Utah State University’s Institutional Review Board (IRB) (Protocol #4405) before data collection started. Survey instrument was then sent out electronically through Survey Monkey (http://www.surveymonkey.com). We invited landscape architecture firms registered with the American Society of Landscape Architects (ASLA) to participate in this survey. The ASLA website listed totally 4,789 members (firms and freelance landscape architects). However, only 3,434 members provided valid or have updated their email addresses online. These members were contacted for the study.

The survey started on June 21st, 2012. A reminder email was sent out two weeks later, on July 5th. The survey was closed on July 21st. A total of 427 valid responses were received (response rate 13%). Although the response rate is relatively low, it is comparable with other similar online survey studies (Baruch and Holtom, 2008). Also, the initial sample size is large which took into account all the ASLA members in the U.S. Figure 1 shows the geographic locations of the respondents and their frequency of 3D technologies use. A random distribution of participants’ locations and their frequency of 3D technologies use also help reduce the bias of using less representative samples. Given these factors, we considered the dataset as acceptable and proceeded with analysis.
4 RESULTS AND DISCUSSION

4.1 Who are using 3D Technologies in Landscape Architecture?

For the question about how frequently professionals use 3D software in their daily work, only 30% of the respondents stated that they often or very often use 3D software during the design process. Only 20% of them considered themselves as experienced/expert 3D software users. Among the eleven 3D software programs examined in the survey, respondents suggested that Google SketchUp, ArcGIS, AutoCAD Civil 3D, 3D Studio Max, and AutoCAD Map 3D are most used.

Use Frequency and Levels of Experience are compared to examine whether experienced users take advantage of 3D software more often than less experienced users (Figure 2). It is obvious that in the expert/experienced groups, more than 50% of the respondents use 3D software often/very often. However, in novice/new user groups, fewer respondents suggested that they use 3D software frequently. The results show that more experienced users would adopt 3D software more often than novice/new users. An interesting finding is that although some respondents did not consider themselves as experienced users, they reported high frequency of 3D software use.
The history of 3D software application in landscape architecture, both in education and practice, is relatively short compared with other related disciplines (e.g., architecture, interior design). It was not until the 1990s that 3D technologies were introduced to landscape architecture (Ervin, 2001). Considering this background, it can be assumed that senior landscape architects would use 3D software less frequently than junior professionals. Figure 3 actually shows that there are 20% of the senior landscape architects seldom or never use 3D techniques. However, when comparing the years of work experience with the frequency of 3D software use, insufficient evidence was found to suggest that there are substantial differences among user groups with varying years of work experience.

Figure 3. Frequency of 3D software use in relation to user’s work experience and years of firm establishment

Around 84% of the respondents have work experience that is more than ten years, whereas less than 10% of the respondents have less than five years. The low response rate from junior landscape designers (e.g., this 10% of respondents) presents a limitation of this study. This is because recent graduates would have been exposed more extensively than earlier graduates to digital graphics in their education, and therefore they are expected to be leading the use of 3D techniques.
Furthermore, there is a weak correlation between the frequency of 3D technology use and years of firm establishment. Generally speaking, younger firms (1–5 years of history) have relatively higher percentages in the category of rarely or never use 3D software, older firms (more than 20 years) reported higher frequency of adopting 3D software. But again, the evidence is not sufficient to conclude that there is a correlation between the frequency of 3D software use and the firms’ year of establishment.

Other factors that were hypothesized to be important for the frequency of 3D software use, did not show huge significance. For example, male and female participants reported similar levels of use frequency. Also, education background does not suggest itself as an important factor that influences the frequency of use.

4.2 What 3D Software Programs are being used in Landscape Architecture?

There are many 3D visualization programs currently available. In landscape architecture, the most commonly used 3D software packages include Google SketchUp, ArcGIS, AutoCAD, 3D Studio Max, Maya, and Vue (Table 1). These packages vary in platform, price, and their main applications. Some programs focus more on 3D visualization and representation (e.g. Google SketchUp and Studio Max). Some are very comprehensive and include 3D analysis and visualization functions (e.g. ArcGIS). The number of users reported by the survey was also included in Table 1.

Table 1. Commonly used 3D software programs in landscape architecture

<table>
<thead>
<tr>
<th>Program</th>
<th>No. of users</th>
<th>Price</th>
<th>Initial Release</th>
<th>Main Applications</th>
<th>Animation</th>
<th>Rendering</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D Studio Max</td>
<td>41</td>
<td>$3,495</td>
<td>1988</td>
<td>Modeling, animation, lighting, rendering, video game creation, visual 3D effects, post-production video editing</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>AutoCAD Civil 3D</td>
<td>90</td>
<td>$6,825</td>
<td>2004</td>
<td>Basic 3D modeling</td>
<td>Yes</td>
<td>Basic</td>
</tr>
<tr>
<td>AutoCAD Map 3D</td>
<td>41</td>
<td>$5,245</td>
<td>2005</td>
<td>Basic 3D modeling</td>
<td>Yes</td>
<td>Basic</td>
</tr>
<tr>
<td>AutoCAD Plant 3D</td>
<td>6</td>
<td>$8,922</td>
<td>2009</td>
<td>Basic 3D modeling</td>
<td>Yes</td>
<td>Basic</td>
</tr>
<tr>
<td>ArcGIS</td>
<td>69</td>
<td>$5,000-$40,000</td>
<td>1999</td>
<td>Modeling, geoprocessing</td>
<td>Yes</td>
<td>Basic</td>
</tr>
<tr>
<td>Bryce 3D</td>
<td>1</td>
<td>Free for a limited time</td>
<td>1996</td>
<td>Modeling, animation, lighting, rendering, visual 3D effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Google SketchUp /Pro</td>
<td>303</td>
<td>Free/$495</td>
<td>2000</td>
<td>Computer aided design</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Maya</td>
<td>6</td>
<td>$3,495</td>
<td>2007</td>
<td>Modeling, animation, lighting, rendering, video game Creation, visual 3D effects, post-production video editing</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Rhinoceros 3D</td>
<td>0</td>
<td>$995</td>
<td>1998</td>
<td>Modeling, computer aided design</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Vectorwork</td>
<td>34</td>
<td>$1,441-$2,895</td>
<td>1999</td>
<td>Computer aided design</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Vue</td>
<td>41</td>
<td>$1,495</td>
<td>2005</td>
<td>Landscape modeling, animation and rendering</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* The initial release date is based on the first commercial version release date

The most popular 3D software program being used by landscape architects is Google SketchUp. This is likely because of the low learning curve and the low (or minimum) investment on license. In fact, Google SketchUp (non-professional version) is the only one that is free and sets no limitation on the license period. AutoCAD and ArcGIS suites are also popular. For example, for firms that involve large-scale planning work, ArcGIS offers powerful 3D analysis and visualization functions. AutoCAD Civil 3D is also instrumental in stormwater related analysis and cut-and-fill calculations, presented in a 3D manner.

4.3 What are 3D Software Programs used for in Landscape Architecture?

Communication plays an important role during the design process and landscape architecture is no exception. Communication becomes particularly critical between designers and clients (Nielsen et al. 2010). In this study, participants were asked to rate the effectiveness of 3D programs in communicating to
different targeted groups. Majority of the respondents agreed that 3D programs are overall effective in communication. To be more specific, the general public, concerned groups, and policy makers were groups to whom 3D programs are most effective for conveying design messages (55.2%, 42.5%, 37.9% respectively, rated as Most Effective) (Figure 4). The above groups are considered to have limited training and knowledge of design (Paar, 2006). Therefore, 3D programs show an advantage in facilitating the design process of engaging layman audience.

![Figure 4. Effectiveness in communication with different groups using 3D software programs](image)

The participants were also asked in respect to how 3D programs were applied in different design phases. Figure 5 shows a fairly even distribution across different design process, with the most extensive use occurs in the project final output. Other phases such as public involvement, planning alternatives, and preliminary draft were reported to have less, but still decent frequencies of use.

![Figure 5. Frequency of 3D software program use in different design phases](image)

The findings have corroborated the perception that 3D programs are mostly successful in performing communication tasks. When communication is addressed to audience groups that have limited knowledge in landscape design (e.g. clients, stakeholders, and policy makers), it is valuable to take advantage of 3D programs for clear and easily comprehensible project presentations (Sheppard and Meitner, 2004).

4.4 Benefits and Challenges of using 3D Technologies in Landscape Architecture

Although the respondents’ knowledge level of 3D technologies varies, most of them consider 3D technologies helpful for the profession (Figure 6). The most compelling benefit is a better communication
between designers and clients (reported by 89% of the participants), and as a result increasing clients’ satisfaction. It is evident that a healthy designer-client relationship will not only help designers accomplish projects smoothly, but also contribute to long-term client retention. In contrast, traditional 2D communication venues (e.g., plan renderings, 2D line-work plans and maps) have not been fully successful in engaging clients and stakeholders (Kheir, 2001). Based on their experiences, designers can rely on 2D drawings to visualize design proposals in a 3D format; whereas average client may be overwhelmed by sophisticated 2D drawings and experience difficulties in picturing landscape design visions. In this sense, 3D technologies complement traditional 2D design languages and increase the versatility of presentation.

![Figure 6. Benefits (green bars) and Challenges (red bars) of using 3D programs in landscape architecture (n=324)](image)

Another major benefit of 3D visualizations is that they allow the proposed design to be put in the real context (e.g. showing the surrounding landscapes). Because these visual simulations are done by computers (versus physical models), it makes designers’ job easier in making design amendments after receiving feedback. These simulations also enable the comparisons of different design alternatives in a speedy manner. Potential design problems that may not be easily identified through 2D drawings may stand out more easily when presented in a 3D format. In addition to 3D visualizations, some software packages (e.g. ArcGIS) can perform suitability analysis and landscape performance evaluation. Other advantages of using 3D programs are also notable, such as the capability of performing time-series analyses through animation and the ease of project collaboration via model sharing.

Challenges also follow. The most noteworthy ones are significant time commitment and steep learning curve, reported as 79.3% and 68.3% by the respondents, respectively. In addition to these two major hurdles, respondents also requested future 3D programs to provide fast, yet photorealistic rendering, increase the compatibility with ArcGIS and other geoprocessing tools, provide more and higher quality symbols, and improve modeling accuracy. Participants also expected future 3D programs to include more features, such as sophisticated lighting design options, rich material and texture libraries, and intricate rendering effect of reflection.

The main technical barrier currently, however, is the programs’ lack of ability in building models and delivering high-quality simulations rather quickly. Practitioners have little choice but to omit details in performing model development and visual simulations. Moreover, for a small project it may not worth using 3D technologies because it may likely go beyond the budget limit. On a personal level, another challenge would be the arduous learning process and substantive time commitment. One of the respondents commented that: “I would be interested in using 3D software, but time for learning and money to invest is currently scarce. I am busy enough without it at the moment.”
5 SUMMARY AND CONCLUSION

This study reveals that landscape architecture practitioners in the United States currently exhibit limited use of 3D software programs. Only 30% of the respondents use 3D programs on a daily basis. Google SketchUp is the most popular 3D software. Other widely used software programs include ArcGIS, AutoCAD Civil 3D, and 3D Studio Max. It is not surprising that the low (or minimum) price and the low learning curve make Google SketchUp a popular option. In respect to when to use 3D programs during the design process, the following phases were reported (from the highest to lowest frequencies): client and public involvement, design alternatives, preliminary draft, and final output.

In addition, respondents emphasized the importance of maintaining core skills (e.g. sketching) of landscape architecture professional practice and design thinking, and put less emphasis on pure graphic production. For example, a few experts from the respondents’ statements expressed the concern of overweighting the importance of 3D visualization as a tool. The consensus among the respondents is that the design process appreciates human spontaneity and imagination. Design is a unique representation of human creativity and the current 3D technologies have yet to fully embrace or be able to simulate these activities in real-time.

- “Too many graduates are coming out of school with great graphics and 3D skills, not professional practice skills and the reality check of whether their designs are attainable.”
- “While not at all opposed to 3D modeling as a presentation tool, I am of the opinion that design professional MUST learn to draw, both in 2D and 3D, by hand. It is critical to the creative process!”

This study also shows that communication and collaboration between landscape architects and hardware and software developers is essential to facilitate a wider application of 3D techniques in landscape architecture. In the United States, landscape architecture is a relatively smaller profession compared with civil engineering and architecture (two disciplines that landscape architects mostly collaborate with). As a result, there are not many 3D software programs specifically designed for landscape architecture (Pihlak and Barrett, 2000). Hence, there is a need to keep up the dialogue with software program development and make a pitch to the growth of landscape architecture profession.

Finally, educators in landscape architecture can benefit from this study through incorporating findings into curriculum development and better serve students for the work force. 3D software developers can also use this research to improve digital programs that are better suited for landscape architecture.

6 ACKNOWLEDGMENT

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7 REFERENCES


FREEHAND RENAISSANCE: CONCEPT SKETCHING FOR A DIGITAL AGE

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1 ABSTRACT
Concurrent with the rise of stunning digital representation techniques, demand for hand drawing classes and workshops is growing. On-site charrettes requiring quick sketching of evolving ideas have become mainstream in town planning practice, and the freehand story-boarding techniques of film-making are finding their way into the creative processes of urban designers. At this writing, a majority of landscape architecture job openings call for hand drawing skills. We’re witnessing a pendulum swing from almost exclusive use of digital imagery to a new found appreciation for the immediacy and freshness of hand drawing.

To effectively complement technology, however, freehand design drawing must be rethought for a digital age. Shorter time frames, tighter budgets and on-the-spot collaboration have outpaced the profession’s traditional, labor-intensive “hand graphics” techniques and call for rapid working methods that complement digital work flow.

This paper discusses the author’s rapid drawing approach and supportive techniques that have evolved over the last dozen years of urban design projects and charrettes, and the influences of interactions with reportage illustrators, product designers and filmmakers on these ideas and methods. Working with faculty and students through teaching of invited workshops across the United States and abroad has heightened awareness of the uniqueness of this approach, and suggests opportunities for moving applied theory from private practice to academic practice.

1.1 Keywords
drawing, representation, freehand, sketching
2 INTRODUCTION

Digital technologies for design representation have become ubiquitous in landscape architecture programs, changing how landscape architecture design proposals look, and by extension changing the way that landscape architecture is taught. Proficiency in a number of software programs and digital representation skills is considered baseline for young graduates entering the job market (American Society of Landscape Architects, 2013).

At the same time, a review of landscape architectural job openings listed by ASLA’s Job Link at this writing reveals that of 20 design-related positions listed, 60 percent specify freehand graphic skills in the list of qualifications they’re seeking (American Society of Landscape Architects, 2013). A conversation on this topic with the Director of Human Resources of a large landscape architectural firm with an international practice clarified that, “We’re not looking for artists or illustrators. We’re looking for evidence of a designer’s thought process and the ability to communicate it convincingly, and that’s more evident in hand work. We feel so strongly about it that we created a book of hand graphic techniques and examples and sent it to graphics teachers at universities across the country; we also provided copies to student attendees of LABash” (Eden, 2012).

On-site charrettes requiring quick freehand sketching of evolving ideas have moved into the mainstream in town planning, urban design and transportation planning practice (Condon, 2007), especially in light of tighter public and private project budgets. The freehand story-boarding techniques of film-making and their creative interpretation by progressive architects such as Tschumi and Koolhaas are finding their way into the practice (Koeck, 2012) and teaching (Amoroso, 2012) of urban design.

The interest in and market demand for freehand sketching skills in landscape architecture and urban design practice is clearly reflected in the author’s project experience over the past dozen years, which has been increasingly distinguished by “concept design” commissions to synthesize complex project impressions into freehand sketch plans and imagery, always rapidly and frequently on-the-spot. These hand-drawn images capture and make visible complex design ideas, help to facilitate a common vision and become the foundation for further development with both analog and digital tools. The time and budget demands of this area of practice have given rise to streamlined approaches and methods for generating concept sketches efficiently, and offer insights into how they might be incorporated into academic practice.

2.1 Purpose

The purpose of the study is to define and articulate a freehand sketching approach and supportive techniques—mined from the trenches of urban design and charrette project experience, workshop instruction and feedback, and self-directed study—that enhance a creative design process and that complement digital work flow. The study opens a view to aspects of design practice that require rapid freehand sketching skills in order to more closely align academic views of drawing and representation with the needs of current projects and clients, thus moving applied theory from private practice to academic practice.

2.2 Methods

This section outlines the author’s project and charrette experience between 2001 and 2013 from which the findings are drawn. It also outlines activities over the past 6 years that have supplemented the project experience, including conducting invited student and professional workshops at universities and conferences, and self-directed study with creative professionals in a range of disciplines.

Based on internal review of project records, the author has served as lead designer for 63 projects that bridge landscape architecture and urban design since year 2001, including urban stream corridor planning, urban freeway enhancement, downtown revitalizations, and transit oriented developments, among others. In 84 percent of these projects, the author acted as a sub-consultant to other private design firms with the charge of generating planning and design concepts on the “front end” of the projects. Thirty-eight percent of the total involved hands-on charrette sessions with in-house design teams and/or public participation, characterized by production of a large volume of illustrative design drawings generated on-the-spot.

The author’s scope in virtually all of these efforts was to employ design thinking with the use of freehand notation and drawing skills to facilitate a consensus on design process and direction, to capture
and develop early impressions and ideas, and to synthesize large amounts of input and information into alternative concepts and a preliminary preferred solution in the form of rapidly generated sketch plans and supporting imagery. This work was then typically used to guide further development with digital tools by the client firm’s in-house design staff. A conservative estimate based on review of these projects is that roughly 2200 freehand, concept-level design drawings were produced by the author in the course of executing these creative works. Over time, the nature of the work has yielded production efficiencies and rapid drawing techniques that in hindsight can be recognized as methods that are transferable from private practice to the classroom.

These approaches were first systematically assembled by the author in a preliminary fashion for presentation to the 2007 LABash conference in Baton Rouge, and were later expanded on for the “Editor’s Choice” article in Landscape Architecture Magazine published in November of the same year (Richards, 2007). They have continued to evolve and subsequent refinements have been presented as invited hands-on workshops or lecture/demonstrations at ten university programs in landscape architecture across the United States and in Turkey, six ASLA chapter conferences, one national ASLA conference, and the 2nd International Urban Sketching Symposium in Lisbon, Portugal to date. Each workshop and lecture/demonstration resulted in feedback from participants on the approaches and techniques themselves as well as the methods used to communicate them; these observations continue to shape the findings.

The continuing search for streamlined sketching methods appropriate for current landscape architectural practice has extended into self-directed study with sketching teachers in allied creative disciplines. Over the last 3 years these efforts have included learning varied approaches and technique from international talents in sketching workshops, and have included reportage artists Veronica Lawlor (New York) and Simonetta Capecchi (Naples), illustrators Nathalie Ramirez (Santo Domingo), Nina Johansson (Stockholm), and Jonathan Schmidt (New York), fashion illustrator and professor Melanie Reim (New York), architects Asnee Tasna (Bangkok), Francis D.K. Ching (Seattle), and Liz Steel (Sydney), and film animator and game designer Marc Taro Holmes (Montreal). These instructional sessions have been complemented with ongoing instruction on digital tablet design sketching techniques with product designer and landscape architect Robert Chipman (Austin).

3 FINDINGS

The findings represent cumulative observations and experience from this mix of creative works, invited workshops and self-directed study over approximately 12 years. They have been driven by the need to capture visual ideas in design sketch form with speed and efficiency, facilitating quick design iteration, allowing for early client/team feedback, and guiding further development through analog or digital tools.

The overarching observation is that freehand design sketching is used to best advantage as an exploratory tool and a catalyst for ideation at the beginning of creative process, rather than to illustrate finished design proposals at the end. Yet the teaching of hand graphics observed in the course of campus visits for workshops, advising and critique appears to be rooted in traditional illustrative “rendering” techniques rather than the use of drawing as a design tool that can provide a springboard for more detailed exploration and representation through digital means. The latter calls for a quicker, less rigid and more accessible style of freehand design sketching that supports and complements our best digital technologies.

This view has been championed by William Johnson, FASLA (Johnson, 1993) since the advent of digital representation technologies in landscape architectural practice. But the insights of production designer Harley Jessup of Pixar Animation Studios lend a valuable perspective from a creative field particularly adept at balancing the advantages of both cutting-edge technology and the traditional arts. “Story is king,” said Jessup. “Until the story is right, Pixar will not allow a film to proceed into production...The act of drawing continues to be the standard medium for communicating visual ideas at Pixar, and although the thousands of drawings we create may never appear directly on the screen, they remain the foundation of every feature film we create. The computer is a miraculous tool but a great story is, in fact, the heart of a Pixar film and to tell that story we always begin with a drawing” (Treib, 2008).

The parallel with landscape architectural practice lies in the rejection of the “either/or” mentality relative to the use of analog and digital methods, and in the creative use of both freehand sketching and computer technology for what each does best, and at their appropriate place in the creative process. The
following specific sketching approaches and techniques have evolved from the cumulative experiences described above in response to the need to capture ideas quickly and on-the-spot.

4 Work Small
This idea evolved in charrettes and in the design studio over time, often in the face of competing project deadlines, where the rapid capturing of ideas was most often spontaneously expressed as a series of very small, spare studies which could be evaluated and then cast aside, or moved forward for further refinement and development. Working small also forces the designer to simplify, reducing the idea and its expression to its essence.

This practice was later corroborated and refined through study of the techniques of film concept artists Syd Mead (2004) and Feng Zhu (2003), architect Jim Leggitt (2009) and Pixar production director Harley Jessup, each of whom advocate working small—from thumbnail to letter-sized whenever possible—as a key to efficiency and clarity. It was further validated in the course of a field sketching workshop with award-winning reportage artist Veronica Lawlor, who teaches the studied use of small thumbnail sketches—often no larger than 2 inches by 3 inches—as visual explorations, not only to discover potential drawing compositions but to zero in on what she calls “the decisive moment,” when a compelling visual idea about an environment or situation is discovered through generating many small exploratory studies, and then developed in a larger format. The practice is similarly reinforced through a lecture, paper and subsequent conversations with Christopher Grubbs, the architectural illustrator whose evocative images prepared for clients like Peter Walker Partners and Hargreaves Associates begin with 2-inch by 3-inch thumbnail studies of visual ideas, often prepared in the course of conference room discussions, to synthesize input into an image that captures an idea with clarity (Treib, 2008).

4.1 Simplify Tools
The creative standardization of a small selection of drawing tools lends speed and efficiency to the ideation process in two important ways, without compromising creative effort. First, limiting choices to a small but versatile and consistent selection of tools eliminates time-consuming decisions about drawing media, allowing the designer to focus attention on developing ideas rather than on which media and techniques to employ (Hanks, 2003). Second, consistent use of a limited selection of tools leads to mastery of those media, wherein they become extensions of the brain and hand in making ideas visible. From a practical standpoint, the small, versatile collection becomes a portable studio, traveling to project interviews, client and team meetings, charrettes and workshops in a satchel or briefcase.

4.2 Simplify Technique
A limited and consistent drawing vocabulary of line work, strokes and textures, practiced and employed to the point where they become second nature, allows the designer to focus attention on the idea to be captured, rather than on how to draw a particular element or surface. This valuable approach to sketching is less about knowledge or technique than it is about practice and repetition over time.

4.3 Simplify the Message
The author’s charrette work has been well served by producing a greater volume of small sketches that employ the minimal line work and tone necessary to convey the essence of an idea, rather than a single epic drawing that attempts to tell the entire story. A collection of small sketches focused on key ideas can be added to and edited in sequential storyboard fashion, keeping a great deal of flexibility in the creation of a project’s “storyline.”

4.4 Use Digital Bases
Make liberal use of digital photography, Google Earth and preliminary SketchUp models as sketch bases. Whether printed out as letter-sized hard copies for tracing or imported into a drawing software program, digital photo and model bases eliminate the need to create perspectives from scratch and provide true context and perspective from which to launch freehand design explorations, resulting in both accurate design sketches and tremendous time savings.
4.5  **Leave Rough Ideas Rough**

The ability to refine presentation imagery to photo-realistic levels with software frees hand drawn, exploratory sketches to be what they are—quick captures of preliminary ideas, often with line restatements and overdrawing, qualities that lend the image a living, human quality often lost in subsequent refinements and “rendering.” Loose, exploratory sketches tend to elicit feedback more successfully than careful renderings, and help convey the exuberance of this exciting part of the creative process. The work of seasoned reportage artists such as Lawlor, Despina Georgiadis and their colleagues at New York’s Studio 1482 employ a loose but confident sketching style that successfully captures a spirit of place with an unmistakable human energy; their work can be instructive for designers seeking to convey ideas about the character and energy of existing or envisioned landscapes (Lawlor, 2013).

4.6  **“Digital Freehand” is Not an Oxymoron**

The drawing ideas and techniques discussed in these findings apply equally to drawing with traditional analog sketching tools and to sketching with pen-interactive computers. This powerful digital drawing hardware, used creatively with intuitive, user-friendly software, can seamlessly merge the human energy and creative flexibility of freehand sketching with the advantages of computer technology (Chipman, 2012). This technology has been used in the fields of illustration, film animation and product design for some time, but its potential in the area of design sketching for landscape architects, pioneered by product designer and landscape architect Robert Chipman among others, is in its very early stages. Chipman's most successful applications, which he has shared with the author through one-on-one training sessions, have used large Wacom Cintiq pen-interactive displays or a portable LE 1600 tablet computer by Motion in combination with Autodesk Sketchbook Pro software. Working with a drawing stylus on a pressure-sensitive screen and with a rudimentary understanding of the software, the designer is free to create any type of design sketch or drawing that she might create on paper, but can incorporate all the efficiencies and advantages of state-of-the-art drawing software. This hybrid approach to freehand design sketching still requires that the user understand the mechanics of traditional freehand sketching, such as line quality, perspective, and composition, but employing that skill in combination with powerful drawing software greatly extends the designer’s creative choices and flexibility (Richards, 2013).

4.7  **Develop Mastery through Freehand Location Sketching**

All of the creative professionals cited here as influences and teachers employ freehand location sketching as a regular discipline that informs and strengthens their drawing skills and confidence, their powers of observation and their creative memory. For the designer, deeply seeing and drawing a place as it is can become a creative springboard for envisioning places as they could be (Richards, 2013). Da Vinci’s sketchbooks celebrate a push and pull between life drawings of subjects of interest and ideas for new experiments and constructions that sprung from his observations (Cooper, 2007). Lawrence Halprin’s sketches of natural phenomena and “the ecology of form,” at once evocative and analytical, informed his celebrated designs for projects such as Sea Ranch, the Portland Open Space Sequence and Levi Plaza (Halprin, 1981). Architect and author Francis D.K. Ching, eloquently describing the relationship between a discipline of observational sketching and design, writes, “Drawing, like the ancient Roman god Janus, has two faces. One looks to the past, at what already exists, when we draw on location from direct observation...The other face of drawing looks to the future, what does not yet exist except in our mind’s eye...these two faces of drawing are related. The things we learn about our environment when we draw on location helps us as we imagine, draw and design the future” (Richards, 2013).

5  **CONCLUSION**

The key recommendation rising from these cumulative observations and experiences takes a lesson from Pixar’s working methods; namely, that a combined, “both/and” approach maximizing the creative strengths of both rapid freehand sketching and computer technology best serves the search for creative solutions to the range of challenges landscape architects face now and in the foreseeable future. This approach suggests moving away from instruction of traditional and sometimes labor-intensive “hand graphics” and “rendering” to less rigid, more accessible rapid sketching techniques that help conceive ideas and crystallize concepts at the beginning of the creative process while providing a blueprint for further development and representation with digital technologies. The techniques outlined in the findings
can provide students and professionals with a foundation for continuing instruction and especially practice, which over time can result in more individualized working methods and style.

The visceral act of hand drawing may yield psychic benefits that should not be overlooked. The author often receives feedback from articles and workshops through letters and conversations from students and professionals that speak to the creative invigoration and personal satisfaction they've experienced through integrating exploratory freehand design sketching into their design process. Their experience speaks to the validity of attitudes and working methods that an arts educator described to the author as “a reintegration of work and play within an ethic of discipline and professionalism” (Jarrell, 1994). One workshop attendee, an experienced landscape architect, expressed his view succinctly: “Thank you… I’d forgotten what we do is supposed to be fun.” Architect Michael Graves closed his recent opinion piece for the New York Times with a parallel sentiment, “…drawing by hand stimulates the imagination and allows us to speculate about ideas, a good sign that we’re alive” (Graves, 2012).

6 REFERENCES
ON “FLOATING AND FALLING”

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1 ABSTRACT

“Floating and Falling” is a video/performance garden artwork being developed by artist videographer Alex Poruchnyk. Poruchnyck is a nationally recognized Canadian artist and academic who works in sculpture and film related projects including animation and performance art. As an artist Poruchnyck continues to experiment with the expanding potentials of emergent media, In “Floating and Falling" the artist engages new video techniques to explore the temporal dimension of place.

This paper traces the artist’s garden building project and his experiments integrating video directly into his deliberate engagements of place. In this work the landscape is considered to be the actor in the performance, where the camera is embedded into the landscape recording the floating and falling of the “subject”. The work includes a number of experiments new media devices. Cameras are embedded in trees recording them falling to the ground or float with them in the wind. Cameras are embedded into forestry equipment record the process of human engagement with the forest. Remote controlled flying cameras track the forest change through time. 3D video cameras are used to record the spatial changes in the emerging garden. Finally the artist experiments with ideas regarding video projection within the forest itself.

The work posits a number of interesting ways of investigating landscape. The work questions the all too often destructive role that we engage in when adapting nature to our own desires. The work involves a deliberate undermining of our prevalent subject/object narrative about a forest by deliberately shifting the point of view from careful cinematographic framing to, for example, free floating tree point perspectives. Finally the work seeks to liberate the potential of disappearance as an essence of landscape phenomena.

1.1 Keywords

video performance art, actor, disappearance

Figure 1. Video frames of original forest scene
In October, 1999, a Lear Jet floated over America, finally falling in a field in South Dakota. This story has resonated with me since then and the idea of floating/falling and landscape continue to haunt my imagination. This particular story would play out in an eerily symbolic way. As the century drew near to its completion we would witness this image of technology on auto-pilot curiously drifting off course (destined originally for Dallas Texas), carrying six people to their deaths including the golf course architect Bruce Borland and the famed golfer Payne Stewart. As a Professor of Landscape Architecture I would dwell on the irony of this floating simulacra, of the floating coffin of a “place maker” and a golfer that was simultaneously a great athlete and, in ways the ultimate commodification of sport. As a Canadian I would watch the story unfold in a curious way as the newsmakers talked about how the American Air Force may be compelled to shoot the plane down before it entered Canadian air space. This plane with its stories and the influences that they carried had floated into Canada long ago.

In the summer of 2012 I entered into a discussion with the video artist and sculptor Alex Poruchynyk about his current work entitled “Floating and Falling”. For Poruchynyk ideas about floating and falling would prove to be both performative and exploratory. As an artist Poruchynyk was interested in uncovering new ways of seeing and reading the landscape, but most of all of engaging the landscape in a meaningful way. Focussing on the use of video as a primary medium of investigation he would begin to examine the nature of place and his relationship to the site. This paper traces the artist’s experiments integrating video directly into his deliberate engagements of place. In this work Poruchynyk asks how the landscape might be considered to be both subject and object, actor and viewer in the performance of human interactions with place. In this way the ideas of floating and falling are coincidently about ways of looking and ways of thinking about landscape process.

It’s hard to say where the ideas of floating and falling originated for the artist. As one who often looks at the world through the video camera lens, floating and falling emerge as dominant visual forces at times working in opposition, at other times as complementary conditions of a singular event, or metaphors drawn from the artists own memories and dreams. Floating and falling are naturally part of all of our dreamscapes, but how do they associate themselves with the observations of our realities? In a sense Poruchynyk began by reading the forest and the nearby lake through his own experiences. Years ago he took care of his very sick daughter. He would speak about the potent memories of carrying her around and that he began to understand this forest in terms of how trees carry one another, support one another, that through the process of filming the forest he began to see the forest as being about complex relationships often acted out between individuals (trees or other vegetation usually) and that reading the landscape is really about uncovering these relationships in time.

When you carry someone who is sick and that you love, it is not about the burden, but rather about a different kind of familiarity, about an alternative kind of relationship and about mutual edification. Floating and falling in this way coexist, we carry each other, and together we fall softly, slowly, he began to see how trees seem to fall upon one another, to become winging at the forest we are provided with reminders of what happened before. Hought of as a sequence of events rather than a collection of objects.
The artist also began to realize, both physically and metaphorically, that we are never following our own paths, but rather we engage the potentials of a living palimpsest of events. Through his rather somatic approach to understanding the landscape, Poruchnyk began to intervene upon the dense forest, beginning with unplanned dérives (Figure 1) sometimes resulting in getting himself lost. (The dérives were recorded using cameras mounted on his person). Through subsequent investigations of the footage he would begin to make the following observations regarding his interpretations of place. First that the dérive is never innocent or absent of intention, that a number of things seem to be occurring. On the one hand, that the directionality of the wandering seemed to often be the result of the “affect” of forest features, that, for example, certain trees seemed to serve as attracters that pulled him forward or towards themselves. This would cause him to consider the source of such attractions, the power of the object or his tendency, as a filmmaker, to construct a coherent navigational narrative.

Alternately, his wanderings were influenced by a desire to “be a part” of the local ecology, that the paths chosen would follow existing paths that were created by the local fauna (usually white tailed deer, or black bear). Ironically his investigations would reveal that the paths often originated from human actions, sometimes his own, and that the palimpsest of events were precipitated in part by his own meanderings. As he wandered aimlessly in the forest, he would temporarily find that he was lost, and he would begin to become obsessed with “finding the survey stake”. Somehow the survey stake served as a touchstone to the place, but as his work continued he found that he required a different type of touchstone, a virtual touchstone that would allow him to be spatially networked to his past video experiences, a GPS based virtual index of video recordings. In this way place and experiences of place would be included into a floating hypermap accessible on a portable device.

Unlike many garden building exercises this projects was primarily extractive in nature, often about falling trees (Figure 2). He had originally purchased this property to site a film project where he could build a cave like structure and film the stormy beaches as a way of recreating his tale about the Orkney Islands. Now he found that he owned acres of dense forest that he barely understood. He remembers with humour the advice of an elderly woman who said to him: “You should cut it all down so that you can see what you have.” In a way she was right, he couldn’t see the forest for the trees. He couldn’t understand what was there because it was so dense and seemed so impenetrable. But what do you cut, how do you cut, what is this act of cutting? As an artist he was interested in decentering the narrative, of finding ways to tell the story through the agency of the forest.

Figure 3. Fishing line into tree canopy to attach video cameras
In a sense this work would become an exercise in what the cultural geographer Nigel Thrift calls nonrepresentational ethnography, of studying and exposing the performative natures of both man [sic] and environment, of trying to uncover the agency of the living system where human desires are searching for a foothold. “Nonrepresentational research pays attention to the sensuousness of our presence in the world, as well as to the affective dimensions of our actions, and the habituated nature of everyday existence.”\(^1\) This act of working in the forest included a sensuousness that was at time aggressive and brutal, deliberate and exploratory. As a video artist he needed to record and expose this sensuousness, where the actors included not only himself, and the forest vegetation, but also the tools themselves (in some ways this work would continually return to the agency and sensuality\(^2\) of the machine).

Floating and falling would become filters to the sensuousness of place. Using fishing line Poruchnyk would string cameras throughout the forest (Figure 3), dangling and drifting from branches the cameras would sense the tree, its gentle and steady interactions in the wind and the chaotic patterns of human interaction. This work was more than changing the point of view, of seeing the world from the canopy, (Figure 4) it was about sensing the point of view, of allowing the camera to float with the branches and to animate the vitality and everyday life of the forest. But it is also is about the vitality of interaction, of falling, of the sudden juxtaposition of events in time, of violent sudden acceleration and then... disappearance. The work uncovers the real affect of technology, the ability to control time, the ability to manipulate the acceleration and deceleration of natural events.

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\(^1\)Philip Vannini, "Non-Representational Theory and Ethnographic Research", <http://ferrytales.innovativeethnographies.net/>

\(^2\) The idea of sensuality of the machine comes from thinking about particular tools, what they do and how become one with our experiences; examples of machines with a strong sensuality might be a chainsaw or a motorcycle. But it is more than the sensual as a state of being sexy, http://thoughtcatalog.com/2012/the-sensuality-of-understanding/>
As Paul Virilio would say: “… one would now live a duration which would be his own and no one else’s, by way of what you call the uncertain conformation of his immediate times, … it would be a latitude given to each man to invent his own relation to time …”

Rather than recognizing loss as something that has occurred and is recorded as a memory (the disappeared), the emphasis is on the process disappearance itself. “[T]he tabula rasa is only a trick whose purpose is to deny particular absences any active value.” There is agency in absence and in the disappearance of the vitality of place. Disappearance is a natural process and subject to manipulation. Landscape architects deliberate, or not, engage (speed up and slow down) social, cultural and ecological processes of disappearance. Metaphorically, landscape architecture is often viewed as a discipline of emergence, a discipline highlighted in the spring and summer. But it is also as much about the reconfiguration of decay, metaphorically the autumn (the fall) and winter, and there is great beauty, power and import in such processes. Disappearance in the boreal landscape, is normally a slow and gentle shifting of the landscape, complemented with sudden forces of landscape change. Poruchnyk’s work is about both the revelation of this gentleness, and a recording of the affects of place and of acting on place, a recording of the acceleration of disappearance in the landscape (Figure 5).

As an actor in this space the artist began to play out the act of garden design through extraction from within the forest rather than from an abstract drawing (or model) about a possible future. In this work the common architectural representation such as plan and section drawings were replaced with personal and aerial video tracking. Using the Parrot 2 remote control helicopter video system he could read in real time, on an iPhone, the activities taking place on the ground. As the camera hovered above the site he would begin to see how the agency of forest was shifting, the new revelation of light, the choreography of the blowing vegetation, the emergence of unexpected assemblages.

Using video cameras embedded in his person he would undertake a form of post-performative personal surveillance. He began to see himself as undertaking the simultaneous role of a director whose actions were being subjected to the limitations of the embodied recording, his everyday recording device, but also with a different kind of consciousness about, for example, framing the shot or creating a coherent sequence. At the same time he would become the actor and a different form of consciousness emerged, that included a blend of both personal questioning about the mixed messages of what he was actually doing to the forest (He would sometimes describe it as reality TV gone wrong); and seeing himself participating in the dramatization of an event. As part of his garden building he would often cut and then deliberately weave the residue back into the paths edge in an act of taking and putting back.

\[4\] ibid, (p. 31).

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Figure 5. Performative views of floating camera
By embedding cameras directly on equipment, such as chain saws and brush cutters he would begin to recognize the wonder and brutality of his actions. (Figure 6) As boys will be boys there remains a fascination with the agency of machines, and their uncanny ability to increase disorder and convert and limit a system’s biotic potential at rates that are both unnatural and difficult to imagine. It is hard to know whether this fascination with machines is in fact a fascination with their power or is it part of a deeper fascination with how they begin to redefine time itself.

“… time itself has no absolute rate of flow, nor do events have any absolute succession. Instead, the rate of flow and the succession of events is determined by the position of the observer, the speed at which he’s [she’s] moving, gravitational fields, temperature conditions, etc. All this is quite familiar, but it implies that a given culture has to set up some kind of framework in which people can relate to time. An individual has the same problem. His experience of time consists of nothing more than a succession of events and consciousness which he [she] has to order in some way from which he [she] projects principles or discerns certain rates of flow.” (Lippard, p. 82)

Perhaps the most telling observation about the understanding rates of flow would be revealed when Poruchynyk would talk about the dynamic potential of the forest itself. He would continually be amazed at how quickly and persistently the forest would return, that within fairly short time frames he would have difficulty discerning the locations of his previous interventions. He would say that working in a forest was similar to “putting masking tape on the floor and saying that this is my office”.

In the end there are a number of lessons that landscape architecture may derive from artistic investigations like this one. First, there is an obvious potential for integrating technologies such as the drone cameras (Parrot 2) as a means of directly viewing sites that are complex and difficult to traverse; portable cameras (such as the GoPro and the stereo filming rigs) may be used as a direct means of getting feedback from on-site work; and the iPhone apps that are allowing us to manage recorded events and view remote actions in real time.

Alternatively this project begins to uncover a story about how we (landscape architecture included) have unwittingly entered into technology driven concepts of time. This is perhaps about more than technology being out of control but that time is now out of control. There was something eerie about a Lear Jet (a floating coffin) drifting across a continent, that in a way it should be allowed to drift until it was ready to fall to its own place of rest, but somehow this floating it was an uncomfortable part of our cultural narrative, like our landscapes it remained something that had to be contained and managed. But as we share with our landscapes, change them, design them we should consider how we are floating and falling, together we support one another, and together we may float and fall softly, slowly, gracefully.
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Figure 7. Raising the camera against a summer sky
SPACE, TIME, PLACE, DURATION; GEOSPATIAL FRAMING AND SENSING IDENTITIES OF LANDSCAPE ARCHITECTS

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1 ABSTRACT

This paper presents findings from social media-based analytics that geo-locate social media clusters of architects, landscape architects, and planners throughout the world and the United States as a means of describing the emerging identities of these socially related and mediated groups. Three crowd-sourced surveys were conducted over a period of one month that identified tens of thousands of users and their topical interests according to professional affiliation. The social media user's topical interests were analyzed according to the lexicographical content of their self descriptions. The lexicographical analysis followed framing and sense-making methodologies as a means of defining contemporary geo-located discourse among the three professions.

Preliminary findings from the crowd-sourced surveys suggest that:

- Each professional group has distinct identities defined by disproportionate mixes of similar topical interests.
- Professional identities in social media cluster around metropolitan geospatial groupings globally and in the United States.
- Social media users identified with these groups exhibit similar “framed identities” globally and in the US.
- Social media users associated with sustainability in the US exhibit unique “framed identities,” as do their counterparts within major metropolitan areas such as: San Francisco, New York, and Chicago.

The findings offer valuable methods for geospatial and lexicographical delineation of landscape architecture identities, and provide important analytical methods and definitions related to regional similarities and differences between landscape architects and other social groups. The findings are potentially useful to landscape architecture education programs as base data for regional, interdisciplinary, and educational research related to curriculum and program development.

1.1 Keywords
landscape architecture, social media, geo-location, lexicographic analysis, social identity
2 INTRODUCTION

It is well established that Web 2.0 applications (see Ellison, 2010 for definitions of contemporary social media terms) are providing new data for analysis, as well as, new methods for data utilization to explain significant relationships between individuals, social groups, and the landscape (Centola, 2010). Scholarly work increasingly addresses the expanding social networks, flows of information and human communication related to that data (Gabi, 2006); as well as the social meanings derived from that data that are shaping the activities and values of particular social groupings” (Healey, 2007). For example, Swaffield refers to the development of new social meanings prompted by widespread use of digital and communication technologies as potent stimuli for potential change in the professional of landscape architecture and landscape architecture education (Swaffield, 2002). To that point, Hewitt et al have identified landscape architecture related organizations, educational programs, and landscape architects, which employ social media to define social activities and social groupings (Hewitt, Taylor, and Nassar, 2011). Similarly, Hewitt et al, have harnessed website and social media-based analytics to identify social and geographic hotspots within the fields of architecture, landscape architecture, and urban design identified by professional project, research topic, landscape visualization, sustainable interest, and professional orientation. And while a limited body of scholarship addresses professional identity issues related to journalism, nursing, and education (Deuze, 2005; Wu, 2010) no scholarly work to date has examined the broader influence and impacts of social media to define identity within landscape architecture and related professions with broader implications for landscape architecture education.

This paper presents findings from social media-based analytics of geo-located groups of architects, landscape architects, and planners, globally and throughout the United States, as a means of describing their emerging social identities and relationships. Three crowd-sourced surveys were conducted over a period of one month in May and June 2012 that identified 31,745 users and their lexicographical interests according to professional affiliation. The social media user’s individual topical interests were analyzed according to the lexicographical content of their self descriptions. The lexicographical analysis follows framing and sense-making methodologies identified by Fiss and Hirsch as a means of defining contemporary geo-located discourse among the three professions (Fiss and Hirsch, 2006). Those framing and sense-making methods include the identification and quantification of meaningful and neutral self-descriptive terminology, and the correlation and ranking of that meaningful terminology between groups as a means of illustrating shared and unique identities.

3 METHODOLOGY

Consistent with scholarly research addressing the use of new technologies and data sources for urban studies, and for studies of social media that extract “real world” insights, (Fujisaka, 2010), data were mined from twitter feeds of professional groups including: the AIA, the ASLA, and the APA. The data-mined twitter feeds were geo-located both globally and within the United States to determine identifiable characteristics of the APA, ASLA, and AIA social media users. The geo-location data were mapped with ArcGIS to identify and compare size and proximity characteristics of AIA, ASLA, and APA social media users. The geo-located data were then analyzed for lexicographical content associated with AIA, ASLA, and APA member self-descriptions to reflect terminology both specific to each of the professions and shared across professions. Lexicographical content was also measured between sub-data sets of ASLA social media users associated with sustainability within the United States and in US model cities.

4 FINDINGS

4.1 Global Social Media Geo-location

The following graphs and maps represent findings derived from crowd-sourced data from the three organizations identified above. The graphs and diagrams illustrate the specific source networks from three perspectives: 1) international geo-located mapping of twitter accounts and their respective influence by number of followers, 2) national geo-located mapping of twitter accounts and their respective influence by number of followers, and 3) model metropolitan geo-located mapping of twitter accounts and their respective influence by number of followers. (Note: in the maps below the larger the symbol, the greater the number of twitter followers and their relative influence within AIA, ASLA, and APA groups. Also please note that cited numbers for each professional group does not correspond exactly with respective membership totals; and that data was generally not available concerning member’s confidential data).
Figure 1 below illustrates the relative influence and location of 9,632 social media users’ twitter accounts throughout the world associated with the ASLA. The map illustrates extensive social network activity related to the ASLA in the United States and in Europe, with modest social media activity in the Middle East and India, East Asia and Latin America, and minor social media activity in Africa and Australia. ASLA twitter users illustrated in the map represent approximately 30% of the total 31,745 users surveyed from the AIA, ASLA and APA. The corresponding bar chart indicates a range of 0-3,000 followers, with 3 users accounting for between 1,000 and 3,000 followers, 28 users counting between 200 and 800 followers, with the vast majority counting less than 200 followers. ASLA followers averaged 184 per user, for a reach of 1,772,288 twitter followers in total.

Figure 1. Relative influence and location of ASLA social media user’s Twitter accounts and number of followers

Figure 2 below illustrates the relative influence and location of 6,226 APA social media user’s twitter accounts throughout the world. The map shows less extensive social network activity related to the APA in the continental United States and in Europe with gaps in France and Eastern Europe, and minor social media activity in the Middle East and India, East Asia and Latin America, Africa and Australia.

Figure 2. Relative influence and location of APA social media user’s Twitter accounts and number of followers
The surveyed APA twitter users represent approximately 20% of the total 31,745 surveyed users. The accompanying bar chart indicates a range of 0-5,000 followers among APA members, with 3 APA members showing more than 3,000 followers, 3 members counting between 700 and 3,000 followers and the vast remaining majority (6,220) counting less than 200 followers. Total APA member followers averaged 78 per user, with a combined reach of 485,628 twitter followers in total.

Figure 3 below illustrates the relative influence and location of 15,887 social media user’s twitter accounts throughout the world associated with the AIA. The map indicates extensive social network activity related to the AIA in the continental United States and in broader Europe, with modest social media activity in the Middle East and India, East Asia, Latin America, Africa, and Australia. AIA twitter users account for approximately 50% of the total 31,745 surveyed social media users. AIA twitter users exhibit a range of 0 to 5,000 member followers with 4 users indicating 3000 followers or more, and 14 users accounting for 700-3,000 followers. The vast majority has less than 200 followers each. Total AIA user followers averaged 197 per user, with a combined reach of 3,129,739 member followers.

In summary, worldwide AIA, ASLA, and APA twitter users represent disproportionately sized social media user groups. Those associated with architecture represent approximately half of all total surveyed users, while landscape architects account for approximately three tenths and planners approximately two tenths of surveyed users. Members of the three groups are geographically dispersed globally, primarily within larger metropolitan areas with relatively consistent continental distributions, differing largely in terms of the degree of their representation within metropolitan areas. Larger groups tend to have more members in given metropolitan areas and in a greater number of metropolitan areas. Europe and the United States are by far the most socially connected regions.

Individual influence within the groups globally is overwhelmingly based on small social networks. Less than .2 % of architects, .01% of planners, and .4% of landscape architects have more than 200 followers. While individual social influence within the groups is limited to small groups, the reach of the entire groups can be extensive. Both the ASLA and the AIA count millions of combined member followers, while the APA counts almost 500,000.

4.2 National Social Media Geo-location

Findings derived from data-mined twitter feeds from the AIA, ASLA and APA for US geo-location and influence are based on a data subset associated with sustainability for the three group’s 22,149 twitter users. Figure 4 below illustrates the relative influence and location of 5,702 social media users associated with the ASLA in the continental United States. The map suggests that most influential social network
activity related to the ASLA is located in major metropolitan areas with some influential social media users in areas small to medium metro areas such as Bozeman, Montana. The majority of ASLA social media activity is located throughout the Midwest, the East and West Coasts, and especially the I-95 and I-85 corridors. According to the corresponding bar chart, the majority of influential global social media users are located in the US, as one would expect given the location of the organization. The proportion of influential users compared to total social media users within the US is similar to the proportion evidenced throughout the globe with 99.57% of the 5,702 US social media users counting fewer than 200 followers and slightly more than .4% with more than 200 followers.

Figure 4. Relative influence and location of US ASLA social media user’s Twitter accounts and number of followers

Figure 5. Relative influence and location of US AIA social media user’s Twitter accounts and number of followers
Figure 5 above illustrates the relative influence and location of 9,987 social media users associated with the AIA throughout the continental US. Consistent with ASLA social media use, the map indicates more influential social network activity related to the AIA in major metropolitan areas and some influential social media users in smaller metropolitan areas such as Bend, Oregon and Holland Michigan. As with the US ASLA, the majority of social media activity is located throughout the Midwest, the East and West Coasts, and especially along the I-95 and the I-85 corridors. Like the ASLA, the majority of influential social media users throughout the world are located in the US. The proportion of influential users compared to total social media users within the US, is also similar to that throughout the globe with 99.1 % of total 11,987 US AIA social media users counting fewer than 200 followers.

![Image of AIA social media locations](image1.png)

**Figure 5. Relative influence and location of US AIA social media users.**

Figure 6 above illustrates the relative influence and location of 4,460 social media users associated with the APA throughout the continental US. Consistent with US ASLA and AIA social media use, the map indicates more influential APA social network activity in major metropolitan areas, but in significantly fewer areas throughout the US. Many of the metropolitan areas with US ASLA and AIA social media use indicate no APA social media users. As with the AIA and ASLA, the majority of social media activity is located throughout the Midwest, the East and West Coasts, but with significantly less activity along the I-95 and the I-85 corridors. There is surprisingly little activity in the Central US and Mountain West. Six states in these areas have fewer than 10 twitter users. Unlike the ASLA and AIA, virtually all influential APA twitter users throughout the world are located in the US, while the proportion of users with less than 200 followers is similar to that of global APA social media use (99.9 % of the total 4,460).

In summary, as with the globally surveyed AIA, ASLA, and APA social media users, those in the continental United States represent disproportionately sized groups. That proportion varies somewhat from global media users, with proportionately more US AIA users (55%) than global users (50%), proportionately less US ASLA users (25%) than global users (30%), and relatively equal global and US APA users (20%). Like global social media users, US AIA, ASLA, and APA members are geographically dispersed primarily within larger metropolitan areas, differing largely in terms of their representation within metropolitan areas. In general, the larger the US group, the greater number of members in metropolitan areas and the larger the range of metropolitan areas represented.

As with the global networks, individual influence within the US groups is overwhelmingly based on small social networks. As with the global networks, less than 1% of all US group’s members count more than 200 followers (2 % of architects, .01% of planners, and approximately .4% of landscape architects). As with the global reach of the three groups, both the US ASLA and US AIA count millions of combined member followers, while the APA counts hundreds of thousands.

![Image of APA social media locations](image2.png)

**Figure 6. Relative influence and location of US APA social media users’ Twitter accounts and number of followers.**
4.3 Global Lexicographical Analysis

While analysis of the crowd sourced data to this point has provided clearly identifiable characteristics associated with geo-location and network influence of AIA, ASLA and APA members globally and nationally, lexicographical analysis of AIA, ASLA, and APA member crowd-sourced self-descriptions offers more refined definition of their social identities and comparative relationships. The following charts and descriptions illustrate the 21 most utilized self-descriptive terms by social media users of the AIA, ASLA and APA globally. The sampled terms from the ASLA represent approximately 46% of the 9,632 total ASLA social media users accounts (given that not all user self descriptions were available through data mining). The graph on the left in Figure 7 below illustrates what might be framed as a “global ASLA social media user identity” based on most frequently cited self-descriptive terms. As illustrated in the chart, ASLA social media users overwhelmingly describe themselves as landscape architect designers, who are primarily urban, provide creative specialized services related to planning, building, art and construction in residential areas. They describe themselves as companies or firms that are professional, offering green and sustainable solutions. Some are students.

The middle graph in Figure 7 above illustrates the sampled terms from AIA self descriptions representing approximately 42% of the total 15,887 AIA social media users surveyed. Global AIA social media users exhibit “framed identities” similar to ASLA social media users in many respects. AIA social media users overwhelmingly describe themselves as architects and designers, who are relatively urban, provide creative specialized services, marketing and management related to buildings, interiors, construction and art. They describe themselves as leading professionals offering engineering, consultancy and products that are sustainable and commercial in nature. Some of them are students.

The graph to the right in Figure 7 above illustrates the sampled terms from APA self descriptions representing approximately 53% of the total 4,460 APA social media users surveyed. Global APA social media users exhibit a “framed identity” similar in many respects to both ASLA and AIA social media users. Global APA social media users overwhelmingly describe themselves as urban/city planners, who provide services related to design, architecture, transportation, development, community, and the landscape. They describe themselves as professionals and consultants, whose work is related to sustainability, the university, public policy, advocacy and the environment. Some of them are also students.

In summary, lexicographical analysis of AIA, ASLA, and APA crowd-sourced self-descriptions suggests the following shared “framed” identities: 1) as a whole, global AIA, ASLA and APA social media users describe themselves in terms related to architecture, design, building, sustainability, professional services, urban contexts, and students; 2) global ASLA and AIA social media users (but not APA users) describe themselves most commonly in terms related to specialized creative services, construction and art; 3) global ASLA and APA (but not AIA) social media users describe themselves most commonly in terms related to landscape and planning; and 4) AIA and APA (but not ASLA) social media users describe themselves most commonly in terms related to consultancy.

Lexicographical analysis of AIA, ASLA, and APA crowd-sourced self-descriptions suggests the following unique “framed” identities: 1) global ASLA social media users (not AIA and APA users) describe themselves uniquely in terms of providing green solutions as a company or firm for residences; 2) global AIA social media users (not ASLA and APA users) describe themselves more uniquely in terms of
leadership, marketing, management, engineering, interiors and products; while 3) global APA social media users (not ASLA and AIA users) describe themselves more uniquely in terms of transportation, development, community, the university, policy, advocacy, the public and the environment.

4.4 Lexicographical Analysis within the Continental United States

Lexicographical analysis of AIA, ASLA and APA social media users, to this point, has suggested globally “framed” identities exhibiting both shared and unique characteristics. Given Hewitt, et al.’s identification of the numerous uniquely “framed” group identities within architecture, landscape architecture, and urban design at the global metropolitan level, initial review suggested that ASLA, AIA, and APA social media users would exhibit similarly unique “framed” identities at nation-state level in comparison to global ASLA AIA and APA users. Little evidence within the surveyed data, however, suggests such differing uniquely “framed” identities among US AIA, ASLA, and APA social media users. For example, AIA, ASLA and APA surveyed data from US self-descriptions are similar in proportion to the equivalent surveyed global data. Similarities between the three groups’s global and US “framed” identities are also evident, indicating higher rankings for sustainability in all three groups and lower student rankings in all three groups. Unique terms associated with US ASLA “framed” identities (not ASLA globally) include those related to ecology. Two unique terms associated of US AIA “framed” identities (not AIA globally) were technology and development. In general US APA “framed” identities show very little difference from global “framed” identities.

4.4 Geo-locational and Lexicographical Analysis for Sustainability in the United States

In light of Hewitt, et al.’s identification of the presence of uniquely “framed” social media identities in global metropolitan areas, and because of the scant evidence of such identities among total US AIA ASLA and APA social media users, ASLA data from subsets of the US social media users were analyzed at national and metropolitan area scales related to shared interests concerning sustainability (see Hewitt, 2011, and GENERALITIES above for background). The following maps and charts illustrate the geo-location and lexicographical analysis of ASLA social media users associated with sustainable terminology located throughout the US, as well as in the San Francisco Bay Area, the New York City Area, and the Chicago Area.

Figure 8 below illustrates the relative influence and location of 467 ASLA social media users associated with the sustainability in the continental United States. The map suggests that (unlike general global and US ASLA activity) ASLA social network activity related to sustainability is located in a wide range of small to large metropolitan areas. While the majority of US ASLA social media activity related to sustainability is located throughout the Midwest, the East and West Coasts (similar to general US ASLA activity), 15 states, largely in the Central and Mountain West US, have 2 or fewer users associated with sustainability. According to the corresponding three-dimensional bar chart, the vast majority (approximately 98.5%) of US ASLA social media users associated with sustainability count less than 200 followers. None count more than 300 followers (while some in the general US ASLA count as many as 3,000 followers).

According to the corresponding two-dimensional bar chart, lexicographical characteristics of US ASLA social media users associated with sustainability also vary significantly from those of the general US ASLA social media users. As illustrated in that chart, US ASLA social media users associated with sustainability overwhelmingly describe themselves as sustainable landscape architect designers, who are primarily urban, and who provide creative innovative services related to ecology, decoration, gardens, art and green building. They also describe themselves in terms of providing service related to the environment, planning, development, and economics in residential and community contexts. None are students.
4.4.1 Sustainable ASLA Social Media Activity in the SF Bay Area

Figure 9 below illustrates the relative influence and location of the 23 ASLA social media users associated with the sustainability in the greater SF Bay area. The map suggests that ASLA social network activity related to sustainability is primarily located in the urbanized portion of the greater metropolitan area. According to the corresponding three-dimensional bar chart, 100% of the SF Bay Area ASLA social media users associated with sustainability count less than 200 followers. All but 2 (approximately 91%) count 25 or less followers, and all but 4 (approximately 83%) count less than 10.

According to the corresponding two-dimensional bar chart, the lexicographical characteristics of SF Bay Area ASLA social media users associated with sustainability vary considerably from both US ASLA social media users in general and US ASLA social media users interested in sustainability,
especially in terms of their emphasis on plants, construction, food, social concern, restoration, management and place. As illustrated in the chart above, SF Bay Area ASLA social media users associated with sustainability describe themselves as sustainable landscape architect designers, generally less urban and more interested in plants than those in the US. They provide creative work related to ecology, gardens, construction, art and building. They also describe themselves as providing work related to the community, food, environment, restoration, management, and planning, in social and place-related contexts. None are students.

### 4.4.2 Sustainable ASLA Social Media Activity in the NY City Area

Figure 10 below illustrates the relative influence and location of the 25 ASLA social media users associated with sustainability in the greater New York City Area. The map suggests that NY City ASLA social network activity related to sustainability is primarily located in the urbanized portion of the greater metropolitan area. According to the corresponding three-dimensional bar chart, all but one (96%) of the NY City Area ASLA social media users associated with sustainability count less than 200 followers. 11 users (approximately 44%) count between 25 and 200 followers, and all but 4 of the remaining 52% of users count 20 or fewer.

![Figure 10. Relative influence and location of New York City ASLA social media user's Twitter accounts associated with sustainability and number of followers](image)

According to the corresponding two-dimensional bar chart, the lexicographical characteristics of NY City Area ASLA social media users associated with sustainability also vary considerably from their general and sustainable US ASLA counterparts in terms of their emphasis on plants, writing/editing, recognition, film, social concern, and interest in space. As illustrated above, NY City Area ASLA social media users associated with sustainability describe themselves as sustainable landscape architect designers, who are urban and more interested in plants than the general US ASLA social media users associated with sustainability. They provide creative services related to ecology, decoration, art, writing, editing and film. They describe themselves as recognized firms offering green services related to planning in social and place-related contexts. None are students.

### 4.4.3 Sustainable ASLA Social Media Activity in the Chicago Area

Figure 11 below illustrates the relative influence and location of the 19 ASLA social media users associated with sustainability in the greater Chicago Area. The map suggests that Chicago Area ASLA social media related to sustainability is located primarily in the urbanized portion of the greater metropolitan area. According to the corresponding three-dimensional bar chart, like NY all but one (approximately 95%) of the Chicago Area ASLA social media users associated with sustainability count
less than 200 followers. Eight users (approximately 41%) count between 25 and 200 followers. All but four of the remaining (55%) users count 20 or fewer followers.

According to the corresponding two-dimensional bar chart, the lexicographical characteristics of Chicago Area ASLA social media users associated with sustainability also vary significantly from their US ASLA counterparts in terms of their emphasis on management, marketing, construction, natural resources, business and associations, water and ponds. As illustrated in Figure 11 below, Chicago Area ASLA social media users associated with sustainability describe themselves as sustainable landscape architect designers, who are somewhat urban and more interested in natural resources than the general US ASLA social media users associated with sustainability. They provide services related to ecology, management, construction, marketing, environment, and the development of natural resources. They describe themselves as businesses and associations offering green services related to gardens, ponds, and water. None are students.

![Figure 11. Relative influence and location of Chicago ASLA social media user's Twitter accounts associated with sustainability and number of followers](image)

5 DISCUSSION

The paper has presented findings from social media-based analytics of geo-located groups of architects, landscape architects, and planners globally and throughout the United States that describe social identities and relationships consistent with Fiss and Hirsch, suggesting: 1) that worldwide and US AIA, ASLA, and APA twitter users represent relatively consistent but disproportionately sized social media user groups, 2) that are geographically dispersed globally and in the US primarily within larger metropolitan areas with relatively consistent continental distributions, differing largely in terms of the degree and extent of their representation within metropolitan areas, 3) that individual influence within the groups globally and within the US is overwhelmingly based on small social networks, and 4) that the social reach of the each group can be extensive (Fiss and Hirsch, 2006). While findings suggest shared “framed identities” among the AIA, ASLA and APA globally and in the US associated with the terms architecture, design, building, sustainability, professional services, urban contexts, and students, general US “framed” identities indicate higher rankings for sustainability in all three groups and lower student rankings in all three groups.

Identifiable unique “framed” social identities and relationships also consistent with Fiss and Hirsch, suggest: 1) that global ASLA social media users describe themselves more uniquely in terms of providing green solutions as a company or firm for residences; 2) that global AIA social media describe themselves more uniquely in terms of leadership, marketing, management, engineering, interiors and products; and 3) that global APA social media users describe themselves more uniquely in terms of transportation, development, community, the university, policy, advocacy, the public and the environment.
Unique terms associated with US ASLA “framed” identities address ecology. Unique US AIA “framed” identities included reference to technology and development. US APA “framed” identities, however, showed very little difference from global counterparts.

While both the global ASLA and general US ASLA users exhibited similar shared and unique identities (which are likely attributable to ASLA origins within the US) Hewitt et al’s work concerning differing unique landscape architecture social media identities associated with different global metropolitan areas appears consistent with findings related to sub categories of ASLA social media use related to sustainability (Hewitt et al., 2011). That work also appears consistent with study findings suggesting considerable variance in “framed” identities between ASLA social media users associated with sustainability in US metropolitan areas.

6 CONCLUSION
On its face, this paper offers worthwhile findings related to the establishment of baseline definitions and descriptions related to landscape architecture social media use, location, and self identity, especially in relation to associated design and planning groups. The paper however, also offers worthwhile findings that confirm and build upon previous research associated with landscape architecture, geo-location and identity, and particularly associated methodologies related to social media data analysis and lexicographical analysis. The continuation and publication of related research offers opportunities to landscape architecture programs in terms of professional development, curriculum development, pedagogy, site analysis, program marketing, and alumni surveys.

7 REFERENCES
THE ROLE OF VISUAL IMAGES IN THE PLANNING/DEVELOPMENT PROCESS FOR THREE WIND FARMS IN COLORADO: CASE STUDIES - TWO BUILT, ONE DENIED

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1 ABSTRACT
Visual images are used by developers to inform the public of the impact a proposed wind farm would have on the landscape and could mean the acceptance or rejection of a project. Today’s wind farm can easily consist of over 150 turbines with towers reaching over 300’ tall topped off with a whirling 250’ diameter pin wheel. Preliminary studies have shown that visual impact has been a source of contention in the development of wind farms internationally and in the United States (Ball 2009, Wizelius 2007). This paper compares the use of visual images within the development process of three wind farms in Colorado. The three projects represent early development (Colorado Green completed in 2003), recent construction (Cedar Creek 2006), and recently denied (Silver Mountain 2009). A telephone survey was conducted of county planners involved with each project and submission materials were reviewed. Requirements for approval varied in each county however visual images were used during public hearings and within general impact statements. The focus of this study is on the type of images actually used and the manner and circumstance in which they were presented. This paper is intended to help educators and those involved in wind farm development understand the most effective use of visual images in terms of timing and method within the approval process.

Currently there are more sophisticated 3D modeling software packages available than those used by the developers involved in this study.

1.1 Keywords
wind farms, visual impact, development process
2 BACKGROUND

2.1 International

The development of wind farms as a renewable energy source has been embraced as a viable alternative to carbon burning fuels throughout the world (GWEC, 2013). Preliminary studies have shown that one of the main areas where wind farms do encounter resistance internationally as well as in the United States is in regard to site selection primarily in terms of visual impact (Williams, 2007). It is noteworthy to look at this issue from an international perspective to consider the status of visual impact from a larger perspective (Mogen, 2009). In this way we may perhaps learn lessons from those who have tackled this issue before and judge the overall significance of the subject.

The Scottish Natural Heritage has been refining and updating their “Visual Representation of Wind Farms Good Practices Guidance” (2006) since 2002 and is considered one of the most comprehensive and a standard bearer in the field internationally. Scotland has also developed a country-wide priority method for site selection that has promoted wind development in an orderly and relatively smooth process in terms of public acceptance. This method includes visual impact along with many other attributes such as historic significance and wind speeds. In New Zealand, where there is a more case by case approval process, Visual Impact Assessment (VIA) Guidelines are currently being developed. Without recognized VIA standards typically every new wind farm that is proposed eventually goes to their “Environmental Court” for further review to settle disputes concerning visual and landscape impact. In the province of Ontario, Canada’s largest wind power producer, legislation was passed in 2008 to expedite the building of renewable energy sites by allowing opponents to wind farms sites to challenge only on environmental or safety grounds, and not for “aesthetic.” The basis cited for Ontario’s legislation was the lengthy delays wind farms were encountering due to local resistance created by fears of negative visual impact (Ball 2009). These are a few examples of the importance visual impact has in the review and approval process for wind farms internationally.

2.2 United States and Colorado

In recent years wind power in the United States has begun to develop in a manner approaching its true potential. In the 90’s and the early part of the first decade of the 21st century its development was sluggish at best. However, the United States installed capacity more than tripled between 2007 at 16,824 Megawatts (MW) to 51,630 MW by 2012 (AWEA, 2013). Until recently the United States was ranked first in global wind production however China has recently taken that position (GWEA, 2013). Wind power faced a severe obstacle to growth in 2012 because Congress did not renew the Production Tax Credit (PTC) for renewable energies until January of 2013 as part of the ‘fiscal cliff’ negotiations. This created an insecure business environment causing wind developers to stop plans for proposed projects in some cases as well as layoffs in turbine production facilities.

The United States has been considered a global leader in environmental assessment regulations because of the National Environmental Policy Act (NEPA) of 1969. This document sets forth the structure for what the modern day Environmental Impact Statement (EIS) would require such as adverse environmental effects, alternatives to proposed actions, consultation with other agencies and visual impact assessments, typically done by a landscape architect. However NEPA requirements are only enforced on federal lands. In general the main document for wind farm siting guidelines is “Permitting of Wind Energy Facilities,” prepared by the National Wind Coordinating Committee (NWCC, 2002). This is a useful handbook as an introduction to the process for permitting wind farms and is general in nature. It does discuss visual impact along with other permitting considerations such as noise and wildlife. The main visual considerations it highlights are spacing, lighting, roads and storage structures.

Some states in the United States have developed their own environmental protection regulations that incorporate the siting of energy facilities and vary significantly from state to state. Some states have siting boards authorized by legislation, others have state-level agencies that develop voluntary guidelines, and others require permits. Some of these requirements do not include visual standards, whereas others set strict requirements. In primarily rural and agricultural states in the central and mountain west region of the United States where wind speeds are some of the best in the country private properties are regulated at the local level, by governing bodies such as county commissioners and planning and zoning boards. Often in rural areas the land is zoned for agriculture uses and there can be few regulations. Thus in terms
of siting and visual assessments the requirements are extremely variable across the United States. This has also created a wide range of reactions and results from community to community.

Iowa, the second largest state in terms of built wind capacity at 4,536 MW is a rural/agricultural state and relies on city and county planning and zoning ordinances as the siting authority for wind farms. Massachusetts, a much more urban and densely populated state, has an independent state review board. The Massachusetts Energy Facilities Siting Board, along with a variety of state agencies that review any energy projects planned for over 100 MW of production. Massachusetts is the home of the first off-shore wind farm in the United States, Cape Wind off Cape Cod. It was delayed for years due to visual impact concerns. View sheds were one of many issues used to stop construction with lawsuits. A general 'lack of clear siting regulations’ is often cited as the reason for the Cape Wind project being taken to court. The issues were finally resolved at the federal level in 2010. Another example is Wabaunsee County Kansas where the County Commissioners imposed a ban on commercial wind farms (on private land) until concerns involving “rural character” and “undisturbed vistas” were resolved due to private citizen concerns.

Wind potential in Colorado is ranked 11th in the United States and far exceeds in-state needs. Installed capacity has grown from 22 (MW) in 1999 to 1,805 MW in 2011 (AWEA, 2013). The State of Colorado has declared that embracing renewable energies is a critical step in moving toward a stronger state economy and offering its citizens a healthier environment. Colorado increased their state wide Renewable Portfolio Standard (RPS) policy in 2010 calling for a goal of 30% of its energy to be supplied by renewable energy sources by 2020. To fulfill this goal the state created initiatives and incentive programs such as financial grants, the Wind for Schools program, and the anemometer loan program all of which have already begun to bear fruit. Wind farms are complementary to agricultural uses in Colorado due to their small footprint, low water use and historical familiarity. In general wind farms and their economic advantages have been welcomed in Colorado’s agricultural communities, far from population centers. However, as more renewable energy sources are needed closer to population and scenic areas, it becomes necessary to look more closely and to ask what role visual/landscape impact has on wind farm development.

3 CASE STUDIES

3.1 Introduction

A telephone survey was conducted of county planners involved with each project and submission materials were reviewed. Although requirements varied by county, visual images was used during public hearings and within general impact statements. Planners were asked the type of permit and the time required for the review process. It was established whether visual assessment studies were required or provided by the developer voluntarily. A summary of the number and type of meetings with county staff, the public and approving bodies such as Zoning Boards and County Commissioners was noted including the manner in which visual images were used. Planners also describe the community response to the images. Also recorded were other venues where images were available to the public such as printed materials and the internet. This helped to develop a fuller understanding for the use of images during the approval process.

3.2 Colorado Green Wind Power

The Colorado Green Wind Power Project (Colorado Green) was the first utility scale wind farm to be built in Colorado and came on line in 2003. It is located 30 miles south of Lamar in Powers County (population 13,400), southeastern Colorado. The ranchers and farmers in this area had been struggling with drought for many years before the idea of a wind farm was introduced to the community. The owners and developers of Colorado Green are Iberdrola Renewables and Shell Wind Energy. It was built and is operated by GE Energy. The wind farm consists of 108, 1.5 MW turbines which produces enough energy to serve approximately 52,000 homes. Each turbine is 389’ from the ground to the tip of the highest blade or about the height of a 30 story building. The project covers 11,840 acres of windswept ranchland and some dryland farming which includes 14 different landowners. The wind farm itself only uses 2% of the land area for the turbine foundations and roads leaving the remaining area for grazing or other uses.

In Powers County the land for the Colorado Green project is located in an area classified as a Non-Irrigated Agricultural District which required a Special Use Permit (SUP) to be reviewed by the
County Planning Commission before submission to the Board of County Commissioners. Prior to officially applying for the SUP the developers had conducted site visits, analyzing wind power potential and conferring with landowners in their homes for several years. At the time of application the developers followed the procedures and notice requirements in the “Prowers County Zoning Regulations” (2006). A visual impact study was not required however visual impact was voluntarily addressed as part of the submission package and at public hearings. The developers went beyond the minimum in terms of public information meetings by conducting more than were required. At these meetings they used large photographic images (approximately 36” x 48”) depicting the impact of the wind farm from various viewpoints such as roads that were most commonly used. The photographic images were also left on display in public places such as the County Building for the public to view at their leisure. From the survey and interviews conducted with the head of the Prowers County Lands Use Office, Mary Root, it seemed the community had responded well at the meetings with more concern directed at transmission line locations. It was reported that one landowner did express apprehension about the visual impact of the wind farm on a dude ranch he was thinking about developing however he never followed through with an official complaint. Ms. Root also made the comment that she thought the developers must be used to dealing with the California planning process and not Colorado in regards to the amount of visual images they provided the community.

As a result of the developer working with landowners and the community long before an official application was submitted, it appeared there was an initial positive reaction. Also, the willingness to meet and display the images by the developer was key in providing the community with a sense of comfort that they understood what the turbines would look like and that they were well informed. This is highlighted by the community’s reaction of uneasiness toward the transmission lines that were not discuss as thoroughly as the turbine locations prior to the official public meetings. Other points beyond visual imaging that were an integral part of the acceptance of the wind farm that are necessary to mention include economic impact. Powers County is in an area of Colorado that periodically suffers from drought conditions which in turn creates economic hardships on landowners and the community at large. According to John Stulp, one of the county commissions, Colorado Green increased the county’s tax base by more than 33%. And, individual landowners are able to lease the land the turbines stand on and can earn approximately $2,000 - 4,000 a month of passive income. From interviews and comments made by the planning staff it appears the community has become quite proud of their wind farm and would welcome an extension or other wind farms in the area. Another interesting by-product of the Colorado Green project was the opportunity the county of Powers and town of Lamar took by developing their own five turbine wind farm while Colorado Green was being built. The energy from this small wind farm is used to power schools and local government buildings. In summary it appears that using visual images as part of the public examination process was a significant tool for developers to use primarily to mollify community fears regarding the impact of 108 thirty-story tall structures would have on the landscape.
3.3 Cedar Creek Wind Farm

Cedar Creek Wind Farm is located eight miles east of Grover adjacent to Pawnee National Grasslands in Weld county (population 252,300), northeastern Colorado. Although the immediate surrounding area is made up of a vast grassland landscape the landowners are primarily ranchers with some dryland to irrigated farming. The county seat Greeley is approximately 75 miles to the southwest and has a significant population of 95,000. Cedar Creek was built in two phases. Phase one consisted of 221, 1 MW turbines reaching just over 300' from ground to top of blade and 53, 1.5 MW turbines at approximately 390' tall creating a 300.5 MW wind farm that could power roughly 81,000 homes. Phase II consist of 63, 1.6 MW turbines, total height 390' and 60, 2.5 MW turbines at 411' in height producing 250.8 MW in entirety. Phase I was built on 32,000 acres, Phase II on 30,000 acres and included several different landowners. The developer was BP Wind Energy and Infigen Energy with Infigen remaining as the operator. Phase I became operational in 2006, Phase II in 2009. For this article I will focus on Phase I of the Cedar Creek project because the most intensive scrutiny particularly in terms of visual impact and the approval process came with Phase I.

Cedar Creek is located in an area already occupied by a scattering of oil and gas wells long before a wind farm was conceived. However as mentioned, it borders the Pawnee National Grassland and most importantly Pawnee Buttes, probably the only landforms of any visual significance in the area and a prime area known for viewing birds. On the east side of the dirt road approaching Pawnee Buttes the buttes stubbornly squat on the rolling prairie and to the west are hundreds of wind turbines sited in arrays along the tops of ridges needed for optimal wind exposure. It is because of this proximity to Pawnee Buttes that I first became interested in the approval process for this wind farm. As a landscape architect and with the research I had done on wind farms internationally I was amazed there hadn’t been more controversy. Originally the developers had planned on putting part of Cedar Creek within the National Grassland borders but when they discovered the amount of NEPA as well as other regulations that were part of the federal approval process they soon decided to focus on private lands. In Weld County a SUP including a “Major Facility of Public Interest” was required for approval by the County Commissioners. A visual impact statement was not required and only a partial environmental impact statement was needed for the permitting process. However, the developers went ahead and prepared visual impact assessments and did remove some turbines during staff meetings with planners and public works personal. They also used the visual images in power point presentations at several area resident meetings, open house exhibits, and public hearings. The developers also produced several pamphlets, brochures and booklets that described a variety of issues such as an overview of the workings of wind energy, expected timelines,
wildlife considerations and visual impact was included with images. This printed information was easily accessible to the public and on the internet. (BP Alternative Energy, 2008)

Again we see the developer’s decision to do more than was required, created a sense of security and transparency that helped immensely with public as well as county staff acceptance. While interviewing Chris Gathman the county planner in charge of the Cedar Creek project, he said he did not record one complaint or sign of animosity toward the wind farm in relation to visual impact and felt the power point presentations with images depicting the landscape with turbines in place was the main reason for this. The most controversial facet of concern that emerged from public meetings was the potential disturbance the turbines would have on wildlife. This is substantiated by recent research I have done looking into post construction comments (after Phase II) in public outlets such as area newspapers and websites where I consistently found concerns voiced about wildlife and only the occasional comment on the visual aspect. It is interesting to note that the concerns articulated are typically travelers from outside the area or those that have a historical memory of the area for example; they passed this landscape as a kid going to Grandma’s house and the turbines are ugly. The economic impact is also similar to what was found for the Colorado Green project area. Another interesting yet shocking addition to the landscape I saw during my last visit to Cedar Creek is the amount of fracking wells that are being developed in the same general area. Overall it appears that the developer’s commitment to introducing a wind farm project to the public with plenty of images accessible in a variety of forms allayed community concerns in terms of visual impact.

3.4 Silver Mountain Wind Farm

The proposed Silver Mountain Wind Farm was to be located in Huerfano County (population 8,100), near the town of LaVeta (population 780), 160 miles south of Denver, Colorado. Interstate 25 (I-25) runs through this area at the foot of the Rocky Mountains and more specifically to the project area where Highway 160 travels west into the Sangre de Cristo Mountains. The landscape consists of rolling grasslands and ranching to the east of I-25 and dramatic mountain vistas to the west where the town of LaVeta is supported by tourist trade and a strong artist community. Highway 160 is also a County designated Scenic Conservation Zone. The wind farm was to have an energy output of 150 MW, consisting of 50-100 turbines, maximum height of 450’ on a site of 7,000 acres. There was only one non-resident landowner involved. A General Land Development - Conditional Use Permit was required and a visual assessment study was requested although not mandatory by county planners. The developer was Renewable Energy Systems Inc., with Walsh Environmental Services preparing the Prefeasibility Study for land use and CH2M Hill was preparing the visual assessment studies.

Before Silver Mountain was introduced to the Huerfano planning department, the county had already established “preferred areas” for wind farms. The basic principle for the preferred areas designated land on the east side of I-25 as appropriate for wind farm development and land on the west was not. When the developer made initial contact with the county planning staff they were receptive and even willing discussed land options that might include moving the small local airport. However, when the preliminary application was submitted the developer chose to go with a parcel of land on the west side of I-25 where the wind speeds were best in the area. In the application packet visual resources were highlighted in the Environmental Analysis and Mitigation sections. (Walsh, 2009) However, it was stated that the visual impact analysis was in a preliminary stage. The developer did express mitigation in terms of removing turbines that infringed on views for neighboring landowners and confirmed they were willing to do so. There was an “Open House” for the public where “D” size images were used and a public hearing where power point images were presented. The negative public response was quite raucous particularly from the town of LaVeta where they felt the wind farm would detract from natural scenic beauty of the area and reduce tourist traffic their main economic driver.

In November, 2009 the Huerfano County Board of Commissioners denied the Silver Mountain Wind Farm and requested that the Applicant not proceed to the final application stage. The Board had a variety of criteria stated for denial however visual impact was acknowledged boldly in the introductory remarks of their resolution.

“One resource that is mentioned repeatedly in the land use guide is the natural beauty of the County. To preserve that resource, the Board recently identified a “Preferred Wind Area.” However, this Preliminary Application does not conform either to the land use guide’s goal
of preservation of scenic resources or the identified Preferred Wind Area.” (Huerfano County. Resolution No. 27, 2009)

After the denial of Silver Mountain, Huerfano County placed a moratorium on all wind farm applications until the county could strengthen their land use guidelines in relationship to wind farms. To my knowledge this was a first in Colorado for a utility scale wind farm. Perhaps the developers tried to move too fast without the time needed to prepare the community and present the completed visual analysis and subsequent information and images. Or the fact that they were working with only one nonresidential landowner may have narrowed the beneficial economic impact thus reducing the incentive for the entire community. A similar problem was encountered during the planning process for an Iowa wind farm and after discussions with community members the developers expanding the leasing agreements to include not only those who owned the land where the turbines were to stand but also to landowners that could see the turbines. Another thought is that the developers didn’t present or consider any alternate perceptions. For example using the wind farm as another attraction, as is done in Germany by creating wind parks where educational nodes, bicycle paths and other recreational uses are incorporated into the design of wind farms is encouraged. Overall this developer may simply have needed to give more thought and consideration toward the existing land use codes and realized even more importantly that the local natural landscape beauty was simply too valuable to risk for this community.

4 CONCLUSION

In comparing the importance of visual images in relation to the approval process for the three case studies presented first some general characteristics will be discussed followed by more specific patterns that emerged. Weld County the home of Cedar Creek has a much larger population (252,300) and a more extensive planning office which could infer more sophisticated requirements than the two smaller counties. However, Huerfano County with a much smaller population (8,100) required more from the developers during the approval process in terms of visual analysis. Cedar Creek and Silver Mountain were both located near areas of scenic significance in their respective regions. Pawnee National Grasslands which contains Pawnee Buttes in Weld County is relatively comparable to Silver Mountain located at the foot of the Rocky Mountains. However, the community in Huerfano County considered the preservation of the scenic resources vital to the overall economic health of the area than was found in Weld County. Also, the pre-existing presences of oil rigs in Weld County points to a community that views the landscape first as a working economic resource as opposed to a scenic economic resource. In general economic terms the wind farms benefited much larger groups of people in the cases of Cedar Creek and Colorado Green than the sole nonresidential landowner at the Silver Mountain site.

In comparing the specific use of visual images it became clear that the developers that went beyond the minimal requirements requested by the local planning bodies were successful with their applications. It seemed the method of presentation or type of images whether they were large hard copy type photographs, brochures size or power point presentations didn’t seem to matter as much as amount of access the public had to the images. The images were left on display in libraries and other public building for the public to peruse. Also, the successful developers spent several years prior to their applications holding public meetings and spending time with individuals in the community. In all three cases the county planners involved with each specific wind farm said the visual images were invaluable tools in creating a sense of transparency or not and a feeling of trust or mistrust toward the developers from the community.

5 REFERENCES


Huerfano County, Resolution No. 27. (2009). A resolution of the board of county commissioners of Huerfano County, Colorado, denying the preliminary 1041 and conditional use permit application for the Silver Mountain wind farm.


DESIGN EDUCATION AND PEDAGOGY

Edited by Terry Clements
INTERSECTING SELF-REFLECTION AND SKILL DEVELOPMENT IN LANDSCAPE ARCHITECTURE PEDAGOGY

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1 ABSTRACT

Current landscape architecture education seeks to equip students with know-how and confidence in designing landscapes with a primary focus to make students “work ready” (Dee, 2010; Steinitz, 1990). Although this pedagogical approach is important, it emphasizes an exterior world of form, function, aesthetics and environment with little attention towards enabling students to acquire abstract knowledge of “how best to design” (Murphy, 2005, 35). This paper investigates one approach towards synthesis and evaluation learning (Anderson, 2001) of personal values through cultural landscape theory and graphic design. To determine the lessons effectiveness, data were compiled from students’ surveys, in-class critiques and class evaluations. Results suggest students cultivated deeper self-awareness, gained greater sensitivity of classmate viewpoints, and expanded their theoretical and technical knowledge. These findings illustrate self-reflective pedagogic method has potential to enrich design courses with higher cognitive learning.

1.1 Keywords
social constructivism, values, cultural landscape, education
2 INTRODUCTION

2.1 Self-Reflective Design Practicum

"An unexamined life is not worth living."
_In the words attributed to Socrates in Plato's Apology_ (Baggini, 2005)

When considering the social, environmental and economic impacts design and planning have on our communities it is increasingly important ‘work-ready graduates’ enter employment equipped with a holistic skill set to successfully navigate society’s change. Recently scholars and practitioners in landscape architecture have suggested value exploration useful to develop more “reflective practitioners” (Chase, 2012; Gallo, 2012; Lawson, 2010). According to the 2004 Landscape Architecture Body of Knowledge Study Report 72.55% of respondents indicated social responsibility in design should be a part of the accredited undergraduate education and 39.2% of respondents thought students should have the ability to determine a user’s point of view or values (ASLA, 2004). Yet, as Terry Clements illustrated in her paper titled “What We Are Doing Today: A Snapshot of Scholarship In Design Education and Pedagogy,” only 10.9% of pedagogy research at the Council of Educators in Landscape Architecture 2010 conference touched on the theme “Cultural and Social Issues” with scant few assessing students’ personal values (Clements, 2010). Clearly our current pedagogy is directed more towards skill development in design studio instruction rather than philosophical self-awareness. This condition raises a question of our role as landscape architecture educators in universities, do we focus on providing knowledge and skill areas similar to vocational training or do we also have a responsibility to educate our society in humanistic knowledge?

Considering ethical theory stems from humanistic awareness and that by focusing education on the “common core of the profession” (ASLA, 2004, p.1) educators may inadvertently stifle students’ awareness of opportunities in a time when the average person expects to change careers “three times in their lifetimes” (Alboher, 2007), this study engages the pedagogical discussion by proposing an educational redirect towards a model incorporating philosophical self-awareness. This approach encourages students to evaluate their role as interpreter and synthesizer of place and helps them understand how personal and cultural motivations may ultimately effect landscape design and development decisions. Since past pedagogy scholarship recognizes the difficulty for landscape architectural education to “reconcile the conflicting demands of two bosses: professional practice and academic practice” (Clements, 2010; Lawson, 2010), this research is directed for betterment of landscape architecture education by developing an accretive instructional bridge, whereby students gain both self-awareness and design knowledge by converting their personal contemplation of theoretical reading (implicit knowledge) to physical visual design (explicit knowledge). This paper begins by describing the research methodology and instructional approach, then discusses the students’ surveys and concludes with an assessment of the teaching effectiveness.

3 METHODOLOGY

3.1 Framing the View

The class assignment’s accretive structure assumed the importance of a broader education and sought to assist students’ in “developing their own persona” (Clements, 2010, p.7) with the total interactions between students and teacher considered part of the learning process. This approach allowed students to internalize, construct and reconstruct ideas, beliefs, personal concepts, and generalizations within the broader social context of their classroom (Lawson, 2010) and also enabled students to move beyond subjective self-reflective aesthetics common in studio settings (Schön, 1987).

The learning objectives focused on students contextualizing their values (Walliss and Greig, 2009) in cultural landscape theory while engaging their cognitive process (Anderson, 2001) by encountering a new type of visual design problem, an interpretive graphic. Similar to collage, photomontage, or ideogram, an “interpretive graphic,” as defined for the purposes of this study, means a graphic that communicates personal values inscribed in a cultural landscape. To accomplish the learning objectives in an appropriate manner for various groups of learners, the assignment allowed for an adaptive process of alternative constructions (Daniels, 2001) with the goal upon completion students would 1) communicate a visual representation of their philosophical views of Montana’s cultural landscape, a place relevant to Montana
State University students, 2) gain awareness of alternative viewpoints, and 3) enhance their technical understanding of the design process.

3.2 Lesson Structure: Cultural Landscape Theory & Graphic

The studio assignment had two requirements: First, *The Cultural Landscape* component grounded the project in reflective theory. Lecture and reading centered on interpreting D.W. Meinig's *The Beholding Eye: Ten Versions of the Same Scene* where he discusses the difficulty of communicating the meaning of "landscape" (Meinig, 1979). This literature introduced students to a common language used to describe the essence of a scene, in other words what we are likely to see when we "look out upon that variegated scene" (Meinig, 1979, p.33): *Nature, Habitat, Artifact, System, Problem, Wealth, Ideology, History, Place,* and *Aesthetic*. Students were required to select the "views" representing their values towards Montana’s landscape.

Second, based on the reading, students created a visual and written interpretation of their personal views. For *The Presentation Graphic* students created a 6’x6’ graphic, an appropriate scale for permanent installation in the studio classroom, printed at a scale of 3”=1’-0” to fit on an ARCH D plotted page for presentation purposes. This size conformity allowed for better cross-comparison of work during critiques and challenged students with design restrictions. Graphic expectation examples included environmental and signage graphics from Communication Arts magazines and students were free to work in a variety of media and/or computer programs. The assignment also required students include a separate written concept, *The Information Content*, in which they described the meaning of their graphic, thus creating a reasoning textual body.

The assignment was one week in duration and designed as a competition with the strongest submission installed as a permanent wall-wrap in the students’ studio space. At the presentation critique guests were provided with the assignments learning objectives and requirements. Presentations and critiques were limited to ten minutes per student. Discussions were open-ended format, but in general conversation focused on development of visual voice, design elements and principles. Upon completion of presentation students posted their work for a vote of the three strongest conceptual and technical designs. Important to note grades and in-class critiques were not meant as a judgment upon students’ belief system rather the focus was on effective graphic representations of readings and self-reflection.

3.3 The Survey Assessment: Design, Collection and Analysis

Methods to assess validity in the pedagogical approach include three data collection techniques: (1) An IRB reviewed survey administered through SurveyMonkey, (2) written recording of in-class jury critiques, and 3) end of the semester students’ in-class evaluation feedback.

Students were asked to participate in an anonymous, voluntary survey consisting of 18 questions with the opportunity to write additional information. The questionnaire assessment recorded a purposive sampling representing landscape design students enrolled in three required studio courses in an unaccredited landscape design program at Montana State University: two upper-division classes, senior design (HORT 432) and planting design (HORT 331), and one lower division landscape graphics class (HORT 226). The sample consisted of 24 undergraduate students, with a 75% response rate (n=21.) This sample size was determined adequate as participants represented a stratified sample of Montana State University landscape design students, based on year in school and gender (LeCompte, Millroy and Preissle, 1992). In all courses, students were primarily landscape design majors.

Survey questions were design to evaluate the assignments applicability in a class setting and its effectiveness in building students’ theoretical and technical skills. These evaluations were essential to position the assignments success in meeting learning goals as well as incidental learning and skill development. The survey data results were summed and compared with cross tabulations to uncover similarities and differences among participants’ responses (Merriam, 1998). Findings were organized into statistical tables based on students’ answers and the resulting information was then correlated with jury feedback and class evaluations.

4 RESULTS & DISCUSSION

A large majority of students responded the assignment offered an opportunity to learn and synthesize new information while communicating their knowledge to peers, suggesting the assignment
accomplished the goal of integrated learning (Figure 1 & 2). As one student commented, "I thought it made you think abstractly, which is good." The results also showed the lesson helped students consider alternative viewpoints in critique, while strengthening their skills in design process. Critique participants remarked the students’ work communicated thoughtful, self-reflective compositions, and that the reading improved students’ articulation.

Results indicated a large majority of students reported a meaningful and enjoyable learning experience from the assignment (Table 1 and 4). Although this assignment was incorporated into different types of studio classes most students responded the reading and lecture relevant and understandable in their class subject (Table 1), indicating this pedagogical approach would be useful in a variety of landscape architecture classes. The majority of students answered they did not have previous exposure to cultural landscape theory, yet upon assignment completion a majority responded an increase in their theoretical knowledge (Table 1). A majority of students (47.6%) identified Montana's landscape with Nature. Wealth, History and Place and selected to a lesser extent Habitat, System, Problem, Aesthetic and Ideology, only one student selected Artifact (Table 2). This suggests students were clear in their self-reflective selection of personal values manifested in landscape. A minority of students responded they thought the assigned reading stereotyped views (Table 4); however only one student commented an additional possible viewpoint. Although this study did not correlate students' personal values relative to their permanent resident state, the research raises an interesting consideration worthy of future investigation: how students’ values differ between University settings. For example since Montana State University is a rural campus within a large natural setting, how might regionalism influence students' values towards landscape? In this study 52.4% of students were non-resident with a majority from the Northeast, West Coast, and Colorado; and a majority of students chose Nature as a value. Furthermore a significant majority of students did not think their viewpoint of Montana's landscape would change after completion of working through the project (Table 1), which may indicate students do not think their values change or evolve; however, 52.3% of students thought their viewpoints would change if they evaluated a landscape other than Montana's (Table 4), thus indicating some philosophical awareness of shifting perceptions in alternate landscapes.

Although the students were allowed a week to complete the assignment the majority indicated the allotted time still challenged their ability to synthesize personal viewpoint into design elements and principles (Table 1). Predominately students articulated the use of Color and Balance in their compositions, followed by Line, Form, Rhythm and Texture (Table 3), indicating they had absorbed additional design theory as a part of the assignment. A majority of students answered they thought the assignment helped their design and graphic ability, suggesting the balance between theory and skill challenged their development as designers. As one student responded it "helps launch your potential design concept, a jumping point for ideas." To accomplish the design students used a mixture of hand and Adobe Suite computer programs and as one student commented “The use of Photoshop and Illustrator was a great intro and really made me figure the programs out.” Thus suggesting the effort to communicate their personal values compelled students to enhance their technical skill.

The results showed a significant majority of students preferred the Graphic Project and/or Studio Project as a method for exposure to theory; students responded as less desirable, yet acceptable alternatives PowerPoint Presentation and Essay, and a large majority indicated Quizzes and Tests as least preferred pedagogical approach (Table 5). This is unsurprising as students today are particularly keen to internalize/personalize their learning experience with hands-on activity typical in constructivist methodology. A large majority of students indicated Design & Planning as most important in their education, followed by Plant Knowledge, and Computer/Hand Graphics. The desire for strong plant knowledge may be an anomaly to Montana State's University Landscape Design program, since it resides within an Environmental Horticulture degree and many students enter and remain in the program due to strong interest in Horticulture and Plant Sciences. Students responded as least important in their design education Presentation Skills, Construction Techniques, and Theoretical/Historical. This suggests that although students indicated enjoyment in the interpretive graphic lesson they still did not deem or connect Theoretical/Historical knowledge as important in their educational development, even upon completion of the project. This may be due to this project representing their first encounter with cultural landscape theory and may further indicate the need for repetition through subsequent projects to establish the worth and weight of value exploration and theory. For example, results clearly indicated students have a strong desire for “hands-on application,” which may suggest reapplying cultural landscape theory and self-
awareness throughout experienced based, service learning curriculum may positively influence students’ interest in humanism.

Finally, a large majority of students responded they enjoyed the wall-wrap competition (Table 1) or as one student commented “working towards a goal,” indicating students felt competition an additional motivator beyond project grade. However, this approach could prove difficult in a large lecture class due to class size and individual graphic ability. One possible remedy may be to negate the wall wrap installation and allow students to explore alternative communicative means such as hand-construction, film, 3-dimension modeling or photography. This approach would in-turn address one student comment that the assignment could be improved if left “more open-ended.”
### Table 1. Student Responses: Yes/No question quantitative results

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>Neutral</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1: Consent Form</td>
<td>N</td>
<td>21</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100.0</td>
<td>n/a</td>
</tr>
<tr>
<td>Q2: Prior to this assignment, did you have previous experience in cultural landscape theory?</td>
<td>N</td>
<td>8</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>38.1</td>
<td>n/a</td>
</tr>
<tr>
<td>Q3: Did you find the “placemaking” project relevant to the class subject?</td>
<td>N</td>
<td>21</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100.0</td>
<td>n/a</td>
</tr>
<tr>
<td>Q4a: Was the reading material relevant?</td>
<td>N</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Q4b: Was the reading material understandable?</td>
<td>N</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>71.4</td>
<td>28.6</td>
</tr>
<tr>
<td>Q5a: Was the lecture relevant?</td>
<td>N</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Q5b: Was the lecture understandable?</td>
<td>N</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Q7: If you re-created your project today would your “viewpoint” choices change?</td>
<td>N</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>9.5</td>
<td>90.5</td>
</tr>
<tr>
<td>Q11: Did the assignment allow enough time to complete the requirements?</td>
<td>N</td>
<td>21</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100.0</td>
<td>n/a</td>
</tr>
<tr>
<td>Q12: Is 50 possible points appropriate for this project?</td>
<td>N</td>
<td>21</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100.0</td>
<td>n/a</td>
</tr>
<tr>
<td>Q14: Did the “placemaking” assignment increase your knowledge in theory.</td>
<td>N</td>
<td>21</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100.0</td>
<td>n/a</td>
</tr>
<tr>
<td>Q16: Did you like the wall-wrap installation as a project goal?</td>
<td>N</td>
<td>21</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100.0</td>
<td>n/a</td>
</tr>
</tbody>
</table>
### Table 2. Student Responses:
Viewpoint question quantitative results

Q6: Which “viewpoints” from D.W. Meinig’s “Beholding Eye” did you use in your composition to describe Montana’s cultural landscape? Please select all options that apply to you.

<table>
<thead>
<tr>
<th>Nature</th>
<th>Habitat</th>
<th>Artifact</th>
<th>System</th>
<th>Problem</th>
<th>Wealth</th>
<th>Ideology</th>
<th>History</th>
<th>Place</th>
<th>Aesthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>%</td>
<td>47.6</td>
<td>14.3</td>
<td>4.8</td>
<td>14.3</td>
<td>19.0</td>
<td>33.3</td>
<td>23.8</td>
<td>23.8</td>
<td>28.6</td>
</tr>
</tbody>
</table>

### Table 3. Student Responses:
Design theory question quantitative results

Q9: Which design elements and principles were most important in your final composition? Please select all options that apply to you.

<table>
<thead>
<tr>
<th>Line</th>
<th>Color</th>
<th>Texture</th>
<th>Form</th>
<th>Space</th>
<th>Balance</th>
<th>Repetition</th>
<th>Rhythm</th>
<th>All of the above</th>
<th>I don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>8</td>
<td>18</td>
<td>9</td>
<td>5</td>
<td>10</td>
<td>14</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>38.1</td>
<td>85.7</td>
<td>42.9</td>
<td>23.8</td>
<td>47.6</td>
<td>66.7</td>
<td>9.5</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Q8: Would your &quot;viewpoint&quot; choices change if the landscape was someplace other than Montana?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N 0 1 9 7 4</td>
<td>% 0.0 4.8 42.9 33.3 19.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q10: Please answer the following about the &quot;placemaking&quot; assignment.</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>It was fun</em> N 0 0 0 8 13</td>
</tr>
<tr>
<td><em>It was technically challenging</em> N 0 0 2 12 7</td>
</tr>
<tr>
<td><em>I learned about myself</em> N 0 0 1 13 7</td>
</tr>
<tr>
<td><em>I learned about other students in class</em> N 0 0 4 12 5</td>
</tr>
<tr>
<td><em>It stereotyped my viewpoint</em> N 1 2 12 5 1</td>
</tr>
<tr>
<td><em>I think there are more &quot;viewpoints&quot; than listed in the reading</em> N 0 0 11 8 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q13: After completing the &quot;placemaking&quot; assignment do you feel...</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>more confident in your conceptual design skills</em> N 0 0 2 15 4</td>
</tr>
<tr>
<td><em>more confident in your graphics skills</em> N 0 0 5 8 8</td>
</tr>
<tr>
<td><em>more confident in presenting your designs</em> N 0 0 10 8 3</td>
</tr>
<tr>
<td><em>more aware of others viewpoint</em> N 0 0 2 15 4</td>
</tr>
</tbody>
</table>
Table 5. Student Responses: ranked preference quantitative results

<table>
<thead>
<tr>
<th>Q15: To learn theory which assignment type would you prefer? Please rank the items from 1 to 6, with 1 being most desirable.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Included in a studio project</strong></td>
</tr>
<tr>
<td><strong>Graphic project (our assignment)</strong></td>
</tr>
<tr>
<td><strong>Test</strong></td>
</tr>
<tr>
<td><strong>Series of quizzes</strong></td>
</tr>
<tr>
<td><strong>Essay</strong></td>
</tr>
<tr>
<td><strong>PowerPoint Presentation</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q17: What is most important to you in your design education? Please rank the items from 1 to 6, with 1 being most important.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>design &amp; planning</strong></td>
</tr>
<tr>
<td><strong>plant knowledge</strong></td>
</tr>
<tr>
<td><strong>presentation skills</strong></td>
</tr>
<tr>
<td><strong>theoretical/historical knowledge</strong></td>
</tr>
<tr>
<td><strong>computer/hand graphics</strong></td>
</tr>
<tr>
<td><strong>construction techniques</strong></td>
</tr>
</tbody>
</table>
5 CONCLUSIONS
The results of this study confirm the positive aspects of teaching a hybrid of theory and professional skill development; and the instructional method provides a transformative framework for students to develop their theoretical and technical ability in a more nuanced, self-reflective application. Similar to medicine prescribed with candy the interpretive graphic provides a means for students to metabolize theory in a self-revelatory experience with a concrete visual result. Furthermore, the research findings suggest value investigation in landscape architecture education is worthy of additional academic attention. Teaching students to critically examine and reflect upon their fundamental beliefs will help progress landscape architecture education to a balance of competencies and knowledge while also educating our society in philosophical awareness.

6 REFERENCES
ECOLOGICAL DESIGN | DESIGN ECOLOGY: INTEGRATING SYSTEMS THINKING INTO EARLY DESIGN EDUCATION

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1 ABSTRACT
As a professionally-oriented discipline, education in landscape architecture requires a curriculum with the fundamental capacity to both teach the skills necessary to operate within the contemporary expectations of practice while expanding the nebulous intellectual boundaries of the discipline. Emerging pedagogical frameworks in education are shifting to a more systems-based approach focusing on the recognition of relationships and functional processes of engagement over the need to identify specific and static solutions or responses. While Landscape Architecture programs may already incorporate systems-based pedagogy in their design curriculum, the scope of literature available for how this is done is relatively limited. In this paper, we present our approach to a systems-based design education through two related courses, a studio and lecture that introduce basic ecological principles and integrate them with the design process in the initial year of Landscape Architecture studies at the University of Washington. The application of this framework has had mixed results. We find students have difficulty with: 1) comprehending the complexity of core ecological concepts and their spatial relevance; 2) incorporating the temporal aspects of biophysical processes and focusing on the sometimes intangible qualities of relationship-building reduces students’ capacity for form-making; and, (3) a linear approach to narrative representation of design proposals doesn’t capture or express the multidimensional interactions inherent in ecological systems and in the design process.

1.1 Keywords
design education, studio, systems thinking, pedagogy
INTRODUCTION

As a professionally-oriented discipline, education in landscape architecture requires a curriculum with the fundamental capacity to both teach the skills necessary to operate within the contemporary expectations of practice while expanding the nebulous intellectual boundaries of the discipline. To meet these requirements necessitates that education programs continually assess curriculum structure and content, and adapt to changing needs (Schön, 1985). A primary component of this assessment is the evaluation of the pedagogical frameworks, tools, and processes used in the delivery of knowledge to initiate and expand learning potential.

It has long been acknowledged within the design and planning disciplines that a structured hierarchical and linear approach to delivering information, such as with a strict lecture format, does not adequately facilitate the learning process or engage in professional skills development (Schön, 1985). Used as a pedagogical tool for decades, studio (or workshop) courses provide an opportunity for process-oriented and applied learning (Higgins et al., 2009; Frank, 2006). The studio is a relatively rare pedagogical approach in university environments, but is particularly powerful in teaching students to identify, assess, and generate solutions for complex problems (Tasker et al., 2011; Boyer and Mitgang, 1996). It offers the opportunity to build disciplinary vocabulary and learn new technical skills while introducing a practitioner’s perspective in its approach to addressing complex topics (Ledewitz, 1985). The studio classroom is a place where students learn by doing, a venue for hands-on learning that requires an active role engaging with and incorporating distinct components of the curriculum into a comprehensive project (Ochsner, 2000). It provides the venue to focus on learning activities that exemplify an epistemology of “knowing-in-action” (Schön, 1983), ideally transforming the divide between idea generation and application in the design process.

Yet the methods for how learning is accomplished in studio can vary greatly. An emerging call from educators and practitioners in the design disciplines has sought to reevaluate a pedagogy that supports only an individual’s autonomous creativity and productivity and instead seeks to conduct studio courses as an open-source experiment in which value is produced through the collaborative processes of research and design in an attempt challenge conventional practice within the fields (Steele, 2004; Milburn and Brown, 2003; Boyer and Mitgang, 1996). This approach aligns with broader transitions within education that are shifting to a more systems-based approach focusing on the recognition of relationships and functional processes of engagement over the need to identify specific and static solutions or responses (Tasker et al., 2011).

While Landscape Architecture programs may already actively incorporate systems-based pedagogy in their design curriculum, the scope of literature available for how this is done is relatively limited (Tasker et al., 2011; Ahern, 2002; Poole et al., 2002; Tamminga et al., 2002). In this paper, we describe our approach to systems-based education through two related courses, a studio and lecture that introduce basic ecological principles and integrate them with the design process in the initial year of Landscape Architecture studies at the University of Washington.

2.1 Systems-Thinking in Design Education

Over the past several decades many of the basic principles and theories upon which the ecological sciences were founded have shifted, instigating an extensive reevaluation of the field. As Kristina Hill describes it, “Recent work in the ecological sciences seeks to envision landscapes as composed of shifting nodes of interaction, driven by dynamic temporal relationships rather than deterministic trends” (2005, p.131). Instead of viewing ecosystems as autonomous, deterministically marching toward an operational equilibrium, ecologists now view them as dynamic, in constant flux, and influenced by contextual conditions in both time and space (Pulliam and Johnson, 2002). These shifts in understanding have forced the design and planning professions to more fully understand and engage with the ecological systems that compose and maintain the sites and regions where work is being accomplished. In many ways the professions have responded by taking a proactive rather than reactive stance, understanding sites as productive, living systems and in some instances generating designs that improve upon ecological functionality, and are adaptive and resilient to shifting conditions (Amidon, 2008).

Following these advancements in practice, design education is also evolving to accommodate a more holistic, systems-thinking approach for understanding landscapes. Physicist and systems theorist Fritjof Capra describes, “...a new way of seeing the world and of thinking—in terms of relationships,
connectedness, and context—that goes against the grain of traditional Western science and education" (2005, p.20). In his proposed framework, he argues for a focus on these intangibles, where "ecosystems or human systems, are characterized by sets, or networks, of relationships" (2005, p.20). His approach urges students and educators to view the landscape systemically, not as parts in isolation but through interactions, and that design must cross scales and embody change.

The core concepts that emerge are that “healthy” systems are adaptive and resilient to changing conditions, and that to understand systems we need to focus less on the physical components and more fully on the relationships and patterns that form cohesion and support function within the system. Walker and Salt (2006) argue that a fundamental tenet for comprehending such an approach to education is to embrace an understanding that people, their ideas and actions, are not distinct from their surroundings, but active agents in system processes. “We all live and operate in social systems that are inextricably linked with the ecological systems in which they are embedded; we exist in within social-ecological systems. [...] It is not possible to meaningfully understand the dynamics of one of the domains in isolation from the other.” (p.31).

To shift from a theoretical framework to a practical approach in design education we argue that systems-thinking in design needs to arise from a synchronization of the concepts, tools, and methodologies currently used in design education. According to the Jack Ahern and colleagues (2002) a primary strategy for effectively integrating ecological and systems-based thinking into design curricula is to “show explicitly that ecological concepts apply at all scales and incorporate projects that demonstrate shifting scales of design and planning” (p.382). Systems-thinking in design education becomes focused on ‘how’ and ‘why’ something works. Instead of characterizing the design process as a bounded, linear progression, it must be understood as iterative and responsive in a way that blurs boundaries between what may be right and what is most certainly wrong. This ambiguity inheres the design process, where inspiration and creativity coupled with contextual conditions, unanticipated findings, and design objectives drive direction.

What emerges is a pedagogical structure for establishing effective methods in teaching and learning about landscape conditions through a systems-oriented framework that is open, reflective, and responsive, yet directed toward conceptualizing and defining operational perspectives as opposed to static solutions. Kathy Poole and colleagues (2002) argue that to apply this framework within the design studio the focus should be on the functional potential of the design rather than the aesthetic. “The important matter is not that the project “looks” ecological but that it addresses the dynamics of the landscape of which the project is a part—of both the landscape’s processes and its forms” (p.420).

In early design education, visions, values, and a philosophical perspective prioritize a conceptual understanding of design process along with a formalized design solution. We have sought to apply such a systems-thinking approach to introducing students to the general topic of ecologically-based design. Similar to the distinctions between ecological restoration and restoration ecology, we define ecological design through a skills-based, practice orientation that responds to contemporary ecological conditions while improving upon the capacity for those systems to respond dynamically to changes over time (Rottle and Yocom, 2011). Design ecology is the research that assists in determining the performance capacity of ecological design proposals and a pedagogical framework for engaging students in an inquisitive and query based approach to learning that requires them to conceptually understand socio-ecological systems to a depth that enables the assessment of site conditions and the generation of alternative solutions for improving the process.

3  CASE STUDY

The first year of the three-year program in Landscape Architecture at the University of Washington is framed upon a foundational approach to design education that introduces undergraduate and graduate students to the type, breadth, and quality of work done by landscape architectural professionals, as well as the tools necessary to become a viable candidate for employment within the field upon graduation. Split into three terms (10 – 11 week Quarter system) the first introduces students to basic design concepts, design process, and focuses on developing technical representation skills by hand. The second term builds on the first introducing contextual and systems thinking into design by addressing highly urban conditions. The related technical skills introduced include basic digital research and representation programs commonly used in the field. The third term that we focus on in this case study, seeks to build upon and integrate the concepts, processes, and skills taught in the previous two quarters.
The curriculum in this term centers upon two classes; a lecture/seminar and studio course. To facilitate this integration, the faculty member teaching the lecture course also co-teaches the studio. The courses operate syncretically, and the content and approaches build from those used by faculty who previously taught these courses. The lecture/seminar provides students with a basic understanding of ecological processes such as the hydrological cycle and trophic structure using precedents to clarify how these operational systems have been either mimicked or restored by professional projects within the field. Closely linked, the concurrent studio course actively utilizes these concepts through problem-based activities for design and pushes students to seek new and innovative (for them) approaches, and to succinctly and effectively represent their ideas.

To reduce student anxiety about the informational depth and contextual complexity of applying systems-thinking to site design, the courses are taught using a narrative-development framework. As described by Potteiger and Purinton (1998) a narrative framework provides a good opportunity to collect, structure, and present complex information about a topic. “Narrative refers to both the story, what is told, and the means of telling, implying both product and process, form and formation, structure and structuration” (p.3). They argue that landscape is an effective medium for relaying narratives. “Landscape not only locates or serves as background setting for stories, but is itself a changing, eventful figure and process that engenders stories” (p.3-4). By establishing a narrative approach in the design process that gives structure and focus enables the students to build design content and identify effective modes of communication. Individually the frames of the narrative provide opportunities to reduce design ambiguities and develop the detail of designs so that when combined, a structured narrative that is spatially grounded and temporally relevant is developed.

3.1 Ecological Design and Planning – Seminar | Lecture

This discussion-based lecture course provides much of the content described in the narrative-development framework by introducing students (both landscape architecture and non-majors) to the basic principles of ecology and explores their relevance to the design process in landscape architecture. The course is loosely organized into three phases and proactively coordinated with studio progression while focusing on the dynamics and resilience of system relationships, temporal cycles and flows, and spatial hierarchy. Each process is explored in depth explicitly examining changes over time and the influence of human actions on its functionality. As the foundation is set greater complexity is introduced, evaluating the intentions and actions of specific design opportunities focused on improving or reestablishing the performance of the particular process. The final aspect of the class explores specific design actions, successful and not, to build a greater understanding of the capacity for design to be reflective and adaptive, responsive to shifting conditions and changing perspectives.

While formal lectures are provided, the majority of the class time is spent discussing the topics and the assigned readings. Over the term 4 - 5 practitioners and researchers are asked to join the class for a session to present their work and expertise. The invited discussants shift each year depending on the need and focus of the studio project, but the range of expertise spans from climate change science to environmental psychology to civil engineering and hydrology. The class also goes on several fieldtrips to designed sites that employ the ecological design processes we are discussing in the classroom. However, the most appreciated fieldtrip seems to be a visit to the Botany Greenhouse at the University of Washington. The tour focuses on the structural adaptations of plants to respond to often harsh environmental conditions. After the tour the students are asked to use one or more of the adaptations they have learned about to improve upon some aspect of their lives. The biomimetic innovations range from raincatching backpacks to solar-powered bicycles and beyond (Figure 1), however; the important learning objective from this assignment is that the students are able to translate and relay complex information into an effective narrative.
3.2 Natural Processes in Design - Studio

This studio focuses on the discovery and integration of natural processes in an urban context, emphasizing the intertwined relationships of human use and ecological systems. As students have practiced a site-based design process in the preceding two studios, we shift the initial focus of studio projects towards systems and temporal change that ultimately inform the culminating site design project. This approach is intended to engage students in making explicit the systems and processes that a site plan typically doesn't embody. Students are challenged, as they feel they don't know enough about particular species or processes, as well as how to visually communicate their findings. As such, the initial exercises expand students' repertoire of analytic, conceptual, and representation skills.

As noted in Section 3.0, the sequence of studio projects employ students in narration, asking them to discover and convey a hierarchy of themes and relationships. The first project, introduced with a field trip to the site that will serve for their final design work, engages students in identifying their own experiential and perceptual connections with the site. A list of experiential phenomena is provided as prompts, for students to discover and articulate, and they must identify other phenomena they find meaningful. Students are tasked with creating a two-dimensional composition that expresses a selection of these phenomena, and subsequently, a three-dimensional piece that conveys the relationships among three phenomena. In contrast, the second project tasks students to work in small groups, finding and expressing data at a watershed level using GIS as well as a field trip to sites within the watershed. This project asks students to identify themes of analysis and express their relationships spatially and across three time periods. The project is introduced with presentations by landscape architecture professionals, who provide examples of how such analysis is used in practice. The third project has been revised as a brief design charrette, bringing students back to the site and to expressing concepts as physical form. The subsequent project engages students in discovering and conveying relationships again, that of two species who may be found at the site (Figure 2).
The last third of the term operates as a more traditional design process, of thematic site and program analysis, conceptual and schematic design. But the systems and relationships identified through the preceding projects serve as a grounding and guide for students to integrate, improve, and express ecological processes with human activities. Expression of changes envisioned on the site across time are part of the presentation requirements, which challenges students to consider what time frame is most relevant and appropriate to highlight. The considerations of narrative structure, hierarchy, and dynamic relationships that have been touchstones across the term serve as reminders for the content and the representation of their work (Figure 3).

4 DISCUSSION

In our experience, in four years of explicitly utilizing a systems-thinking framework in early design education its effectiveness has had mixed results. Through reviews of student work and student formal and informal conversations with students we find: 1) they have difficulty in understanding and translating core ecological concepts and their spatial relevance; 2) incorporating the temporal qualities of biophysical processes into early design education adds a level of complexity that taxes students’ form-making process; and, (3) a linear approach to narrative representation of design proposals doesn’t capture or express the multidimensional interactions inherent in ecological systems and in the design process.
Some of these challenges may be rooted in the students’ exposure to new content and ways of thinking must be understood and creatively translated through design, when the design process itself is still a relatively new set of practices. The range of project types and shifting focus may be difficult to synthesize and enable a sense of confidence in giving form while envisioning change.

Further, questions emerge regarding the utility of engaging the students across such a broad foundation so early in the program. Greater merit may be gained from focusing on a more defined, deeper, exploration of a particular system. Additionally, while this is their third term, students’ graphic skills must span both hand and digital realms, to explore, test, and ultimately communicate their design intentions. And their facility with software that could convey more dynamic, shifting, or alternative representations may still be developing. The pedagogy of this term's courses may best be seen as part of a system of future studios and coursework, where design processes and content deepen and enrich students’ understandings of design ecology and their capacities for ecological design.

5 REFERENCES

IMPROVING STUDENT LEARNING THROUGH INTEGRATED PROJECT EXPERIENCES

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1 ABSTRACT

Design projects draw on a broad range of knowledge and skill areas for successful completion. However, in most landscape architecture curricula the rigid structure of faculty assignments and course descriptions prevent learning outcomes that allow students to experience the impact of multiple skill areas in shaping solutions. Rather, students operate within “silos” of information without adequately drawing the connections between subject areas that are necessary to achieve a systematic design solution. Furthermore, because students don’t consider the ways in which one knowledge area influences the others, and the refinements that result, student design solutions can be one-dimensional.

Realizing an opportunity, the faculty of Purdue University’s junior-level courses in design, grading and drainage, plant materials, and construction documents began seeking a single project that would allow the students to integrate material from all of these courses in a single project. This paper describes a project process created by the authors to combat these inherent drawbacks of the traditional curricular structure. Rather than simply using a common site to achieve individual course outcomes, the authors sought a fully integrated experience that would emulate a professional’s process and enrich the end product.

The paper will explore the process created and propose opportunities for programs with like curricula structures to implement similar integrated project experiences, and will include preliminary data gathered. Further data and analysis on the results of this particular methodology to follow once a reasonable sample size is collected.

1.1 Keywords

studio pedagogy, curriculum, systems approach
INTRODUCTION

Due to their complexity, design problems must draw on a broad range of knowledge and skill areas—design theory, sociology, earthworks and drainage, plant materials, detailing, client interaction, and untold others—for a successful and creative solution. Some knowledge areas are essential to most projects; other knowledge areas will only be necessary in some instances. In all projects, however, design professionals must be able to identify the knowledge and skills necessary, be able to bring together knowledge from all the disparate areas, and be able to combine it into the most successful solution to a problem.

This information synthesis—the ability to explore several aspects of a problem simultaneously and allow each area to inform and magnify the work of the others—is the basis of divergent thinking and its complementary process, convergent thinking. As defined by Guilford in the 1950’s, divergent thinking allows for the creation of a number of unique design ideas. As part of this process, divergent thinkers also simultaneously consider a variety of approaches to a problem. Convergent thinking brings the disparate elements into a cohesive whole.

“Convergent thinking has two elements: judgment, the evaluation of concepts to determine the ideas or components of ideas that contain the most potential; and amalgamation, the ability to combine the convergent ideas into a design solution that becomes more than simply the sum of its parts.” (Rotar and Deeg, 2012)

Convergent thinking, then, is the foundation of design thinking. While intuitive solutions may successfully be developed by highly experienced and skilled designers, a clear, deliberate design process that incorporates multiple knowledge areas offers the best opportunity for students to develop successful, creative solutions.

PROBLEM DEFINITION

Unfortunately, many students find it extremely difficult to achieve this synthesis of information that forms the foundation of this kind of project approach. Instead, the projects that students produce in the design studio are too often one-dimensional—students rely on too few inputs to solve the problem, reducing the breadth of their design thinking and, ultimately, the value of their design solutions.

The authors have observed three key student attitudes that restrict students’ ability to integrate multiple knowledge areas into a design problem. The roots of these attitudes are readily understandable, coming as they often do through the structure of the academic curriculum or in the attitudes and culture of the faculty.

First, integrating knowledge areas in a design solution is difficult when students envision separate bodies of knowledge as “silos.” Students do not draw the connections between knowledge areas that are necessary to achieve a systematic design solution because too often they don’t realize the concrete interrelation between the knowledge areas. Students either actively compartmentalize knowledge into manageable pieces (commission) or, often, haven’t thought deeply enough or thought at all of how the different knowledge areas impact one another and the whole (omission).

The typical structure of courses at many universities reinforces students’ compartmentalization of knowledge. At Purdue University the standard curriculum in a given course of study defines many topics and knowledge areas and each knowledge area (or portion of a knowledge area digestible in a proscribed academic term) becomes the subject for a course. The course description rigidly defines the topic; the assigned faculty is responsible for setting the expected outcomes and evaluating student learning in the specific subject area and deviation from the catalog description of the course can become problematic.

Faculty may also play a role in exacerbating this structural problem. Because faculty may simply assume that students are aware of the expectation for knowledge integration, a professor may not explicitly require knowledge integration and students may therefore be unaware of its necessity.

Student designers often develop habits that prevent fully realized design solutions from developing. Often students attempt to reach a program and a set of forms as quickly as possible. This habit may simply form out a desire to be “done” with the design solution (or may be necessary due to the sheer volume of work their coursework requires) or the haste may come as a byproduct of procrastination or distraction. Whatever the source, the result is the same: students jump to design conclusions without
working systematically to investigate the impact of individual knowledge areas upon the others, without fully considering their criteria for making judgments, and without fully exploring design alternatives.

Finally, this rush to design completion also limits the time students take to review their design solution, to reflect and self-criticize, and to revise and refine the solution. This lack of revision and refinement, and the lack of time to allow each of the various knowledge areas to individually come to the fore and influence the overall design, is widespread among students. Again, too often the structure of LA courses reinforces this problem: projects are routinely critiqued following the deadline, but, unlike in a professional setting, there is seldom time given to revision of the solution as a structured part of the assignment. Students look forward to project due dates as the point at which they are “done” and can put a particular problem behind them without having to intellectually engage it again.

Certainly, each of these attitudes may be present in greater or lesser degrees in any given student. While the sources of student attitudes are understandable, faculty should seek ways to improve student outcomes while overcoming the students’ ability to self-impose limits to their creative responses.

Since the authors identified integrated thinking as essential to successful student design projects, and because the authors observed the difficulty that students have in engaging that kind of thinking as part of their design approach, the authors hoped to design a methodology in which we could help students discover this kind of thinking within their own design processes.

4 LITERATURE REVIEW

In recent years there have been multiple studies that seek an improved pedagogy for design. Rotar and Deeg outline a pedagogical process for integrating a divergent thinking process into the studio environment. (Rotar and Deeg, 2012) Others have designed in-class structures and exercises that make visible for students the role that a focus on different content areas within a design process will yield different final project results. (Dahl et. al., 2013; Steinitz, 2011)

The integrated studio (similarly defined in Levy’s descriptions of his “Total Studio”) best simulates architectural design in a real office, reinforcing the iterative multi-modal skillsets inherent in the design process. It is difficult if not impossible to separate technical, historical, or theoretical content from the act of designing, yet many traditional AEC programs teach in this manner, with coursework covering the parts of a system (“silos” of knowledge) but not the whole. As Teal describes, “...history, theory, and design are not separate subjects but instead are fundamentally interconnected realms that can be engaged and activated through both intellect and activity.” and that “Approaching design foundations from this integrated perspective introduces students to a necessary interplay between society, culture, place, people, and time; and initiates practices for activating their knowledge of these factors to engage complexity, nonlinearity, and the a-rational, ways of thinking that are frequently excluded in more rigid educational frameworks.” (Teal, 2011, p.37-38) The design process is not an isolated linear exercise and often one bounces between separate and unfinished works to refine a single idea, revealing insight into disparate areas of a project. The same can be said for the inclusion of materials presented in non-studio courses.

No design professor is so much of a specialist that they are not capable of contributing to the generalist approach often presented in a design studio yet all too often faculty teach specific skills without being able to connect them to the larger systems inherent in the design process. This approach does the faculty and especially the students a disservice by avoiding the interrelations between aesthetic design and technical skills and knowledge. The argument that technical content is too complex and unwieldy to present to students new to the major has been shown to be false; numerous studies have demonstrated the rich work presented by students in collaborative, integrated, or interdisciplinary courses (Bender, 2005; Goldberg, Holland, and Wing, 2012; Levy, 1980; O’Brien, Soibelman, and Elvin, 2003; Ozimek and Ozimek, 2011; Steinitz, 1990, 2011; Teal, 2011).

Students are more likely to retain specific skills and techniques if they are integrated into a larger framework of a project the student finds interesting. This way they are working towards a visible creative goal and not just “adding another tool to their toolbox”. Projects presented through integrated coursework force students to use knowledge in direct practice and design; reinforcing the value and purpose of the skills and concepts they have been taught. Students in the digital age often feel “bombarded with facts... 

Thus, they do not pay attention to knowledge we try to deliver them, unless they find it useful.” (Ozimek and Ozimek, 2011, p.54-55) While their research dealt with integrating CAD tools into studio courses, Ozimek and Ozimek’s findings are applicable to any technical or theoretical content. They found that
undergraduate students had difficulties applying the skills learned in non-studio courses to their studio design work in a traditional educational system but that an integrated approach "...seems to help in shortening of this (application and transition) period and in better understanding of dependencies between different aspects of their creation." (Ozimek and Ozimek, 2011, p.56)

In a multi-course integrated approach to architectural education, the design studio should serve as the catalyst or "master course" as it "...is the only environment in which all aspects of architectural ideas and skills - formal aesthetics, building technology, theory, history, and drawing - can be learned". (Levy, 1980, p.29) though it is important that the non-studio courses are not seen as being secondary or "lesser" by students. All learning goals, methods, and outcomes should be structured around and focused through a studio design project that forces a creative endeavor to be influenced by technical skills and theory presented in supporting courses. This material can also be presented in the studio course itself as redundancy, with studio related content discussed in the technical courses in order to keep project goals in mind throughout the student learning process while reinforcing the interrelated nature of different course materials.

To accomplish the truly integrated studio, technical course assignments should coordinate work whenever possible with studio design problems that can take advantage of the use of knowledge of that particular topic or skillset. Teaching basic materiality and construction methods during a small scale site design would reinforce the technical knowledge through use in studio, and should result in a more robust and "complete" design as noted by Teal in his study on non-architectural course influences on design. "When such thinking provides a foundation for a designer's specific skills, the process of making architecture shifts from the creation of particular objects toward cultivating practices that open up territories, like 'ecological urbanism,' where all the relevant elements and information can react with one another. When this occurs, design becomes more effective." (Teal, 2011, p.38) This clearly creates some scheduling and material continuity issues in some classes, but over the course of a semester the bigger topics and concepts can be planned around (this especially includes assignment due dates). This methodology also allows multiple professors to fit seamlessly into formal critique sessions as project constraints and opportunities are already known to the involved faculty.

This methodology requires the availability of professors from each of the non-studio technical or theory classes during formal studio hours so that there isn’t a break in "voice" or vocabulary, which can cause difficulties for faculty, though e-mail, video conferencing, and other technologies have made this less of an issue in recent years. (Bender, 2005, p.1) It should be noted: the idea "...that a holistic view of architecture leads directly to support for a holistic approach to architectural education may be simplistic." (Levy, 1980, p.30) and that careful consideration should be taken to be sure that all included faculty fully understand the overall project and are able to contribute to the system without bias towards their specific course material. At Purdue University, all tenure track professors teach a mix of studio and non-studio courses, easing difficulties that may arise in approach between technical course and design studio teaching methods.

5 PROJECT DESIGN

Perhaps the most common vision of landscape architecture education sees the design studio as the vital component of the curricular system. In the studio, students are presented with the opportunity to integrate all the knowledge and skills acquired in their broader studies—especially the technical and theoretical knowledge of other parts of the landscape architecture curriculum—into creative solutions to complex problems. Any experienced educator knows, however, that this ideal situation is seldom easily realized. The authors sought to use the studio as the basis for crafting an integrated project process approach while incorporating several other content areas that should impact design thinking.

The authors designed a pedagogical approach with three goals: first, to integrate the various knowledge areas (in this case design theory, earthworks and drainage, planting design, and landscape architecture engineering—construction documentation) in a single project; second, to break the typical structure of student projects in which a master plan is seen as a project’s final product by including an iterative design process, in which many revisions are required; and third, to make visible the impact of each knowledge area upon the others and the whole.

For the project site, the instructors chose a vacant piece of land in the middle of the Ellsworth-Romig neighborhood in Lafayette, IN. A local neighborhood advocacy group, the Ellsworth-Romig Neighborhood Association, was seeking a vision for the site that would enhance it as a potential open
space for the city. The site, a sloping parcel bounded by several streets (including an abandoned dead-end), offered great potential for the problem: it was neither too large nor too complex to allow students to apply several knowledge areas to its design. Rather than simply using a common site to achieve individual course outcomes, the authors sought a fully integrated experience that would emulate a professional's iterative and cross-informative/cyclical/revisionist process and enrich the end product.

Students began their design exploration with a quick “charrette” day of intense activity involving the faculty of their design studio course and their courses in earthworks and stormwater, planting design, and landscape engineering-construction documentation. This charrette introduced the design problem and reinforced the nature of the collaboration between the courses. Subsequent design development occurred using critique from the four faculty members both individually in their own class time, and collaboratively in a series of group pin-ups and interim juries. The initial product requirements included an illustrative plan and support drawings to communicate a vision for this site, a conceptual planting scheme that described the characteristics of plant materials and massings, and a conceptual grading scheme that addressed the relative vertical location of elements, slopes, and water runoff.

Following the initial submittal, students were then asked to review their design work with a critical eye and, following a round of client input, to revise their site designs in accord with peer, faculty, and client critique. The critique included input related to program, site forms, grading, and plant material use. As a part of this step, students were required to create a precision drafted digital line drawing of the plan, as the original illustrative plan and support drawings could be produced by hand or digitally; while they conveyed vision, they were not of the quality to allow for more accurate representation necessary for construction drawings.

In the next step, students were asked to revise their design solutions a second time, paying particular attention to the changes mandated by a more focused and refined approach to earthworks, stormwater design and planting. Students used their digital drawings (produced through CAD) as the base for the creation of a construction-document quality grading plan. A final revision and refinement of the project is currently taking place as students prepare final site plans, layout plans, and planting plans.

In all of these multiple steps, instructors reinforced the need for students to self-assess as part of the process of revision. Faculty expected each subsequent layer of thinking to influence the overall design, even though changes, especially in the later stages of the process, would be subtle.

In summary, the project process pushed students to experience the project as a professional typically would: integrating many types of information into the project process, using an iterative process of revision and assessment, allowing each type of information or process to demand particular responses, and then incorporating each piece into a new cohesive whole.

6 ASSESSING PROJECT EFFECTIVENESS

Surveys are the primary method for assessing the project’s effectiveness. However, the variability of the survey method is minimized by the use of multiple surveys to different audiences. Three surveys have been designed: one to assess student skills by questioning their internship employers (see table 1 and table 2); a second to quantify student perceptions by asking questions of those involved in the project (see table 3), and a third to quantify student perceptions of effectiveness after a longer period by questioning graduating seniors (see table 4). The overlapping results begin to reliably assess effectiveness. Secondarily, the study uses a metric developed in which faculty assessment can be quantified.

This study has used our current junior class (20 students) as a model to test this collaborative integrated system; these students will soon be venturing out to work in their co-op firms where we will receive evaluations from their professional mentors. Measuring the success of an integrated course approach requires a control group that is difficult to create in architectural education due to instructional equity and faculty/student scheduling. This can especially be the case if a study attempts to split a typical design studio into two separate groups since students are accustomed to collaboration and shared learning styles in a studio environment. We will compare this data to previous class years that were taught the material in the more traditional segregated manner and determine if there are any significant differences between class abilities in the topic areas covered in the four integrated courses involved in this study.
Because these undergraduate students at Purdue spend their fourth year on a paid cooperative internship (referred to as the co-op) before they return for their fifth and final year we can survey their mentors and direct bosses or project managers at their design firms as to the students design skills, production effectiveness, and general knowledge. We can then use this data to measure not only our teaching effectiveness but also our student's comprehension and retention of material learned to date. There are factors that are likely influencing the professional abilities of our students, expressly maturity, personal drive, and talent, but we believe the independent assessment by active practitioners is the best way to determine the ultimate effectiveness of our courses and abilities of our students.

Table 2. Co-op survey question measuring technical skill aptitude

<table>
<thead>
<tr>
<th></th>
<th>Far short of expectations</th>
<th>Short of expectations</th>
<th>Equals expectations</th>
<th>Exceeds expectations</th>
<th>Far exceeds expectations</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grading</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Hydrology</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Understanding of materials</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Plant knowledge</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Cost estimating &amp; takeoffs</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Time management</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Punch lists &amp; evaluation</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Table 3. Excerpt from the participant student perception survey

<table>
<thead>
<tr>
<th>The integrated course approach has allowed you to:</th>
<th>Hindered a lot</th>
<th>Hindered a little</th>
<th>Neither helped nor hindered</th>
<th>Helped a little</th>
<th>Helped a lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a deeper more robust design solution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understand the coordinated systems approach to design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understand the iterative and adaptive process of design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Better manage time due to shared deadlines and expectations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Become competent in the individual skills necessary to create a complete project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(grading, drainage, planting, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Excerpt from the graduating senior survey measuring perceived knowledge and abilities

<table>
<thead>
<tr>
<th></th>
<th>Not at All</th>
<th>Name &amp; Describe</th>
<th>Understand &amp; Apply</th>
<th>Create &amp; Integrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop design programs based on user needs and client goals/resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analyze relationships among design elements by determining opportunities and constraints</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop conceptual design, planning, &amp; management solutions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluate design alternatives to determine appropriate solutions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Designing complete places (strong sense of identity, enclosure, wayfinding, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This study understands that due to relatively small sample sizes, variations between class years, and placement availabilities of student internships, the confidence interval possible in drawing valid inferences from the data is lower than the ideal. It is the hope of the professors involved that over time a large enough sample can be gathered, along with the opinions of the faculty (based on independent assessment of student work), to measure the hypothesized increase in quality and depth of student projects. Informal responses from students gathered as the project progressed show an unintended effect. As part of project critiques, students often expressed confusion about faculty expectations for the project. Broader than students simply lacking understanding, the students expressed dismay that they were receiving different kinds of comments from their four instructors. While unintended, this perception both demonstrates the inability of students to adequately assimilate multiple points of view (searching for “the” answer) into a project, and offers the opportunity to again replicate a professional project experience, as the situation replicates the multiple viewpoints found in several clients, stakeholders, or firm principals and project managers.

It is the authors’ belief that an collaborative course structure will allow students to see, understand, and integrate knowledge gained in various non-studio courses, thereby creating more robust, deeper, and more “complete” design solutions in studio. This methodology should serve landscape
architecture’s students by reinforcing the iterative multi-modal nature of design before they venture out to their co-op internships.

7 OBSTACLES TO AN INTEGRATED APPROACH
Perhaps the largest obstacle to integrated student learning experiences is simply that university and curricular structures often do not envision them nor easily allow them to occur. The difficulties of course content, course description, and the structure of curriculum have already been discussed. In addition, while faculty may expect students to apply knowledge from previous semesters or concurrently running courses, the students too often expect that only the content laid out in the course description be covered. These disconnects between faculty and student expectations may become a source of misunderstanding, frustration, and disappointment on both sides.

Further complicating the issue, the standard practice in many universities is to establish an “instructor of record” responsible for administering a specific course to an individual group of students. Although collaborative teaching with colleagues may offer benefits to student learning, student expectations of a single instructor to whom they are responsible, and who ultimately evaluates and issues the grades, is a reality of administration that is not easily discounted.

Finally, the reality of faculty course assignments is also problematic. In some landscape architecture programs, faculty members are routinely assigned the same courses year after year. While most instructors are aware of each course’s role in the overall curriculum and seek student outcomes that reinforce that role to the benefit of all students, the danger of faculty focused solely on their subject with little regard or overview of the entire curriculum still exists.

8 SUMMARY
At present, this course approach has not gathered a large enough sample size to measure significant results from the study. However, the authors expect that the repetition of an integrated course approach will yield valid data as to the effectiveness of this methodology in the future. While previous studies have described integrated approaches to design pedagogy in the past, these methods have not yet been widely adopted in landscape architectural education. The authors hope that this study will reinvigorate a conversation about an integrated approach to design so that students will be better prepared for the complex realities of professional design practice.

9 REFERENCES
Dahl, B. et. al. (2013). Guiding groups of students to develop divergent design proposals for a common site and program. Paper read at 2013 CELA Annual Conference, March 26, 2013, Austin, Texas: CELA.
LEAVING THE DRAFTING TABLE:
STUDENTS’ PERSPECTIVES ON THE DESIGN-BUILD EXPERIENCE

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1. ABSTRACT
Design-build courses can create powerful learning experiences for students. Although project descriptions prevalent in design-build literature provide useful how-to information, a broader perspective on potential learning outcomes is lacking. Additionally, little insight exists into how these learning experiences occur. This article develops a framework of potential design-build learning outcomes through a content analysis of existing literature on design-build courses in architecture and landscape architecture programs. An analysis of a student-written blog about a design-build project conducted in the University of Georgia’s masters of landscape architecture program tested this framework. Key learning outcomes included: gaining construction knowledge, skills, and values; integrating design with construction; engaging with “real world” problems; developing personal qualities and interests; and improving their transition from school to work. Learning outcomes may be closely linked to the hands-on, holistic, “real world,” and collaborative qualities of design-build courses. Additionally, in this particular case, the experiences of anticipation, working together, having fun, and seeing tangible results appeared significant to the students’ experience. Viewing design-build from perspective of students creates a compelling argument for how valuable and rewarding design-build education can be. Students experience a wide variety of learning outcomes, and the emotional investment of the students had a large influence on their experiences.

1.1 Keywords
design-build education, learning outcomes, qualitative analysis
2 INTRODUCTION

What I now know is that it was one of the most valuable experiences of my educational path and at an appropriate time (Henri Foch qtd. in Tygart 2010, p.153).

The lessons we learned about the process of design and working with others will always be with us (Reker, 1993, p.23).

I gained a much better understanding of the design process in relation to the building process . . . Honestly, this has been one of the most helpful classes I've had thus far (student evaluation for design-build course at the University of Georgia).

As the above statements imply, design-build courses in architecture and landscape architecture schools can create powerful learning experiences for students. In a survey of 60 students who had participated in design-build courses in the University of Washington's landscape architecture program, one hundred percent said that the course helped them in their professional career (Winterbottom, 2002). Yet little research exists - besides project descriptions by instructors and end of course evaluations - that explores what exactly those learning experiences are and how they occur.

Most articles about design-build courses are written by the course instructor, and they typically focus on one or two projects, describing the process and the final product (Ascher-Barnstone, 2002; Badanes, 2008; Carpenter, 1997, 2010; Corser and Gore, 2009; Erdman et al., 2002; Foote, 2012; Fowles, 1984; Hinson, 2007; Luescher, 2010; Reker, 1993; Scarpa, 1999; Wing, 2005). As descriptive studies, these articles can provide valuable how-to information for others interested in attempting design-build education. But their mostly-anecdotal evidence does not provide a broader perspective on their learning outcomes, not because design-build in and of itself "resists theorizing" as Erdman et al. (2002, p.174) claim but because the field lacks systematic studies.

In these articles, instructors note a myriad of potential learning outcomes from design-build classes: integrating previous knowledge of design and construction (Luescher, 2010; Winterbottom, 2003), becoming more prepared for professional life (Winterbottom, 2003), gaining confidence (Badanes, 2010), and, for design-build studios with a service learning focus, experiencing how the professions can positively impact society (Badanes, 2010; Wing, 2005). Occasionally, these observations are backed up through student questionnaires (Winterbottom, 2002), selected quotes from students (Luescher, 2010; Tai and Lamba, 2003; Tygart, 2010; Winterbottom, 2002), or a mixed-method study (Wallis, 2005). Existing descriptions of design-build courses from students’ perspectives describe projects several years after their completion (Reker, 1993; Tygart, 2010). Hearing about a design-build course from the students while they are going through the experience can bring us insight into how learning experiences occur. Additionally, their experiences can help us understand the qualities of a design-build project that make the learning outcomes so powerful.

2.1 Research Statement

This article asks two main questions: what learning outcomes do students and instructors experience in design-build courses? And are there specific qualities of the design-build experience that influence these learning outcomes?

3 METHOD

To develop a picture of the learning outcomes and students’ experiences in design-build courses, this study consists of two parts. First, a content analysis of existing literature on design-build courses develops a framework of learning outcomes as a starting point. A student-written blog about a design-build project conducted in the University of Georgia’s masters of landscape architecture program tests this framework. Second, a further qualitative analysis of the blog text explores both the students’ learning experiences and also the context in which those experiences occur. As with other qualitative research, the goal is not to produce generalizable conclusions or a causal correlation between variables; but, instead, to share a nuanced and contextual picture of how learning was experienced in this particular case and form hypotheses on the connection between experience and learning in design-build (Gaber and Gaber, 2007; Glesne, 2006).
3.1 Project Description

In fall 2011, nine graduate students in the masters of landscape architecture program at the University of Georgia embarked on a design-build project. This new class was created as a result of student requests for hands-on construction experience, specifically with a design they had worked on. It was offered as an elective in addition to their required studio classes.

There were three main goals for the class: (1) giving students hands-on experiences with landscape construction techniques and materials, (2) creating a situation where students could see the connections between their own designs and a final built product, and (3) connecting the class with the service-learning mission of the College and the University.

The project site was a central open area surrounded by seven homes in east Athens, Georgia, being constructed by Habitat for Humanity. The houses have very little open space of their own, so the central area needed to be attractive and useful for the seven households. The Athens Garden Club had already adopted the project and raised funds for its installation. The Athens Area Habitat for Humanity and the Athens Garden Club served as the clients and partners for the project.

The first two months consisted of an intensive design process, resulting in a layout plan and design details for the site. The remainder of the semester was devoted to construction. As part of the class, students were required to contribute to a blog documenting their progress. They were required to contribute at least two posts throughout the semester.

3.2 Framework Development and Analysis

Seventeen articles about architecture and landscape architecture design-build courses and programs from 1984 to 2012, were reviewed for educational goals and observed learning outcomes (statements of learning). All articles except two were written by instructors in the classes; one was written by a former student reflecting on the project (Reker, 1993), and one was an interview with students about their experiences (Tygart, 2010). Because both educational goals and observed learning outcomes represent assumptions of what can be learned in a design-build course, they were both included in the analysis. The statements of learning were separated by whether they were observations from instructors or quotes from students. They were then coded and categorized following structural coding methods outlined in Saldaña (2009) and Lindlof and Taylor (2011). The coding resulted in 16 subcategories of learning outcomes observed by both instructors and students, which were then grouped into five main categories. The resulting framework represents what both students and instructors (in these 17 cases) believe are the learning outcomes of design-build courses. Although this framework is based on subjective descriptions, it is a useful summary of assumptions about design-build learning which can serve as a starting point for further research.

To test this framework of design-build learning outcomes, a similar analysis was performed on the text from the students’ blog. Learning experiences as reported by the students in the blog text were identified and coded. They were then compared to the framework for commonalities and differences.

3.3 Hypothesis Generation

A second analysis was performed on the blog text – one that shifted the coding focus from specific learning outcomes to the broader experience of the project itself - the emotions and observations that the students expressed about their experience - called emotion coding in Saldaña (2009). The paper concludes with the themes that arose out of this experiential analysis, and hypotheses on how those themes may relate to the observed learning outcomes.

3.4 Limitations

This research focuses on perceived outcomes as reported by students and instructors. There has been no formal measurement to confirm if these outcomes do occur and to what extent they do. The aim is to understand the design-build education within its own context and not necessarily to compare the practice with other educational approaches; other classes could have similar learning outcomes.

The goal of the second analysis is hypothesis generation – to suggest qualities of the experience that could influence learning outcomes. These hypotheses are offered for further testing and elaboration. The students’ blog is from one design-build educational experience, and it cannot be described as a prototypical design-build course (if there is such a thing). Therefore, the observations and conclusions
drawn from the experiential analysis may not pertain to all design-build courses. For example, this was a relatively simple project. With it being the first design-build conducted by the instructor and with limitations on course time, the course was not as innovative with material use or as extensive in community processes as more mature design-build programs are. Also, since the blog was public, the students probably felt some pressure to only report positive experiences; although the project statement encouraged them to “Be honest about challenges we are facing – either as a group or as an individual, and what we are doing to address those challenges.” Additionally, the students had a hand in creating the class, so their reports might be more enthusiastic than reports from students less-invested in a class.

4 RESULTS AND DISCUSSION

4.1 Learning Outcomes: Literature Analysis

The learning outcomes drawn from the instructors’ observations and goals fell into five main categories: gaining construction knowledge, skills, and values; integrating design with construction; engaging with “real world” problems; developing personal qualities and interests; and improving the transition from school to work. These main categories contain subcategories with specific learning outcomes (Table 1).

Table 1. Framework of design-build learning outcomes developed from the literature analysis

<table>
<thead>
<tr>
<th>Main category</th>
<th>An understanding of the process from design through construction</th>
<th>Project management skills: planning, communication, and problem solving</th>
<th>Personal qualities, interests, and relationship skills</th>
<th>An ease in transitioning from school into professional work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction knowledge, skills, and values</td>
<td>- Connection with knowledge from past courses and experiences.</td>
<td>- Ability to communicate with clients and contractors.</td>
<td>- Appreciation for collaboration.</td>
<td>- Teamwork skills.</td>
</tr>
<tr>
<td></td>
<td>- Understanding of how design and construction interrelate.</td>
<td>- Ability to adapt to change and unexpected circumstances.</td>
<td>- Development of personal qualities such as confidence.</td>
<td>- The profession’s capacity to serve others in need.</td>
</tr>
<tr>
<td></td>
<td>- Understanding of how a design document translates into a build project and vice versa.</td>
<td>- Capacity to experiment and learn from mistakes.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On a basic level, in design-build, students learn about construction materials, methods, and documentation, as “students pursue details and construction methods not easily considered in the abstract data-based design environment” (Foote, 2012, p.54). Through hands-on experience, students work on the “development of construction skills” (Wallis, 2005, p.278). Finally, by experiencing the construction process, students grow to value both the craft of construction - “successful details make good buildings” (Jay Reeves qtd. in Tygart, 2010, p.154), and the builders, craftsmen, and contractors who engage in the process - “The value of good General Contractors and craftsmen are immeasurable” (Jay Reeves qtd. in Tygart, 2010, p.154).

Students not only learn about construction; they also see the process from start to finish, and begin to “understand design and construction as an integrated process that begins with the consideration of materials” (Luescher, 2010, p.25). By experiencing the entire process, students have opportunities to integrate knowledge from past courses: "I was able to use the knowledge I gained throughout the entire BLA program in a time period of ten weeks” (Janet Salsbury qtd. in Tai & Lamba, 2003, p.53). They also
see how design relates to construction and what happens when their designs get translated onto actual sites: “It was nice to actually see how our design looks in real life” (student qtd. in Luescher, 2010, p.24).

The value of the design-build educational experience is also enhanced by the “real world” situations and challenges encountered: “Moreover, what I learned by doing something meaningful in the real world was more enduring than the lessons I learned in the virtual world of my previous studios” (John Kleman qtd. in Tygart, 2010, p.153). Students experience how to negotiate between design vision and the practical limitations of a project such as site constraints, building regulations, and budgets. “The more enduring lessons come from the things that are out of the student’s control. The list of such external forces includes . . . working through the various limitations and regulations that are part of a building project” (Perkes and Herrmann, 2010, p.106). They gain communication skills by interacting with clients and contractors: “you learn necessary communication and people skills . . .” (Wayne Lee qtd. in Tai and Lamba, 2003, p.53). The “real world” context also gives the students a chance to learn by trying and to develop problem solving skills by responding to unexpected conditions, “The reflective dialogue between designing and building gives students the opportunity to test ideas and teaches the flexibility needed for the design process” (Winterbottom, 2003, p.72).

Instructors and students also reported significant impacts on students’ personal growth and interpersonal relationships. By working together and with clients, students get an intense exposure to collaboration, contributing to the “development and appreciation of team working skills” (Wallis, 2005, p.278). For example, one student concludes, “I learned that creating in a community and embracing the power of collaboration can be extremely powerful and fulfilling” (John Kleman qtd. in Tygart, 2010, p. 153). Instructors also observed personal growth happening over the course of a project, including increases in “self-motivation, courage, self-reliance, perseverance, teamwork and service to others,” (Badanes, 2008, p.250); confidence being the quality most often mentioned: “My design/build experience gave me confidence” (Mary Beth Doehr qtd. in Tai & Lamba, 2003, p.53). Finally, when the project involves a community service component, as many of the design-build projects do; students may gain a broader perspective on the professions of landscape architecture and architecture, and “have the sense that architecture can make a real difference in the lives of people who can’t afford it” (Badanes, 2010, p.86).

The final learning outcome is that several students “report an easier transition to professional work” (Winterbottom, 2003, p.113) due to their design-build experience. Several years after the design-build experiences, students reflect: “Such an experience was an invaluable transition from the academic studio environment to the practice of architecture” (Jay Reeves qtd. in Tygart, 2010, p.153), and “I know that the design/build experience helped me launch my career at a higher level of skill and confidence” (Wayne Lee qtd. in Tai & Lamba, 2003, p.53).

Student quotes from the articles represented all 16 subcategories, except for appreciating the service value of the profession. The lack of this subcategory doesn’t mean the students don’t experience it; just that it was not expressed in the selected quotes in these articles.

### 4.2 Learning Outcomes: Blog Analysis

In the project-specific student blog, ninety-one different learning experiences were identified. They covered every category and subcategory of learning outcomes developed from the literature analysis (Table 2). Additionally, all of the learning experiences identified in the blog text fit into one of the previously determined categories; no new categories were created from the blog analysis.
Table 2. Learning outcomes supported by select quotes from students’ blog

<table>
<thead>
<tr>
<th>Construction knowledge, skills, and values</th>
<th>Construction skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of construction materials, methods, and documentation</td>
<td>Creating the planting plan has been more informative than I imagined! I learned not just about plants [sic] palettes, choosing color schemes, and working with hardiness zones, but it has also been a great introduction to native plants of the South East ….</td>
</tr>
<tr>
<td>Construction skills</td>
<td>Although slightly intimidated I gave the machine a whorl and had a blast.</td>
</tr>
<tr>
<td>Appreciation of craft and detailing</td>
<td>Personally, I have gained a tremendous understanding of construction techniques (everything I've ever built before this typically fell apart) and an appreciation and respect for the build portion of landscape design.</td>
</tr>
<tr>
<td>Respect for builders, craftsmen, and contractors</td>
<td>Although slightly intuitive in its mechanics, I have gained respect for those folks who can become one with the machine, just like they are moving earth with their hands.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>An understanding how the whole process works together</th>
<th>Wheelbarrow load after wheelbarrow load I began to understand what “earth moving”, a popular word in our design studios, really meant.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrates past knowledge</td>
<td>I think that this class is really important for students to understand how design really doesn't stop until the last stone is set and the last plant goes into the ground.</td>
</tr>
<tr>
<td>Understanding of the relationship between design and construction</td>
<td>Most of us took this class for the opportunity to get our hands dirty and see what it takes to implement our grand design ideas.</td>
</tr>
<tr>
<td>Understanding of how a design document translates</td>
<td>I was surprised by how much earth we were digging for what seemed, in my mind, to be such a small retaining wall.</td>
</tr>
<tr>
<td>Project management skills: planning, communication, and problem solving</td>
<td>However, after looking at the site more closely and the dimensions of the boxes, we decided it would be best to have just 2. Seven would have cluttered up the space.</td>
</tr>
<tr>
<td>Knowledge of how to work within practical limitations</td>
<td>The main challenge was uncertainty around what we were allowed to build/design under the two conserved trees and the best location for some of the elements.</td>
</tr>
<tr>
<td>Ability to communicate with clients and contractors</td>
<td>The design for the play area was really loose – we generally located the area on the site plan and I drew construction details for elements including logs and boulders – but what it really came down to was talking with one of the boys on Saturday and asking him where he would like to play and what he thought would be fun to play on.</td>
</tr>
<tr>
<td>Ability to adapt to changes</td>
<td>This was an important lesson for us as students of the design-build process: Site conditions often dictate a change of plans.</td>
</tr>
<tr>
<td>Capacity to experiment</td>
<td>For most of us, the class will fulfill a desire to have the experience of taking a project through to completion while still in the academic environment (i.e. where mistakes are a good thing).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personal qualities, interests, and relationship skills</th>
<th>Appreciation for collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appreciation for collaboration</td>
<td>It has been an interested [sic] adventure in compromise as we work though [sic] what we want and what is possible.</td>
</tr>
<tr>
<td>Teamwork skills</td>
<td>We ended up with a pretty cool assembly line. Some where [sic] prepping, some measuring, others cutting and the rest building.</td>
</tr>
<tr>
<td>Personal qualities like confidence</td>
<td>From this class, I found a strong interest of mine, to build something by myself. I even wanted to build a traditional Beijing Sihe Yuan in American by hand. Of course, this could be a dream of mine for now, but it is still a good beginning as well.</td>
</tr>
<tr>
<td>Appreciation of the ability of the profession to serve others in need</td>
<td>We all had an amazing experience working on the project and I believe an essential part of that comes from building something that – we hope – will make a small different in the lives of families living next to it. After all, it is the opportunity to have a positive impact on the world that led most of us to this profession.</td>
</tr>
</tbody>
</table>

| An ease in transitioning from school into professional work | While it was humbling at time to realize how much we had to learn, it was also exciting to get such a great jumpstart on that education. And get some great exercise to boot! |
4.3 Learning Outcomes: Discussion

The categories developed in the learning outcome analysis seem consistent across instructor observations, student comments in articles, and the learning experiences in the students’ blog. The fact that the learning experiences identified in the students’ blog fit so well into the framework suggests that what students experience in design-build is not far from what instructors expect and observe. The commonalities also suggest that the learning outcomes framework may be useful for further study into the learning outcomes of design-build courses, although the framework should continue to be tested and elaborated upon.

In order to evaluate the breadth of learning that occurs in design-build courses, the design-build learning framework can be compared with the major taxonomies in educational theory. The two most well-known taxonomies of learning are Bloom’s (1984) taxonomy of cognitive learning and Fink’s (2003) taxonomy of significant learning (Fallahi, 2009; Robinson, 2009).

Bloom’s taxonomy separates learning into six steps, with each one building on the previous one: knowledge, comprehension, application, analysis, synthesis, and evaluation with higher levels of learning occurring at the end of this spectrum (Bloom, 1984). The learning outcomes observed in design-build courses span this continuum. By applying their designs to an actual build site, students experience knowledge, comprehension and application. By grappling with “real world” problems and unexpected circumstances, they engage in analysis, synthesis, and evaluation. The integration of design into build helps students experience the entire taxonomy – from knowledge to application to evaluation.

Fink’s taxonomy expands Bloom’s from purely cognitive learning to also include affective learning “relating to emotion, values, and beliefs.” (Robinson, 2009, p.26). Fink’s six types of learning are: foundational knowledge, application, and integration (all three are cognitive aspects that relate closely to Bloom’s taxonomy), human dimension (learning about yourself and others), caring (development of new feelings, interests, and values), and learning how to learn (Fink, 2003). The more integrated the six types are, according to Fink, the more significant the learning is. In the framework of design-build learning, the six types of learning can occur in any of the categories; but certain categories lend themselves more strongly to one or two of the six types (Table 3). Through construction knowledge, skills, and values, students gain knowledge, application, and also caring (i.e. new values about construction and builders). Through the holistic experience of design into build, students apply and integrate knowledge already gained in previous classes. Through the problem solving skills developed in response to “real world” situations, students not only apply knowledge but they also learn how to learn – by experimenting and adapting to change. And, finally, the experiences of working as a team, serving others, and taking on individual responsibility, directly relate to the human dimensions (learning about self and others) and caring (development of new feelings and interests).

Although the framework of design-build learning does not match up perfectly with the two taxonomies, it does cover most of the types of learning within the taxonomies, which demonstrates that design-build has the potential to create a wide breadth of learning outcomes and significant learning. The breadth of learning is especially interesting in the case of the students’ blog. Although this project was limited in time and scope and not as complex as other design-build projects, students still self-reported the same breadth of learning outcomes. This suggests that complexity or scale is not a requirement for achieving significant learning in design-build courses.

4.4 Hypothesis Generation: Links between Experience and Learning

Within the blog text, for each main category of learning outcomes, there appeared to be a quality of the design-build experience that was directly linked to the outcome (Table 3). In gaining construction knowledge, skills, and values, the hands-on nature of the experience appeared to be critical. The hands-on quality of the experience also played a role in how students view and value construction, “Although slightly intuitive in its mechanics, I have gained respect for those folks who can become one with the machine, just like they are moving earth with their hands.”

In integrating design, construction, and past knowledge, exposure to the whole process seems to be an important factor. If the student just engaged in the design or just in the construction, seeing the link between the two would not happen. The link appears to be more critical for that understanding than either one separately.

The “real world” quality of the experience seemed critical for development of project management skills like planning, communication, and problem solving. Experiencing “real world” limitations challenged
their design skills, “The main challenge was uncertainty around what we were allowed to build/design under the two conserved trees . . .” The “real world” quality of the experience also gave students an opportunity to test out ideas, observe results, and reframe the problem: “For most of us, the class will fulfill a desire to have the experience of taking a project through to completion while still in the academic environment (i.e. where mistakes are a good thing).”

Table 3. Model linking qualities of experience with learning outcomes in design-build courses

<table>
<thead>
<tr>
<th>Through (quality of experience):</th>
<th>Construction knowledge, skills, and values</th>
<th>Project management skills: planning, communication, and problem solving</th>
<th>Personal qualities, interests, and relationship skills</th>
<th>An ease in transitioning from school into professional work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands-on experience</td>
<td>A holistic process</td>
<td>“Real world” experience</td>
<td>Collaboration, individual responsibility, and service learning</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>the students developed (category of learning):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction knowledge, skills, and values</td>
</tr>
<tr>
<td>An understanding of the process from design through construction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>by improving or increasing their (specific learning outcomes):</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Knowledge of construction materials, methods, and documentation.</td>
</tr>
<tr>
<td>• Construction skills.</td>
</tr>
<tr>
<td>• Appreciation of craft and detailing.</td>
</tr>
<tr>
<td>• Respect for the work of builders, craftsmen, and contractors.</td>
</tr>
<tr>
<td>• Connection with knowledge from past courses and experiences.</td>
</tr>
<tr>
<td>• Understanding of how design and construction interrelate.</td>
</tr>
<tr>
<td>• Understanding of how a design document translates into a build project and vice versa.</td>
</tr>
<tr>
<td>• Knowledge of how to work within practical limitations (i.e. site constraints, building regulations, budget, client needs).</td>
</tr>
<tr>
<td>• Ability to communicate with clients and contractors.</td>
</tr>
<tr>
<td>• Ability to adapt to change and unexpected circumstances.</td>
</tr>
<tr>
<td>• Capacity to experiment and learn from mistakes.</td>
</tr>
<tr>
<td>• Appreciation for collaboration.</td>
</tr>
<tr>
<td>• Teamwork skills.</td>
</tr>
<tr>
<td>• Personal qualities like confidence.</td>
</tr>
<tr>
<td>• Appreciation of the ability of the profession to serve others in need.</td>
</tr>
</tbody>
</table>

How students developed personal qualities and interests appears to be more complex. Working as a team, taking on individual responsibility, and serving others all seem influential in the students’ personal experiences. Teamwork helped one student learn and grow, “Everybody in the group can be my teacher. It was kind of them that helped me a lot with tool using …From this class, I found a strong interest of mine, to build something by myself.” Having created the design seemed important for another, “I feel excited and nervous to see my work installed. It will be thrilling if it all turns out beautifully and such heartache if it ends up being a disaster.” But these qualities: teamwork, individual responsibility, and serving others not only help develop personal interests, they also appear to have increased the students’ engagement with the project, “We all had an amazing experience working on the project and I believe an essential part of that comes from building something that – we hope – will make a small difference in the lives of families living next to it.” This connection between service, engagement, and learning is supported by research on service learning that suggests courses with real world applications increase levels of student engagement and learning (Ramaley, 1997).

This model of linking qualities to learning outcomes is simplistic. It shows only one quality that appears to have the strongest connection to each learning outcome. In reality, multiple qualities probably influence each learning outcome, and each quality impacts multiple learning outcomes. As Fink (2003) suggests, learning is stronger when all aspects are integrated. Additionally, this model is only bringing up
hypotheses that emerged from the analysis of one project and one group of students' views; subsequent studies and analyses are needed to flesh these ideas out further.

4.5 Hypothesis Generation: Emergent Themes

In addition to the learning experiences and the hypothesized qualities of those experiences, five themes emerged from the analysis of the blog. Experiences and emotions that repeated throughout the blog include: positive anticipation (excitement), negative anticipation (trepidation), working together, having fun, and seeing tangible outcomes. Excerpts from the blog that exhibit these five themes are included in Table 4.

Table 4. Emergent themes from the students' blog

<table>
<thead>
<tr>
<th>Anticipation: excitement and curiosity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary designs are due tomorrow and it'll be interesting to see what people have come up with.</td>
</tr>
<tr>
<td>Now excitement is growing as we move closer to the build aspect of this course. Will all the details fall into place? What will get changed for better or for worse, what won't change at all? I think we are all excited to see what happens when you leave the drafting table.</td>
</tr>
<tr>
<td>I feel excited and nervous to see my work installed. It will be thrilling if it all turns out beautifully and such heartache if it ends up being a disaster.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipation: trepidation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I thought to myself, “This will be an interesting challenge’… The bareness and size of the site seemed daunting, and the idea of designing and building something real seemed impossibly immense.</td>
</tr>
<tr>
<td>When we arrived on site in the morning, the area looked dauntingly incomplete with just the retaining wall and steps finished . . .</td>
</tr>
<tr>
<td>I can relate that the final work day began with uncertainty as to whether or not we would finish the project by the end of the day (this is not the first time this thought has crossed the mind of a landscape architecture graduate student).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Working together</th>
</tr>
</thead>
<tbody>
<tr>
<td>It was nice to see the different ideas and solutions to the site and to have the freedom to come up with ideas that might work.</td>
</tr>
<tr>
<td>It has been fascinating to see when we have had our pin ups in class how everything will be put together.</td>
</tr>
<tr>
<td>Everybody in the group can be my teacher. It was kind of them that helped me a lot with tool using.</td>
</tr>
<tr>
<td>Thanks […] to my 8 classmates who poured our sweat (and maybe a little blood, but hopefully no tears) into this design – I had a blast!</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Having fun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dirt on their jeans, shovels in hand, sweating and laughing, they [the students on the first work shift] definitely were working hard. …</td>
</tr>
<tr>
<td>Aside from all the digging we had to do to lay the foundation, the process of building the wall has been really fun. We all joked about the rocks ‘whispering’ in our ears about where they wanted to go, but it really did seem like after a short while it started to make more sense where each rock would best fit with the others</td>
</tr>
<tr>
<td>Although slightly intimidated, I gave the machine a whorl and had a blast!</td>
</tr>
<tr>
<td>Some of us tried it out and it is really fun to jump around on - think it turned out pretty well!</td>
</tr>
<tr>
<td>The limited time still brought me a lot of joy, the joy of working together with the group, and the joy of learning.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seeing tangible outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>It was great to see a tangible result after all of our hard work and I know that we’ll be happy to have the wall finished up soon.</td>
</tr>
<tr>
<td>I received a great deal of personal satisfaction from seeing something I designed documented on the web for all to see.</td>
</tr>
<tr>
<td>They [planter boxes] looked great! … It will be great to see them out on site on our next build day.</td>
</tr>
<tr>
<td>This past week we finished up the construction of the site and it looks fantastic!</td>
</tr>
</tbody>
</table>

Embarking on the design, students expressed anticipation, both in terms of mild excitement or curiosity and in terms of trepidation. One of the tasks the students were most apprehensive about was
developing a consensus on the final design. Despite the apprehension about the consensus building phase, the students appreciated seeing other’s design ideas and incorporating them into one design.

As the design was finalized and the project transitioned into the build phase, anticipation shifted from trepidation to a more positive form. Their excitement expressed not just a curiosity but also a real emotional investment in the design. But once the work started, the amount of it sometimes appeared overwhelming to the students.

Despite all the challenging experiences of the construction days (the physical exhaustion, the work delays, and feelings of being overwhelmed), having fun arose as a common theme throughout the build. The students’ abilities to have fun with the project, it seems, was directly linked how much they enjoyed working together. And, finally, as the pieces of the project came together, students expressed pride, a pride in creating something both tangible and attractive.

The emotions expressed sometimes were surprisingly strong, which begs the question if this emotional investment influences the extent of the learning experiences, especially in the realm of personal growth. The students were more than engaged in the project, they were invested in its outcomes. The hands-on, holistic, real world, collaborative, and service qualities of design-build courses seem to contribute to the learning outcomes. But the fun of teamwork, pride of accomplishment, and joy of helping others seems to create an emotional investment that might be what makes design-build education so powerful.

5 CONCLUSION

Viewing design-build from perspective of students creates a compelling argument for how valuable and rewarding design-build education can be. Even a relatively simple project produced a broad range of learning outcomes and emotionally-invested students. Most of what has been written about design-build courses as well as the students’ experience in this particular case support the proposition that students in design-build courses are: gaining construction knowledge, skills, and values; integrating design with construction; engaging with “real world” problems; developing personal qualities and interests; and improving their transition from school to work. This framework of learning outcomes can be used to structure future research on design-build education. Future research could also test these propositions through more quantitative and measurable methods. Other research could compare how these learning outcomes compare with other courses in a design curriculum.

Exploration of the design-build experience suggests that the hands-on, holistic, “real world,” and collaborative qualities of design-build courses influence these learning outcomes. Since it is a preliminary hypothesis, further studies are needed to verify the connections between these qualities and learning outcomes.

In this particular case, the emotional investment of the students also had a large influence on their experience. The experiences of anticipating, working together, having fun, and seeing tangible results appear to be significant to them. Future research could explore if these experiences are also important to students in other courses. If further corroborated, these hypotheses could form recommendations for the creation and execution of design-build courses. First, starting with a small project can be effective. Large scale design-build efforts can seem overwhelming for a beginner, but even small projects can produce a wide range of learning experiences. Second, getting students involved in the design decisions that have tangible outcomes can make them invested in the project. Both learning and a sense of pride comes from their seeing what they created come to life. And, finally, the fun that occurs in a design-build should be encouraged. The fun that arises from working together can make hard work and frustrations bearable and make learning powerful.

6 REFERENCES


MAKING OUR GRADUATES COMPETITIVE IN THE WORKFORCE: WHAT SOFT SKILLS DO STUDENTS, FACULTY, ALUM AND EMPLOYERS VALUE?

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1 ABSTRACT
Facing the realities of increased education costs, competitive job markets and new demands of the 21st century, Universities are exploring how they can revitalize education and make their graduates more competitive in the workforce. Today’s employers are looking for skills beyond discipline, knowledge and technical acumen. The study explores the ranking (using a force-rank response system) of soft skills (7 clusters with 7 characteristics each), such as communication, listening effectively, cross-disciplinary experiences, working well under pressure, ability to self-start and leadership. The soft skill priorities are compared to identify where students, faculty, alum and employers in Landscape Architecture and allied professions (n=1,036) agree or differ. The data is a subset of a larger study with over 8,000 respondents in Agriculture and Natural Resource disciplines from all 50 states and 31 Land-grant Universities. Mean scores are used to identify rankings of soft skills and ordinal regression to identify significant differences between the stakeholder groups. The employers rank order of soft skill priorities is: Communication, Self-management, Teamwork, Decision-making/Problem solving, Experiences, Professionalism, and Leadership. All of the stakeholder groups agree Communication is the most important soft skill with Employers value listening as the top Communication characteristic; above oral and written skills. Employers value Teamwork higher than students and faculty in importance for new employees. Discussion includes issues such as: students seem to under-estimate the importance of self-starting and that having a positive attitude is important to their future employers. Curricular implications are also discussed to enhance soft skill development.

1.1 Keywords
soft skills, employability, curriculum, communication
2 INTRODUCTION

The importance of soft skills are being extolled internationally - from government reports to university research studies. Employers, students and faculty are aware of the need to complement professional and technical skills with soft skills. This study explores the ranking (using a force-rank response system) of soft skills (7 clusters with 7 characteristics each), such as communication, listening effectively, cross-disciplinary experiences, working well under pressure, ability to self-start and leadership. The purpose of this study is to identify soft skill priorities and identify where students, faculty, alum and employers in Landscape Architecture and allied professions (n=1,036) agree or differ. The data is a subset of a larger study with over 8,000 respondents in Agriculture and Natural Resource disciplines from all 50 states and 31 Land-grant Universities.

The need for soft skills is receiving international attention. Findings from US national surveys are reporting that employers are encouraging students to place higher importance on their sense of urgency, being a quick study, being a team player and managing one's own time when in the work place (SCANS, 2000; Agricultural Future of America and Millennium Research, 2009). Employers in the United Kingdom are looking for more skills in oral communication, customer handling, problem-solving, and team-working (UK Commission on Employment and Skills, 2009). Communication skills include a strong foreign language component for employment in Asian and European markets (Arocena, Nunez & Villanueva, 2007; Zaharim et al., 2009). In terms of international experience and study abroad, US studies are finding both ends of the spectrum, from highly valued to least valued, for new employees (Gardner, Gross & Steiglitz, 2008; Scholar Ship, 2007).

A baseline study in South Africa speaks to gaps in the skills needed for new employees to “hit the ground running” and the mutual responsibility of employers and educators to address the gap (Griesel & Parker, 2009). Sensitivity to culture and diversity are also cited as important skills new employees should bring to the workplace (Barry, 2007). The Australia Department of Education and Training published a guide addressing core skills such as communication, teamwork and problem-solving in the social and work context of Western Australia (Commonwealth of Australia, 2009).

Universities may be lagging in preparing our future workforce with the skills and values they will need for success (Bolmen & Gallos, 2011). This is compounded by a potential disconnect between what students and faculty consider are important skills to learn, which can diminish the learning experience (Angelo, 1993). Studies in the US, Europe and Asia are finding employers feel university/college graduates need to expand their basic communication skills (Jagger, 2001; Stevens 2004; Zaharim et al., 2009). Phil Gardner, in his US nationwide study of recruiting trends, observed that “employers do not believe young people are not smart. In summary, employers believe young people lack the skills they need in the workplace: meaningful work experience; maturity to deal with the situations they will face as an employee; and command of the skills that allow them to converse with diverse colleagues, handle multiple assignments, and manage themselves.” (2013, p.30) University administrators and faculty are exploring how they can revitalize education and make their graduates more competitive in the job market. It’s more than just a matter of professional or technical knowledge, the soft skills of communication, decision-making, self-management and teamwork are critical skills employers are looking for in applicants (Crawford et al., 2011b).

3 SOFT SKILLS

While the literature explores a host of soft skills important for entry into the job market, many fail to discern differences in priorities. All of the soft skills are important. The literature also ranges from very broad, blanketing multiple industries, jobs and profession, to very specific, such as for computer technicians or engineers. Responsibility, asserts Lowden, et al., 2011, for learning and implementing these skills in their lives falls three ways: the public body or university, the employer, and the individual. Each specific sector of the market, however, requires specific competencies and skills for employment (SCANS, 2000).

The Association of Public and Land-grant Universities (APLU) commissioned report on soft skills creates a starting point for identifying soft skill priorities in Agriculture and Natural Resources related industries and connecting this information with US Universities. The APLU, located in Washington, D.C, focuses on higher education policies and gives a national voice to university concerns. The organization includes 221 member public universities, land-grant universities and state university systems with over 3.5 million undergraduate students (Fink, 2011; APLU, 2007-2011). The 2011 APLU National Academic
Comparability of Soft Skills: Data Set (Crawford et al., 2011c) is used for analysis with the Statistical Package for Social Science 19 (SPSS - IBM Statistics Software Editor). For this study the data is explored for significant differences of ranking of the soft skills between stakeholders using ordinal regression. This technique is selected due to the forced ranking of data used in the CASS study which places an “order” on the variables but does not indicate a scale or distance between the variables (IBM, 2011). Ordinal regression allows for multiple independent variables and unequal sample sizes. In this study, the stakeholder group is designated as the independent variable and the soft skill clusters and characteristics as the dependent variables (See Figure 1: Employers Soft Skills Ranking for full list). Using the SPSS ‘cellinfo’ option it was determined that all of the cells were populated allowing for analysis of the full data set. The analysis was run for 336 comparisons of the four stakeholder groups with the dependent
variables (7 clusters plus 49 characteristics). The findings include significant differences between the stakeholder groups. The sample size is \( n=1,036 \) and the Wald statistic is used to identify significant differences. Differences equal to or less than 0.05 are considered significant.

5 RESULTS AND DISCUSSION

The 1,036 survey responses are distributed across the four stakeholder groups with 38.5% students, 22.3% faculty, 36.1% alum and 3.1% employers. (See Table 1: Response Rate by Stakeholder). The 32 employer responses represent small to large businesses across the US and only one survey per firm or organization was collected.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>399</td>
<td>38.50%</td>
</tr>
<tr>
<td>Faculty</td>
<td>231</td>
<td>22.30%</td>
</tr>
<tr>
<td>Alum</td>
<td>374</td>
<td>36.1%</td>
</tr>
<tr>
<td>Employer</td>
<td>32</td>
<td>3.10%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1036</td>
<td>100%</td>
</tr>
</tbody>
</table>

The employers rank order the soft skill clusters with Communication, Self-management and Teamwork as the most important with Leadership as the least important for an entry level employee. (See Figure 1: Employers Soft Skills Ranking). Employers and students have significant differences for five of the seven soft skill clusters. Employers significantly rank Communication, Self-Management and Teamwork higher than students. Students rank Professionalism and Experiences significantly higher than employers. Employers rank Self-management significantly lower and Experiences significantly higher than faculty, alum and employers. Employers rank Decision-making higher than faculty, while faculty rank Teamwork lower than employers in importance for new employees. (See Table 2: Soft Skill Cluster Significant Differences across Stakeholders).

The employers rank order of the soft skill clusters are interpreted as a spectrum, with the top priorities being the basic building blocks with the skills building on each other (Fink, 2011). The results of this study are interpreted with Communication (the top priority) as a foundational skill for work. Self-management (second priority) is then the ability to work without explicit directions and monitoring, building towards working with others in teams (third priority). With development of personal and team skills, then Decision-making and Problem-solving in the workplace become viable roles for a new employee. The value of Experiences is influenced by the development of the previous skills. Experiences, such as internships or study abroad, may not have the impacts needed to foster learning and professional development if basic communication or decision-making skills have not been developed. The last two, Professionalism and Leadership, are then higher order skill sets which are possible because of the foundational skills.

For soft skill clusters at the entry level of the spectrum, (Communication, Self-management, Teamwork and Decision-making), all of the significant differences with students are with the students valuing the skill lower than faculty, alum and employers. As a cautionary note, because employers ranked Communication as number one doesn’t mean new graduates don’t have these skills, it just says this is their top priority soft skill when looking at new hires. Students place significantly higher emphasis on the other end of the spectrum (Experiences, Professionalism and Leadership) and not the foundational end of the spectrum. There can be a host of explanations for the students’ emphasis on the upper end of the spectrum. Some may be from generational norms or trends such as organized youth sports and activities where their activities are organized for them and they don’t realize skills are missing, inflated expectations of entry level employment, the plethora of unit or university “leadership” events, to the influences of web 2.0 on what is considered ‘valid’ knowledge, or appropriate communication and social interaction. For whatever the reason, exploring the disconnect is important. Employers are looking for base skills first, while students may be seeking leadership and other experiences more than the base skills.
Figure 1. Employer Soft Skills Ranking

Table 2. Soft Skill Cluster Significant Differences across Stakeholders

<table>
<thead>
<tr>
<th>Core Skills</th>
<th>Significant Differences by Stakeholder Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employer-Student</td>
</tr>
<tr>
<td>Communication</td>
<td>0.047 E</td>
</tr>
<tr>
<td>Self-Management</td>
<td>0.019 E</td>
</tr>
<tr>
<td>Teamwork</td>
<td>0.003 E</td>
</tr>
<tr>
<td>DM/PS</td>
<td></td>
</tr>
<tr>
<td>Experiences</td>
<td>0.024 S</td>
</tr>
<tr>
<td>Professionalism</td>
<td>0.041 S</td>
</tr>
<tr>
<td>Leadership</td>
<td></td>
</tr>
</tbody>
</table>

Within each cluster, seven descriptive characteristics give deeper meaning to the cluster. Significant differences between stakeholder rankings emerged (4 stakeholder groups and 7 characteristics = 42 comparisons per cluster). The cluster with the most differences in ranking characteristics is Experiences, with over half of the possible comparisons between stakeholder groups significant. Two thirds of these differences are between students and the other stakeholder groups. Self-management and Communication follow second and third with 40% and 33% of the possible stakeholder comparisons significant. The students represent the majority of significant differences in both clusters. Professionalism is next with a quarter of the possible comparisons significant. The majority are differences between alum and students or alum and faculty. Decision-making, Teamwork and Leadership have the least number of significant differences. Student to faculty and alum comparisons represent the most differences in the Decision-making cluster. In Teamwork, alum have the most significant differences and in Leadership the majority of differences are between students and faculty. (See Figure 2: Significant Differences within Soft Skill Cluster Characteristics and Table 3: Significant Difference Occurrences by Characteristic within Clusters). An in-depth analysis of each individual cluster and characteristics are presented next.

Figure 2. Significant Differences within Soft Skill Cluster Characteristics

Table 3. Significant Difference Occurrences by Characteristic within Clusters

<table>
<thead>
<tr>
<th>Skill</th>
<th>Number of Significant Differences Among Stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>Communication</td>
<td>14 (33.3%)</td>
</tr>
<tr>
<td>Self-Management</td>
<td>17 (40.5%)</td>
</tr>
<tr>
<td>Teamwork</td>
<td>7 (16.7%)</td>
</tr>
<tr>
<td>DM/PS</td>
<td>8 (19.0%)</td>
</tr>
<tr>
<td>Experiences</td>
<td>24 (57.1%)</td>
</tr>
<tr>
<td>Professionalism</td>
<td>11 (26.2%)</td>
</tr>
<tr>
<td>Leadership</td>
<td>6 (14.3%)</td>
</tr>
</tbody>
</table>

5.1 Communication

Communication is the most important soft skill for employers. Students also rank Communication as the most important, yet significantly value it less than the employers. Employer rank order of the characteristics is: listen effectively, communicate accurately and concisely, communicate pleasantly and professionally, effective oral communication, effective written communication, ask good questions, communicate appropriately and professionally using social media. Faculty value communicating pleasantly and professionally significantly less and written communication significantly higher than the other groups. Employers, faculty and alum value asking good questions higher than students. Students, on the other hand, value skills for appropriate and professional social communications higher than the other groups. (See Table 4: Communication Characteristics with Significant Differences by Stakeholder).
In this study, Communication skills are the most important and listening skills are the most important characteristic of Communication. How often are ‘listening skills’ a learning objective in a course syllabus? Or is it a skill that students are expected to have upon entering the design studio? Given the importance across the stakeholder groups, perhaps more direct attention is warranted. Because of the alignment with student responses it can enhance learning – they already value it and may appreciate listening skills being formally addressed in their classwork (Angelo, 1993).

A social interaction disconnect is potentially in play between students and the other stakeholder groups. Employers, faculty and alum value the social aspect of learning and working through the processes of asking good questions while the students emphasize skills in digital communications, such as facebook, twitter and blogging more than the other groups. This may be a generational comfort, or preference, of face-to-face communications versus digital.

### Table 4. Communication Characteristics with Significant Differences by Stakeholder

<table>
<thead>
<tr>
<th>Communication</th>
<th>Significant Differences by Stakeholder Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employer-Student</td>
</tr>
<tr>
<td>1 Listen</td>
<td></td>
</tr>
<tr>
<td>2 Acc&amp;Concise</td>
<td></td>
</tr>
<tr>
<td>3 Pleasant</td>
<td>0.005 E</td>
</tr>
<tr>
<td>4 Oral</td>
<td></td>
</tr>
<tr>
<td>5 Written</td>
<td>0.011 F</td>
</tr>
<tr>
<td>6 Questions</td>
<td>0.021 E</td>
</tr>
<tr>
<td>7 Social Media</td>
<td>0.017 S</td>
</tr>
</tbody>
</table>

Letter Indicates the Stakeholder that Places Higher Emphasis on the Skill/Characteristic. S= student, F=faculty, A=alum, E=employer

### 5.2 Self-Management

Self-management is the second most important soft skill cluster for employers and they rank it significantly higher than the students. Employers top four characteristics are: efficient and effective work habits, self-starting, well-developed ethic, integrity and sense of loyalty, and sense of urgency to address and complete tasks. Employers and faculty significantly value self-starting more than students. Students value the ability to work well under pressure and dedication to professional development significantly more than employers and faculty. (See Table 5: Self-Management Characteristics with Significant Differences by Stakeholder).

### Table 5. Self-Management Characteristics with Significant Differences by Stakeholder

<table>
<thead>
<tr>
<th>Self-Management</th>
<th>Significant Differences by Stakeholder Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employer-Student</td>
</tr>
<tr>
<td>1 Work Habits</td>
<td>0.028 E</td>
</tr>
<tr>
<td>2 Self-Starting</td>
<td>0.000 E</td>
</tr>
<tr>
<td>3 Ethic</td>
<td></td>
</tr>
<tr>
<td>4 Urgency</td>
<td>0.027 S</td>
</tr>
<tr>
<td>5 Pressure</td>
<td></td>
</tr>
<tr>
<td>6 Technology</td>
<td>0.046 E</td>
</tr>
<tr>
<td>7 Prof. Devel.</td>
<td>0.001 S</td>
</tr>
</tbody>
</table>

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Students seem to under-estimate the importance of self-starting as an important skill for new employees. This may be a reflection of their ‘managed’ academic world with course assignments
containing set due dates, specified objectives to fulfill and information delivery through lectures, reading lists, and resource guides provided by an instructor. Fitting courses into University semesters/quarters and a lock-step professional design curricular structure also allows students to progress through a curriculum without thinking much about when to start or stop. Practicing self-starting behaviors can be supported through co-curricular and extra-curricular clubs or activities, and are especially useful when they help build multiple soft skills. The students’ dedication to continued professional development is applauded, but may be a bit pre-mature. This may connect with employers concerns that students are graduating with an unrealistic sense of where they will start in the workforce (Gardner, 2013).

5.3 Teamwork

Teamwork is in the top three soft skills clusters for employers, with being a productive team member and a positive attitude the top descriptive characteristics. Of the few significant differences in this cluster, most involve the alum. Alum significantly value punctuality and meeting deadlines more than employers, working with multiple approaches higher than faculty, and awareness and sensitivity to diversity higher than faculty or students. Employers join the alum in valuing a positive attitude significantly more than students. (See Table 6: Teamwork Characteristics with Significant Differences by Stakeholder).

An important aspect of the characteristics in this cluster is the lack of significant differences between students, faculty and employers. While students may not like teamwork for course projects, and rank the cluster as a whole lower than employers, there is substantial agreement on the important descriptive characteristics of teamwork. This is with one exception; students undervalue the importance of having a positive attitude and possibly how this can be a valuable attribute in the workplace and in supporting productive teamwork. The finding doesn’t indicate that students have a negative attitude, just that they may not be connecting the adage “attitude is everything” with success in gaining entry level employment and promotion.

<p>| Table 6. Teamwork Characteristics with Significant Differences by Stakeholder |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|</p>
<table>
<thead>
<tr>
<th>Teamwork</th>
<th>Significant Differences by Stakeholder Comparisons</th>
<th>Employer-Student</th>
<th>Employer-Faculty</th>
<th>Employer-Alum</th>
<th>Faculty-Student</th>
<th>Faculty-Alum</th>
<th>Student-Alum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Prod. Member</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Pos. Attitude</td>
<td>0.009 E</td>
<td></td>
<td></td>
<td></td>
<td>0.000 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Accountable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Deadlines</td>
<td></td>
<td>0.013 S</td>
<td></td>
<td>0.018 A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Mult. Appro.</td>
<td>0.022 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Mult. Audience</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Diversity</td>
<td></td>
<td></td>
<td>0.038 A</td>
<td></td>
<td>0.000 A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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5.4 Decision-Making / Problem-Solving

At the cluster level, employers rank Decision-making lower than faculty in importance for new employees. This may be a systemic problem where the academia sees it’s role as to help students learn how to make decision and solve problems. But as new employees in the workforce, they need to learn the ropes of the business before jumping in and making decisions. Another interpretation is looking at the Teamwork and Decision-making clusters together. Employers place a higher value on the interpersonal skills which are developed in Teamwork and the faculty place a higher value on critical thinking skills which are developed through problem identification and decision making processes. Both are important, but who is responsible for teaching which skills, and to what level of mastery, needs to be vetted across the stakeholder groups so that graduates are competitive in the job market.

The students have a different view than the faculty, with significant differences for four of the seven characteristics. Faculty value identifying and analyzing problems and finding creative and innovative solutions significantly higher than students. Students value understanding the effects of
decisions and life-long learning significantly more than faculty. (See Table 7: Decision-making / Problem-solving Characteristics with Significant Differences by Stakeholder).

### Table 7. Decision-making / Problem-solving Characteristics with Significant Differences by Stakeholder

<table>
<thead>
<tr>
<th>DM/PS</th>
<th>Significant Differences by Stakeholder Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employer-Student</td>
</tr>
<tr>
<td>1 Ident. Probl.</td>
<td>0.000 F</td>
</tr>
<tr>
<td>2 Action</td>
<td>0.021 A</td>
</tr>
<tr>
<td>3 Effect of Dec.</td>
<td>0.001 S</td>
</tr>
<tr>
<td>4 Transfer Knowl.</td>
<td>0.006 F</td>
</tr>
<tr>
<td>5 Creative Solut.</td>
<td>0.029 S</td>
</tr>
<tr>
<td>6 Life. Learn.</td>
<td>0.029 S</td>
</tr>
<tr>
<td>7 Abstract Think.</td>
<td>0.029 S</td>
</tr>
</tbody>
</table>

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### 5.5 Experiences

Experiences are the most contested skill cluster with students valuing Experiences significantly higher than employers, faculty and alum. The differences continue within the descriptive characteristics with two-thirds of the significant differences between students and the other stakeholder groups (16 of 24). Faculty and employers both rank teamwork and internship experiences significantly higher than students. The students rank leadership experiences and cross-disciplinary experiences significantly higher than faculty, alum and employers. (See Table 8: Experiences Characteristics with Significant Differences by Stakeholder).

### Table 8. Experiences Characteristics with Significant Differences by Stakeholder

<table>
<thead>
<tr>
<th>Experiences</th>
<th>Significant Differences by Stakeholder Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employer-Student</td>
</tr>
<tr>
<td>1 Work-Internsh</td>
<td>0.000 E</td>
</tr>
<tr>
<td>2 Teamwork</td>
<td>0.000 E</td>
</tr>
<tr>
<td>3 Leadership</td>
<td>0.009 S</td>
</tr>
<tr>
<td>4 Proj. Mgmt.</td>
<td>0.014 A</td>
</tr>
<tr>
<td>5 Cross Disc.</td>
<td>0.000 S</td>
</tr>
<tr>
<td>6 Community</td>
<td>0.001 E</td>
</tr>
<tr>
<td>7 International</td>
<td>0.001 F</td>
</tr>
</tbody>
</table>

Letter Indicates the Stakeholder that Places Higher Emphasis on the Skill/Characteristic. S= student, F=faculty, A=alum, E=employer

Faculty rank international experiences and cross-disciplinary experiences higher than employers. In contrast, employers rank community engagement experiences significantly higher than faculty. This cluster needs significant dialogue and processing to unpack the meaning and root of the strongly different perceptions of these types of student experiences. Integrating these into curricular offerings is costly for everyone involved – faculty, employers and students. Yet, these types of experiential and authentic learning are considered to be some of the most powerful ways to enhance learning (Doyle, 2011; Kuh, 2008). Are we not preparing the students adequately to connect their learning with the experiences? Do we need to spend more time on reflection so that students can communicate their learning? Are we focusing limited resources on the most impactful learning experiences?
5.6 Professionalism

Professionalism is ranked 6th of the 7 skill clusters by employers. The majority of significant differences are between faculty and the other groups (8 of 11) and half of the differences are with the alum stakeholder group. (See Table 9: Professionalism Characteristics with Significant Differences by Stakeholder). Effective relationships with customers, business and the public is ranked first by employers and is significantly undervalued by faculty when compared to the other groups. This could be an important gap if the importance of effective relationships in the workplace is not being addressed with the students. Faculty place a significantly higher value than alum on the characteristics of trustworthy with sensitive information, dealing effectively with ambiguity, and, working with and accepting advice from a mentor. These characteristics may be more important in the academic setting than for an entry level employee. No significant differences were found with accepting and apply critique in the workplace and maintaining appropriate décor and demeanor.

Table 9. Professionalism Characteristics with Significant Differences by Stakeholder

<table>
<thead>
<tr>
<th>Professionalism</th>
<th>Significant Differences by Stakeholder Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employer-Student</td>
</tr>
<tr>
<td>1 Cst. Relations.</td>
<td>0.026 E</td>
</tr>
<tr>
<td>2 Critique</td>
<td></td>
</tr>
<tr>
<td>3 Role in wrkplc</td>
<td>0.001 S</td>
</tr>
<tr>
<td>4 Trustworthy</td>
<td>0.002 F</td>
</tr>
<tr>
<td>5 Ambiguity</td>
<td></td>
</tr>
<tr>
<td>6 Décor/dmrnr</td>
<td></td>
</tr>
<tr>
<td>7 Mentor</td>
<td></td>
</tr>
</tbody>
</table>

Letter Indicates the Stakeholder that Places Higher Emphasis on the Skill/Characteristic. S= student, F=faculty, A=alum, E=employer

5.7 Leadership

Leadership is ranked 7th by employers, potentially representing Leadership as the pinnacle of the soft skills. The major difference in perspectives is between faculty and students. (See Table 10: Leadership Characteristics with Significant Differences by Stakeholder). This scenario represents a similar situation to how the clusters can be explored with the top characteristics as entry level foundational skills and the last characteristics as higher order skills. foundational characteristics of learning how to see the big picture and respecting contributions from others.

Table 10. Leadership Characteristics with Significant Differences by Stakeholder

<table>
<thead>
<tr>
<th>Leadership</th>
<th>Significant Differences by Stakeholder Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employer-Student</td>
</tr>
<tr>
<td>1 Big Picture</td>
<td></td>
</tr>
<tr>
<td>2 Lead/Follow</td>
<td></td>
</tr>
<tr>
<td>3 Respect</td>
<td></td>
</tr>
<tr>
<td>4 Conflict mgmt</td>
<td></td>
</tr>
<tr>
<td>5 Relationships</td>
<td></td>
</tr>
<tr>
<td>6 Motivate</td>
<td></td>
</tr>
<tr>
<td>7 Lead Change</td>
<td></td>
</tr>
</tbody>
</table>

Letter Indicates the Stakeholder that Places Higher Emphasis on the Skill/Characteristic. S= student, F=faculty, A=alum, E=employer

Students emphasize the higher order characteristics of motivating and leading others, and recognizing change is needed and leading the change effort. With the increase in leadership events and programs across college campuses, a touch of caution is wise. While learning is enhanced when students
are in a compelling and engaging situation (such as leadership), placing them in situations beyond their skill level, especially without appropriate support and guidance, decreases their learning (Komives et al., 2011). This may be a case where faculty guidance to insure the foundational skills are in place first is appropriate.

6 SUMMARY AND CONCLUSIONS

The findings can inform educational curriculum to better prepare undergraduates across the full spectrum of professional skills, disciplinary knowledge and soft skills. While ALL of the soft skills are important, the employer priority rankings can aide in where to focus limited resources. The differences between stakeholder groups can assist with bridging across the perspectives and values. The final solution will be a combined education, industry and individual effort. When looking at the characteristics of the individual soft skill clusters, faculty and employers do not have any significant differences in Self-management, Teamwork, Decision-making and Leadership. The majority of significant differences are found with student comparisons to the other stakeholder groups, and the highest frequency of difference is with faculty and student comparisons.

Active learning, learner-centered teaching, authentic learning and connecting learning to real-world situations, to name a few, are some of the approaches in curricular design that connect development of disciplinary knowledge and soft skills. In the seminal article, "Seven Principles of Good Practice in Undergraduate Education," Chickering and Gamson (1987) address the importance of active learning for students to connect with and apply their learning in their own lives. Embedded in the seven principles the authors emphasize the soft skills of oral and written communications, problem solving and teamwork. In 1993 Angelo published fourteen research based principles for improving learning. This work brought out the importance of a connection, or fit, between the students and the teachers goals to enhance learning efficiency and that 'unlearning,' or changing an assumption, can be more difficult than learning new material. When applied to soft skill development, a difference in priorities between students and faculty of which soft skills are important diminishes the potential learning that could occur (Angelo, 1993). Helping students understand why they are important, and which ones employers value can remove learning barriers. Soft skills are often an unintended, or incidental, learning byproduct of a curricular design (Crawford et al., 2012; Engelkemeyer and Brown, 1998). Some of these skills, such as listening, communicating with diverse groups and time management, may be extremely important for employability and early career success. Whether attended to explicitly or incidentally, soft skills are an essential piece of making our graduates competitive in the workforce.

Further research can include comparing the priorities of the Landscape Architecture and allied professions to other disciplinary / professional groups. This is important for the University setting where curricular decisions, and priorities, can be set by upper admistration. Parents can also be considered another influential stakeholder group that influences how students perceive the value of soft skills.

7 ACKNOWLEDGEMENTS

Thank you to the Association of Public and Land-grant Universities for permission to use the Comparative Analysis of Soft Skills Data Set in this research. Support for the CASS Report project was provided by the Association of Public and Land-grant Universities, the University-Industry Consortium, Michigan State University and MSU AgBio.

8 REFERENCES


THEORY THEATRE: REFLECTIONS ON AN EXPERIMENT IN BORDER PEDAGOGIES

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1 ABSTRACT

“With cities, it is as with dreams: everything imaginable can be dreamed…” (Calvino, 1972, p.44)

Bryant Alexander describes border pedagogy as a transformative practice that aspires to “engage students in the places and ideological spaces of their own experiences as they try to make sense of culture and curriculum” (p.427). Grounded in theories of performance (Thrift & Dewsbury, 2000), border pedagogies situate knowledge acquisition within an embodied, temporal, dialogical, and spatial experience for the learner. As a critical discourse, border pedagogies challenge hegemonic divisions within design schools, “refiguring the boundaries” (Giroux, 1991b, p.ix) between educator and student, thinking and making, and theory and spatiality. As an experiment in border pedagogy, theory theatre provides students with an opportunity to remap the critical dimensions of theory through a performance-based pedagogy. Working in groups of four, students construct a conversation between a theorist and a designer. The dialogue is theatrically staged within a series of imagined environments each discursively constructed through interpretations of theory. Theory theatre encourages students to act out the social, cultural and political codes embedded in theory, not only critically, but also spatially. Students reconfigure traditional terrains of textuality (Scholes, 1985) through alternative modes of representation, incorporating “play” as a “serious object of politics and analysis” (Giroux, 1991a, p.72). Reflections on the experience of theory theatre discuss the potential of theory as a performative medium which may open a space for “thinking otherwise” (Thrift & Dewsbury, 2000, p.428).

1.1 Keywords
design education, border pedagogy, performance, critical theory
2 BACKGROUND TO THE RESEARCH

McHarg: “Dystopie, when I visited it, was of little resemblance to the utopias envisioned by the institutions from which it was born. The city was beautiful, a single organism, from the airplane, but the at street level the people had taken advantage of the preserved natural spaces. The resident’s extravagant lifestyle had come at the price of nature.” (Loewen, Abdulrehman, Eidick, Yang, Mojica, 2012, p.19)

Bryant Alexander (2005) describes border pedagogy as a transformative practice that aspires to "engage students in the places and ideological spaces of their own experiences as they try to make sense of culture and curriculum" (p.427). Grounded in theories of performance (Thrift and Dewsbury, 2000), border pedagogies situate knowledge acquisition within an embodied, temporal, dialogical, and spatial experience for the learner. As a critical discourse, border pedagogies challenge hegemonic divisions within design schools, "refiguring the boundaries" (Giroux, 1991b) between educator and student, thinking and making, and theory and spatiality.

This paper provides a critical reflection on the pedagogical significance of an educational experiment known as theory theatre. In this regard, I position myself as a critically reflective teacher (Brookfield, 1995) seeking to problematize traditional means of delivering and receiving knowledge. Within this guise I shall endeavor to "deterriorialize the map of dominant cultural understanding, ... [and reject the traditional learning model] as the exclusive referent for judging what constitutes historical, cultural, and political truth" (Giroux, 1991a, p.70). In this task I am equally positioned as what Henry Giroux describes as a "critically informed postmodern educator" (p.69). Here, my territory is the realm of culture, of which environmental design, landscape architecture, and the academy itself, are all generators, conveyers, producers, imitators, and consumers of cultural forms and values. Situated in the classroom, the critically positioned educator produces opportunities within the learning modules for students to experience "individual empowerment and social transformation" (Weber, 1988 in Dutton, 1991b, p.67).

The design school is a microcosm, or fractal of a larger world. Schools are not, as some students may declare, a place apart from the real world. Situated as design educators, our milieu is a veritable ratatouille of conflicted power relations, identity politics, diverse values, and the stresses and strains of any major institution where large numbers of humans congregate. However, as a "training" ground for professional practice, where students spend large amounts of time in a design studio, overseen by single or multiple tutors, students may become sequestered from the every-day world and vulnerable to the internal power hegemonies that remain endemic in design institutions (See Nicol and Pilling, 2000). Equally, the need to supplement studio education with courses of shorter duration such as history, theory, and the technological based courses such as digital methods, site planning, and grading can fragment student experience with competing workloads and deadlines, and even divergent ideological stances. In this scenario, students may rebel against the workload, or beg for an extension, but they are seldom critically sensitized to question the ways in which knowledge in the academy is delivered, replicated, evaluated. Many design educators remain equally unaware of the presence and implications of this hidden curriculum.

The hidden curriculum is produced in the alchemical merger between knowledge production and social practices in schools of design. As Thomas Dutton (1991a) notes: "...injustices and inequities of society are not simply nested in the mind but are embodied in forms of lived experience and social relations that penetrate to the innermost recesses of human subjectivity..." (p.167). For Dutton, awareness calls for action on four fronts--the problematizing of the conflicted relationship between society and power inequities, the development of critical awareness in teachers and in students, the empowerment of individuals who are able to derive meaning from the world, and the role of theorizing design education as a form of cultural politics (p.166).

This experiment in critical pedagogy is housed in an undergraduate landscape + urbanism theory course. Theory and theorizing provide a means of illuminating the underpinnings of the discursive universe, challenging us to reconsider the broader social, cultural, economic, political, spiritual and environmental implications of our actions, and of those who have preceded us. Examined theoretically, artifacts, social practices, cultural mores, ideas, and the production of space are revealed as charged with human morals, values, and machinations; and thus design as an extension of human culture, is no longer
viewed as a neutral construct, nor as monolithic or unchanging, but as a site of multiple and heterogeneous borders” (Giroux, 1991a, p.75).

In seeking a theoretical platform upon which to engage in a series of critical reflections on the pedagogical implications of theory theatre, I was drawn to the potential of performative theory, for this mode of inquiry is implicitly directed towards examining “the social and cultural dynamic that extends and exposes the import of repetitive human activity” (Alexander, 2005, p.414) and is intended to reveal "social action as moments of broader power relations that can be illuminated, interrogated, and intervened, if not transformed" (p.414). The three primary concerns of performance theory privilege the incorporation of creative and aesthetic means of activating human expression “across borders of text, context, and embodied practice” (p.414), knowledge as “enfleshed” – situated, activated and demonstrated through the body (McLaran, 1993 in Alexander, 2005, p.425), and ethnographic approaches to reading, translating, and performing cultural practices (p.415). This final point makes reference to the liberation of the history and the theory of philosophy, ideologies and designed environments from traditional forms of knowledge reproduction in theory courses, from the report, the paper, the text gleaned from a master narrative, to a performed temporal and spatial realm of lived experience.

Performance is not foreign to theoretical discourse within schools of design. Our curriculum is peppered with references to the conceptual history of performance--the futurists, Dadaism, surrealism, (see McCall, 2000), manifestos and their idiosyncratic actors, the role of the flaneur in the activation of the city, but the key players in these performances are invariably white and male (see Wilson, 1992) and do not reflect the diversity in our contemporary classrooms. Walking as both a performative and as an epistemological activity has been ever adjacent to design discourse through the work of Stalker and Francesco Careri (2002) and Rebecca Solnit (2000; 2005) who have become essential readings for many students of landscape architecture. Certainly Anna and Lawrence Halprin’s RSVP Cycles (1969) are directly relevant to discussions here.

3 DEFINITIONS

Jencks: “Within the creation of what we understand to be the universe (The Big Bang) there was a city created within the cracks of the four forces – time, space, matter, and energy.” (Choi, Greene, Kirkland, Mejia, 2012, p.8)

Clarification of a few terms will assist the reader with this journey into the theoretical implications of performative design pedagogy. This curricular approach is situated as a “border pedagogy” (Aronowitz and Giroux, 1991, p.128). Border pedagogies are, by nature, transformative critical practices, that aim to engage students in places and ideological spaces of own making and experiences as a means of making sense of culture, curriculum, and in our instance, the production of space (Giroux, 1991a). Border pedagogies call for the renegotiation of traditional borders, boundaries, and edges that demark the divisions between thinking and making, between teacher and student, between student and text, and between schooling and “the real world”. As a postmodern pedagogical practice, border pedagogies not only acknowledge, but incorporate the critical reading of “official texts”, the legitimization of video, photography, performance, forms of popular culture, and the everyday, not only serve as alternative sources of knowledge but also as alternative modes of representation (p.72-73). “Border pedagogy must provide the conditions for students to engage in cultural remapping as a form of resistance” (p.73). As a border pedagogue, the educator must critically reflect on the implication of this approach to design education, “…student experiences have to be analyzed as part of a broader politics of voice and difference” (p.75). Equally, the educator is charged with developing a means of subverting entrenched “hierarchies of oppression” and traditional trajectories of power, and liberating discourse from entrenchment in taken-for-truth master narratives while acknowledging the role of the body as a “site of knowing and feeling, and the site from which transformation is instantiated and initiated” (Alexander, 2005, p.425). Thus the critical educator must “strategizes purposeful learning with an awareness of the social, cultural, and political contexts in which learning and living take place” (p.426).

Performance has roots in non-representational theories (Thrift and Dewsbury, 2000) and was initially intended as a discourse that transgressed repressive social practices surrounding gender and sexuality (Butler 1993, in Thrift and Dewsbury, 2000, p.412). While Nigel Thrift and John-David Dewsbury have identified three distinct apprehensions of performance following Judith Butler’s work, they note the
following common attributes or aims of performance—a departure from traditional forms of representation, a focus on the epistemological potential of embodied practice, the revelation of new potentialities within human/non-human relationships, and the desire to enliven spaces [of learning] (p.411). Performance in this application is an experimental pedagogical construct, a means of “seek[ing] understanding of other cultures and lived experience [through a] body-centered method of knowing” (Alexander, 2005, p.411). Performance as a means of representing theoretical notions and the production of space become what Hayden Lorimer (2005) describes as “more-than-representational”. Text is researched, discussed, translated, performed, and reflected upon within a collective realm. Meaning cannot be transcribed by traditional means of dissemination, rather a “countermemory” (Giroux, 1991a, p.75) is produced, transgressing and reconstructing new knowledge in vanguard configurations. As a “more-than-representational” pedagogical construct, performance potentializes “an escape from the established academic habit of striving to uncover meanings and values that apparently await our discovery, interpretation, judgement and ultimate representation” (Lorimer, 2005, p.84).

4 RESEARCH QUESTIONS

J.B. Jackson: “I am reminded that every city can be described metaphorically, there is more to a city than what visually appears.”
Laurie Olin: “I agree it is almost as if every city has its own language, I try to listen and translate the language into sketches.”
J.B. Jackson: “Yes, the language, the locality, its uniqueness – the vernacular of the city.” (Shin, Brubacher, Idowu, and Ryback, 2012, p.13).

Theorized reflections on the experience of theory theatre provide an opportunity to discuss the potential of theory as a performative medium which may open a space for “thinking otherwise” (Thrift and Dewsbury, 2000, p.428) about pedagogical practices in design. Although we may know that design is never neutral, formal methods of developing form, the cold-instrumentalism of digital representation, and the insularity of schools of design may lead students to never question the implications of design in the lived-world, nor their own biases. Like all human constructs, design is shaped by human partialities, and although as landscape architects, we may explicitly insist that design emerges from a sensitivity to context, that context is as much as social realm as an environmental realm, and the interventions we propose for any location are filtered through our proclivities and subjectivities. As Dutton (1991b) observes “design...is an intentional practice that portrays the world in quite specific ways” (p.68).

As design educators, our biases and sensitivities leak into our curricular formations, thus we must find deliberate means of interrogating our practice. We must learn to read the cultural codes and cues that we embed in our pedagogy; we must question how and why these codes are produced and represented (Giroux, 1991a). How does our ideological stance effect the development of our students as independent, activated, aware producers of knowledge and of space? Giroux charges critical educators with the task of avoiding the replication of taken-for-granted ways of delivering knowledge and hidebound disciplinary boundaries. “Students must engage knowledge as border-crossers, as persons moving in and out of borders constructed around coordinates of differences and power” (p.72).

Determining the success of a pedagogical construct is seldom taken on as an exercise in critical theoretical reflection. On a day-to-day basis, our success as design educators is measured by the lack of absenteeism in our classroom, by the bell curve measuring the students’ accomplishments, by smiling emoticons in the comment section of the course evaluations. But student success cannot be represented by measures alone, these record mere frozen moments and cannot account for the fluidity of thought, the generativity of ideas, and the emancipatory potentials of a pedagogical episode that seeks to break with “established academic habits” (Lorimer, 2005, p.84).

Theory theatre is a means of deliberately disrupting pedagogical practices and expectations. This approach to learning and reflecting on theoretical principles and their application to spatial constructs is unconventional and its success immeasurable. Space is brought into becoming dialogically, discursively, and performatively. Reflections regarding the significance of the pedagogy are, in some respect, more-than-representational (Lorimer, 2005), as the social, affective, embodied and performative aspects of choreographic theorizing are complex and generative. For students, the moments of revelations may occur prior, during, or even months or years following performative act. Theory theatre constructs space
as embodied--thought and actions interface with emplaced identities (in-formation). As a performance-based pedagogy, theory theatre is intended to be "a social force, a strategic embodied methodology, and a moral discourse" and a "critical pedagogical practice designed to democratize the classroom" (Alexander, 2005, p.424). How then can we begin to understand the pedagogical significance of such an event? For Alexander it is the act of theorizing that provides the means for reflecting upon teaching practice and examining the value of performance as an insurgent method of engaging, critiquing, and commenting on culture (p.424).

5 METHODS

Virilio: "Like a long suppressed memory that cannot be erased, war shaped this city. Military tanks of old times were the feet that used to roam its former asphalt roads. Boulevards were widened to accommodate these tanks – to deliver them as fast as possible to the unruly rioters. Now motorists – with their ghostly absence – have gifted these grids with their presence". (Cook, Flores, Li, and Moug, 2012, p.12).

As an experiment in border pedagogy, theory theatre provides students with an opportunity to remap the critical dimensions of theory through a performance-based pedagogy. Working in groups of four, students construct a conversation between a theorist and a designer. The project is assigned at the commencement of the term, and time is provided in the classroom for discussion, both within the individual groups, and with course instructors. Students theatrically stage the dialogue within a series of imagined environments, each discursively constructed through interpretations of theory. Theory theatre encourages students to act out the social, cultural, and political codes embedded in theory, not only critically, but also spatially. Students reconfigure traditional terrains of “textuality” (Scholes, 1985) through alternative modes of representation, incorporating “play” as a “serious object of politics and analysis” (Giroux, 1991a, p.72).

The origins of theory theatre in this guise are somewhat lost within a constellation of intertwined recollections regarding its genesis. I believe the stirrings of the idea began in a conversation about how to integrate a session on utopian cities into an undergraduate theory course. The dialogue between myself, and the teaching assistant for the course, Desirée Bunn, surrounded our amore for Italo Calvino’s (1972) Invisible Cities. We began to imagine the students constructing a dialogue around the production of space, in the same manner that Marco Polo and Kublai Khan dialogically reconstruct a series of cities:

Kublai: “I do not know when you have had time to visit all the countries you describe to me. If seems to me you have never moved from this garden.”
Polo: “Everything I see and do assumes meaning in a mental space where the same calm reigns as here, the same penumbra, the same silence streaked by the rustling of leaves. At the moment when I concentrate and reflect, I find myself here again, always in this garden, at this hour of the evening, in your august presence, although I continue, without a moment’s pause, moving up a river green with crocodiles or counting the barrels of salted fish being lowered into the hold.” (Calvino, 1974, p.103)

Concurrent to this conversation with Desirée, were discussions with fellow educators in our history/theory streams surrounding how to and when to introduce the students to particular philosophers, philosophies, and ideologies. As an educator and researcher, I am very interested in how theory can inform the act of design, but more over, I am intrigued by how theory allows us to dissect and to understand the world on a deeper level. This, I believe, is essential knowledge for students of design. Following Jonathan Culler (1997), my approach to theory is interdisciplinary, founded on the belief that theory is a tool for analysis, for the uncovering and dissemination of meaning and that theory is a tool of speculation. Additionally, theory forces us to move beyond common sense thinking and taken-for-granted ways of knowing—or questioning things we believe to be “natural” or given. Finally theory is reflexive, reflective, and revelatory, a means of thinking deeply about the way that we think about things in the world (p.15).

The final piece in the genesis of the project lays in the conundrum of how to activate students’ understanding of the interrelationship between philosophical constructs and spatial expressions, and to
help them discover how this has implications for the built-environment. We wanted to invite the students to envision the political, economic, environmental, and aesthetic implications of ideological constructs of lived-space. As I began to assemble the list of possible “players” for the students to explore, I became aware that the lists I made were subject to my own ethnic, gendered, and experiential biases—biases that did not necessarily reflect the diversity within the classroom. And so although I do provide the students with a series of potential candidates, many of whom have been prefaced through readings and lecture content, the students are free to suggest alternatives.

The students construct a conversation between two individuals and a series of cities. One individual is a theorist or philosopher and the other a designer. The students contrive a discursive space where the conversation takes place. Three or four cities emerge from the convergence of the setting and the discussions between the characters. Students are asked to consider how their characters’ ideas inform the envisioning of the cities and how their ideas may influence and interplay with each other. Spatial form is to be thought of as a manifestation of these ideas and thus can be abstract, symbolic or iconic in form and character. Students consider the materiality of the city, its scale, its street patterns, the qualities of public space, what sort of environmental conditions shape the city and how all of this effects the human experience of the space.

Students form groups of four or five; the project lends itself to two primary actors, allowing those uncomfortable with performing to take on other roles such as documenting the performance and producing a “playbook” of the script. What I believe to be the most dynamic actions of the project take place beyond the instructor’s purview—that is the deciphering, deconstruction, and remapping of the cultural codes embedded within the discourse on their subjects. Group dialogue is employed as a means of retelling, summarizing, expanding and reimagining histories. The performances are short, only 15 minutes in duration, and take place in a lecture space with minimal props. The settings are quite remarkable given the simplicity of the performance space—an office, a transit bus, an airplane, trains, coffee shop, a library, a taxi-cab, a bedroom. Students are invited to wear costumes and most do, as it aids in becoming the character. Students merrily exchange their own ethnicities, genders, and sexual identities for an interpreted version of the subject of their inquiry. Youtube and TED videos, the Wikipedia, and scholarly sources of knowledge, are mined to discover not only the philosophical underpinnings of the character, but also their physical attributes, mannerisms, and ways of speaking as a means to animate the character. Students are not required to memorize their scripts, although they use clever means to conceal them in props that the characters use, such as a steering wheel, sketchbook, books or newspapers; alternatively sheaves of papers accompany the ambulation across the “stage”—a minor detail soon forgotten as the audience becomes drawn into the thick descriptions that animate each invisible city.

The cities appear as dreams, as places recalled or visited, as mystical voyages, as half-forgotten recollections, or the ports of call on a drunken evening. It is clear that the pedagogical richness of each moment of the performance, is beyond its physical and discursive presence in place and in time; a “passive representation of the world replaced by notions of the direct unfolding of action in context” (Thrift and Dewsbury, 2000, p.415). The cities exist as umwelts, overlapping worlds constructed by a convergence of ideologies, spatial constructs, and fluid identities. “The terrain of learning becomes inextricably linked to the shifting parameters of place, identity, history, and power” (Giroux, 1991, p.72). The students transcend the original texts, the margins of their own identities and experiences; in the performative act, “students cross over into borders of meaning, maps of knowledge, social relations, and values that are increasingly being negotiated and rewritten as the codes and regulations that organize them become destabilized and reshaped” (p.72). Nor is the audience complacent, for we too are drawn into the performative action as the traditional boundaries between who “performs” in places of learning, between who produces knowledge within the educational milieu and who receives it, dissolves. Performance …[is] “concerned with lessening gaps between the known and the unknown, illuminating and exploring the lived practices of others, and bridging geographical and social distances through vivid description, narration, and embodiment – helping readers/audiences to see possibilities through the visualization of experience” (Alexander, 2005, p.419).
6 IMPLICATIONS

[Driving again.]

Plato: “So let me get this straight, you want a city that is decentralized, has no history, no identity, and no discernible structure.”

Koolhaas: “Yes.”

Plato: [Drives for a bit, thinking.] “You know, there is one city, but I don’t know if you are going to like it.”

Koolhaas: “Why not?”

Plato: “Nobody who I take there ever wants to stay.”

Koolhaas: “Why not?”

Plato: “Oh, you’d be surprised… everyone is looking for a better place.”

Koolhaas: “Well, I doubt most people are interest in what I am after. Let’s see it.”


It is a truism to say that theory strongly influences design thinking. This logically infers that theory is integral to design practice. As educators we believe this to be so. Yet one of the many schisms in schools of design is the division between “thinking” and “making”. This notion influences our pedagogical methods and the tools we provide our students with so that they may become competent designers. But critical educators also envision our students as critical designers, who would challenge prevailing norms and radicalize taken-for-granted practices. The study of theory reveals the world as a deeper realm; students learn that culture is not something passively consumed, it is constructed, produced, and if not challenged, may extenuate systems that prolong, intensify, and replicate oppressive practices. This is no less true for design, than for any other discipline (Dutton, 1991b).

Theory theatre draws students out of their own experiences and invites them to construct a space of otherness where, for a short time, they dwell as other. This action creates a counter narrative that supplements and potentially contradicts pre-existing pedagogical forms and spaces. As a border pedagogy, performance, “both confirms and critically engages the knowledge and experience through which students author their own voices and construct social identities” (Giroux, 1991a, p.75).

While earlier iterations of performance neglected the realm of spatiality (Thrift and Dewsbury, 2000, p.414) more recent apprehensions of performance “takes as both its subject matter and method the experiencing body situated in time, place, and history” (Conquergood, 1988 in Alexander, 2005, p.420). Theory theatre facilitates the construction of multiple emplaced “realities”--some situated within the here and now, others may exist in the past, in dreams and visions, in recollections of a blurry night out on the town. Invisible cities require a space in which to dwell--although imaginary they are performed within an intersubjective exchange between players, audience, and milieu. Theory theatre encourages communication, cooperation, and the mutual construction of a “more-than-representational” realm (Lorimer, 2005). Performance pedagogy provides an arena for a collective negotiation of identity that helps students to move beyond an individual politicized agenda and where space becomes “an active operator”. In these transformative moments, “dead geographies … come alive as they are performed” (Thrift and Dewsbury, 2000, p.417).

Thrift and Dewsbury (2000) highlight competing strategies embedded in performance relevant to our discussion here. The “overlay of strategies” is relevant to theory theatre where all aspects leading to performance--research, discussion, rehearsal, performance, production, reflection--become as important as the act of performing itself (p.420). A “trickster”, shape-shifting pedagogy, performance transgresses disciplinary boundaries and repudiates knowledge replication, leading instead to learning episodes ripe with a “surplus of meaning” (p.420). This counter narrative supplements and potentially contradicts pre-existing discursive spaces. Theory theatre is equally an expansive pedagogy, history, philosophy, critical thinking, graphic capacities are repurposed and unhitched from taken-for-granted ways of expressing knowledge in educational settings. This “expands our knowledge of how we know what we know about the world, most especially by stressing the arts of what people do … in real time through the expressive qualities of the body …” (p.420). Additionally, the engagement of “kinaesthetic vocabularies and imaginations” (Roach, 1996, in Thrift and Dewsbury, 2000, p.420) ensures that knowledge creation through performance is sensorial, sensual, and embodied. Space is revealed as pregnant with cultural meaning and the potential oppressive nature of idealized discourses of spatial formation is revealed. And
finally time is experienced as fluid, historical ideas and “facts” are repurposed and re-imagined in the present time; these moments of “enchantment … resist the process of historicization” (Thrift and Dewsbury, 2000, p.420).

7 LIMITATIONS

Derrida: “Back to the story, we then got on the train and while on it we experienced a beautiful city that had in it a lot of ambiguity, disruption, disjunction, disturbance and oppositions.”
Gustafson: “No I remember it differently.”
Derrida: “You must have been in a different sensory territory then. Anyway, buildings had root structures spontaneously shooting out into the sky and others had irregular additive transformations to them. It was difficult to tell what the buildings were used for.”
Gustafson: “How is that beautiful?”
Derrida: “Who are you to question my standards of beauty? Why must what you consider beautiful be beautiful to all? Again I say signs are polysemic.”
(Mubanga, Goodman, Hill, and Belton, 2012, p.8-9).

The question remains, does theory theatre “provide new theoretical tools to rethink both broad and specific contexts in which authority is defined” (Aronowitz and Giroux, 1991)? In an age where students seem more and more resistant to thinking independently and schooling is becoming increasingly outcome based, the ambiguity of production, the depth of dialogue, and the choreography of potential meanings performed through theory theatre does indeed supplant the authority of the text, the canons of knowledge, and the traditional authority of the teacher within the classroom. The need for “totalizing theories” based on a desire for “certainty and absolutes” (Giroux, 1991, p.70) is abandoned, and history, theory and forms of popular culture become constituents of a rich alchemy of epistemology and experience.

But as a critical pedagogy, theory theatre is equally indebted to the project of democracy and to the development of an “architecture of resistance” where “social roles, power relationships and institutional life” are critically examined and questioned (Schuman 1991, p.15). This may occur only within the moment of performance, but should be played out in all operative fields within the academy and beyond. Monitoring this as a desired outcome of theory theatre is beyond my possible purview. I did observe, however, a marked elevation in the confidence of the students and within the intellectual discourse within the classroom. In addition to the performance, we watched films on environmental issues, on the politics of public and private space, on activism and the deleterious effects of rampart urbanization on a global scale. We held debates, questioned prevailing views, discussed manifestos, and critically examined the identity of our discipline. The students were critically engaged, politically activated, and theoretically articulate. But I cannot say if this activism moved beyond our time and place together.

Issues of privilege in the classroom are fertile topics for theorization and critical examination, but as educators we can never escape our position of power. Students performed the work because it was a requirement within the curriculum. To be sure, they were proud of their work, they learned a lot, and they had a great deal of fun performing. The performances were thoughtful and deeply considered, the playbooks provided a more reflective opportunity to discover the complexity of the ideas embedded within the performed text. It was clear that the students understood that design can liberate, constrict, empower, and destroy, that ideas about space can have an explicit effect on the qualities of social life and the environmental health of the planet. But there is always the knowledge that the work is being adjudicated and that a mark will be assigned.

For me, the assessment of performative pedagogy failed to transcend traditional means of assessment. The performances were successful, completed within the time required, thoughtful, engaging, and entertaining. Unlike the previous year, where it was difficult to discern the philosophical notions embedded in the text, theory theatre 2012 was a rousing success. The ideas came across clearly, and the moral implications of the script were evident. All the performances were of high caliber, so the variability in grading came from the craft, care and graphic character of the playbooks. But I confess this is a woefully bereft means of critically adjudicating work of this intensity. Fortunately for future iterations of this project and to the benefit of others who might wish to take on this form of border pedagogy, Alexander (2005) provides criteria for evaluation, more appropriate to performative work in the educational setting.
Although Alexander’s work is situated with performative ethnographies, these criteria are equally applicable to performative pedagogies in other milieu, and could assist in providing students with substantive critique to deepen their understanding of the transformative capacity of critical pedagogy. The evaluative categories include content, reflexivity, the expression of a substantive “reality”, aesthetic merit and impact. Briefly stated content refers to the substantiveness of the work and notions of intention—is it clear what theoretical notions that the performance/performers seek to portray? Are the moral/theoretical arguments embedded in the text discernable? Does the performance seek to incite a specific response from the audience? The notion of reflexivity surrounds the quality of information remapped within the performative text. Additionally, we query here if the characters channeled are represented in ways appropriate to their place, time and ideologies. Equally we question how deeply the “actor” has embedded themselves within the character--does their own subjectivity leak through? Is this a deliberate act that adds to the discursiveness of the event? Is the “reality” accessible? How does the audience encounter the invisible cities? Are they portrayed with thick descriptions allowing us to encounter them in all their splendor and wonder? Does the work operate aesthetically? Is the writing, the performance, the movement through the staged space, considered, choreographed, well crafted? Does the script end succinctly or does it meander off into ambiguity? Was the audience engaged by the performance? And finally what is the impact of the performance? Has theory come alive? Is the performance appropriate to its educational setting and more specifically to our purposes, does the performance text critically examine the theoretical implications of spatial ideas for landscape and urbanism (p.428-430)? These components for adjudication could be integrated into a peer-assessment matrix provided to students at the time of the performance, but I believe they would prove even more valuable as concepts for group discussion during the formative phases of the project.

I am also left with the question of how to capture the critically reflexive insights that students harvest from this experiment in border pedagogies. Although the students maintain a theory journal, the play occurs around the end of term, and few reflections are recorded in the journals. This can be simply remedied, by integrating specific questions regarding the intellectual souvenirs of this journey into the frontiers of design pedagogy. Certainly the act of theorizing the performative capacities and pedagogical implications of work such as this has provided ample fodder for fertile interrogations.

8 SUMMATIONS

Corner: “This city is one of the most unique ones I have ever visited, it is a city that was built to eradicate what they feared….”
Kunstler: “I fear nothing but doctor-prescribed medication; what were they scared of?”
Corner: “… the street …”
[ominous silence]
(Gray, Tremblay, Jiang, and Bul-lalaya, 2012, p.7)

Thrift (2004 in Lorimer, 2005, p.84) invites us to conjure “wild new imaginaries” that can materialize from emergent performative repertoires. Similarly, James Corner (1999) has remarked, “Any recovery of landscape in contemporary culture is ultimately dependent on the development of new images and techniques of conceptualization” (p.153-154). Performative pedagogies do offer design educators an innovative means of invigorating theory, enlivening the study of landscapes--urban and otherwise, and exposes the implications of power and politics within spatial incarnations. Additionally, as design educators, the act of theorizing upon our curricular constructs, equally exposes the power relations, theoretical undercurrents, and potential transformative moments within design education and provides for reflective moments that illuminate how we can perhaps become more critically aware of the implications of our curricular constructs and their impact on the lives of our current students as future designers. I end here with some reflections from the point of view of a student:

At first when I found out that we had to do a play, I honestly was not excited about doing it at all. However, once we began to find out enough about our designers and writers and began creating characters out of this information, my perception of this project spun around. Each designer and writer’s ideals and insights were easily distinguished. Reflecting on how Invisible Cities helps me as a designer, I realized that we need to design with the landscape and to use the natural processes to function within the design. Creating cities based upon a single aspect of someone’s view shows how cities can become
fragmented. Our challenge as designers is to intertwine each aspect within a functioning design. Thinking about how this could happen, I once again come to the conclusion that whomever is in politics has the power to change building regulations, codes, and bylaws, and must do so that we can create more self-sustaining cities. (Cook, 2012, p.54)

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INSTITUTIONAL MEMORY AND THE LONGUE DURÉE: STRATEGIC PRESERVATION OF ARCHIVAL RESOURCES

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1 ABSTRACT

Many alumni practitioners and emeritus faculty wish to donate valuable collections of slides, videotapes, or drawings to their alma mater. Such archives provide invaluable data for future researchers in our field. However, enormous volumes of archival material in institutional storage is inadequately housed, conditioned, evaluated, or accessed. This study reports on an on-site inventory and assessment of a century-old archive held in the Department of Landscape Architecture at the University of Illinois, Urbana-Champaign. Containing over 35,000 separate objects, its diverse categories of holdings include student drawings, research data, lecture videos, personal notebooks, sketches, slides, photographic plates, as well as specialized equipment acquired to view these artifacts. This paper describes the first stage of procedures for inventory and assessment of the Illinois holdings in order to prepare strategic priorities for future conservation actions. The project team includes an historian-educator in landscape architecture, a trained archivist, and a library media preservation specialist. Overarching project goals are to balance the optimal stability and condition of the collection with open access for students and scholars and, possibly, new capacity for collections growth. Based on these goals, a decision-model was developed to assess the collections. Using a basic spreadsheet inventory, first-stage project objectives were to: 1) describe the range of formats contained in the collection, 2) annotate format descriptions with any clearly visible content data and 3) assess evident condition of artifacts. Although this project is ongoing and its outcomes continue to unfold, several lessons may inform others facing similar challenges. There are practical, professional, and low cost ways to stabilize and protect institutional legacy; protocols are simple but slow and time-consuming; to protect momentum, small archives need individual “champions” inside and outside the institution to drive forward; the availability of expert advisors and other University resources is essential for success; and thoughtful discussion of unit values, mission, and identity must guide any decision-making processes.

1.1 Keywords
institutional history, archives, media preservation, strategic planning, decision model
2 INSTITUTIONAL HISTORY

As in many other land-grant programs, the Department of Landscape Architecture at the University of Illinois began its existence in the College of Agriculture, becoming the Division of Landscape Gardening in 1907. The Division of Landscape Architecture was created in 1912, just as women were also being admitted to the professional program of study. As one of the founding institutional members of the National Council of Instructors in Landscape Architecture (NCILAA), Landscape Architecture at Illinois was also one of the original eight programs in the country accredited by the ASLA in 1929. After joining the newly formed College of Fine & Applied Arts, Landscape Architecture became an autonomous Department in 1931. During these formative years, Departmental faculty offices and studios were scattered all over campus in frame houses occupied by the University, as well as in academic buildings still dominated by the College of Agriculture. Then, in 1995-96, when the Department’s new offices opened in Temple Hoyne Buell Hall, many archival elements were consolidated, and in 1998 the current configuration of the Department Archives was established in Noble Hall (Figure 1).

![Figure 1. Department archives before inventory (Sept. 2012). Photograph by co-author (Matkowszki)](image)

When the archives were moved in 1998, a comprehensive effort was made to inventory and assess the collections with data recorded on a set of floppy disks. Sadly, these data are all but unreadable today, and have joined the detritus of much other institutional data we generate. Obviously, an archive of any merit should be protected because it is rare, meaningful, and vulnerable to amnesia and neglect, but also because contemporary digital data—unlike paper and glass—are ephemeral in peculiar ways. This complicates the predicament that many institutions now face. The very notion of an archive raises interesting questions about the role of personal memory in institutional identity, as well as the technologies, priorities, and larger values invested in the selection of items for conservation and/or public access. And while these topics may trace familiar ground in Museum Studies or Library and Information Science courses, they have been less central to Landscape Architecture.

In *Digital Memory and the Archive* (2012), the media theorist Wolfang Ernst addresses the emerging field of media archaeology. Just like other products and commodities, stored knowledge has a differential shelf life. Ernst discusses the problem of "microtemporality" of digital information; consider the ephemerality of a Facebook page with the *longue durée* of paper, plastic, metal and glass. If we worry that the attention span of contemporary media is roughly equivalent to the life span of a gnat, then for those places that preserve institutional memory—archives, libraries, museums, repositories—objects should and still do matter. However, when any collection of objects (or data) remains unconsolidated, uncurated, or simply indecipherable, its chances for survival are severely reduced. Making judgments on the value of specific artifacts or collections is inherently political, and therefore should be a matter for governance by
members of the unit and the institution. Ideally, any decisionmaking as to value should involve faculty, administrators, and subject area experts (at a minimum) in a frank discussion of priorities, resources and institutional values.

Then there is the issue of demographics: because “old institutions” generally have older alumni, there is a strong relationship between the conditions of the archive and the hopes or needs of the generations now retired or preparing to retire. Typically, today’s retirees represent classes graduating from the late 1950s to the early 1970s. We are witnessing a sea-change in the pace and style of their giving. In a May 2011 article in Landscape Architecture Magazine entitled “File Under Forever,” Ernest Beck described the challenges that retiring alumni present to academic institutions. He quotes several leading landscape architecture practitioners on this subject: as a result of a “store it and forget it” attitude, or worse, “store and purge,” says Design Workshop CEO Kurt Culbertson, “Many documents have already been destroyed and… scattered to the winds,” with more substantial losses likely in the near future (in Beck, 2011, p.131).

In summer 2011, an alumnus of the University of Illinois was reading Beck’s article at the very same moment he was thinking of donating his professional library to the Department of Landscape Architecture. During our discussions, he brought the LAM article to our attention. “What,” he wanted to know, “were we planning to do about our Archives?” What indeed?

Many alumni, practitioners, and emeritus faculty wish to donate valuable collections of design works, teaching materials, travel slides, and other archival materials to their alma mater and thus ensure a kind of ‘after-life’ to their careers. Whether such generosity results in a treasure trove or a midden heap often depends on institutional actors and their goals, space, financial capacity, and “know-how” to store and care for these materials. Some practitioners are aware of the power of skillful curation for ensuring posterity: for instance, Culbertson’s firm has pioneered a collaboration with Utah State University to create the Design Workshop Landscape Architecture Archive and Digital Collection (DW, 2011). But both digital and physical archives will provide invaluable data for future researchers in our field and some institutions still vie with each other to receive the most valuable collections.

Figure 2. Hand-tinted glass slides from the Florence Bell Robinson collection (ca. 1932).
Photograph by G. Kesler; used by permission

Massive amounts of information in any form can be a mixed blessing. Enormous volumes of institutional storage are occupied by archival material, much of it inadequately conditioned, inventoried, evaluated, or accessed. At the University of Illinois, we know we could be doing a better job. However, with over 38,000 discrete objects, housed in a dusty space in a building already on the chopping block for demolition in 2016, and with no alternative archival space in sight, what is a small Department to do?
Well, first, we needed a team. We began by asking for our donor’s help; with a little seed money were able to hire a graduate assistant for one semester. Enter Ilona Matkovszki, a PhD student in Landscape Architecture fortuitously trained in archival conservation (from the University of Illinois’s Graduate School in Library & Information Science) and keenly interested in landscape and community informatics. Luckily, being a small Department in a big University, we discovered we had access to Library specialists concerned with many of these same issues. With the addition of Josh Harris, Media Preservation specialist, our team was now complete and, in Fall 2012, we started work.

In conducting our on-site inventory and assessment of Departmental holdings, what did we find? Among other things, the Archive contains priceless hand-tinted glass slides of inter-war Chinese and Japanese gardens and temples from the 1920s and ’30s—many picturing places now destroyed (Figure 2). We have a historic collection of nearly 1,000 flat works on paper, dating from 1914-2007, the majority produced between the 1940s and the 1980s. Karl Lohmann’s extensive teaching slide collection is also an archive of local midwestern history. Lohmann conducted an extensive typological study of vernacular town morphologies, with images of streets, buildings, and landscapes from communities of Illinois straight out of the mid-20th century—also places that no longer exist. In addition to archaic surveying equipment, we have other “tools of the trade”: ink pens, lettering sets, ship curves, and perspective grids, all now historic artifacts, as are the various projectors and computers (such as a 1980s mini-Mac). In short, a rich study may be conducted in this archive on historic changes in both the practice and pedagogy of landscape architecture over the last century.

3 MEDIA PRESERVATION

The Archives & Collections Committee of the ASLA maintains a comprehensive web inventory of over 60 institutional archives. Held in a variety of institutions and foundations from Harvard to Berkeley and many points in between, these archives provide invaluable data for future researchers in our field. Despite the emphasis placed on community access to digital resources, much valuable information about institutional history still exists only in analog media. Virtually all CELA members who once taught with analog media have now fully embraced digital systems. For most, this transformation began in the early 1990s with text, followed quickly by still images, projections, digital design, modeling, websites, digital video, and sound. As a result, most analog educational materials have been rendered antiquated and obsolete within a surprisingly short time. Due to the sheer pace of technological innovation, any digital media created during the first wave of digital technology in the 1980s and 1990s is now already useless.

This is where the Media Preservation Program comes in. Started as a new program in Fall 2011, the Media Preservation Unit is the first of its kind since the University of Illinois Library was founded in 1867. Housed within the University Library’s Department of Preservation and Conservation, the unit is tasked with the preservation of the Libraries’ vast media collections, typically in the form of film, audio, video, and photographs, but encompassing other types of analog media as well (Figures 3-4). The Media Preservation Unit was started during a particularly economically difficult time for public universities. With the move to electronic collections (such as e-journals and e-books) many academic libraries slashed both staff and acquisition budgets tied to traditional paper-based preservation practices. Fortunately, at Illinois, these funds stayed within the Preservation and Conservation Department and were re-allocated to focus on newer disciplines such as media and digital preservation, showing campus commitment to the stewardship of these collections. The Media Preservation program is also an active participant on the steering committee of a grassroots group known as the Center for Multimedia Excellence, the goal of which is to foster collaboration between media professionals at the campus level.

The collections of the University of Illinois Libraries are recognized around the world for both size and depth. With the fifth-largest library overall and the largest public university library in the United States, resources at the University of Illinois are nevertheless stretched thin. Most preservation professionals understand that relatively low importance has been placed on visual and time-based media as compared to other, more “respected” forms of print media such as books and journals. Just as for the Department of Landscape Architecture, many other University collections are housed in repositories dispersed all over campus. Bits and pieces of media indexing and conservation work have been done by individual repositories in the past, but usually without any formal or professional guidance.

One outcome of this situation was an NEH-grant-funded Campus-wide Media Census conducted in 2011 and 2012. The goal of the Media Census was to produce accurate data regarding collections held across the entire university, as well as conduct outreach, education and consultancy to departments with
archival collections (such as Landscape Architecture). Now in the final stages of this census, the Media Preservation Unit has interviewed over 100 academic units, and recorded over 375,000 individual items held all over campus. This data will be used to create services and determine the future preservation actions necessary for the University’s media heritage.

Figure 3-4. Preservation activities at the University of Illinois Media Preservation Unit (2012). Photographs by co-author (Harris); used by permission

The pilot project for the Landscape Architecture Archives represents the first time a Department has taken direct advantage of the expertise provided by the Media Preservation Unit. We are hoping this project will become a model for other units on campus, perhaps also for CELA members, to help units consider how best to organize their own historic assets.

4 INVENTORY, ASSESSMENT & OUTCOMES

Inventory is a deceptively simple method within a broader research strategy called Classification. In this project, the team uses classification as form of measurement (counting), to recognize patterns in artifact types and conditions, and to address any anomalies that might signal a critical need for immediate intervention in terms of conservation. The classification of collections is a necessary precursor to pursue more complex thematic investigations such as interpretation and historical curation (Deming and Swaffield, 2011, p.126-128). Classification always requires a frame of reference in order to identify categories (media type) or variables (poor or good condition); for this project these references came from a system of best practices (working conventions) recommended by the team’s media expert.

Assessment, on the other hand, belongs to a different research strategy called Evaluation; it is performed according to a rubric supported by a defined theory of value (Deming and Swaffield, 2011, p.174-177). Developing principles for assessment requires discernment, negotiation, and consensus among stakeholders as to the goals of the project and the larger theory of values that the collection might serve. Media experts at Indiana University explain: “a set of general principles is needed to guide the development and implementation of preservation strategies so that efficient, accurate, sustainable, and enduring work is supported as well as cooperation between stakeholders, all while maintaining a consistent focus on the primary goal of long-term preservation” (Media Preservation Initiative, 2011, p.28). The Illinois project team has therefore provisionally adopted several principles initially outlined by MPI, ranging from timeliness and technical digital accuracy to developing effective partnerships and maintaining transparent decisionmaking (2011, p.29-31).

Descriptive assessment of each item in the collection (for instance an individual slide, notebook, or drawing) is a relatively simple matter; compared to a “norm” of expected condition (undamaged, physical integrity, visual clarity), how well did each item meet or fail to meet this standard? However,
evaluating the content of components and subcollections within the archive will require a more complex rubric that can only be developed in concert with stakeholders of the archive. This level of evaluation has not yet taken place. Also, shared ideas for desirable outcomes may not always be evident at first. Before work begins in any archival collection therefore, a Preliminary Needs Assessment must take place so realistic goals can be set.

Based upon preliminary examinations by the Media Preservation Coordinator of the space and environment in which the LA materials were stored, it quickly became evident that some early stage “triage” needed to occur before a proper assessment of the collection could even begin (Figure 5). For instance, the Image Permanence Institute (based at Rochester Institute of Technology) suggests minimum cold and dry standards for the long term stability of many of the image types found within the Illinois collections (Reilly, 1998, p.30-39). More specifically, one of the largest and most historically important collections contained within the Landscape Architecture archives, the glass plate negatives, should ideally be stored in very cold storage of 4°C at 30-50% relative humidity (Adelstein, 2004, p.5). Unfortunately, for our archive, this is far from the reality.

Despite the fact that the Landscape Architecture archives were held in a non-climate controlled environment, several things were done in the short term to “stabilize” the assets. This began with a thorough cleaning of the space (extremely dusty with pest issues). It became clear that the collection had little to no “known” organizational structure and or supporting information. Initial examination determined that the collection was of substantial size, and consisted of many different collection formats (ie. audio, video, still photographs, flat paper drawings, etc). After further discussion, the team decided the best course of action was to establish a process for collecting data—a basic spreadsheet inventory—to describe the range of formats contained in the collection. These were to be annotated with any clearly visible content data (ie. anything written or attached to the object which provides content information), and evident condition assessment (preservational state, ie. any item clearly broken, damaged or visibly deteriorating). Using this approach, our Research Assistant was able to move efficiently and confidently through the data collection phase.

The procedure was time-consuming but simple: sort all the items based upon format type; count numbers of assets in order to come up with numeric totals by format; record information on damaged or deteriorating pieces; and record very general content. From a preservational standpoint this general level of data (in the form of raw numbers, basic condition and basic content importance) is essential in deciding next steps. Several outcomes resulted from our preliminary assessment of the LA archives:

**SPATIAL OUTCOMES**
- Archival space is ‘straightened out’ and cleaned up
- Cleared surfaces are useable for future research as well as future archiving work
- Improved organization and sorting of archival collections

**DATA COLLECTION & ACCESS**
- Defined data set is created with basic collection description: [basic collection content; preservational state; exact number of assets by format, etc.]
- All boxes are labeled to correspond with a number in the inventory (spreadsheet)
- Annotated information on content of each box: [medium; number of items or folders; brief description of content and condition; etc.]

**INITIAL RE-HOUSING**
- Archival materials are now sorted by medium: [e.g. all slides, film media, audio-visuals, and LA magazines on the open gray shelves; all boxed paper archives stored together by the entrance; all computer manuals and textbooks are stored boxed up under the 2 tables]
- Paper media and slides neatly boxed up
- Flat paper items moved into the flat file storage drawers (previously laying about on various surfaces with other items piled on top)

**ENVIRONMENTAL OUTCOMES**
- Basic understanding of environmental factors and building conditions
○ In concert with data on media and format, we can project which elements may degrade or deteriorate faster than others
○ Knowing the vulnerability of the collection is vital for prioritizing funding proposals

![Flowchart: Decision Model for Media Preservation]

**Figure 5. Josh Harris (March 2013). Planning for Media Preservation: A Decision Model**

The Media Preservation Coordinator developed a decision “tree” or model (Figure 5) that can be used, regardless of discipline or institution, by units considering an archival assessment process. The first-tier decision is for the unit to determine its capacity for action: “are you able to work with the collection right now?” If the answer is “no,” several options remain; answering “maybe” leads the unit to consider further planning tasks. If the answer is “yes,” the model then leads the unit to consider securing resources and collection data.

After conducting its inventory (basic condition and basic content data—compiled as an Excel spreadsheet), the Illinois team next plans to prepare a Master Report for the Department and its newly formed advisory group. The Master Report will help facilitate further discussion and development of assessment goals and criteria for a long-term strategic preservation plan. With data and protocols from the initial inventory phase now in hand, we are ready to seek feedback for goal-setting, and to apply for the funding necessary for more in-depth collection investigations, to include:

○ Item-by-item assessment of condition and content (at some defined level)
○ Rehousing or re-boxing to preservational standards (with repair and conservation of severely damaged items)
○ Improved overall storage conditions to archival standards
○ Identify collections for possible removal/relocation from archives and
○ Development of a more robust catalogue and finding aids for the archival items.
If the desired outcome for an institutional collection is to be available to researchers and general users, then “access” should be the ultimate goal for future collection and preservation work. In other words, our first and main goal is that anyone should be able to access anything in the LA archives using the inventory. The ultimate goal is to place a finding guide for this inventory on our Department web page, and to share it with the ASLA’s Archives and Collections Committee.

5 CONCLUSION

In social, economic, and cultural history, the concept of the longue durée (in English: the long term) signals that historical events often have root causes and end effects manifested well beyond the period ordinarily assigned to them. Like the landscapes they occupy, academic institutions also have duration and scale and rhythms, and the concept of the longue durée can be easily applied to them. Yet the loss of unique archival assets threatens more than institutional history, it also affects disciplinary and broader cultural history. According to the Task Force of the Indiana Media Preservation Initiative, this threat is widespread:

Media archives have reached a critical point in their history marked by the simultaneous deterioration of unique original materials, the development of powerful new digital technologies, and the consequent decline of analog formats and media. Rapidly advancing obsolescence—of playback machines, spare parts, technical expertise, tools, and formats—combined with degradation of carriers multiplied by large numbers of archival recordings have resulted in a necessary race against time to preserve important holdings. (2011, p.24)

Although the Landscape Architecture Archive assessment project is still evolving and its outcomes continue to unfold, we have learned several lessons so far:

1) There are practical, professional, and low cost ways to stabilize and protect institutional legacy;
2) Assessment protocols seem simple but need to be done thoughtfully, with a clear guidelines for “judgment calls”;
3) Availability of expert advisors and other University resources is essential for success;
4) The work itself is slow and time-consuming; when depending on volunteers, small archives need individual “champions” inside and outside the institution to drive forward;
5) It is not a contradiction to say there must also be a sense of group ownership to sustain momentum and trust in the “champions”;
6) Thoughtful discussion of unit values, mission, and identity must take place in a deliberate manner to guide team decision-making processes, and
7) If all the above can be clearly established, the likelihood of getting institutional support and funding will be enhanced.

Since this report was prepared, the team has secured a small grant to rehire our Graduate Assistant for the next steps in the process to begin in September 2013. In recognition also of the political dimensions of the values at stake in this process, the Department has appointed an ad hoc task force comprising faculty and staff to serve in an advisory capacity. This group will discuss the values and the goals of the Department for the Archive, and will look further ahead at ways in which the archive might be used, distributed, and/or reconceived in the larger institutional and professional contexts. Many months of work lie ahead and a constant search for additional resources will be necessary. This is a slow-moving project within the even slower long-term historical structures of the institution that created it.

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DESIGN IMPLEMENTATION

Edited by Malgorzata Ryciewicz-Borecki and Bo Yang
MATERIAL REUSE IN THE LANDSCAPE: THE FEASIBILITY OF REUSING WOOD IN LANDSCAPE CONSTRUCTION AND DESIGN

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1 ABSTRACT
Wood reuse is an effective technique for reducing human impact on the landscape and additionally has much untapped potential in bringing economic, environmental and cultural benefits to the field of landscape construction and design. Designers have a professional and ethical responsibility to address the challenges associated with conventional practices of landscape construction, such as the over reliance on specifying virgin building materials. Materials reuse, an essential component of the green building movement, offers an alternative method for landscape architects and designers to view materials in life cycles as opposed to single-life disposable products.

This study specifically examines whether reusing wood is a practical design tool for landscape architects and construction professionals compared to traditional applications using virgin wood products. The overall goal of this study is to gain experiential knowledge and produce tangible evidence through the physical construction of three common landscape items utilizing three common types of wood waste followed by a thorough review by landscape design and construction professionals. Each of the wood waste prototypes are measured against a comparable landscape product composed of virgin wood materials. All products are evaluated according to five design criteria: aesthetics, affordability, durability, efficiency and ecological impact. The study concludes that reused wood prototypes scored highly in all categories of design criteria in comparison to conventional virgin wood products; however, there are numerous issues that thwart mainstream application of reused materials in landscape construction and design, thus significant reform must take place within the construction industry for reuse to be widely accepted.

1.1 Keywords
material reuse, reclaimed wood, sustainable landscape construction, deconstruction
2 THE DILEMMA OF WASTE

Take a look into any curbside trashcan or job-site waste container and it is evident that a great amount of wood waste is neither reused nor recycled. There are many reasons for this, chiefly because of time constraints and storage concerns, but is there larger systemic causes for wood to be landfilled at such staggering rates instead of being reused? After all, wood is such a familiar American product. The EPA estimates that approximately 250,000 single-family homes are demolished each year in the US (EPA, 2008). Based on case studies from 2002, the Forest Products Laboratory (FPL) determined on average 30 percent of demolition wood waste was recoverable (Falk, 2002). Alternatives to demolition such as deconstruction, materials reuse and recycling have the potential to divert large amounts of waste from the landfill; however, there are many reasons why the hulking construction sector has been slow to adopt these practices, as well as why designers are often mystified as how to incorporate them into projects consistently.

In the past century, a consumer-driven throwaway culture has emerged resulting in a glut of single-use, disposable products, which have subsequently led to massive accumulations of waste on Earth. "Waste" in modern times, is seen not as a valuable commodity, but instead a liability to be removed. Landscape architects have an increasingly prominent role in developing solutions to vastly complicated problems such as waste management through the utilization of ecologically responsible construction practices. However, in order to make a sizable impact in countering the deleterious effects of waste, widespread reform within the design and construction industry has to take place, such as a complete reversal of the conventional practices of seeing materials and built products through the lens of a linear or "cradle to grave" trajectory and instead through material life cycles.

In recent years, with the development of the green building industry, designers and construction professionals have become increasingly conscious of the source and end life of building materials, as it is now widely established that the production and disposal of materials have drastic consequences for the environment in the form of excessive pollution and degradation to the landscape (O'Connor and Sathre, 2010; Thompson and Sorvig, 2008). Seeing construction from an ecological standpoint and "closing the loop" of building material flows are concepts that are relatively new but integral to the future of green building. Emerging professionals in the new millennium are clearly more in tune to the concerns of anthropogenic climate change, but are we really doing enough? Exhaustive amounts of research and analysis in the academic field of landscape architecture by reuse luminaries such as Meg Calkins and Kim Sorvig have made the case for reclaimed materials being used in practice, specifically in landscape construction (Calkins, 2000; Calkins, 2002; Calkins, 2009; Thompson and Sorvig, 2008).

Even so, materials reuse remains one of the least used components of LEED and conventional practices of design and construction have mostly failed to incorporate reuse into built projects on a large scale despite the growing awareness of material life cycles (Addis, 2006). The raw numbers still show that a substantial amount of potentially usable construction and demolition (C&D) materials are destined for the landfill. In most Southern and Western US states where tipping fees at municipal solid waste (MSW) and C&D landfills are as low as $25 per ton, landfilling is the preferred method for waste management (DCA, 2010). Although reuse (and particularly recycling) has improved substantially since the early 1990s, only ten to twenty percent of total waste is diverted annually, mainly in the form of metal and concrete recycling (Kibert, Sendzimir, and Guy, 2001). Nonetheless, materials reuse – or in the case of this study, wood reuse – presents an abundantly beneficial opportunity for landscape architects to design and construct meaningful, cost-effective and aesthetically pleasing landscapes while adhering to environmental values of the green building movement.

2.1 Reusing Wood in the Landscape

Although there are numerous types of materials that landscape architects and contractors will ultimately specify in design projects, wood is one such product that is universally used, has historically been used since the recording of modern time and also is a building material that is truly considered to be ‘sustainable’ because it has a minimal carbon footprint and low embodied energy compared to energy intensive products that are mined from the Earth like metals, rock or concrete (Falk, 2010). Wood is an immensely popular and trusted brand because it is easy to work with, cost efficient and a plentiful and renewable resource in the US, that is, if it is harvested sustainably. Considering that almost half of timber harvested in the forest ends up as a construction building material, wood has huge implications to the environment (Falk, 2010).
In contrast to the many positive qualities, wood has a particularly different existence in the landscape. Wood, of course, is impermanent and highly susceptible to the deleterious effects of climate such as rot, infestation and UV exposure (Lyons, 2007; Winterbottom, 2000). While wood has a low embodied energy relative to other materials, it performs poorly in terms of life cycle analysis (LCA) primarily because of its long-term maintenance issues, thus wood requires extra attention to treatment, durability, finishes, maintenance and appropriate application (Crawford, 2011). Wood waste product, or reclaimed wood, which is virtually an untapped resource, shares all the attributes listed above but with a few notable differences. Reclaimed wood, harvested or salvaged from demolition, renovation or construction sites, tends to be older-growth, more dense and generally higher quality than conventional virgin lumber, with an added benefit of reducing the environmental toll of waste, such as increase of greenhouse gases due to landfiling and the depletion of natural resources (Thompson and Sorvig, 2008).

As to why reclaimed wood is not used extensively in the US, it poses many logistical, safety and regulatory challenges. Local building codes in the US require a grade stamp for all structural components made from wood (Winterbottom, 2000). Even if a piece of reclaimed wood contains an old stamp, salvaged wood must be re-evaluated by American Lumber Standard Committee (ALSC) accredited lumber-grading agencies to meet current codes. The re-grading process of salvaged lumber is a somber reality for the reuse industry; nonetheless, it is crucial element, as users do not know definitively what type of stresses reclaimed wood has been subjected to over time. Interestingly enough, a study by the Forest Products Laboratory (FPL) in 1999 revealed that nail holes and end damage accounted for a majority of grade reduction in reclaimed lumber (Falk, 1999). In other words, simply cutting bad ends off lumber might increase its structural condition and reduce its tendency to failure.

The other major difficulty with reclaimed lumber is the process of procuring it safely and efficiently as well as its availability in the marketplace. The process of deconstruction and selective salvage is slow and labor intense, which is potentially costly and ultimately passed down to the client. The availability or scarcity of reclaimed wood is a huge determinant in its success as a building material; for example, estimating enough salvaged materials needed to finish a project (Calkins, 2002; Calkins, 2009). Choosing materials and applications that are less labor intense and relatively easy to execute are a part of every designer's learning curve.

The specific emphasis of this project was to look at the effectiveness of wood waste reuse or reclaimed wood as a sustainable building material and design tool for landscape architects and contractors compared to conventional virgin lumber products. The reuse of wood in the landscape has potential to not only provide economic and ecological values to design and construction projects but also to inform the design process and connect the site to a tangible historical and cultural meaning or sense of place (Calkins, 2002). Thus this study is designed to compare both the use of reused and virgin wood in landscape design and construction in order to answer the following research questions and sub-questions: what is the feasibility of reusing wood in landscape design and construction? How does it compare to contemporary virgin lumber products? What are the impediments to wood reuse as an effective design tool? What is the future outlook for materials reuse in the field of landscape architecture?

In this study, the primary method for investigating the effectiveness of waste reuse was to develop and physically construct reuse prototypes of three common landscape structures – a tool shed, fence with gate, and raised bed – that could be evaluated and marketed alongside comparison structures constructed with conventional, virgin lumber. In order to truly explore the diversity and breadth of wood waste as a sustainable building material, each landscape structure was made from three different types of common wood wastes: wood scraps less than four feet in length, full length dimensional barn lumber and wooden pallets.

After construction was completed, a formal review of each of the reuse products in comparison to its conventional virgin wood counterpart was administered using an outside panel of design and construction professionals. Each participant was selected to individually grade each landscape structure according to five criteria deemed as integral to product design: aesthetics, affordability, durability, efficiency and ecological impact. Study participants assessed each structure using their own professional opinions in addition to supplementary data provided from the research and construction process.
3 THE STUDY: TESTING THE BUILT PRODUCT
Dubbed the ‘Reuse Village,’ the physical construction project used for this study was located publicly on a farm site on the South Campus of the University of Georgia in Athens, Georgia. The overall concept of this experiment in “testing the built product” was to gain practical insight into all phases of the reuse process from material procurement to design and construction implementation. Documenting the entire process from a quantitative standpoint: recording weight totals, hours worked and distance traveled all played a part in the final calculations. Building on past work in the field of reuse, generating experiential knowledge from the entire design and construction process as well as administering a professional review of built products was the general methodology for this study. The premise for analyzing new versus old lumber products in the landscape is to setup a real-life dialogue within the industry of the challenges and opportunities that specific products offer within the green building industry.

3.1 Landscape Products
Three types of common landscape items – the tool shed, fence with gate and raised bed - were chosen to serve as prototypes. Each landscape item, typical to any American backyard or community garden, is easily comparable, whether made from reclaimed materials or made from virgin lumber products. The commonality of each item is fundamental to the research of this project because it represents the mainstream culture that is the driving force behind much of the design and construction industry. In order to connect the public to the concept of materials reuse, considerable understanding of the market and people who buy goods and services must be established. Are the reuse landscape products marketable or comparable in quality to the conventional virgin wood landscape product?

3.2 Wood Waste Types
In addition to distinguishing landscape products by specific uses, three variations of reclaimed wood types were also used for analysis. The extensive use of wood in the US results in a tremendous amount of wood waste in many forms year after year. In 2002 alone, nearly 63 million metric tons of wood waste was created as a result of the manufacture of a variety of different types of wood-based products (Falk, 2004). The three types of wood waste used are as follows:

Wood Scraps – The first wood waste type evaluated was wood scraps less than four feet in length, which can be found in both MSW and C&D waste streams. On average, the National Association of Homebuilders estimates forty percent or three thousand pounds of waste on a home construction site is wood waste (Falk, 1999). Much of these are end cuts and scraps created from framing and trim carpentry in wood frame construction. The small size of wood scraps, however, limits the types of application for this product.

Full Length Dimensional Lumber - The second type of wood waste used in this project is standard non-painted reclaimed dimensional lumber at full-length. The primary source for this type of wood is demolition and renovation sites. In contrast to the other two wood waste types, full-length dimensional lumber is most analogous to the conventional, virgin wood based counterparts bought at retail stores.

Wood Pallets – The third and final wood waste type delineated in this study, the wooden pallet, is an abundant product that is sometimes recycled and reused, but more importantly a significant part of the waste stream. Aside from wood products used for fuel consumption, the wood pallet is the largest domestic user of wood base fiber in the United States (White and Hamner, 2005). Although wood pallets are recyclable only 14.8 percent of total pallets are recovered from the MSW waste stream compared to paper and paperboard products at 65.5 percent (EPA, 2008).

3.3 Design Criteria
The final component of the methodology was developing design criteria in order to grade each landscape structure, whether reused or virgin wood. In order to best gauge the product, five key performance standards were presented in survey form. These criteria were aesthetics, affordability, durability, efficiency and ecological impact. Is the design marketable? Is the pricing competitive? Will the materials last? Does it maximize waste as a resource? Does it reduce ecological footprint? For the purposes of simple ranking and analysis, performance measures were graded on a scale of one to five by respondents, one meaning the particular item is least effective and five meaning the particular item is most effective.
The reused wood-based products evaluated were labeled as ‘A’, ‘B’ and ‘C’, whereas the conventional virgin-wood based product were labeled as ‘Lowe’s.’ Landscape items labeled as ‘A’ utilized the wood scrap material, items ‘B’ used the full-length dimensional lumber and ‘C’ were made from pallets. The new conventional products labeled as ‘Lowe’s’ were items found at typical multi-national home improvement retailers, such as Lowe’s Corp.

3.4 Study Participants
The point of the study was to get a thorough appraisal of each item through the lens of construction and design professionals that likely specify these types of materials on a daily basis. For this reason, six design and construction professionals were chosen to complete the evaluation. The six participants were composed of two tenured design faculty with backgrounds in landscape construction and sustainable building, one senior designer at the Office of University Architects, one materials research scientist with the US Environmental Protection Agency (EPA), one University administrative director who oversees campus landscape construction and one private contractor who has worked in building construction for thirty years.

4 IMPLEMENTATION
The physical construction project of the nine landscape products at the Reuse Village commenced in March of 2012 and took roughly 30 working days to complete. Landscape products were arranged in a linear fashion in zones A, B or C, according to respective reuse material (scraps, full-length or pallet), in order to clearly present the items for evaluation, similar to demonstration areas at major home-improvement retailers (Figure 1). Another key aspect of the experiment was to design products of similar dimensions and form in order to clearly evaluate and differentiate waste types according to realistic standards and compare them to conventional models sold commercially. Although form and dimensions of products were built uniformly, style or construction application varied from item to item as a result of material type. Additionally, materials were applied in the simplest way possible to ensure practicality and usability for consumers, at the same time keeping in mind that consumer taste can be highly subjective. Different application and presentation of materials were used for the purpose of demonstrating the versatility of reclaimed wood.
4.1 Material Harvesting

All reuse projects vary in terms of material procurement; nonetheless, it is an integral component. In this case, all materials were previously harvested as part of the Material Reuse Program, a pilot project developed by the College of Environment + Design and administered by the author. A majority of salvaged materials were harvested within a 10-mile radius of the Reuse Village, while some were harvested on site. In terms of salvage origin, materials came from one building deconstructed on site, various selective salvage projects on campus, several privately deconstructed buildings and trade between other builders. Students and volunteers working for class credit took part in the processing of materials prior to the construction date.

4.2 Reuse Models

In the first zone A, wood scraps (less than four feet in length) were the material for the fence and gate cladding, shed envelope and raised bed body (Figure 2). Instead of blocking and siding, Shed A employed an atypical cladding approach where interior cavities of the frame were filled with wood scraps using anchors and construction adhesive on plywood backing. In this example, the wood scrap requirement clearly informed the construction method and resulting aesthetics. Fence A, utilizing a mosaic of 2x6 end cuts from the framing, formed more of a solid wall than other fences in this study, whereas the gate stands in stark contrast with visual permeability and more eclectic material aesthetic (pine flooring previously used in an art exhibit). Raised bed A borrowing from the fence wall aesthetic was built using solid 2x6 staggered and screwed to vertical 2x4s. Overall, zone A products exuded a distinct personality and freedom, very different from the other models, but not without sticking to standard principles in design and construction. Additionally, the A products had a definitive heavy appearance, and that they were.

The next zone B, composed of full-length dimensional (reclaimed barn lumber), assumed a more traditional and lightweight look and application, despite its unusual (Poplar) wood variety (Figure 3). Shed B was clad in vertical 1x8 and 1x10 Poplar flat board with an identical platform framing system as Shed A; however, the major difference is B products weighs half as much as A. Fence B, to contrast the Shed, featured a ‘ranch style’ horizontal fence with generous spacing.

Figure 1. Reuse Village Site Plan
The final zone C featured the common hardwood pallet as its wood waste material (Figure 4). Weighing less than a half-ton, shed C was by far the lightest of sheds while employing an old-growth timber frame structure different than the others. In order to best use pallets, the openness of the timber frame was preferred to form a seamless envelope. Fence C was designed and built with vertical uprights and spacing as well as capped with a 2x6 to give it a more finished look, but more importantly to make the pallet look less like a pallet. Bed C was built similar, if not identical to its corresponding shed, where the pallet is inserted into the frame.
4.3 Comparison Models

Without a baseline comparison model, there was little evidence for this study to gauge the effectiveness of the reused wood in the landscape. Comparable items of similar dimensions, style and form were used in this survey and graded in identical manner as the reuse products. The ‘Lowes’ tool shed, for example was nearly identical in square footage and overall proportions, however, different in wood material (cedar), application (horizontal, beveled siding) and slightly altered in form (low, gable-ended roof). The ‘Lowes’ fence chosen for comparison was a typical seven-foot high, pressure-treated spruce, dog-eared fence with vertical slats. Since raised planting beds are not sold as products, but instead as individual pieces for home-installation, the ‘Lowes’ bed used for comparison employed a common construction application using non-treated cedar 2x6 in similar treatment as reuse model bed A.

4.4 Evaluation Data

A thorough amount of background data was compiled to supplement the reviewers in making informed decisions about products. The supplemental data sheet included the following: item weight; total hours needed to construct; cost to build (which factored in labor costs plus material value); source of materials in distance; embodied energy ranking (formulated on additional sheet); linear footage of materials used; wood age; and wood type (Table 1). Data was calculated during the process, so for example, an approximation of weight was determined through weighing individual pieces on an agricultural scale and totaling them. With regards to weight, reclaimed wood, particularly older sticks lose weight over time as a result of a natural drop in moisture content, thus explaining why the timber frame on Shed C was significantly lighter than expected. Another key factor - labor and cost - were derived using standard carpentry rates according to BLS statistics in tandem with estimated hours used in fabrication and installation. Basic embodied energy, the amount of energy required to produce an object, was calculated primarily using source data, volume of material and electricity usage; however, the information was merely ranked according to total but provided on a separate sheet. Basic embodied energy, unlike life cycle analysis, does not account for operation and maintenance over time, which is a limitation of the study.
Table 1. Supplemental Data Sheet

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight</th>
<th>Hours/Cost</th>
<th>Source</th>
<th>EE Dimensions</th>
<th>LF Envelope</th>
<th>LF Total</th>
<th>Wood Type</th>
<th>Wood Age</th>
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<tr>
<td>Shed 'A'</td>
<td>1768.1</td>
<td>20/$2400</td>
<td>&lt;20</td>
<td>3 6x8'</td>
<td>996</td>
<td>1543</td>
<td>Pine/HW</td>
<td>Mix</td>
</tr>
<tr>
<td>Shed 'B'</td>
<td>1034.4</td>
<td>13/$1620</td>
<td>&lt;20</td>
<td>1 6x8'</td>
<td>168</td>
<td>735</td>
<td>HW</td>
<td>50s</td>
</tr>
<tr>
<td>Shed 'C'</td>
<td>855.1</td>
<td>14/$1680</td>
<td>20-50</td>
<td>2 6x8'</td>
<td>170</td>
<td>480</td>
<td>HW</td>
<td>Mod</td>
</tr>
<tr>
<td>Shed 'Lowes'</td>
<td>770</td>
<td>8/$1899</td>
<td>2000+</td>
<td>4 7x7'</td>
<td>n/a</td>
<td>n/a</td>
<td>W. Cedar</td>
<td>Mod</td>
</tr>
<tr>
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<td>2/$120</td>
<td>&lt;20</td>
<td>3 5x8'</td>
<td>96</td>
<td>151</td>
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<td>Mix</td>
</tr>
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<td>64</td>
<td>72</td>
<td>W. Cedar</td>
<td>Mod</td>
</tr>
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5 STUDY FINDINGS

According to performance standards, side-by-side comparisons reveal that the A items did best with aesthetics, while C structures scored the worst. Conversely, with affordability, the results were flipped as the C items scored highest, whereas A and Lowe’s items scored the lowest. Respondents rated the B products highest in the durability category as once again C products were rated worst. In terms of efficiency and ecological impact, all of the reuse landscape products scored highest and the non-reuse ‘Lowe’s’ products overwhelmingly scored low. Though the positive response in efficiency and ecological impact were similar, B products scored highest for the shed, and C items succeeded with the fence with gate while A structures narrowly received the highest score for raised beds.

In totality, all of the reuse landscape items were well received by respondents; however, there were many lessons in style and application that could be taken from the experience (Table 2). Despite the aesthetic success of Shed A, the amount of labor involved as well as the sheer weight of the structure make it unrealistic for most situations, particularly as a pre-fabricated model. On one hand, the scrap wood structures utilize a fair amount of “hard-to-reuse” waste but also the material application could be seen as redundant requiring more energy and labor. In contrast, the aesthetic failures of pallet structures may call to question its viability as a building material. Pallets are extremely common and make up a significant part of the waste stream, though they are also highly reusable and recyclable as pallets. It may be that pallets are not aesthetically appropriate for every situation; for example, they seem to fit in well in rural settings with less stringent codes, but would be unsuitable in a suburban neighborhood. Although the A and C structures did well in their own categories, the more traditional looking B items easy to construct, while retaining acceptable aesthetic qualities, thus making them the most competitive structures against the Lowe’s products. Affordability and efficiency as a product make the B structures available to a wider audience, which a critical goal of this project.
Table 2. Survey Results (1=least effective; 5=most effective)

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<th>criteria 4</th>
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6 CONCLUSION

The underlying justification of the Reuse Village experiment was to gain knowledge into the effectiveness of reclaimed wood as a building product and design tool, specifically through the experiential building process coupled with a careful review by professionals within the design and construction industry. In conjunction with the physical evidence, an analysis of the existing body of academic and technical work in the fields of wood reuse, sustainable landscape construction and green building provided a template for investigating further. While the experiential process represents a personal journey for the emerging designer, the professional design opinions and existing body of knowledge demonstrate a consensus among leaders in the industry. The ability for humans to engage and share ideas creates a consensus that ultimately defines our culture and how we choose to design the world.

6.1 Key Components to Reusing Wood in the Landscape

The construction of the Reuse Village not only provides tangible results for evaluation and synthesis of ideas but also reveals the errors and rewards of the decision-making process along the way, while the existing data provides the framework for focusing efforts. The survey results help to verify or refute the success of reused materials compared to conventional, virgin wood-based products. The following is a list of important lessons learned and conclusions determined as a result of an analysis of the existing body of research in reuse, the implementation of the built project and the subsequent product review.

a. Reused wood has the aesthetic potential to compete with or improve upon conventional virgin-wood lumber products. As evidenced in the success of all the A landscape products as well as shed B, the reclaimed wood products performed well against conventional Lowe’s products. Lack of uniformity, however, is one aesthetic condition that plagued the pallet-based C products. Conversely, irregularity was a virtue of the success of A products as the numerous sizes, types and colors of reclaimed wood made for a creative alternative to an otherwise mundane look of conventional or traditional application. The more conservative approach utilizing Poplar upright boards evidenced in Shed B demonstrates that reclaimed wood also has the potential to look more clean and modern that may captivate a wider audience.
b. Reused wood contains cultural and historical values specific to its local origin that can add layers and to a landscape’s depth. Using reclaimed wood is an easy way to relate a site to its local culture. Each piece of lumber with its own texture, type and color tells a story to the site user without a need for literal translation. A rich patina layered with nail holes, burn marks, writing, paint, tree rings, burns and saw marks are all typical characteristics found in the lumber used in this project.

c. Reused wood has the potential for significant savings in energy consumption compared to conventional virgin wood products but is highly variable according to its source. The origin of reclaimed wood plays a huge role in its energy efficiency as a product. In terms of embodied energy, or the energy it takes to produce a material, reclaimed wood has the lowest energy requirements because it is harvested using minimal equipment and is mostly a local product. According to basic embodied energy calculations in this study, locally sourced reclaimed Southern Yellow Pine and Poplar achieved incredible advantage over its virgin Western red cedar counterparts sold at Lowe’s produced in British Columbia more than three thousand miles from Georgia. In terms of “production” reclaimed lumber is harvested or dismantled, or in this case deconstructed by hand instead of produced using petroleum products. If reclaimed materials have to be purchased from an outside market or require mechanical extraction, energy consumption increases, thus the availability and accessibility of materials has a significant role in whether a project is efficient, both in cost and energy. Another important factor in energy consumption is time, for example the maintenance, operation and durability of materials; however, because the study focused on comparing new vs. old wood-based products instead of wood vs. steel, time is less of a consideration in terms of energy costs when comparing two products of the same kind.

d. Reused lumber products likely have limitations in durability; however, all wood is impermanent. Time is a major element of this project that was unable to be calculated, but undoubtedly plays a major role in the life cycle of landscape materials. Wood is impermanent. Nonetheless, there is several wood qualities that can determine durability such as treated compared to untreated lumber, old growth compared to new growth. By and large, the density associated with old-growth timber is significantly different than virgin timber harvested in monoculture forests and this plays a role in how long it can last. The question that remains to be answered is whether old-growth, tighter grained reclaimed lumber outpaces modern-treated lumber or typically rot-resistant wood in longevity. Of course, even creosoted railroad timbers can rot with time.

e. Reused wood has the potential for cost savings, but it is highly variable to labor requirements, design and material availability. Reusing lumber in design and construction projects is always labor-intensive because it requires both processes of construction and salvage, and as a result, prices of materials wildly fluctuate. Shed A is a good example of a physical undertaking that may or may not be worth the time commitment. Coming up with an easy, straightforward design is key to labor efficiency. In addition, if materials are not readily available, transportation costs have to be included. As salvage markets across the US slowly expand, prices may begin to ease. Expansion of the salvage supply chain is key in the affordability of reuse materials, while simplified construction application is critical to labor concerns.

f. Reclaimed lumber has serious issues with quality control, which limit is use in construction projects, but landscape application may be absolved. All lumber used in structural components require a grade stamp. With the exception of bridges, decks and large outbuildings, local building codes do not necessarily require a grade stamp on landscape structures. Aside from durability issues, it seems that landscape construction may be the best fit for reclaimed lumber, because structures similar to those built in the Reuse Village do not require stringent oversight that would disqualify reclaimed wood. Some quality control problems can be resolved by merely sawing off end damage.

g. Reused wood can be a practical alternative to conventional virgin wood products in terms of performance and applicability. Reclaimed lumber is not appropriate for every situation, but it is potentially an effective alternative to conventional virgin lumber as it can be ecologically, economically and culturally beneficial to a landscape design and construction project. Resolving issues of labor and associated costs, addressing durability, improving availability, and employing a streamlined design approach is key to the success of a reuse project.

6.2 Closing the Loop

Although it sometimes seems the reuse industry is handicapped by a number of well-established forces, in actuality the tides have slowly begun to turn. The recent introduction of green building standards
has opened the floodgates for research and development, creating a more inviting climate for reform and change. Improving access and availability to salvaged materials, educating the public on its benefits and encouraging local initiatives to expand reuse and recycling is central to the growth of reuse networks. The most important aspect of closing the loop of building materials and establishing reclaimed wood as an effective landscape design and construction material is creating an environment conducive to its success.

7 REFERENCES
HISTORY, THEORY AND CULTURE

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AN ANALYSIS OF THE SPATIAL STRUCTURE OF THE NATIONAL PALACE OF QUELUZ

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1 ABSTRACT

The National Palace of Queluz is often described as the Versailles of Portugal, a comparison that would seem fitting due to its stately rococo architecture, French-inspired gardens designed by Jean-Baptiste Robillon, and later role as the primary royal residence. But this comparison is misguided as the landscape and palace bear only a superficial resemblance to Le Nôtre's masterpiece. Instead, at Queluz we find Moorish, Dutch, and vernacular Portuguese influences beneath the more domineering baroque and formal French motifs.

Spatial and viewshed analyses of the gardens reveal a complex spatial arrangement that contrasts with baroque principles. This departure can be explained by considering the social uses of the gardens. Additional analysis is leveled at Robillon, who was neither an architect nor landscape designer, and demonstrates how his background as a jeweler may have impacted the development of the garden plan. Through understanding the socio-cultural and historic background of Queluz, it becomes clear that rather than being a flawed baroque design, the gardens are a unique hybrid of baroque and Portuguese vernacular.

1.1 Keywords

garden history, Portuguese gardens, baroque, spatial organization
2 BACKGROUND

Located seven miles northwest of Lisbon, what would eventually become the royal estate at Queluz (see Figure 1) was little more than a small rural hunting lodge and agricultural lands until it was granted in 1742 to Dom Pedro, who would eventually rule Portugal as King Pedro III (Ferro, 1997, p.13). It was under the watchful eye of Dom Pedro, who was keenly interested in both architecture and botany, that Queluz was transformed from a modest lodge to one of the last great rococo palaces to be built in Europe. Although Portugal had long since passed the height of its power, Queluz was still the beneficiary of a far-flung empire that provided the financial means and inspiration for much of the work undertaken at the palace.

Figure 5. The Palace of Queluz, located in Queluz, Portugal. Image source: Bing Maps, used under Fair Use Law

The palace was decorated in an opulent manner with precious gold, wood, stone, and fabrics brought from the most exotic places of the empire. Enormous numbers of plants were imported from plant nurseries in the Netherlands and from tropical Brazil (Attlee, 2008, p.155; Delaforce, 2004, p.37).

The first designer to work at Queluz was Mateus Vicente de Oliveira, who was noted for his work in the baroque and rococo styles on several prominent churches in Portugal (Borges, 2003, p.619). Oliveira oversaw the construction of approximately half the palace building, but it was under the nearly thirty-year tenure of French goldsmith and architect Jean-Baptiste Robillion that the remainder of the palace, inner facades, and gardens were laid out and constructed (Ferro, 1997, p.17-20).

Especially during the period of Dom Pedro’s control of the estate, the palace remained a relatively care-free and private place. The design of the gardens reflect the private social purpose for which the palace was originally constructed (Rodrigues, 2013, p.17). Shortly after construction began, Queluz would become the seat of royal power when the Palace of Ajuda was destroyed by fire in 1794 (Abecasis, 2009, p.11). This shift in role to become the primary royal palace led to later comparisons of the gardens to other royal baroque palaces. However, it is incorrect to view the gardens in this manner. Baroque gardens are spatially constructed around concepts of power and projection. The building is sited along a main axis that either appears to continue to the horizon, or is made to project the viewer into the surrounding landscape,
and connect the greater landscape to the overall composition of the garden. There are many major axes that cross, or in other ways interact, with the main axis to create a complex web of geometry on the landscape. The display of power was pervasive, portrayed through the control of natural elements. Water featured prominently in the baroque garden, carefully controlled in canals and ornate fountains. This control extended to the vegetation, and plants were arranged in carefully groomed parterres and allées (Rogers, 2001, p.211).

By contrast, Queluz was designed with privacy and social intimacy in mind, and was influenced by Dutch and Moorish ideas. It bears a superficial resemblance to the baroque style; possessed of parterres, axes, patte d'oie, plentiful fountains, and mythical-themed statuary. With ornate flourishes applied to seemingly every surface, a visitor to the gardens would readily compare them to those of other baroque palaces. However, when a spatial analysis of the gardens is conducted, it becomes apparent that Queluz is an extraordinary departure from the principles of the baroque garden, and the true structural and spatial framework was the social needs of Dom Pedro and his family.

3 PURPOSE AND OBJECTIVES
This research examines the spatial structure of the gardens of the Palace of Queluz and compares it with contemporary palatial baroque gardens in Europe. It is tempting to view Queluz as a poor application of baroque design principles. This conclusion, however, ignores the historic social function of the palace, the character of the garden’s designer, Jean-Baptiste Robillion, and the strong vernacular style on the Iberian Peninsula that predated the popularity of the baroque. In the interplay of these three factors, a design narrative emerges that accounts for the noticeable departures from baroque archetypes, and demonstrates that the majority of these departures were undertaken as conscious decisions. It is only through an understanding of this design narrative that we are able to appreciate Queluz as a unique synthesis of ideas and a rationalization of competing principles within the design.

4 REVIEW OF LITERATURE
Comparatively little research has been published on the Palace of Queluz, and what research has been done has focused primarily on the architecture, finishings, and furnishings of the palace. Pires' (1924) two-volume work is still considered to be the seminal work on the history of palace, yet only a single chapter, largely descriptive in nature, is spent on the gardens. Others, namely Ferro (1997) and Alfonso and Delaforce (1988) have given the gardens more consideration. Both of these works provide a wealth on information on the individual elements and spaces of the garden, but fail to thoroughly analyze their overall composition. Most modern textbooks give Queluz, and Portuguese gardens in general, little coverage. Newton (1971), Pregill and Volkman (1993), and Mann (1993) all fail to mention Portuguese gardens in their entirety. Only Jellicoe and Jellicoe (1995) and Rogers (2001) distinguish the Portuguese design style as being distinctly separate, the result of the infusion the historic Moorish style with those of France and Italy. This lack of exposure to Portuguese gardens has laid a foundation for misunderstanding and improper comparisons to other contemporary styles, most notably the baroque, and led to descriptions of Portuguese gardens as “backward-looking” (Rogers, 2001, p.211). Such a dismissive attitude towards Portuguese gardens may be explained by the fact that they don’t fit our accepted schema for formal gardens in Europe at this time.

5 METHODS
As the primary concern of this research is the spatial arrangement of the gardens, the different data collection and analysis methods were selected to provide a robust and multi-faceted understanding of the spatial arrangement of the site and the surrounding landscape. The initial impetus of this research emerged from a visit to Queluz in 2011, and observations, photos, and measurements were collected at that time. Further analysis of the spatial organization of the site was carried out using reproductions of the original plans for the gardens and aerial imagery available through Google Maps. An analysis of the viewsheds surrounding Queluz and a selection of other baroque gardens was performed in GIS using elevation data available from the Shuttle Radar Topography Mission (SRTM). Contemporary accounts of the gardens and secondary sources were also referred to where pertinent to elucidate the cultural and social role of the palace and its spaces, as well as the character of Robillion.
4 PRESENTATION OF DATA

The differences between Queluz and accepted baroque principles first become apparent when examining the location of the palace and its orientation on the site. The palace is located in a small shallow valley, running generally east to west. Its location in the middle of the valley proffered it no views to the nearby sea, but did offer the potential of utilizing several distinguishable hills as focal points outside the formal grounds of the palace. The use of distant objects and vistas as focal points through which to project the viewer and seemingly expand the garden was a technique commonly used by baroque designers (Baridon, 1998, p.9-10). Yet at Queluz, no such alignments exist and, in contrast, the garden and axes were instead laid out in a manner that reinforced the insular character of the estate. Figure 2 illustrates the prominent axes of the gardens, with the primary axis denoted in purple. Note how none of the prominent axes are aligned to any significant visible landmarks, but instead are aligned to points of lower elevation. The effect of the location and alignment of the main axis becomes more pronounced when a viewshed analysis along the main axis is compared to those of the main axes of Schönbrunn, Eszterháza (see Figure 3). The view along the main axis of Queluz is dramatically shorter than those in the other gardens. This is a result of the palace being sited in the valley floor with the main axis orientated towards a nearby slope. The alignment of the axes, combined with the wall surrounding the garden, effectively removes the outside landscape. Instead, the boundaries of the garden are reinforced, clearly circumscribing the limits of the gardens and creating a walled paradise that owes its heritage to the Moorish occupation of the Iberian Peninsula.
Turning to the internal spatial arrangement of the gardens, the contrast between Queluz and other contemporary baroque landscapes becomes even more pronounced. Figure 4 illustrates the differences in the basic spatial arrangements between the contemporary traditional baroque estates of Schönbrunn and Eszterháza, and the palace of Queluz. Schönbrunn and Eszterháza demonstrate strong axial arrangement along a very pronounced linear form, strong cross-axes, and consistent geometries, all carried out on a grand scale that blurs the border between the estate and the surrounding landscape. In these two landscapes, landforms and objects are combined with these axes to create bold projections of power and wealth, and to create a dramatic stage in which the theatrics of the garden play out. The spaces around the palaces typically contained parterre gardens or open courtyards in order to ensure that the palace sat prominently visible in the landscape. The palace itself was the pinnacle of the main axis, unfolding in perfect symmetry as if to place a final stamp of control on the landscape. These were estates designed to present a face of power, to send a message of prestige that only one possessed of a tremendous amount of wealth could do.

At Queluz, the baroque schema is turned upside down and seemingly abandoned. Queluz is not a linear garden; rather it is compact and compartmentalized (see Figure 4). While a main axis is discernable, its dominance is reduced as it must compete with other overlapping and offset axes in both the garden and the architecture. The building itself is not symmetrical, and many of the secondary axes of the garden do not align to the architecture and vice versa. The gardens extend all the way to the palace, further reducing the visual impact of the palace within the landscape. Even the parterre gardens abutting the palace depart from convention, eschewing the form of a verdant tapestry for visual pleasure, but rather taking the form of garden rooms that one might typically expect to find farther from the palace in a typical baroque garden. Queluz is markedly different in scale as well; the palace and landscape are smaller and more intimate than their contemporaries. Instead of utilizing visual tricks to incorporate the outside landscape, a wall surrounds the entire garden, further reinforcing the modest size.

Other abnormalities exist throughout the garden. The patte d’oie extending from the main parterre is considerably wider and squatter than is seen elsewhere, and the interweaving pattern of paths is overly complex. Perhaps the most important section of the garden, the canal and stream, are intimate spaces that bely their importance in the site and are also the most informal portion of the gardens (see Figure 5). The main axis of the garden is both disjointed and abruptly halted by the large free-standing waterfall known as the Grand Cascade, which turns what is traditionally an element of spatial projection into an element of spatial retention.

What explains these sharp departures from baroque conventions? Is it simply a matter that the gardens were poorly designed or cheaply executed? Such a proposition seems unlikely considering the wealth and resources available to Dom Pedro, and can be safely dismissed in light of the exacting detail and workmanship evident throughout the estate. Instead, it would appear that the explanation is threefold. First, the training of the garden’s designer, Jean-Baptiste Robillion, as a goldsmith contributed to the production of a garden designed as a complex series of separate elements. Second, the Moorish-influenced vernacular design style of Portugal was integrated into the landscape, unlike other baroque
landscapes where the vernacular was largely abandoned and suppressed. Furthermore, the spatial character of the garden is heavily influenced by the social role of the palace as primarily a private retreat, and not a public expression of power. Finally, elements of other styles from Europe and the Portuguese empire were integrated into the garden.

Figure 8. The basic spatial arrangements of Queluz (A), Eszterháza (B), and Schönbrunn (C)

THE GOLDSMITH

Frenchman Jean-Baptiste Robillion was responsible for the design of the gardens and much of the palace of Queluz. Robillion trained in Paris as a goldsmith under the famed Frenchman Thomas Germain, one of the most preeminent artisans of his day. After going bankrupt in Paris, Robillion moved to Portugal where he was employed by the Portuguese King as the goldsmith for the royal court. Robillion’s first exposure to Queluz and the work being carried out there was through his work as a goldsmith, intriguingly a profession shared by Queluz’s first architect, Mateus Vicente de Oliveira. Robillion replaced Oliveira after the earthquake of 1755, following which Oliveira left to work on reconstruction efforts in Lisbon (Ferro, 1997, p.18). As a goldsmith, Robillion was trained to work in a small scale and on individual pieces. Although some commissions required continuity, a table set for instance, even in these cases each piece was an individual element to itself. Furthermore, detail and complexity were a trademark of the profession and, having trained under Germain who was particularly noted for his rococo work, Robillion was certain to have had an eye for minute detail.

This research proposes that at Queluz, the tendencies of a goldsmith are expressed in the design of a landscape that can be described as a collection of individual elements with little apparent continuity between them. Yet within each element, great care is paid to detail, especially the finishing artistic
elements of a space such as fountains and statuary. Ironically, Robillion’s ability to pay close attention to the detailed finishings in the garden’s spaces may reinforce the notion that Queluz is a baroque garden, superficially covering the structural inconsistencies between Queluz and other contemporary palaces.

Consider the garden rooms adjacent to the palace: the Hanging Garden and the Malta Garden. Internally, each is well balanced and symmetrical, each is lavishly decorated with fountains, statuary, and clipped hedges. Yet neither room relates particularly well to the other, and to move between the gardens one must travel along an awkward diagonal path. Their axes do not align, nor do individual elements within each space relate to the other. Despite being adjacent to each other and forming the first impression of the gardens from the palace, they are clearly singular elements designed to be spaces distinctly separate from each other.

The main axis of the palace further demonstrates the compartmentalization of the design. While in the Hanging Garden the main axis aligns perfectly with the façade of the building, once the axis crosses into the formal forest it noticeably shifts a couple feet to the northwest. Just as with the Hanging Garden and the Malta Garden, this flaw is explained if the design of both the Hanging Garden and the formal forest are viewed as two separate elements. In the Hanging Garden, the location of the axis is drawn from the main façade of the palace. In the formal forest, instead of simply extending the axis of the Hanging Garden, the location of the central axis is determined by the intersection of a pair of patte d’oie emanating from the southeast and southwest corners of the garden. The southwestern patte d’oie has paths radiating at 30° angles while the southeastern patte d’oie radiates at 20° angles. The choice of these angles enable the bottom path of each patte d’oie to form a straight connection, while the third path of each provides a nearly direct route to the entrance to the Hanging Garden. The axis of the forest is determined by the intersection of the second path on each patte d’oie, at which is placed a large fountain basin, and which results in an offset with the Hanging Garden axis. This decision to locate the axis in this manner creates a balanced and pleasing geometric array of paths and rond points within the forest, but once again this individual balance is achieved to the detriment of the continuity of the overall design, even if minimal.

Robillion’s tendency to focus on the details of individual elements separate from the whole design can also be seen in the architecture, especially the internal façades. Each main façade is remarkable in its own right, but perhaps more remarkable is the significant differences between them. Unlike the uniform façades of other baroque palaces, Queluz enjoys several prominent façades, each with its own unique character. The façade of the throne room is scalloped and clearly rococo, the Façade of Ceremonies is baroque, while a semi-circular balcony and military themes punctuate the façade of the Robillion Pavilion. This visual cacophony of façades is more remarkable considering that all three are simultaneously visible from the Hanging Garden, creating the distinct feeling that the palace is older and was designed in separate stages.

A GARDEN OF SOCIAL SPACES

Robillion’s tendency to compartmentalize his design was reinforced by the nature of the palace as a private retreat. Unlike other baroque palaces, which were often constructed as much to project the wealth and power of the owner as to provide a home, at Queluz the creation of a pleasurable home and landscape for Dom Pedro and his family remained an overriding concern throughout the entire construction process. Because Queluz served a significantly different purpose than contemporary baroque palaces of the time, it is not unexpected that the design heavily reflects this. The external projection of power, and the desire to impress that led to the creation of massive axially arranged landscapes elsewhere, had little bearing at Queluz, which was organized around social uses and a desire for privacy. The inward focus of Queluz is evident from the very arrival at the palace, which externally greets guests with markedly modest façades largely devoid of the elegant scrollwork and detailing that characterize the inward facing façades of the palace. Similarly, when approaching the palace through the formal forest, the first gate that greets the visitor is very modest, while the grand Horse Gateway is positioned at the entrance to the Hanging Garden, at the heart of the estate.

Figure 5 illustrates the primary areas of the gardens. The forms of these spaces, and the relationships between the spaces, were driven by their social functions and uses. Returning to the relationship between the Hanging Garden and the Malta Garden, the spatial arrangement of these two gardens become clearer within the social context that they served. Unlike the grand parterres seen elsewhere, these two gardens at Queluz are intended to be experienced from within – they are spaces to be physically interacted with. In fact, while the geometrically-trimmed hedges immediately conjure up
comparisons with parterre gardens, both the Hanging Garden and Malta Garden are based more on the concepts of the internal courtyard than a parterre. These gardens are extensions of the palace itself, literally outdoor rooms intended to be used as such (Guimarães and Carneiro, 1995, p.2). The forms of the gardens are based off of the architectural outline of the palace, and are further connected to the palace through the use of a balustrade extending around both gardens. This architectural extension of the palace to create the rooms results in the creation of two gardens of different sizes and the subsequent misaligned axes, but it fulfills the social role of creating a pair of outdoor rooms closely tied to the palace (see Figure 5).

The main social space of the garden extended along the length of the tile canal (area #5 in Figure 5), which served as both the defining and unifying element of the western side of the estate. A stream, the Ribeira de Jamor, was transformed into an impressive canal under the supervision of a Dutch designer (Dynes, 1968, p.186-7). Decorated with thousands of Portuguese azulejos, or tiles, the canal was the focal point of social life at Queluz. Largely retaining the natural course of the stream, the canal and remaining portions of the stream, create a wandering but linear strip of spaces designed solely around their social function. During the evenings, the royal family would float along the illuminated canal in boats, relishing the cool of the water. Chinese pavilions were constructed over, and adjacent to, the canal, and a game court was positioned along the eastern bank of the stream. A wide promenade was constructed along the entire length, meandering with the stream.

While the canal itself was straight, no attempt was made to undertake large-scale alteration of the existing topography to further extend the canal, or align it better with the palace. Nor was the shape of the palace altered to align it with the canal. Instead, the beautiful Lions’ Staircase was constructed to connect the competing alignments, gracefully moving the visitor from one geometric order to another. Beyond this formal junction between the palace and the canal, little effort appears to have been taken to connect the two.

![Figure 9. Plan view of the palace and prominent areas and features: 1) The Hanging Garden, 2) The Malta Garden, 3) The Grand Cascade in the formal forest, 4) The Lions’ Staircase, 5) The Tiled Canal, 6) Citrus Groves. Image copyright: Google, permission granted under Fair Use Law](image-url)

In fact, the opposite would appear to be the case. Upon entering the promenade heading south from the Lions’ Staircase, the palace quickly disappears from view, screened by hedges and dense
plantings. If Queluz itself was an insular palace, than the social spaces along the canal and the stream would appear to be the most private of all. It was here that the occupants of Queluz sough the greatest seclusion from the cares of court, enjoying a completely private oasis uninterrupted by formal overtones in the landscape.

On the northwest side of the canal lies a roughly square garden, built on the spot of what was most likely the garden of the original house that occupied the site. This would have been filled with citrus and other fruit-producing trees and is laid out in a very Germanic style with its square form and square subsections (Twiss, 1775, p.22). Ironically, though it aligns to little, this garden has the strongest and longest uninterrupted axis in the estate. The width of the walkway and pair of impressive fountains would suggest that it served as another important promenade in the garden despite its relatively far-flung position on the estate.

**A BLEND OF CULTURES**

The third factor that we must consider is the historical context in which the palace was constructed, and the rich design heritage that existed in the region prior to the arrival of the baroque style. Within the design of both the palace and the gardens there is clear evidence that the modifications made to baroque principles were often influenced by Portugal's vernacular style, as well as others. The influence of the Moorish occupation of the Iberian Peninsula is most notable in both the arrangement and the use of the spaces. Unlike other baroque palaces that are symmetrical in their footprint, the palace at Queluz has a stepped form, punctuated by internal courtyards, that bear a striking resemblance to the organic structures of the Ibero-Moorish palaces of the Alhambra and the Real Alcázar of Seville. In these two palaces, a series of independent architectural units, almost always formed around a courtyard, are combined in an irregular fashion to create the whole. While this growth happened somewhat organically over time, the focus was not on creating an overarching spatial organization that extended across the entire site, rather the focus was placed on creating cohesion and balance within each individual space. The use of this approach is seen clearly in the Hanging Garden and the Malta Garden, but it is also exhibited in the other garden spaces. This compartmentalization approach marries well with the approach taken by Robillion that favored the creation of detailed independent spaces over the creation of a purely cohesive whole.

The relation between the canal and the palace was also partially defined by an element with Moorish heritage: a large reservoir for holding water through the summer. The Hanging Garden is built atop this reservoir, the walls of which can be clearly seen from the path to the west of the reservoir (Ferro, 1997, p.22). The palace and upper gardens were laid out so as to be at the same level as the Hanging Garden. As a result the visitor to the garden must pass through a series of grade changes before arriving at the area of the canal, a transition that serves to further separate the canal as a more private social space.

The compact form of the garden at Queluz, as opposed to the linear forms of contemporary baroque landscapes, is also in keeping with the Moorish style. Typically eschewing long, uninterrupted axes, the Moors preferred gardens of a smaller scale, with interconnected spaces, each defined by their own separate character. This spatial organization is similar to that seen at other Portuguese gardens, such as the Jardim do Paço Episcopal, the Palacio de Fronteira, and the Convento de Cristo as well as the grander Spanish gardens such as the Real Alcázar. Perhaps the most overtly Moorish heritage at Queluz is the garden wall. Derived from the Persian *paridaiza*, Moorish gardens were vibrant paradises contained within a courtyard or garden wall. Both the Spanish and the Portuguese retained the wall as a key element of their garden design, sometimes creating expansive walls that enclosed acres upon acres of garden space. The enclosing of a garden was at odds with baroque principles that sought to create as expansive a landscape as possible, but such an approach fit perfectly within the site program at Queluz to create a personal pleasure ground.

An early plan of the garden done by Robillion was more chaotic, and suggests that an even stronger influence of both Moorish and Dutch ideas may have originally pervaded the thoughts of Robillion and his workers. In a plan from shortly after Robillion was appointed architect of the palace, the central fountain along the main axis in the forest is ringed by a circular path, which is bisected by a series of radiating paths that spread across the area. More complex and with a different form than is seen in contemporary baroque designs, this layout bears a striking resemblance to the geometric tile and plasterwork of Moorish artisans. Other, small garden spaces, fill the areas between the palace and the
stream, and resemble the more intimate geometrical Dutch gardens. Dutch influence is not unexpected, as the Dutchman Gerald Van der Kolk worked with Robillion in implementing the planting plan for the gardens (Ferro, 1997, p.107).

7 FINDINGS AND CONCLUSIONS

When the Portuguese royal family left Queluz, they left an impression of a royal palace that was never intended. It was only through the untimely destruction of the other royal palaces in Lisbon that the royal family took up residence at Queluz, a palace ill-equipped for the display of power desired by a European monarchy. Perhaps it is unsurprising that the Englishman William Beckford, upon visiting Queluz, said little about the nature of the garden itself (Beckford, 1834). For someone who had traveled extensively across Europe and seen some of the greatest palaces it had to offer, Queluz must have been underwhelming and disorganized. Others shared this opinion, describing Queluz as worthy of a wealthy individual, but not a royal family (Franco, 2007, p.33). With its intimate scale, insular nature, complex cluster of spaces and seeming lack of coherence, it would have been in sharp contrast to the formal gardens of France, Italy, Bavaria, Austria, and contemporary Spain. Had these been the feelings of Beckford, then he, as have many others, misjudged Queluz by viewing it in the context of other royal baroque palaces.

When Dom Pedro began his building campaign in 1747, he never intended that the estate should become a seat of royal power, but that it would remain his personal sanctuary away from Lisbon. As such, the standard elements of the baroque style were often altered or completely abandoned in pursuit of creating an insular estate designed around the social desires and needs of the family, not the theories of design popular at the time. The gardens that emerged at Queluz are a marriage of deliberate planning and happenstance due to the nature of the man who designed them and their social and historic setting. It would appear that Robillion had a subconscious tendency to focus on spaces as separate units, where the internal arrangement of the spaces is more important than the overall arrangement of the spaces and their interaction with each other. This tendency of Robillion was reinforced at Queluz by the focus on creating spaces around social functions, and not overarching geometric or symmetric spatial rules, as is seen in traditional baroque gardens. Both of these design themes were further reinforced by the traditional Ibero-Moorish vernacular style, which featured an organic arrangement of spaces that served different social purposes or classes within the household, and with the entire garden being enclosed by a wall.

Queluz presents us with a critique of our tendency to group sites and designs into ordered historical movements defined by clearly established principles. While this provides some overall clarity in the historic timeline, it does a disservice to sites, such as Queluz, that do not fit into the historic mold we have created. These sites are criticized for failing to conform to the design canon, and become viewed as abnormalities or simply poor designs. This analysis of Queluz suggests that instead of dismissing these types of sites outright, we should strive to understand more fully the context in which they emerged, and recognize the multifaceted forces that may have influenced the final design. Only after developing a full understanding of the design narrative of a site are we in a position to attempt to pass judgment.

How then, should we view Queluz? It is a hybrid that resists definition, not quite baroque but not quite vernacular. It is not quite a palace, but not quite a private home. If we try to interpret it purely by the ideals of the baroque, then we find it wanting. Similarly, should we compare it to other royal palace it appears too modest for the royal family of this once great empire. Ultimately, as with all aspects of history, only by grasping the context of its creation and function can we appreciate Queluz as a unique synthesis of design and purpose.

8. REFERENCES


CULTURA AND THE COUNSEL OF ROBERTO BURLE MARX

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1 ABSTRACT
The Brazilian Conselho Federal de Cultura (Federal Council of Culture) was created by governmental decree in November 1966, two years after the 1964 military coup initiated a right-wing dictatorship that would last twenty-one years. The twenty-four counselors had dissimilar allegiances and motivations, but they all shared an interest in the national projection of Brazilian culture. Roberto Burle Marx (1909-1994), now widely considered Latin America’s most significant modernist landscape architect, was an appointed counselor, serving alongside other well-known cultural figures.

This paper examines Burle Marx’s written opinions from 1967 until 1971, delivered to the President of the Republic and published in the Council’s journal, Cultura. His opinions address such issues as deforestation, the establishment of national parks, the place of commemorative sculpture in public parks, and the unique history of the Brazilian landscape. A close reading of these texts, seen in the contemporaneous cultural context of Brazil, provides new insight into Burle Marx’s earlier design work and elucidates a little-known but extremely important moment in the trajectory of his oeuvre, from prolific designer to prescient counselor. Many of Burle Marx’s landscape projects prior to the period of the military dictatorship are public parks, ranging in scale from the small town squares of Recife to the large parks executed in Pampulha, Araxá, and Rio de Janeiro. After the military coup of 1964, Burle Marx clearly considered his position as Counselor as an equally important cultural project, for it provided a platform from which to develop and promote his ideas of the Brazilian landscape, its relationship to the public realm, and its protection and conservation, even in a milieu in which critical speech acts were restricted.

1.1 Keywords
Roberto Burle Marx, Brazil, military dictatorship, culture, deforestation
2 CONSTRUCTING A BRAZILIAN CULTURAL IDENTITY

Figure 1. Passeata dos cem mil (March of 100,000), Rio de Janeiro (1968)
Public domain image

2.1 From the Semana de Arte Moderna to the Conselho Federal de Cultura

The Brazilian Conselho Federal de Cultura (Federal Council of Culture) was created by governmental decree in November 1966, two years after the 1964 military coup initiated a right-wing dictatorship in Brazil that would last twenty-one years. Appointed directly by the President of the Republic, Humberto de Alencar Castello Branco, the twenty-four counselors had dissimilar allegiances and motivations, but they all shared an interest in the national projection of Brazilian culture. The landscape architect Roberto Burle Marx (1909-1994) was an appointed counselor, serving alongside other well-known members, including sociologist Gilberto Freyre and novelist Rachel de Queiroz. Many other culturally significant Brazilians spent this period abroad in political exile; freedom of speech and political opposition were often suppressed, yet civilian protests toward government-imposed censorship did occur (see Figure 1). This conflux of culture and politics, specifically a nationalist cultural policy implemented by a military dictatorship, is particularly fascinating as the continuation of a decades-long search for brasileidade, or “Brazilianness,” and the national construction of a uniquely Brazilian culture.

The Semana de Arte Moderna (Week of Modern Art), a 1922 arts festival in São Paulo staged by Emiliano Di Cavalcanti and Mário de Andrade, is generally cited as the first emergence of the self-conscious search for a “modern” Brazilian cultural identity, an attempt to establish a distinct identity from European influence. The hero of this search for identity, which looked to the folklore of the Brazilian countryside rather than the European elite, was a compelling character named Macunaíma, developed by Mário de Andrade in the 1928 novel of the same name. Macunaíma represented the new Brazilian cultural identity—a semi-wild jungle boy embodying the three races of Brazil—the African, Indian, and Iberian. The modernists argued for cultural anthropophagy, or the cannibalism of the oppression of European influence, expressed satirically in Oswald de Andrade’s Manifesto Antropófago of 1928. “Only Cannibalism unites us…Tupi, or not Tupi, that is the question,” became the mantra of a generation of artists and writers; this cultural argument influenced the development of a particularly unique and “Brazilian” modernist identity in the work of many architects, including Lúcio Costa, Oscar Niemeyer, and Affonso Reidy, as well as emerging in the rich oeuvre of the landscape architect Roberto Burle Marx (1909-1994).

This paper reconsiders Roberto Burle Marx’s publicly commissioned plazas and parks from 1934-1964, as well as examining his consular opinions from 1967 until 1971, delivered to the President of the Republic and published in the Council’s journal, Cultura. His opinions address such issues as deforestation, the establishment of national parks, the place of commemorative sculpture in public parks, and the unique history of the Brazilian landscape. A close reading of these texts, seen in the contemporaneous cultural context of Brazil, elucidates a little-known but extremely important moment in the trajectory of Burle Marx’s oeuvre, further cementing his position as Latin America’s most significant landscape architect for not only his beautiful public parks and plazas, but for his political writings.
3 URBAN PLAZAS AND PUBLIC PARKS BY ROBERTO BURLE MARX, 1934-1964

Figure 2. The aquatic garden of the Praça de Casa Forte, Recife (1938)
Photo by Benício Whatley Dias, courtesy of the Acervo Fundação Joaquim Nabuco

3.1 Public Plazas, 1934-1942

Roberto Burle Marx’s earliest projects, dating from 1934 to 1942, were a series of small public squares in Recife, in the northeastern Brazilian state of Pernambuco, and the headquarters of the Ministério de Educação e Saúde (Ministry of Education and Health), in Rio de Janeiro, then Brazil’s capital city. In both the conception and projection of these plazas, Burle Marx had begun to construct a particularly “Brazilian” style of landscape architecture, parallel to a similar cultural construction undertaken by the authoritarian regime of the president of this period, Gétulio Vargas. The First Vargas Regime, the term for Vargas’s long dictatorship of 1930-45, struggled to establish a national cultural identity and to define Brazilian modernism.

Two of the plazas in Recife, the Praça de Casa Forte and the Praça Euclides da Cunha, are particularly noteworthy. Praça de Casa Forte, completed in 1935, is a formal linear park with two rectangular pools and a central round fountain. Planted with trees from the Amazon rainforest, its reflecting pools contained a variety of aqueous plants, including the famed victoria regia water lilies, native to Brazil (see Figure 2). Recife is not particularly close to the Amazon basin, and its climate is much hotter and more arid than the rainforest. But the presentation of these plants from the state of Amazônia was carefully conceived in this promenade plaza of water plants, and it may have been inspired by the botanical gardens of Kew in London and Dahlem in Berlin, which Burle Marx greatly admired. Very few Brazilians had actually been to the Amazon to observe its incredibly rich flora; Burle Marx brought this diversity of native flora to this middle-class neighborhood enclave in Recife.

The Praça Euclides da Cunha also is an ecological presentation of flora; in this case, a composition of desert plants from the culturally and botanically rich Brazilian sertão, the dry desert, or caatinga, of the interior of Northeastern Brazil. Here, the reference is more literary. Da Cunha is one of Brazil’s most important authors, creator of a rich portrait of the resilience and steadfast character of the typical Brazilian sertanejo, or “backwoodsman.” His 1902 novel Os Sertões is certainly one of the most influential novels in the genre of Brazilian literature. The plaza’s winding picturesque paths frame views of cactus plants and other succulents. Here, the ecological tableau has been enriched with the culture of the Brazilian folkhero, as lionized in da Cunha’s novel.

The projection of both Praça de Casa Forte and Praça Euclides da Cunha as small tableaux representing richness and diversity of Brazil’s abundant flora, worthy of experiencing and preserving, already captures the beginnings of a cultural project that Burle Marx continues throughout his career, through both the construction of parks and the writing of consular opinion.

In 1938, Burle Marx became involved in the first important modernist building of the Vargas cultural project: the Ministério de Educação e Saúde (MES), whose planning and construction dates from 1936-1942. This building, the capstone project exhibited at the “Brazil Builds” exhibition held at the Museum of Modern art in 1942, and widely published throughout the United States and Europe, represented the dawn of the Vargas-era cultural project rather than its twilight, the oppressive Estado
**Novo.** The Vargas-appointed Minister of Education, Gustavo Capanema, envisioned a new modern culture in Brazil to be established through the vehicle of education (Azevedo). The MES building was seen as a complete work of art, which included architecture, sculpture, painting, landscape, and interior and exterior murals. Burle Marx, responsible for the landscape design of the building’s public plaza as well as two private roof gardens, was invited to join the project by Lúcio Costa, head of a design team including Oscar Neimeyer, Affonso Eduardo Reidy, Emani Vasconcellos, Carlos Leão, and Jorge Machado Moreira. The Swiss-French architect Le Corbusier was an advisor to the project, producing a sketch plan in 1936, but when the building’s site was moved from the waterfront to an interior block, the Brazilian team completely transformed the building’s linear parti into a thin vertical slab on pilotis with a perpendicular low volume punctuated by the expression of the theater, and forever claimed this design as uniquely different from the initial sketch of Le Corbusier. North and south facades of the building were treated appropriately to respond to the specifics of the climate, with the articulation of adjustable quebra-luz (brise-soleils) along the north face of the tower.

Similarly to the public plazas in Recife, Burle Marx again uses a palette of native Brazilian plants, and here for the first time uses the sinuous amoeba-like curvilinear planting beds that become the signature of much of his later work. Pedra portuguesa paving stones, blue-and-white azulejo tiles painted by Cândido Portinari adorning the building’s vertical exterior surfaces, and monumental statuary by Celso Antônio are fully integrated into the design of the plaza. The roof garden atop the low projecting volume is the Minister’s private terraced garden, with paved walkways and raised planting beds, and a second small roof garden is atop the tower slab. These roof gardens foreshadow many future designs by RBM, as well as echo his very first commission of 1932, the roof garden of the modernist Alfredo Schwartz House in Rio de Janeiro, designed by Lucio Costa and Gregori Warchavchik.

### 3.2 The Parks of Minas Gerais

Burle Marx’s work in the interior state of Minas Gerais follows a fascinating shift of Brazilian cultural and political focus from the coasts and cities of Rio de Janeiro and São Paulo toward the interior terrain of Minas Gerais. Vargas was supported by many wealthy landowners of Minas Gerais as it developed into a burgeoning economic power, and he was politically close to its governor from 1933-1945, Benedito Valadares. As a young man and again as a member of the Conselho Federal de Cultura, Burle Marx often wrote of his admiration of this interior state, its mountainous landscape and unique flora, and its rich colonial heritage, worthy of protection and conservation. Burle Marx designed two large landscape projects in Minas Gerais. The first, the landscape of the extensive grounds and artificial lake of the Grande Hotel de Araxá, the Parque do Barreiro, was again conceived as a representative ecological tableau, showcasing flora of this richly diverse region. Construction began in 1938, during the later years of the First Vargas Regime. This huge complex of a hotel and mineral spa, sited at a natural source of mineral waters and medicinal mud, was inaugurated in 1944 by Valadares and Vargas. The hotel, with its famed mineral baths, became the site of social, political, and cultural events, and brought an era of cultural splendor to this inland region of Brazil, particularly given the Novo Estado’s emphasis on Brazil’s mineral wealth and the promise of resource extraction. The hotel complex is conservative neo-colonial building designed by the architect Luis Signorelli. In 1947, a gem-like modern structure by the architect Francisco Bolonha, the Fonte Andrade Júnior, was constructed on the grounds of the Parque do Barreiro, housing both the source of the site’s medicinal sulfurous waters and the dinosaur bones discovered during the building’s construction. These two architecture styles, juxtaposed so jarringly in the Parque do Barreiro, illustrate the aesthetic cultural debate still raging within the Vargas regime—between a Brazilian culture defined by the embrace of the neo-colonial style, or one that reflected a Brazilian manifestation of the Corbusian international-style modernism of CIAM (Congrès International d’Architecture Moderne / International Congresses of Modern Architecture).

RBM’s second project in Minas commenced during Juscelino Kubitschek’s early political career, during his 1940-1945 mayorship of Belo Horizonte, the capital city of Minas Gerais. Kubitschek later became the third democratically-elected President of the Republic following the fall of the First Vargas Regime in 1945, and he held office from 1956-1961. Kubitschek embraced the nationalistic expression of culture, a project which culminated in the construction of the new Brazilian capital on the high plateau of the country’s interior, Brasilia. During the years prior to his presidency, for which he campaigned on the promise of “fifty years of progress in five,” Kubitschek was developing a modernist aesthetic expression of Brazilian culture. His major project of an artificial lake in the wealthy Pampulha district of Belo Horizonte,
intended to supply water to the city, included with a complex of luxury buildings, including a hotel, casino, yacht club, church, and dance hall. The architect Oscar Niemeyer was commissioned to design the buildings, and Burle Marx designed the landscaping of the surrounding lakefront terrain. Although the hotel was never built, the rest of the project was completed in 1943. Considered by many critics as the finest buildings of Niemeyer’s oeuvre, the project cemented the relationship between Kubitschek and the architect, which led to the Niemeyer’s future commission for the design of the nation’s new capital, Brasília. Burle Marx however was not commissioned for any projects in Brasília until after the end of Kubitschek’s presidency.

3.3 The Brazilian Pavilion at the New York World’s Fair

After the Ministério of Educação e Saúde, Burle Marx collaborated on another project with Costa and Niemeyer, the Pavilhão do Brasil (Brazilian Pavilion) for the 1939 New York World’s Fair. The designers received a directive from the Vargas regime to export an international projection of Brazilian culture, demonstrating Brazil’s forward-looking national identity. A new term was employed for the pavilion—tropical modernism—which was reflected not only in the architecture style of the building, but also in its artwork, the tropical gardens by Burle Marx, and the very content of the exhibition.

Vargas wanted Brazil to appear as both modern and uniquely Brazilian, and to position its distinctive place in the Americas. The architectural response of the pavilion did not just reflect the principles of the CIAM (International Congress of Modern Architecture), of which Costa was a member, but it added a new expressive lyricism to the modern canon through the use of curvilinear forms and ramps, the fluidity of interior and exterior spaces, and the moderation of the intense tropical sunlight through the use of the exterior quebra-luz.

The exhibition content displayed highlights of Brazil’s economy while downplaying the oppressive autocratic regime of Vargas’ Estado Novo. The country’s mineral wealth, tropical hardwoods, and other natural resources were highlighted. And Brazil was marketed as the world’s largest coffee producer, with a glamorous coffee bar as the focal point of the pavilion. Burle Marx’s outdoor garden, with tropical plants arrayed in sinuous patterns around a small lagoon of victoria regia water lilies, brought an exotic Amazonian touch to this former wetland in Queens.

Shortly after the New York World’s Fair, international interest in the tropical modernism of Brazil’s new architecture led to the highly acclaimed exhibition “Brazil Builds” at the Museum of Modern Art, New York, in 1943. Both the history and influence of Brazil’s baroque colonial heritage and its new modern architecture, exemplified by the Ministério of Educação e Saúde (MES), were emphasized, along with the wealth of Brazilian flora and the response of the new architecture to the specifics of the tropical climate.

3.4 Parque do Flamengo and a New Nature

Burle Marx’s last publicly-commissioned project before the military coup of 1964 was arguably his finest and most comprehensive—the landscape design of the Parque do Flamengo, a landfill project on Rio de Janeiro’s Guanabara Bay, which was built to transform a proposed highway into an urban park that would serve this densely-populated part of the city (see Figure 3). This park was built during the post-Vargas era, characterized by a series of democratically-elected presidents. The project was conceived in 1957, and it was actively supported in 1961 by the Governor of the State of Guanabara, Carlos Lacerda, a dynamic political figure who was involved in the decline of Vargas’ autocracy. Lacerda re-envisioned this infrastructural highway plan as an urban waterfront park and beach, enhancing the quality of park space for a quickly urbanizing Rio de Janeiro. With the Parque do Flamengo, Burle Marx began to develop a social mission as part of his work as a landscape architect, constructing a notion of the park as a didactic landscape for the urban citizen. This idea was nascent in his early projects in Recife, but here he develops the educative function of the ecological garden as one which engages the citizen in the cultural and botanical stewardship of a particularly Brazilian heritage: its wealth of native flora. “The garden of today is for the man of tomorrow,” wrote Roberto Burle Marx in 1970. He further emphasizes this social act of stewardship, stating “to preserve plant species through the composition of gardens is a way of protecting future generations from an extreme solitude.” (Burle Marx, “O jardim de hoje para o homen de amanhã,” 1970) With the knowledge and engagement of a botanical heritage gleaned from the constructed park, he hoped the public would insist on the protection of its forests and other “natural” areas from exploitation and destruction.
Burle Marx’s arborização, or urban afforestation, of this new terrain, reclaimed from the sea, includes more than 200 different species of trees and 50 species of palms, most native to Brazil, but with the inclusion of selected tropical exotics. This didactic presentation of “nature” is in fact highly artificial—it is a rich ecological tableau of species that would never have occurred together in nature. This new nature, a waterfront park for local residents revealed at high speed through the windshields of a burgeoning middle class heading to the wealthy southern zone of the city, was the culmination of Burle Marx’s development of the cultural project as a designed landscape. Anchored by the airport and Affonso Eduardo Reidy’s Museum of Modern Art, the Parque do Flamengo indeed posited Brazil as the land of the future.

4 CULTURA: A NEW NATIONAL CULTURAL PROJECT

4.1 The Military Coup of 1964 and the Conselho Federal de Cultura

With the military coup, the ambitious and fast-paced publically-commissioned projects disappeared. Burle Marx seems to focus his thinking toward the future, reflecting on the consequences for the ecological diversity he had always championed, as Brazil’s natural resources were extracted and development began to sprawl into the countryside. With his appointment to the Conselho Federal de Cultura in 1966, the military dictatorship provided Burle Marx with a highly effective new forum for the continuation of his cultural project—this one constructed through rhetoric and words.

In the five years spanning from 1967 to 1971, RBM wrote a total of thirteen testimonies for the Conselho Federal de Cultura, and read these at the Council’s plenary sessions, in the presence of the President of the Republic. There were a number of presidents during this period: Humberto de Alencar Castelo Branco (1964-1967), who created the Conselho; Artur da Costa e Silva (1967-1969); the two-month military junta of Augusto Rademaker, Aurélio de Lira, and Marcio Melo (September-October 1969); and Emílio Garrastazu Médici (1969-1974).

Burle Marx’s consular statements of this period, often arguing for the protection of Brazilian landscapes from development and neglect, were as important and influential in the construction of Brazilian culture as his earlier public park projects. In one of his earliest consular statements, he writes: “Unfortunately, it seems that a concern for public parks and for the natural landscape itself is lacking in our country. Even those with a limited capacity of observation would perceive, without too much effort, the offenses committed on our natural landscapes.” (Burle Marx, “Statues in Gardens,” 1968).

4.2 Preservation of the Cultural Landscape Heritage

For Burle Marx, the question of culture and its national definition now shifted toward protection and preservation. The notions of protection, which had been taken on by the Ministry of Education through the establishment of the Livros do Tombo, (the registration of cultural treasures, usually buildings, into the record of national patrimony) focused on the built environment—the protection of buildings. Burle Marx argued strongly for a shift to create a meaningful protective status for landscapes, both historic and
contemporary designed landscapes as well as natural landscapes. Both types of landscapes were vulnerable to neglect and devastation.

The first speech delivered by Burle Marx in his role as counselor, in July 1967, was addressed to both the plenary session of the Conselho Federal de Cultura as well as the Câmara do Patrimônio Histórico e Artístico Nacional (Chamber of National Historic and Artistic Heritage). Entitled "Paisagismo Brasileiro" (Brazilian Landscape), he frames his experience as a landscape architect through his early experience of viewing Brazilian plants at the Berlin-Dahlem Botanical Gardens, noting the beauty of plants he had not observed in the parks and gardens of Rio de Janeiro. Burle Marx often writes of this impression (despite the fact that Auguste Glaziou had indeed used native flora in his nineteenth-century parks in Rio de Janeiro) as part of the construction of his cultural Brasilidade. “And it was in order to valorize Brazilian flora that I began to create my first gardens, aided by my wise friend Lúcio Costa.” (Burle Marx, “Paisagem Brasileiro,” 1967.)

Burle Marx immediately states his position, and his ambition as counselor which he would repeat again and again for the next five years: to prevent the deforestation, personally observed over the course of his career, which had led to the extinction of hardwood species and an increase in erosion and mudslides. He notes the observable change in the climate—the increase in torrential rains—that deforestation seems to have provoked. For Burle Marx, the definition of national culture needed to include the Brazilian forest and its diversity of flora. And that “culture” needed to be understood as part of the Brazilian national heritage, deserving of both definition and protection. "Paisagismo Brasileiro" was followed by Burle Marx’s comprehensive list of ten suggestions to preserve this national patrimony, including the establishment of more national parks and public parks, the proper reforestation of devastated landscapes, and the protection of both historic nineteenth-century landscapes and contemporary parks from destruction and damage. In several of his speeches to the Council’s plenary sessions, he insists on the immediate protection and preservation of the Jardim Botânico in Rio de Janeiro as a cultural heritage site. This botanical garden, founded by Dom João VI of Portugal in 1808, was opened to the public in 1822. Best known for its magnificent allée of more than one hundred royal palms, Roystonea regia, and giant water lilies, Victoria regia, it houses more than 6500 species of Brazilian and exotic tropical flora.

5 CONCLUSIONS AND REFLECTIONS: THE CULTURAL PROJECT

Burle Marx is an important figure in the long period of the national search for brasilidade. This cultural construct, and its relationship to his practice as a landscape architect, was also a personal quest and a project that continued throughout his career: his first observations of Brazilian flora in Dahlem; his ecological tableaux in Recife and Rio de Janeiro, his large didactic public park projects; and his crusade as a cultural advisor to protect the destruction of the natural Brazilian landscapes that had always been his inspiration.
Appropriately, one of his many legacies is his personal continuation of the tradition of ecological study and preservation, perhaps equally inspired by Karl Friedrich Philippe von Martius’ *Flora Brasiliensis*, Dom João VI’s *Jardim Botânico* and Adolf Engler’s Berlin-Dahlem Botanical Garden. This act of collection and preservation then initiates a process in which plants extracted from their complex habitats are transformed into living materials for Burle Marx’s particular design sensibility. And his design work is now one that is perceived as particularly “Brazilian” and worthy of protection. In 1949, Burle Marx purchased the former plantation Sítio Santo Antonio da Bica in Barra de Guaratiba, a village west of Rio de Janeiro. This 150-acre collection consists of over 3500 species of plants, many of which Roberto Burle Marx collected and even discovered himself during his viagens de coleta, his travels throughout the various geographic regions of Brazil (see Figure 4). And appropriately, upon its donation to the government in 1985, this public site has been fully protected by the *Instituto do Patrimônio Histórico e Artístico National*, and renamed Sítio Roberto Burle Marx.

6 REFERENCES


ABSTRACT

The Australian Institute of Landscape Architects (AILA), founded in 1966, was born out of environmental concerns, particularly the perceived widespread visual and environmental degradation of the Australian landscape. While similar concerns were being expressed in other countries, Australia was experiencing an influx of population, which triggered rapid and widespread urban expansion and the attendant fragmentation and/or outright loss of habitat throughout metropolitan areas. Simultaneously, a heightened appreciation and articulation of an Australian identity arose in the built environment professions. Previous research in Australia has traced the landscape profession’s response to these issues by examining national AILA conferences. (Saniga, 2006) This paper takes another angle on reading the development and growth of the profession by analyzing the national awards program. We focus on changes in the award categories—as well as the winning projects—as the categories are manifestations of contemporary ideals and/or formative debates occurring within the profession, revealing thematic patterns of professional concerns over time.

The analysis was developed by reviewing the AILA National Awards programs from their commencement in 1986, through to the 2012 awards, focusing on categories related to “environment” and/or “infrastructure.” When considered in the context of key environmental projects in Australia, this analysis illuminates the degree to which the national awards program has served the promotion of the landscape architecture profession’s standing in relation to environmental issues and values. From this desktop survey, a picture emerges of a profession whose engagement with environmental issues could be better served by the awards program of the institute.

1.1 Keywords

Australian landscape architecture, professional awards programs, environmental practice
2 INTRODUCTION

Amidst the current and diverse efforts to reposition landscape architecture in relation to mitigating the effects of climate change, and the imperatives of working toward sustainability and urban resilience, it is instructive to give thought to how, where and to whom the profession of landscape architecture develops and advocates its professional knowledge, expertise and capacity. Because the professional journals, conferences, and awards programs are important vehicles for communicating and advancing knowledge within and beyond the profession, each provides a useful lens for examining the values and priorities of the profession. For example, recent critical reviews of the mission and content of both Landscape Journal and Landscape and Urban Planning reflect the value of journals as spaces for both assessing and recalibrating the priorities and scope of the profession (Gobster, Nassauer, Nadaneck, 2010; Gobster and Xiang, 2012).

Conferences feature issues and projects of concern to the contemporary ideals and/or formative debates for the profession. They are an important means of testing, advancing and confirming knowledge to the group, and their themes and content indicate priorities, the range of and depth of engagement in specific issues (Bull, 2010, p.26). Critical reviews of conference agendas, themes and papers are a means of tracking and revealing internal challenges for professional bodies. For example, Andrew Saniga’s 2006 study of the first two national conferences (1969 and 1971) of the Australian Institute of Landscape Architects (AILA) revealed that Australian landscape architects were positioned, both philosophically and in terms of employment opportunities, outside the mainstream environmental movement and advanced a ‘cosmetic’ environmental agenda (Saniga, 2006, p.146-147). Likewise, in her 2008 manifesto, Elizabeth K Meyer noted that the 2006 and 2007 ASLA conference themes reflected a weak alignment with the contemporary ecological concepts of resiliency and adaptability. (Meyer, 2008) Both reviews warn that the profession of landscape architecture was neither well prepared nor well positioned with regard to the environmental agenda it was espousing.

This paper presents the results of a pilot study which investigated how effectively the national awards program of the AILA has aligned with and advocated a position on environmental/ecological issues and values. We focus on changes in the award categories—and the winning projects—as indicators of contemporary ideals and/or debates occurring within the profession, revealing thematic patterns of professional concerns over time. Shifts in the institutional perspective on the value of the awards program are discussed briefly, alongside the criteria used to assess the nominated projects. To contextualise the study, a selection of the awarded projects is compared to recent studies of the canon of Australian landscape architecture. An understanding of what is meant by exemplary engagement with environment emerges alongside a picture of how the profession has collectively conceptualized and championed its capacity to engage effectively in “environment”, or “ecological design” or “design for sustainability” over the last 26 years. We conclude with thoughts on how the awards program can more rigorously advocate the strengths and success of landscape architects’ engagement in environmental concerns in Australia.

3 BACKGROUND: THE PROFESSION, ENVIRONMENTAL VALUES AND AWARDS

Founded in 1966, the AILA was borne out of and into environmental concerns. Foremost at the time was a concern for what was perceived widespread visual and environmental degradation of the Australian landscape. (Saniga, 2006, p.146) While many of these same concerns were being expressed in other countries, Australia experienced a high degree of immigration from Europe and the Middle East following World War II, and rapid urban expansion with the attendant fragmentation and/or outright loss of habitat. These conditions simultaneously heightened an appreciation of an Australian aesthetic connected to the country’s unique landscape qualities—from which emerged the Sydney School or the Bush School (Buchanan, 2009, p.95-115). The AILA was founded in large part to distinguish the work of landscape architects concerned with promoting this aesthetic from the work of planners, architects, landscape gardeners, and foresters (Saniga, 2012, p.176-182). Dr Catherin Bull’s 2002 book, New Conversation with an Old Landscape, catalogued the distinctive themes of landscape projects that emerged from this particularly Australian sensitivity to the unique environmental conditions across the continent. (Bull, 2002) In recent years, new directions for professional practice have been established as the AILA has expanded its vision and policy to include stewardship, green infrastructure and the mitigation of the effects of climate change as important areas of professional engagement for Australian landscape architects.
3.1 The AILA as a Profession

Professions deliver distinctive bodies of knowledge in service to society through autonomous, self-regulating processes. In addition to the broad benefits to society at large of this applied expertise, be it health care, legal or design advice, professionalism also provides economic and social rewards to the professional body at large, and to individual professionals through income and prestige (Western et al. 2006). Monitoring the professional body of knowledge is thus vital to sustaining and improving the benefits to society and to the profession. For landscape architecture as a profession, scholarly documentation and evaluation of projects is increasingly important, to maintain clarity about what landscape architecture is and what landscape architects do, particularly in relation to their capacity to engage in complex environmental and social issues, and especially as the profession moves towards an evidence based approach to design (Brown and Corry, 2011).

In Australia, the profession of landscape architecture is approaching its 50th year, and now counts over 1,000 registered members (and many more unregistered), six accredited educational programs, and a significant body of built work. Landscape architecture in Australia is an entirely self-regulated profession. The AILA manages the processes of registering members and accrediting educational programs, and oversees a mandatory continuing professional development program. The AILA writes its own codes of practice and policies, and documents the work of the profession through the publication of a journal, Landscape Architecture Australia, biannual national conferences and a biannual national awards program.

To date, there has been very little scholarly research or reflection on the development of the profession in Australia, its canon or its significance. Important contributions have emerged over the last decade: Catherin Bull’s previously cited book, New Conversations with an Old Landscape was published in the same year that Philip Goad published a similarly titled essay called “New Land, New Language: Shifting Grounds in Australian attitudes to landscape, architecture, and modernism (Goad, 2002).” In 2010 Richard Aitken, a garden historian, published Garden of Ideas, a well researched account of the key influences that have lead to Australia’s broad range of distinctive gardening styles. In 2012, Andrew Saniga released his book Making Landscape Architecture in Australia, which charts the history of Australian landscape architecture from the late 19th c through to early 21st c.

For its part, by way of raising the profile of the profession and its body of work, the AILA established a List of Significant Sites in 2006. However, the process of nominating and assessing projects for this register lacks objectivity and rigour; for example, criteria include a minimum age of 5 years, with no explanation of the significance of this benchmark, and projects must be “considered outstanding” but there is no indication of how or by whom this quality could be legitimately evaluated (AILA, 2006).

3.2 Awards and Method

Professional organisations and societies use awards to recognize outstanding achievements, as well as to advance values and issues deemed significant at a given time. Thus a review of an awards program, particularly the categories and criteria of assessment, can shed light on the how the profession constructs both its identity and its role in society. In addition, because they classify, catalogue, rank and publicly evaluate significant achievements, awards programs can contribute to the development of the canon of the profession.

There is limited scholarly work on the role and effectiveness of awards programs. In 1986 Clare Cooper Marcus and Julie Vischler’s paper, “Evaluating the Evaluation”, revealed that “good” design is a function of the value and perspective of the evaluator, and that no single perspective was the best predictor of excellent design. The research underscored the importance of including the experience of the end-users (residents, in this case) into the assessment process. A second study, in 1996, compared the evaluative frameworks of six different housing awards programs in England, and revealed the biases inherent in the process (Biddulph, 2006). A recent study of industrial design awards program in Australia found that adding a new category—in this case, to recognise sustainable design—does not necessarily result in either innovation or an increase in sustainable material and/or product (Clune and Ramirez, 2010).

Clearly then, there are limitations to a critical review of an awards program. Any awards program reflects what is submitted, which in turn depends on the resources (time, human, financial) of those making submissions. The evidence provided is limited to authors of projects, and thus can be very subjective. As highlighted in Vischler and Cooper Marcus’ research, the interpretation and assessment of
the designs will vary with the composition of the jury. A group of designers reviewing the work of designers will not arrive at the same conclusions as a jury of users or residents reviewing the work of designers. In addition, the judging process typically does not include site visits, and instead relies on material submitted and incidental knowledge of jury members, so there is no direct experience as part of the assessment.

To explore our question of how awards serve to advance the core values and expertise of the profession, we conducted a longitudinal review in three parts:

1. We first examined the overall program of Australian national awards over its 26-year history to extract any significant changes in the nature of the program itself.
2. We then charted the categories of awards in order to discern any shifts in the nature of work and the profession’s own definition of landscape architecture and environmentally oriented work.
3. Finally, we reviewed the projects recognized as exemplary, focusing on the highest award for each year and, where possible, those projects which received an award for engagement with environmental issues.

This approach has its own inherent constraints: it does not account for changes in juries from year-to-year, nor does it account for the changes in criteria in any detail. Both of these factors can contribute to a lack of consistency in the evaluation process over time. In addition, as Clune and Ramirez suggest, new categories do not correlate with changes in design outcomes. (Clune and Ramirez, 2010) Furthermore, our data does not determine the degree to which changes in categories reflect client preferences rather than changing professional values.

4 The Australian National Awards Program
4.1 Overview
The National Awards Program was instituted in 1986, 20 years after the establishment of the AILA. The statement setting out the purpose of AILA’s national project awards in landscape architecture reflects a profession in the early phases of maturity:

in the twenty years since the profession was established …it has not sought wide recognition. …clarify in the public mind what landscape architects do, and what is a good landscape. … help to establish design, planning and reporting standards… provide an opportunity to critically examine this work in one place and to appraise the direction of landscape architecture in Australia. (Neale, 1986)

According to Ralph Neale, who was also the editor of Landscape Australia, the awards were a means of establishing professional identity and improving the quality of work—the same issue, as mentioned above, that catalyzed the formation of the Institute in the 1960s (Saniga, 2012).

Across the 26 years of the awards program, statements by both juries and the AILA National Council concerning the overall purpose of the awards have consistently emphasized the value of the awards program to the development of the profession. Between 1986 and 2008, the juries’ comments on the awards program display five themes; namely, that the program
- helps to establish standards, encourage good practice; provide an opportunity to evaluate and critically review peers;
- provides an opportunity to assess direction of practice, and to encourage open, critical assessment;
- recognizes engagement in key issues;
- recognizes and rewards innovation;

The concern here is primarily with landscape architecture as a profession, rather than with the distinctive values and/or areas of expertise of landscape architects. There are also few references to specific aspects of, or the importance of, landscape architecture to society at large, particularly in the early years of the program. One exception occurred in 2004, when the chair of the jury Beau Beza wrote:
Responsible environmental design and management is central to the relevance of landscape architecture. It is vital that we applaud those practitioners (and clients) who have demonstrated excellence, who have taken both creative and technical leaps in this aspect of their work and, in so doing, have advanced and expanded the role and value of our profession. This is especially important in Australia – the driest and oldest continent on our planet – where good stewardship of our landscape is paramount (Beza, 2004).

Beza indicates an ongoing concern that the awards are a means of establishing identity and purpose, but he also signals two important shifts. One was clarity regarding the nature of the profession and its engagement with environmental matters, and the other was his reference to the custodial obligation of landscape architecture. While not a direct result or outcome of Beza’s comments, stewardship as an important area of professional practice now has a presence in both AILA policy as well as the awards program. For example, the AILA issued a new mission statement in 2010: ‘to advance the profession … in the service of the public interest and to provide leadership in the creation and stewardship of sustainable cities and settlements (AILA, nd, b).’ The story behind the emergence of stewardship as an important dimension of landscape practice in Australia warrants further study.

The current statement of the purpose of the awards reflects a profession less concerned with establishing its relevance and stature. Instead, the awards program now has a broader emphasis on excellence and advocacy:

The AILA’s Landscape Architecture Project Awards provide a tangible and high profile expression of the profession’s activities and promote and advance the profession of Landscape Architecture by:

- encouraging excellence by members of the landscape architecture profession.
- fostering public awareness and recognition of the work of Australian landscape architects.
- creating local, regional, national and global advocacy for Australian landscape architecture (AILA, 2012).

### 4.2 Awards Process and Criteria

The National Awards are biannual, while the State Awards are annual. To qualify for a National award, a project must have been submitted to a state program, but need not have won an award at that level. In addition, sites are not visited by the jury, due to cost and time constraints, and thus the onus is on the authors of projects to clearly document and communicate the value of their work.

The four criteria by which projects are assessed currently is deceptively simple: demonstration of excellence; response to the brief; evidence of influence; adherence to the Australian Landscape Principles. (AILA, 2012) How, for example, does a designer demonstrate influence of a project, when it is defined as ‘fostering broad support and understanding of landscape architecture (AILA, 2012)?’

The AILA endorsed “The Australian Landscape Principles” in 2009, a public statement—even a manifesto—of a commitment to “strategically direct landscape interventions both in our existing and future built environments towards more sustainable, holistic outcomes (AILA, nd, a).” Subsequently, since the 2010 national awards program, submissions are required to provide evidence of how the nominated project aligns with the principles and achieves and/or exceeds environmental sustainability (AILA, 2012). There are five principles which constitute in effect a sub-set of the awards criteria, as follows:

- Value our landscape
- Protect > Enhance > Regenerate
- Design With Respect
- Design For The Future
- Embrace Responsive Design

The principles are also qualitative in nature, and given that the designers prepare their own statements, there is a high degree of variability in how the principles are interpreted and how extensively the principles are addressed across the submissions.

### 4.3 Categories of Awards

Since 1986, there have been 13 National Award events. During this time, the awards have been distributed across three main categories: Design, Planning, and Research and Communications, and an award for “overall excellence” has been given every year (except in 2008 when two awards were made).
Beyond this overall main framework, the categories and subcategories of awards have changed frequently. There have been a few short-lived, or ‘evaporative’ categories:

- Special Awards or Initiatives were recognized from 1986-1994;
- Institutional complexes, in 1986 and 1988;
- Government projects, from 1988-1994

Other categories have also been ephemeral: Landscape Art was featured from 1998-2002, and Infrastructure was acknowledged in 1986, 1992, 1994, 1998, and 2002. These changing categories reflect special initiatives and trends in the types of projects undertaken—landscape art for example flourished in Australia in the lead up to the 2000 Olympics.

Two new awards were introduced over the last 5 years: a Landscape Management Award was introduced in 2008, followed by an Urban Design Award in 2010. The AILA defines Landscape Managers as those who ‘use their knowledge of the natural environment and human impact to advise on the long-term care and development of the landscape’ (AILA, nd, b). This new category expanded the Australian awards programs to a planning and stewardship perspective, and its proponents clearly intended that it would both improve the impact of practice and loosen the traditional disciplinary boundaries of the profession. For example, on the value of this expansion, the AILA Council President wrote:

If this idea transpires it will allow AILA to recognise and publicise works undertaken outside the traditional realm of landscape architects – that can have a massive positive impact on the function of cities and natural ecologies - think major public transport initiatives, major water management projects, and implemented urban planning changes. The positives for AILA will be an increased profile, and further opportunity to influence decision-making (AILA, 2008).

However, as discussed below, it is not at all clear whether this award represents an accurate reflection of the specific expertise of Australian landscape architects or is simply a case of driving expansion of the profession by claiming new disciplinary ground.

With regard to how well the categories reflect engagement with environment, if at all, it is notable that a stand-alone category for ‘environment’ was established in 1994, the fifth year of the awards program. The environment category was described as “planning or design that is responsive to environmental and ecological parameters (AILA, 1994, p.2).” Since 1994, two award programs had no distinct environmental category, and in another two, where there was a specific category, no Award of Excellence was made. (See Table 1) So, since 1994, this category has been on one hand “ephemeral,” that is, disappearing and re-appearing. On the other hand, it has been highly variable—it has had four different labels, each with slight variations in meaning. Two other categories—rehabilitation and infrastructure and rehabilitation and conservation—had an ecological design emphasis, but flickered on and off the awards program between 1998 and 2002. Clearly then, another issue that arises from this review of categories concerns the stability and meaning of “environment,” as a distinct category of professional achievement in Australian landscape architecture.

### 4.4 The Awarded Projects

In 1994, the first year the awards featured a distinct Environment category, both the Award of Excellence and the Environment Award went to Seven Spirit Wilderness, a remote and exclusive eco-tourist facility in the Northern Territory. (See Table 1) Two merit awards were given; one to another resort project, Laguna Quays resort in Queensland, and the other to a proposal for storm water management.

In 1996, there was no environmental category, and no award, but in 1998, in a revised structure of categories, ‘Planning’ was broken out into three areas: Master Planning, Environment and Conservation. The main award for ‘Planning: Environment’ went to “Restoring the Waters”, a Sydney project which the jury praised for its use of community participation to catalyse a poetic and innovative landscape ecological reconstruction (AILA, nd, c). Merit awards went to another two plans addressing the integration of drainage systems into public open space, Mitchell Creek Parkland in Queensland and the Torrens Catchment Comprehensive Plan, in Adelaide.
### TABLE 1. Environmental categories and awards in the AILA National Awards Program

<table>
<thead>
<tr>
<th>DATE</th>
<th>CATEGORY</th>
<th>PROJECT</th>
<th>DESIGNERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>Research and Studies</td>
<td>Torrens River Study Adelaide SA</td>
<td>Land Systems</td>
</tr>
<tr>
<td>1992</td>
<td>Excellence Infrastructure</td>
<td>Salt Pan Creek Corridor, Sydney NSW</td>
<td>Environmental Systems</td>
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<tr>
<td></td>
<td></td>
<td>River Torrens Linear Park Adelaide SA</td>
<td>Land Systems EBC</td>
</tr>
<tr>
<td>1994</td>
<td>Award of Excellence and Environment</td>
<td>Seven Spirit Wilderness NT</td>
<td>Ecosystems</td>
</tr>
<tr>
<td>1996</td>
<td>Citation for environment, Design Merit</td>
<td>Jawbone Flora and Fauna Reserve, Williamstown VIC</td>
<td>Hassell and CMPS &amp; F</td>
</tr>
<tr>
<td>1998</td>
<td>Design: Rehabilitation &amp; Infrastructure</td>
<td>Centennial Park Pond Interpretation Trail NSW</td>
<td>Context Pty Ltd and CPMPT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wetland and Effluent Re-use Project NSW</td>
<td>Pittendrigh Shinkfield and Bruce</td>
</tr>
<tr>
<td></td>
<td>Planning: Environmental Planning</td>
<td>Restoring the Waters, NSW : Mitchell Creek Parkland</td>
<td>Barnsley and Schaeffer; Ecosystems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Torrens Catchment Water Management Plan, SA</td>
<td>Hassell</td>
</tr>
<tr>
<td>2000</td>
<td>Design Rehabilitation &amp; Conservation</td>
<td>Hill Road Corridor Wetlands and Landform, Homebush Bay</td>
<td>HASSELL, Peter Walker &amp; Partners, Bruce Mackenzie</td>
</tr>
<tr>
<td>2002</td>
<td>Design Rehabilitation &amp; Conservation</td>
<td>Green &amp; Gold Bell Frog Habitat, Homebush Bay, NSW</td>
<td>Pittendrigh Shinkfield and Bruce. Barwick and Associates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bass Highway Westbury By-pass, Tasmania</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planning: Environmental Planning</td>
<td>Willoughby Natural Heritage Register, NSW</td>
<td>Landarc Pty Ltd</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transgrid EIS Sydney, NSW</td>
<td>EDAW</td>
</tr>
<tr>
<td>2004</td>
<td>Excellence in Environment</td>
<td>None</td>
<td>mcgregor+partners; Kiah,Infranet</td>
</tr>
<tr>
<td></td>
<td>Merit Awards</td>
<td>Eco 1+2:Eastcom City, Hanghou, China;</td>
<td>Tract Consultants; Hassell ; John Mongard;Vicroads – Landscape Section</td>
</tr>
<tr>
<td></td>
<td>Commendation Awards</td>
<td>The 12 Apostles Visitor’s Centre VIC; Victoria Park, NSW</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecovillage – Currumbin; Calder Freeway VIC</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>Environment</td>
<td>Rocks Riverside Park, QLD</td>
<td>Brisbane City Council</td>
</tr>
<tr>
<td></td>
<td>Merit Awards</td>
<td>Atton Street Conservation Park Master Plan, Victoria</td>
<td>Hassell Pty Ltd</td>
</tr>
<tr>
<td></td>
<td>Commendation Awards</td>
<td>Booyeembara Park, Fremantle WA</td>
<td>Ecoscape</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Melaleuca Wetlands, Ferntree Gully, Victoria</td>
<td>GbLA Landscape Architects</td>
</tr>
<tr>
<td>2008</td>
<td>National Landscape Architecture Award: Excellence &amp; Landscape Management</td>
<td>Kubu River Hippopotamus Exhibit VIC</td>
<td>Urban Initiatives Pty Ltd</td>
</tr>
<tr>
<td>2010</td>
<td>Landscape Management: Excellence</td>
<td>Rouse Hill Landscape Restoration, NSW</td>
<td>AECOM</td>
</tr>
<tr>
<td></td>
<td>Landscape Management: Award</td>
<td>Nungatta Station Land Management Program, NSW</td>
<td>Material Landscape Architecture</td>
</tr>
<tr>
<td>2012</td>
<td>Landscape Management</td>
<td>Lollipop Creek, Victoria</td>
<td>Fitzgerald Frisby Landscape Architecture</td>
</tr>
</tbody>
</table>
In 2000, following another revision of categories, the Planning: Environment category was removed. In the most closely aligned category, ‘Design: Rehabilitation and Conservation,’ the main award went to Hill Road Corridor by Hassell with Peter Walker and Bruce Mackenzie. Hill Road is part of Millenium Parkland, the park that extended the work done for the Sydney Olympics, and is now part of Sydney Olympic Park. Like winning projects in earlier years, Hill Road Corridor focused on water as well as landform, vegetation and circulation. The jury described it as a “successful rehabilitation project in extremely difficult conditions. Sophisticated hydrological design achieved through complex earthworks executed as strident abstract forms. Successfully connects with other major landscape elements in the surrounding park (AILA, nd, d).” It is also worth noting that this was one of seven awards for Hassell (one of Australia’s largest multidisciplinary design firms) that year, out of 18 awarded overall.

In 2002, tripartite Planning awards were reintroduced, along with lists of relevant project types. The Planning: Environment category targeted environmental impact statements, visual assessments, environmentally sustainable development, natural resource and landscape analysis, and management plans. Two awards were given in this category, one project award and one merit award; the first was a register of areas and items of natural significance in a local municipality, and the second was for an environmental impact statement done for a large utility company. In the Rehabilitation and Conservation category, a subset of the Design category, two awards were given for built habitat restoration projects, one for the Brick Pit at Sydney Olympic Park (AILA, nd, e).

In 2004 and 2006, Environment was re-established as a stand-alone category. Although six awards were given in this category in 2004 and four in 2006, there was no Award for Excellence in either year—all awards were merits and commendations. The 2004 jury explained that not enough information was submitted to document excellence, and cited in particular the need to clarify the criteria for this category. The jury offered that submissions “should reflect the ‘whole of life’ aspects …include statements in regard to the ecological rigour adopted … during construction and the long term management regime (AILA, nd, f).” The attention to the temporal in this statement foreshadowed the emphasis on stewardship as a benchmark for professional practice in landscape architecture which emerged in 2007.

The merit and commendation awards in the Environment category in 2004 and 2006 recognized a range of project types: a visitors’ centre, courtyards for an urban infill multi-family residential complex, an ecovillage, and rehabilitation projects resulting in parklands. All dealt with issues common to professional practice—runoff, pedestrian circulation, remediated soils, etc., but as the jury noted in 2004, the submissions presented little in the way of detailed ecological issues and long term outcomes.

Since 2004, there have been five awards made in the Landscape Management category. Only one of these, the Nungatta Station Landscape Management Program, represented an expanded scope of the discipline in that it was in a rural location, approximately 5,000ha, and a long term implementation program. Further, it was a pioneering effort as it promoted the concept of expanding the commercial agricultural focus of the property to encompass biodiversity outcomes. The degree to which it represents landscape architectural expertise remains undocumented. The other projects—a hippo exhibit at a zoo, a planned residential estate which integrated development with the rehabilitation of vegetation communities, and two ecological regeneration projects—are all more familiar project types for landscape architects.

5 DISCUSSION/CONCLUSION

What do landscape architects do to ensure positive environmental outcomes, and how does the Australian national awards program promote this? The frequent changes in award categories make them an unreliable register of environmental engagement. At this point in this research, the reasons for many of the changes lack clarity. Do they reflect changing emphasis in practice, and/or are they the result of reflections and recommendations by juries? At the same time, the awarded projects reviewed represent an impressive body of work and cumulative body of knowledge. In scrutinising the work, serious engagement with environmental issues and values is evident in many categories, not limited to those with environment in their heading. These categories include restoration, rehabilitation and conservation, and more recently, landscape management. For example, rehabilitation and conservation is where we find an award in 2000 for work on the Hill Road Corridor Wetlands and Landforms at Homebush Bay, in preparation of the 2000 Olympic site. In addition, when considering the entire body of work represented in the AILA National Awards program, projects dealing with wetlands and river corridors emerge as a particular focus. For example, in 1992, Carrum Carrum Wetlands, Melbourne, was recognised in the ‘evaporative’ Special Initiative category. Also in 1992, work to open the Salt Pan Creek Corridor in
Sydney to recreational pursuits received the overall Award of Excellence, as well as a parks/recreation award. The 1998 award for work on the Torrens River Corridor and Catchment was the third award to this project, making it the most awarded of all projects in the history of the awards to date. (In 1986, it won a Research and Communication award for the original study of the Torrens River; in 1992, an award in the Infrastructure category for the River Torrens Linear Park.)

At the same time, many seminal projects are missing—projects that have been identified by other disciplines, and in other awards programs, for example, as exemplars of “best practice,” upholding sound environmental values and practicing green infrastructure principles. Some are internationally recognized (Beatley, 2009) ‘green’ urbanism projects, such as Christie Walk, Adelaide, and Newington Village, Homebush (Beatley, 2009). There are also projects that have been recognised by scholars as “significant,” those that anticipated the concept of “ecological design,” such as the National Gallery Sculpture Garden, the Sails Resort and the Visitors Centre at Uluru in Central Australia (Bull, 2002). While it is important to remember that awards are only given to projects that have been submitted by practices, it is equally important to note that there may, in fact, be many other worthy projects that represent “best practice.”

To assess the legacy of celebrated projects, it is important to revisit them and examine how they continue to or have been extended to display a sustainable and, hopefully, regenerative approach to urban landscape design. With the increasing demand for evidence-based planning approaches, landscape architects’ work needs to be assessed more rigorously within the awards program. The work needs to be thoroughly documented, discussed and benchmarked against emerging international standards of “best” practice, not just “good” practice. In Australia, we have limited examples of this sort of ongoing rigorous assessment of projects—and not surprisingly the focus has been on the Torrens River Linear Park project, one of a very few projects to have been written about in the scholarly, international literature (Dexter, 1996; Bull, 2002; Mugavin, 2004). The River Park, along with the entire Torrens Catchment Water Management project warrants a re-assessment of all the work implemented since the 1980s onward, as this would highlight its achievements as green infrastructure. We note that a broader approach to acknowledging outstanding work is now underway in Australia with the AILA trialling the Sustainable Sites Initiative assessment tool on select projects, but it is not yet clear how this may align with projects nominated for excellence through the awards program.

Awards programs, like environmental processes, are dynamic and ever-changing. The Australian awards program has been in place now for a generation, and during this time there have been a number of significant moments for built environment professionals, such as the Australian Bicentennial Celebrations and the Sydney Olympics. Today, with the urgency of mitigating the effects of climate change and the opportunities of green infrastructure and ecological urbanism, the traditional expertise of landscape architects is more challenged than ever to the planning, design and management of our cities and towns. It is thus critical that AILA ensure that the awards programs present robust and consistent assessments of achievements, as well as clear and effective communications of the nature of the discipline, not only to its members but also to other built environment professions and the general public.

6 REFERENCES


PARADISE IN CONFLICT: REEXAMINING AND SAFEGUARDING THE GENIUS OF THE MUGHAL GARDENS OF KASHMIR

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1 ABSTRACT

The history of garden making in Kashmir goes back to ancient times with garden making closely linked to the natural beauty and spirit of the place. During the Mughal period in Kashmir these traditions reached unprecedented heights. Through the implementation of the Islamic chahar bagh and Paradise Garden concepts onto the topography of Kashmir hundreds of Mughal gardens were created.

Since the decline of the Mughal Empire many of these gardens suffered neglect and only a small number of the gardens still exist today, with the traditional use and significance of these sites and their wider settings being undermined. The paper’s focus is on the gardens in Indian-administered Kashmir. To date this heritage remains under-examined and at risk, particularly given the context of the ongoing conflict in Kashmir, with Nishat Bagh and Shalimar Bagh included in the 2008 World Monument Fund List of 100 Most Endangered Sites.

The paper presents evidence of historic and new threats to this irreplaceable heritage due to inappropriate development and change and a limited understanding of the history and significance of the sites. In the meantime the paper raises awareness of the importance of this heritage and illustrates recent preservation initiatives to address these issues, including the ongoing preparation of a UNESCO World Heritage nomination dossier. In doing so, the paper hopes to garner support from the international landscape architecture and preservation communities in investigating this heritage and safeguarding the genius of the Mughal gardens of Kashmir.

1.1 Keywords
Mughal gardens, Kashmir, preservation, landscape planning, UNESCO World Heritage
THE BIRTH OF A GARDEN HERITAGE

The history of garden making in Kashmir (Figure 1) extends before the Mughal period to ancient times. Predominantly Hindu Kings ruled over Kashmir before Islam arrived in the 14th century in Kashmir with the Shahmiri Sultanate. In the Hindu period, gardens were created in the valley of Kashmir reflecting the *vatikas* concept of wooded pleasure grounds with orchards, flowers and herbal plants (Wani, 2011a). For instance, literature sources indicate that an early villa and garden stood at Shalimar during the reign of Pravarassena II in the late 6th century, when the garden was a sacred site (Patterson, 1972).

The Sultanate dynasty brought with them Persian traditions including their passion for gardening. During this period it is known that many gardens were created, most notably by King Sultan Zain-ul-Abideen and reflecting the stylistic patterns of the Persian Paradise gardens (Wani, 2011a). It is for instance documented that under 15th century Muslim Rule and King Zain-ul-Abideen's reign the Shalimar Canal with a *bund* (embankment) was created (Patterson, 1972). The Canal remains a key feature at Shalimar Bagh. Ashraf Wani highlighted the embedded traditions of flowers and gardens in the Kashmiri culture, giving the example of the traditional earthen roofs that were planted with flowers (Wani, 2011a).

The Mughals arrived first in Kashmir during Babur's reign when they attempted to conquer the region (Beg, 2011). During Emperor Humayun's reign in the mid-16th century the Mughals ruled briefly over Kashmir, and in 1586 Emperor Akbar fully conquered Kashmir, after which it was ruled as a Mughal province (Wescoat and Wolschke-Bulmahn, 1996). Inspired by the beauty of the valley and the cooler climate, the Mughal Emperors and nobles made frequent visits to Kashmir. The valley offered a perfect setting and inspiration for garden making, with Akbar credited as saying 'Kashmir is a garden, do not call it a country' (Beg, 2011). Akbar visited Kashmir three times, and in doing so, started a tradition amongst successive Emperors of using Kashmir as a summer resort (Beveridge, 1902–39). Emperor Jahangir (1569-1627) spent a total of fourteen summers in the valley (Rogers and Beveridge, 1909-14).

By the time the Mughals arrived in Kashmir in the 16th century the valley would already have been dotted with gardens featuring terraces, central water channels, fountains and planting schemes (Wani, 2011a). For instance, Achabal had already become a well-known site before the arrival of the Mughal Emperors, with Emperor Jahangir recalling his visit in his memoirs, the *Tuzuk-I-Jahangiri* (Rogers and Beveridge, 1909-14). Jahangir wrote in his memoirs about a fountain and waterfall at Achabal, of lofty *chinar* trees (Oriental plane, *Platanus orientalis*), poplars and a garden with flowers. Jahangir referred to the spring at Achabal as being more plentiful than the spring at Verinag, which also already was a well-known site (Rogers and Beveridge, 1909-14). Francois Bernier, a French traveler during the time of Emperor Aurangzeb, also mentions in his travelogue that a royal country house existed at Achabal prior to the Mughals (Bernier, 1891).

Wani stated that what perhaps the Mughals did ‘...was to work on a refinement of the set pattern, and thus taking them to a new height....’ (Wani, 2011a). Typical features of the Mughal gardens of Kashmir became the implementation of the Islamic *chahar bagh* (‘four gardens’ or quadripartite garden) onto the mountainous topography, the terraces, the central water channel with *chadars* (cascades), *hauz* (water tanks), fountains and *baradaris* (pavilions) (INTACH J&K, 2005). In many cases water flows through the terraced gardens to a larger water body, such as a stream or a lake.

Sources speak of over 700 Mughal gardens in Kashmir at the height of the Mughal period in the mid-17th century (Crowe et. al., 1972). Many of these gardens were located in the vicinity of the city of Srinagar (Figure 2), particularly near the city centre and on the shores of Dal Lake, which provided a more secluded location for the royalty (Hamdani, 2011). Well known gardens near Srinagar include Nishat Bagh (Figure 3), Shalimar Bagh, Pari Mahal and Chasma Shahi. Other gardens are located throughout the valley, such as Verinag and Achabal Bagh, which are located in the vicinity of Anantnag (Figure 2).
Figure 1. Location map of Jammu and Kashmir in India and the city of Srinagar. Haenraets, J. and Hollingsworth, M.

Figure 2. Location of Shalimar Bagh, Nishat Bagh, Chasma Shahi and Pari Mahal near Dal Lake in Srinagar, and the location of Achabal Bagh and Verinag near Anantnag. Haenraets, J. and Hollingsworth, M.

Figure 3. The central axis and channel of Nishat Bagh in 2010 with its terraces sloping up against the hillside and views framed by the chinar trees (Platanus orientalis). Haenraets, J.
3 HISTORIC NEGLECT, ADAPTATIONS AND THREATS

In order to assist in raising awareness about the significance of this irreplaceable heritage, the types of threats and the required preservation initiatives, it is useful to first look at how the gardens have evolved since the Mughal period, particularly given that threats and neglect are not a new phenomenon and occurred throughout the gardens’ lifespan. Little detail is known to date about the state and management of the gardens during the period of Afghan rule, after the Mughal rule, but some descriptions give an indication of the state of the gardens (Hamdani, 2011). For instance, Sajjad Kausar described how ‘...with the downfall of the Mughal emperor in the 18th century chaos prevailed in the subcontinent. Mughal gardens became ideal camping grounds for invading armies from Persia and Afghanistan....’ (Kausar, 2006). Arif Shafi Wani also described how under the Afghan rule many of the Mughal gardens were vandalized to show supremacy of the new rulers (Wani, 2011b).

Kashmir was transferred to Maharaja Gulab Singh upon defeat of the Sikhs in 1846 (Kak, 1933). This was the start of the Dogra period which lasted until the Indian Independence in the mid 20th century. More records provide an indication of the state of gardens during the Dogra period. For instance, the travelogues by early European visitors to Kashmir, such as Francois Bernier (Bernier, 1891), or the historic images by early photographers such as Samuel Bourne are most valuable documentation (Bourne, Shepherd and Robertson, 1860-75). An investigation of such sources illustrate how certain garden features were modified, repaired or rebuilt, and what state some gardens were in during this era. The photographs by Bourne show for instance the state of Achabal Bagh and its pavilions. Of the main pavilion only part of the ground floor walls remained in a ruined state and the gardens looked run down (Bourne, Shepherd and Robertson, 1860-75). The garden compartments are still planted with orchards but lawns appear compacted and worn out. Bourne’s images of Shalimar Bagh and Nishat Bagh show however several pavilions that now have disappeared. In comparison to the present day conditions Nishat Bagh and Shalimar Bagh appear minimally maintained, rustic and wild, but nevertheless with much historic integrity intact (Bourne, Shepherd and Robertson, 1860-75). Early 20th century photographs by Jean Hilary, a British visitor in 1929, show similar impressions, such as at Chasma Shahi, where the garden and setting were still unspoiled from the developments that would occur later in the 20th century (Hilary, 1929) (Figure 4 and 5). It is well-documented that in the 19th century Maharaja Rambir Singh (1830-1885) undertook several refurbishments, such as of some pavilions in key gardens, and in many cases to accommodate and entertain European visitors (Wani, 2011b). For instance, the baradari at Achabal Bagh was rebuilt and the Black Marble Pavilion at Shalimar Bagh was adapted (INTACH J&K, 2010).

Figure 4 and 5. The entrance to Chasma Shahi in a photograph by Jean Hilary from 1929 (left) and the much altered entrance area in 2010 (right). Hilary, J. and Haenraets, J.

In the early 20th century the British Archaeological Survey India started to conduct surveys, mainly ‘...on the persuasion of British experts...’ (Beg, 2011). The British Archaeological Survey India also launched codes with guidance for the preservation of monuments (Marshall, 1923). The reroofing of the baradari at Shalimar Bagh in 1908 has been described as the first restoration of any cultural property in
Kashmir that followed such codes, by involving the Public Works Secretary W.H. Nicholas for guidance (Beg, 2011). The post-1947, post-Independence period, has been a period of continuous unrest and conflict in Kashmir and has seen many gardens extensively change and evolve (Beg, 2011). At times Kashmir found relative peace, such as in the 1970s when good numbers of visitors would travel to Kashmir and also visit the Mughal gardens (Haenraets, 2010b). At moments of heightened unrest, such as during parts of the 1990s, Kashmir was much closed off from the rest of the world, which impacted the general presentation and upkeep of the gardens.

The 1960s and 1970s were a brief period of relative stability and more visitors found their way to Kashmir. The most well-known gardens became popular visitor attractions with them being managed by the Department of Agriculture until 1969 (INTACH J&K, 2005). In 1969 they moved under the jurisdiction of the Department of Floriculture, Government of Jammu and Kashmir, which currently still manages these gardens (Naqash, 2011). To facilitate the growing visitor numbers, the Department of Floriculture undertook initiatives of refurbishments and adaptations for visitor reception. Ticketing facilities, new entry gates and paths, restaurants, car parks, restrooms, sound and light installations, formal rose gardens, flower displays, and so on, were built in the most popular gardens (Haenraets, 2010b). While this in many cases had benefits, this often resulted in irreversible changes. Such as in various cases where existing structures and buildings were adapted or even removed. An example is the removal of part of the historic stone wall of the Zenana garden in Shalimar Bagh to accommodate better viewing during commercial sound and light shows. Hakim Sameer Hamdani highlighted the case of the demolition of two baradaris in Nishat Bagh around 1975 and how ‘the spirit of the place’ has been affected (Hamdani, 2011). Hamdani is of the opinion that such interventions have damaged and compromised the ‘…hierarchies of spaces and their relation with key built and landscape features…’ (Hamdani, 2011) and concluded that since 1947 the Mughal gardens have faced a sad depletion of their historical character. It is also around this time that one of the baradari in Chasma Shahi was demolished (Figure 6 and 7).

![Image](https://example.com/image.jpg)

**Figure 6 and 7.** The bagh at Chasma Shahi with fruit trees and the now lost baradari, as photographed by Jean Hilary in 1929 (left), and the same garden area in 2010 with much of its integrity lost and the pavilion removed (right). Hilary, J. and Haenraets, J.

By the 1990s the gardens were visited and enjoyed by thousands of local and national visitors. The number of international tourists was still much influenced by the political climate and recurring periods of unrest and instability. By the 1990s the visitor facilities and the gardens themselves had an overall tired appearance and proper protection and appropriate preservation and presentation of the gardens remained a concern (INTACH J&K, 2005). By the late 1990s the Department of Floriculture continued to manage and maintain the most well-known and intensively visited gardens. Landscape aspects like planting schemes, flower displays and maintenance of lawns were the responsibility of the Department’s horticulture wing. The engineering wing of the Department handled civil works, such as the periodic maintenance of the water channels, the repair and upkeep of structures, the boundary walls and the construction of new features (Naqash, 2011).

Since about 2000 the unrests in the valley due to the conflict have reduced, with more visitors, particular Indian, again finding their way to Kashmir and the Mughal gardens (Naqash, 2011). Several of the historic gardens can still be visited, but of the hundreds of Mughal gardens that once dotted the valley,
many of the gardens have been lost altogether. In many cases due to urban development, lack of funds or awareness, and it can be said that now only the ‘tip of the iceberg’ survives (Wani, 2011a). The appearances of the gardens that remain will also be much different from how they would have looked in their heyday. This is not only the case for the Mughal gardens in Kashmir, but as Kausar suggested, by the beginning of the 21st century there was most probably ‘...not a single Mughal Garden in the subcontinent which still retains its original landscape....’ (Kausar, 2006).

4 RECENT PRESERVATION INITIATIVES
4.1 Widening Research and Understanding

In the late 1990s the Indian National Trust for Art & Cultural Heritage, Jammu and Kashmir Chapter (INTACH J&K), a non-profit organisation, started to raise concerns about the sad depletion of the historical character of the gardens and the continuing threats (Beg, 2011). INTACH J&K and the main INTACH headquarters in Delhi recognised that there was an urgent need for better preservation, presentation and in-depth study of the Mughal gardens of Kashmir. Most importantly, INTACH J&K acknowledged that it was fundamental to enhance the understanding of the sites, their evolution and significance, and enhance preservation in line with the established international preservation methodologies and principles (Beg, 2011).

This was not a new concern and even as early as in 1913 Constance Mary Villiers-Stuart voiced how she could not understand that the Kashmiri gardens remain so ignored and neglected, in comparison with, for example the ‘Italian Baroque’ gardens. Villiers-Stuart questioned that ‘...When these Italian gardens are so much admired, photographed, and visited, why are the Mughal baghs of the Indian foothills...ignored?....’ (Villiers-Stuart, 1913). She was of the opinion that even the Chinese and Japanese gardens received more attention. In more recent years, new calls for improving the knowledge base have been voiced. For instance, James Wescoat raised in the late 1990s that the planned research project by INTACH J&K on the preservation of Mughal gardens was ‘...an opportunity to speak to modern interests in garden history and conservation in that embattled region...’ (Wescoat, 1999). Wescoat also concluded in his assessment of recent progress with research on Mughal gardens that over the past decades studies undertaken to assess the practical and comparative interests of Mughal gardens in Kashmir

‘...seem repressed, unvoiced, or underexamined...A research project on Kashmiri gardens, for example, would no doubt harbor some hope, however modest, for conservation and conciliation in that embattled region of multiple cultural identities. How can such practical aims be envisioned, articulated, and pursued?...we lack the theoretical and methodological apparatus needed for comparative practical inquiry. Probing conservation projects, linked with further historiographic research on Mughal gardens...might illuminate some of the possibilities, and pitfalls, for comparative research, and thereby contribute to a constructive reweaving of scholarly and practical interest in the gardens of the world....’ (Wescoat, 1999).

A major breakthrough occurred in 2004-05, when INTACH J&K and the INTACH headquarters in Delhi got approval for a project to survey three gardens and develop management guidance (Beg, 2011). The Department of Floriculture wished to undertake certain repair works on built structures in the gardens and there was an agreement that to inform such work a combined Preliminary Conservation and Management Plan that included the gardens of Shalimar Bagh, Nishat Bagh and Achabal Bagh would be prepared (INTACH J&K, 2005). This was a significant step towards recognition that the gardens require expert preservation planning to safeguard their historical significance, integrity and authenticity. This survey was a first of its kind in Kashmir and for INTACH J&K.

The proposals and recommendations of the Preliminary Plan convinced the Department of Floriculture, in partnership with INTACH J&K as architects, to progress by 2008 various on-site preservation actions of key buildings and structures (Hamdani, 2011). Some additional analysis of archival material and explorative archaeology at channels, structures and buildings further helped to inform these preservation works. Projects included the repair of the last surviving baradari at Nishat Bagh, the preservation of the Hamman at Shalimar Bagh, and the repair of the water channels, pools, cascades and baradaris at Achabal Bagh (Figure 8). In the meantime the Department of Floriculture continued day to day maintenance and presentation of the gardens and their planting schemes (Naqash, 2011).
Figure 8. Photographs of Achabal Bagh, near Anantnag, by Samuel Bourne from about 1864 showed the baradari with only parts of the lower walls surviving as a ruin. In the late 19th century, under Dogra rule, the baradari was rebuilt. By 2010 the baradari and hauz were again fully restored under the supervision of INTACH J&K. Haenraets, J.

4.2 Limitations of Initial Survey Work and Gaps in Expertise

While the Preliminary Plan and the start of on-site preservation works must be seen as major achievements, it was acknowledged that there were shortcomings in the planning process (Beg, 2011). Not only time and budgetary restrictions limited the depth of the Plan, but a gap in historic landscape preservation expertise in Kashmir restricted its scope (Haenraets, 2010b). As a result the Preliminary Plan had a strong focus on buildings and structures and major gaps remained regarding the survey of horticultural and landscape features, the wider historic landscape and areas beyond the garden (INTACH J&K, 2005). Without the inclusion of comprehensive landscape and horticultural survey documentation the recommendations and conclusions of the Plan remained incomplete and there was a risk that progressing initiatives on the basis of the plan could pose serious threats to the sites or cause irreversible damage (Haenraets, 2010b).

In addition to the Preliminary Plan, some survey and planning work occurred for other gardens. For instance, the Department of Floriculture requested in 2009 from INTACH J&K the preparation of a survey and development vision for Chasma Shahi (INTACH J&K, 2009). Proposals were formulated for redevelopment of the historic site, with a new restaurant and visitor centre, and the extension of existing terraces. However, similar shortcomings in available landscape expertise meant that within the context of international preservation methodologies, the completed landscape survey remained limited in scope and investigation (INTACH J&K, 2009). As a result, the redevelopment proposals were seen by Haenraets as major threats to the surviving historic fabric and Mughal design composition of Chasma Shahi (Haenraets, 2010b).

Another reason for concern was that such preservation and redevelopment proposals and actions occurred without firm legislative protection of these sites in place. In 2004 INTACH J&K prepared listing documentation for key Mughal gardens (INTACH J&K, 2005), but only in 2010 preliminary listing of some sites under the Jammu and Kashmir Heritage Conservation and Preservation Act No. 15 of 2010 progressed, with notification still pending. The relevance and urgency to address and improve the preservation needs of the gardens was further demonstrated by the inclusion of Nishat Bagh and Shalimar Bagh in the entry for the Srinagar Heritage Zone in the World Monuments Watch List of 100 Most Endangered Sites of 2008 (World Monument Fund, 2008).

4.3 New Initiatives to Address Gaps in the Existing Surveys

Aware of the continuing threats to the gardens and the potential to improve their preservation and presentation, INTACH J&K and Haenraets started in 2010 with additional survey and research work (Haenraets, 2010a; Haenraets, 2010b). The initial objective was to address the shortcomings in the surveys and gaps in available expertise, and to continue work to achieve the ambition to progress the
long-term preservation of the sites within the spirit of international preservation methodologies and principles (Beg, 2011). For this purpose Haenraets first reviewed the Preliminary Plan from 2005 and established a framework methodology for a more comprehensive preservation management planning process (Haenraets, 2010b). The methodology reflected approaches in the United Kingdom and the United States, where several organisations such as the Heritage Lottery Fund, the National Trust, the National Trust for Scotland, the National Park Service and the Olmsted Centre for Landscape Preservation of the National Park Service have developed sound preservation management plan methodologies, such as the Cultural Landscape Report approach of the National Park Service. It was believed that only by addressing the gaps in the preservation methodologies and approaches, proper recommendations for the sites could be developed. Widening of the surveys also appeared essential to understand the full significance of the sites, their wider context and the impending threats to this heritage (Haenraets, 2010b).

Due to the 2010 unrests in Kashmir and valley-wide curfews and strikes the initial trial surveys looked predominantly at Nishat Bagh and Shalimar Bagh. Nevertheless, the survey produced new documentation and suggestions for: Site History and historical phases of development; Understanding of the chahar bagh concept in the gardens and the significance of the wider landscape; Development of landscape character areas for the gardens and wider landscapes; Historical key features and existing conditions by character zones; Treatment options and proposed treatment alternatives; and recommendations for management and further study (Haenraets, 2010a; Haenraets, 2010b). As part of the outcomes also draft Masterplan visions for Nishat Bagh and Shalimar Bagh (Figure 9) were developed. The investigations and reports were seen as draft versions and recommendations, which would require further investigation, consultation and expert input. It was however hoped that the framework structure and surveys could raise awareness and set an example, which would allow for a continuation of initiatives and adoption of the methodology to other gardens.

Figure 9. A Masterplan vision for Shalimar Bagh to revive the chahar bagh concept and planting, as based on the 2010-11 investigations. Haenraets, J., Schwann, A. and Atelier Anonymous.

4.4 Threats and Neglect in the Wider Garden Compartments

As mentioned, as a result of the Preliminary Plan of 2005 several on-site preservation actions were already taken forward by the Department of Floriculture (Naqash, 2011). However, the 2010 investigations also revealed that the garden management and presentation at Nishat Bagh and Shalimar Bagh by the Department of Floriculture focuses largely on areas along the central channels in the gardens. The garden compartments further away from this central axis received minimal maintenance attention (Haenraets, 2010a; Haenraets, 2010b). However, evidence from the 2010 surveys indicated that these compartments were significant parts of the overall composition and sophistication of these Mughal baghs. The 2005 Preliminary Plan still downplayed this significance and suggested that the Mughal
gardens in Kashmir did not strictly follow the historic *chahar bagh* concept given the topography of Kashmir. The 2005 Plan indicated that the Mughal gardens in Kashmir often followed a more linear garden layout arranged around the central channel. Nishat Bagh was presented as an example of this approach (INTACH J&K, 2005).

The 2010 survey studied this central axis, but also reinvestigated the wider garden compartments within the boundary walls. The findings lead to the conclusion that these side compartments are an essential part of the composition and that the gardens' dimensions and layout reflect the *chahar bagh* concept. The significance of this appeared to have been overlooked in Kashmir in recent years and in the current management of the sites. Haenraets suggested that the layout of the terraces is as complex and significant in the side compartments, as in the central axis (Figure 10). This potentially means that in Kashmir the *chahar bagh* principle was taken to another level and that this contributes towards a new typology of 'Mughal Terrace Gardens', which potentially can be a specific Kashmiri contribution towards Mughal garden history (Haenraets, 2010a). Further investigation would be required to fully understand the importance of these findings.

![Figure 10. The investigations of 2010 showed that in Nishat Bagh terraces exist throughout the whole garden. This sketch plan indicates the rough outlines of existing terraces. Haenraets, J.](image)

It is in these side compartments at Nishat Bagh that the majestic historic avenues of *chinars* can be found. Avenues and plantations of trees became a key component of the Kashmiri gardens' geometrical ground plans, with the *chinar* having evolved as the most iconic tree in the Mughal gardens and parks of Kashmir (Wani, 2011). The *chinars* are used to frame vistas, such as the panorama from Nishat Bagh to Dal Lake.

The 2010 investigations also confirmed that the side compartments had been much damaged by inappropriate developments and changes. At Nishat Bagh and Shalimar Bagh various buildings and visitor facilities had been constructed in these compartments since the 1970s (Haenraets, 2010a; Haenraets, 2010b). A recent example of damage was observed during the authors’ investigations in 2011 when a *hauz* (water tank) on the central axis in Nishat Bagh was being restored and excavated. The surplus soil was deposited at the edge of one of the side terraces in a garden compartment that received little maintenance and therefore few visitors. This resulted in unplanned and undocumented changes to the historic contours of the terrace, a practice, which apparently had already altered terraces in the past. The preservation work of one feature lead as a result to the disfigurement of another significant feature. The new investigations also concluded that the presentation and horticulture in the side compartments was very poor, with many of the historic orchards lost (Haenraets, 2010a).
4.5 Threats to the Wider Historic Landscapes

When the new survey work started in 2010 and reviewed the findings of the 2005 Preliminary Plan, another significant conclusion was that gaps remained in the investigation of the historic landscape outside the baghs’ boundary walls (Haenraets, 2010b). Sources highlight though that the significance of the Mughal baghs in Kashmir rests much in the relationship between the gardens and the surrounding landscape. Wani pointed this out by stating that:

‘...another innovation made in the kinder land of Kashmir is that instead of separating the surrounding landscape, it is drawn inwards to the heart of the garden. Thus while in Persia we find a complete separation from the surrounding landscape, in Kashmir the garden walls were modified from the complete barrier of the Persian originals to allow the landscape and the garden to drift into each other. Certainly, the corner pavilions which we see in the Mughal gardens of Kashmir like Tudor and Jacobian gazabos were meant to enjoy the charming surroundings. After all, unlike elsewhere in the plains where there was inner paradise and outer deserts, in Kashmir the surrounding was a natural paradise...’ (Wani, 2011a).

This confirms that in the Kashmir Mughal gardens the walled garden spaces engage with the wider settings and landscape. Using engineering skills the natural topography was sculpted into garden terraces, with the mentioned gazebos or viewing towers at its corners. With the terraces sloping down and trees such as the chinars in place to frame the views, the garden became a central part within a wider landscape composition, which captured the beauty of the place. Wani described how the Mughals ‘...invested their huge human and material resources to create paradies within paradise...’ (Wani, 2011a). This implementation of the Islamic chahar bagh and Paradise Garden concept onto the topography of Kashmir, could be argued as having resulted in a highpoint of garden history.

While the importance of the wider landscape is most significant, it is however here that some of the most worrying cases of neglect and threats to the historic integrity of this heritage were observed during the investigations.

The Land Use Plan of the Srinagar Metropolitan Area, Master Plan 2000-21 (Srinagar Development Authority, 2003) gives stipulations for land use around the gardens and proposed that the Mughal gardens were to be expanded in order to meet the requirements of recreation for growing local population and tourists, and this to overcome the backlog of additional recreational land that is needed in Srinagar Metropolitan Area. However, by 2010 it became clear that in large areas of these designated areas already much illegal urban development had occurred (Haenraets and Hollingsworth, 2011a).

A good example of this is the Shalimar Canal between the walled garden and the Dal Lake, which even predates the Mughal garden. The Canal was the historic access route to the garden and it is set within a working cultural landscape with much integrity. Nevertheless, the Shalimar Canal has been much damaged by urban development and neglect, with as recent as 2011 a new asphalt road being constructed on its southern bank (Figure 11).

Acknowledging the importance of the wider setting of the gardens an initial landscape character assessment and viewpoint assessment for the buffer zones and wider landscapes around Shalimar Bagh and Nishat Bagh was prepared in 2011 (Haenraets and Hollingsworth, 2011a). The assessment mapped how inappropriate urban developments were damaging the integrity of the wider landscape. The assessment was also intended as a tool to inform required decisions about legal protection and the potential boundaries of a World Heritage Property and buffer zones.
Figure 11. Shalimar Canal in 2011 with the recently created asphalt road and the canal in a neglected state. This illustrates the ongoing threats and damage to wider cultural landscape of Shalimar Bagh. Haenraets, J.

Another concern arose when in 2011 the Lakes and Waterways Development Authority (LAWDA) was exploring the idea to develop a new public park in the area of land at Shalimar Bagh that was designated in the Land Use Plan for park expansion. This concerned the rural land along the Shalimar Canal, between the garden and Dal Lake. A potential designation of this area as open space was positive, but the creation of a public park also raised concerns, given that this could result in turning this living rural cultural landscape into an urban public park. INTACH J&K together with Jan Haenraets and Melissa Hollingsworth therefore made in 2011 the suggestion to LAWDA to prepare a Masterplan proposal for this park (Haenraets and Hollingsworth, 2011c) (Figure 12). In the meantime a similar exercise was undertaken for Nishat Bagh Fore Shore, which also included an area designated for park expansion (Haenraets and Hollingsworth, 2011b). It was hoped that the Masterplan suggestions would raise awareness of the significance of these areas amongst LAWDA, and show that alternative approaches to the current damaging developments could help to safeguard the cultural landscapes, and assist with the environmental issues and pollution of Dal Lake. Urban encroachments and overly engineered lake and waterways developments had already altered the character and ecosystem of these features in a devastating and unsustainable manner (Haenraets, 2010b). Most importantly, from preservation perspective these spaces could function as key buffer zones for the Mughal gardens. The visions for these areas potentially could include new state of the art visitor and interpretative facilities, relocated parkings and retail facilities. However, LAWDA appears not to have altered its development intentions and since the preparation of the Masterplans various developments occurred, such as the new asphalt road along Shalimar Canal (Figure 11).
Figure 12. The Masterplan vision of 2011 for the Shalimar Country Park, prepared to halt impeding threats of urban development and raise awareness of the significance of the wider cultural landscape of Shalimar Bagh. The Masterplan illustrates the potential of landscape preservation and interpretation. Haenraets, J. and Hollingsworth, M.

4.6 Towards UNESCO World Heritage Listing

The new findings and conclusions from the 2005 and 2010 surveys strengthened the position that the Mughal Gardens of Kashmir are of universal significance and should be considered for UNESCO World Heritage listing. To date no Kashmiri site has been included in the UNESCO World Heritage List. The inclusion of the gardens in the UNESCO World Heritage List could bring much needed local, national and international attention to the significance and conservation of the gardens, but just as important, it can assist with enhancing the image of Kashmir to the wider public and world, and help to rejuvenate Kashmir as an internationally recognized cultural and heritage tourism destination (Beg and Haenraets, 2011).

The final UNESCO World Heritage Tentative List application was submitted in October 2010 to the Archaeological Survey of India (ASI) with the approval being confirmed in December 2010 (INTACH J&K and Haenraets, 2010). The serial nomination included six key gardens and it was suggested that the gardens nomination would qualify under the following three UNESCO criteria (Iqbal, 2011): ‘to represent a masterpiece of human creative genius’ (Criteria 1); ‘exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on development in architecture or technology, monumental arts, town-planning or landscape design’ (Criteria 2); and ‘to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates significant stage(s) in human history’ (Criteria 4) (UNESCO World Heritage Centre, 2008).

Well aware of the risks of limited preservation expertise in Kashmir, in May 2011 INTACH J&K and the University of Kashmir, with the support of the Department of Horticulture, organised an international seminar on the subject of ‘Mughal Gardens of Kashmir: Towards the UNESCO World Heritage nomination’ (Haenraets, Hollingsworth, and Aertgeerts, 2011). International Mughal gardens experts were invited to share experiences and expertise with the objective to arrive at recommendations for the preparation of the UNESCO World Heritage nomination dossier. The outcomes also added valuable insights to the development of sustainable management visions for the gardens (Beg and Haenraets, 2011). Following the seminar, INTACH J&K prepared initial funding applications to assist with the preparation of a comprehensive World Heritage Nomination Dossier and the required conservation planning documentation (Haenraets, 2011). However, the preparation and implementation of new long-
term visions and conservation management plans for the properties to achieve a UNESCO World Heritage Listing will demand a multi-disciplinary and integrated approach. With a limited number of trained preservation experts in Kashmir, the challenges posed by skills shortages remain a major issue in achieving the UNESCO listing and proper on-site conservation actions (Haenraets, 2011). The findings of the recent surveys and lessons learned from the international seminar also resulted in initial suggestions for the creation of a type of Mughal Gardens of Kashmir Conservancy and a potential Mughal Gardens World Heritage Office, such as parks conservancies in the United States, or World Heritage expert offices at key sites in the world (Haenraets, Hollingsworth, and Aertgeerts, 2011).

5 CONCLUSIONS

The Mughal gardens of Kashmir are part of a rich cultural and architectural heritage. They are important and irreplaceable physical evidence to the understanding of Mughal and Kashmiri history and Mughal Garden history. The paper illustrated that the gardens have much evolved over time and that threats and neglect occurred throughout the gardens’ lifespan. It is known that only the ‘tip of the iceberg’ of the over 700 Mughal gardens that once existed in Kashmir still remain.

The paper presented evidence of historic and new threats to this irreplaceable heritage and illustrated some of the recent preservation initiatives to address these issues. INTACH J&K has managed to raise awareness about the gardens to key organisation, governmental bodies and the public, while various preservation projects occurred on-site. The knowledge base about the significance and historic evolution of the gardens is now also continuously expanding. Nevertheless, the lack of landscape architecture and preservation expertise in Kashmir continues to cause concerns regarding the maintenance and management of key gardens and their wider historic landscapes.

An important conclusion from the new investigations is that more attention should be given to the understanding of the significance of the wider garden compartments. A recommendation from the recent investigations is that there is an urgent need to raise awareness amongst the management authorities of the significance of the landscaping, terraces and horticultural features in the wider garden compartments. Evidence suggests that the sophistication of the use of terraces in Kashmir contributes to a new typology of Mughal Terrace Gardens. Further in-depth research is required to investigate and verify these findings.

Another key conclusion from the investigations is that the significance of the cultural landscapes outside the walls of the Mughal baghs is not sufficiently recognised. The paper showed how these areas are severely at risk and suffered much from neglect and urban encroachment. Legal protection of the baghs, their wider historic landscapes and buffer zones is urgently required as the existing measures appear to fall short as effective protective measures.

The inclusion of the Mughal Gardens on the Tentative List for UNESCO World Heritage illustrates how there is a clear shift in attitude towards the gardens, but while the achievements have been extraordinary and must be applauded, there remains a massive amount of work to be done before it can safely be said that the Mughal garden heritage of Kashmir is sufficiently recognised, safeguarded and protected. While the momentum to prepare a UNESCO nomination dossier is a step forward, it also should not be forgotten that this project concerns only the most popular sites, while many other lesser-known sites that make a significant contribution to the wider Mughal gardens heritage exist and are in many cases at risk. An overarching Mughal Gardens of Kashmir initiative, such as the suggested Gardens Conservancy, could therefore play an important role in investigating all garden sites, and start with the compilation of an inventory, database and research archive.

To achieve such ambitions the paper pointed out that it is crucial to establish skills and expertise in Kashmir. With the new research and preservation actions, and the 2011 international expert seminar, an important first step has been made towards engaging more experts and the full re-examination and re-discovery of these gardens. These recent initiatives have created a momentum and it is the hope of the authors that new support can be created amongst the international landscape architecture and preservation communities in investigating this heritage and safeguarding the genius of the Mughal gardens of Kashmir.

6 REFERENCES


LANDSCAPE PLANNING AND ECOLOGY

Edited by Charlene LeBleu
NEW BEACH DESIGNS AS URBAN ADAPTATION TO SEA LEVEL RISE

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1 ABSTRACT

Recreational beaches and beaches that protect against storms are regularly replenished with offshore sand. As rates of relative sea level rise increase, sandy beaches are likely to erode faster. Adaptation strategies that maintain these beaches will become increasingly critical in this context.

For this study, we reviewed recent design prototypes for urban beaches that use an innovative Dutch beach replenishment strategy known as “mega-nourishment,” in which very large amounts of sand are placed every 20 years, rather than smaller amounts every 1-5 years. Waves and wind re-distribute the sand along the shore, with fewer bulldozers and pressurized slurry pipes. Mega-nourishment may also offer habitat benefits, creating large sandy beaches that lie relatively undisturbed for decades. These beaches also provide a different range of aesthetic and recreational experiences than the typical tourist beach.

Our approach was to examine present conditions and future trends at Virginia Beach, Virginia, a region of historic significance with one of the fastest rates of relative sea level rise in the U.S. We generated simple sand delta and spit forms at multiple scales and compared them according to specific performance criteria and the Coastal Evolution Model (CEM). Certain forms are more likely to perform well, but all of the prototypes involve some novel aesthetic experiences that are not common on linear beaches. We gathered local feedback about the desirability of this adaptation strategy, and found mixed reactions to the aesthetic implications but strong interest in the cost savings and ecological benefits. With greater involvement by designers, this adaptation strategy might find more rapid acceptance.

1.1 Keywords  
urban design, beach nourishment, coastal ecology, community planning, aesthetic experience, climate change, urban adaptation, sea level rise
2 SANDY BEACHES

2.1 Coastal Erosion and Beach Nourishment

Sandy beaches play a critical role in protecting coastal communities from storm damage. Yet beaches are dynamic zones that often erode due to many factors, including changes in sea level, wave action and human alterations of the coastline (Charlier et al., 2005; USACOE, 2007). With the loss and alteration of natural sources of sand, coastal erosion on sandy beaches is occurring at a faster rate than accretion (Hapke et al., 2010). In order to retain their important functions, beach sands are periodically replenished, effectively building the beach berm seaward (USACOE, 2007). Sand is dredged from offshore sources and placed on the beach annually or semi-annually via dredge boats and pipelines, using trucks and bulldozers onshore (USACOE, 2007). Projections for increased erosion rates with global climate change (Hapke et al., 2010), as well as the reduced local and federal budgets for large public works projects such as beach nourishment, make it ever more important that coastal communities consider strategies that will maintain the ecological, recreational and storm protection benefits of sandy beaches in the future.

Coastal erosion also results in losses of coastal habitat. While most nourished beaches experience heavy recreational and seasonal use and often do not support unusual species, nourishment sands will eventually erode and be distributed through wave and wind action to other areas of the coast, including on-shore dunes. This can be a benefit for areas farther from the nourished beach resorts that receive sand. However, the standard process of nourishing a beach disrupts both the on-shore and off-shore habitats by using heavy machinery to add and distribute new layers of sand (Hayden and Dolan, 1974; Petersen and Bishop, 2005; Fenster et al., 2006). As a result, legal protection of certain endangered and threatened species often partially determines the permitted locations for dredge-sand sources and the schedule of beach nourishment, in order to protect nesting and migration areas.

Beach nourishment also maintains the aesthetic and recreational value of the coastal landscape (USACE, 2004). Sandy beaches play a central role in the tourist economies of coastal areas (City of Virginia Beach, 2002; Yochum and Agarwal, 2009). Additionally, coastal real estate has high value as a source of tax revenue (City of Virginia Beach, 2002). Both public and privately-owned structures are often affected by changes in sand movement. Sewer outfalls may require sand to be cleared if it interferes with discharge. Private boat docks, marinas and fishing piers may be made unusable if sand accumulates around them. While beaches with shoals of sand located below the low tide line may function as storm protection, they do not provide recreational space for water-oriented recreational events and sunbathing (Leonard et al., 1990).

Municipalities and US tax-payers already pay millions of dollars annually for these benefits. A formula is currently used that distributes the cost between local and federal governments, in which the federal government typically contributes 65% of the cost with a 35% local contribution, and beach nourishment projects are managed by the United States Army Corps of Engineers (USACE, 2007). In general, costs are reduced when the sand source is closer to the beach, dredged sand is placed in the near-shore zone with a so-called “rainbowing” or “side-casting” dredge boat, when a greater proportion of sand is placed in deeper water zones, and when the fleet of dredge boats on the East Coast is less busy (Philip Roehrs, pers. comm.).

3 EXAMINING ALTERNATIVE STRATEGIES

Recently, Dutch engineers and planners have begun to experiment with “mega-nourishment” as a new strategy for sustaining critical beaches and dunes. A very large quantity of sand is added to a sandy beach, and a longer time interval is established between nourishment events, in contrast to the typical practice of annual or semi-annual nourishments (Aarminkhof et al., 2010). The Zandmotor (“Sand Engine”) was built between the cities of The Hague and Rotterdam in 2011-2012, led by the coastal management authority (Rijkswaterstaat, 2013). A much larger quantity of sand (about 28 million CY) was used to nourish the beach with the understanding that additional nourishment would not be required for 10-15 years. The sand was placed in the shape of a hook that protrudes from the existing coastline and extends into the ocean. The key innovation was that cost is reduced by placing a much larger percentage of the sand in deeper water, allowing future accretion of sand on the coastline to occur via wave action and wind alone.
Several positive outcomes already observed from the Sand Engine suggest that this method can be applied successfully in places where large quantities of dredged sand are available, such as the Mid-Atlantic, the Southeastern coast of the United States, and the San Francisco Bay. The cost of the Dutch Sand Engine was approximately 25% the price of traditional beach nourishment for the same length of coastline (Nico Bootsma, Project Manager, Rijkswaterstaat. Pers. comm.). Dutch coastal managers have also observed plants and animals returning that were long absent from this area of the coast, and believe that the placement of sand by natural processes of wind and waves, as well as the longer time interval before re-nourishment, support the return and establishment of coastal organisms (Nico Bootsma, pers. comm.). Wind surfers, kite surfers and board surfers have all found that the Sand Engine produces exceptional conditions for their sports, in comparison to a linear beach. In short, the design of the Sand Engine imitates and makes use of natural processes to reduce the cost of achieving the multiple goals of storm protection, ecological diversity, recreational potential and varied aesthetic experience.

3.1 The Sand Engine and Virginia Beach: Comparison of Conditions
We identified Virginia Beach, Virginia as a city where the need for regular beach nourishment, presence of a strong recreational and tourism economy, and continued problems from coastal storm damage might warrant a new approach. Sand transport dynamics and coastal geomorphology set many of the parameters for construction in both standard beach nourishment projects and for mega-nourishment. We compared these variables to understand whether the Dutch model could be applied to this Virginia site and found the geological and climatic conditions to be reasonably similar. Typically, wave energy in the Dutch condition is higher, moving more than twice as much sand along the coast (Aarninkhof et al., 2010; Hapke et al., 2010). This means that sand would probably be transported more slowly in Virginia Beach unless a major storm occurs.

Figure 1. Context maps of Virginia Beach, VA (left) and Ter Heijde, Netherlands (right)

The development conditions are very different, however (see Figure 1). Virginia Beach has a highly urbanized shoreline with large hotels, businesses and private homes that face directly onto the Atlantic Ocean. In contrast, the coastline adjacent to the Dutch Sand Engine is largely undeveloped, with small towns located several kilometers inland. While both beaches are used for recreational purposes, the scale of the recreational and tourism industry in the Virginia Beach area is considerably greater. Infrastructure present at the sites also differs; Virginia Beach has a privately-owned fishing pier, a marina...
entrance that is dredged for boat access, several municipal storm water outfalls that extend up to 2000 ft. into the ocean, and a 13.5' tall concrete sea wall which has been incorporated into a concrete boardwalk (USACE, 2006). In contrast, the Sand Engine site has no piers, sewage outfalls, or seawalls, and is backed by a 35-foot high line of sand dunes rather than a seawall. A drinking water supply area lies beyond the dunes.

Since its construction in 2011, engineers have carefully mapped the surrounding currents and erosion of the Sand Engine, as well as accretion in adjacent locations. The only unexpected problem to arise has been an impact on the water table, which could have resulted in contamination of ground water by a nearby landfill. Recovery wells were installed to address the issue before contamination occurred (Nico Bootsma, pers. comm.). This is not expected to be an issue in Virginia Beach given the presence of a pumping system under the sea wall that can mitigate changes in ground water levels (USACE, 2006). The presence of a well-established dune line on the Dutch coast, rather than the sea wall present in the Virginia Beach area, is also significant since dunes constitute important buffers of wave energy in storms, and are also protected as part of coastal habitat. Elected officials and business leaders in Virginia Beach supported the use of a seawall instead of dunes because it allowed beachfront businesses to maintain valuable views of the water’s edge, instead of having those views blocked by dunes (Philip Roehrs, pers. comm.).

3.2 Potential for a Sand Engine at Virginia Beach

We explored two primary forms for a feeder beach or Sand Engine in Virginia Beach: a sand spit or “groyne,” and a sand delta (see Figure 2). We selected these basic forms because we believe they would be (1) relatively easy to construct, (2) would create zones of reduced wave energy with habitat and recreational benefits, and (3) could allow the placement of a relatively large proportion of sand in deeper water, reducing costs. We explored introducing different numbers of these forms as well as different sizes in order to examine their implications for cost, recreation, ecological value, and storm protection (see Table 1).

### Table 1. Initial Conditions (comparison of forms in situ, using estimated values)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>SD1 L</th>
<th>SD3 M</th>
<th>SS1 L</th>
<th>SS3 M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated area above MHW high tide (acres)</td>
<td>90</td>
<td>80</td>
<td>105</td>
<td>60</td>
</tr>
<tr>
<td>Estimated total sand volume (CY)</td>
<td>1,863,673.00</td>
<td>1,317,842.00</td>
<td>1,034,668.00</td>
<td>1,583,295.00</td>
</tr>
<tr>
<td>Est. CY in 0-10ft depth</td>
<td>376,003.00</td>
<td>57,033.00</td>
<td>114,066.00</td>
<td>28,516.00</td>
</tr>
<tr>
<td>Est. CY in 10-20ft depth</td>
<td>1,191,839.00</td>
<td>1,260,809.00</td>
<td>496,047.00</td>
<td>938,720.00</td>
</tr>
<tr>
<td>Est. CY in &gt;20ft depth</td>
<td>295,830.00</td>
<td>0.00</td>
<td>424,555.00</td>
<td>616,058.00</td>
</tr>
<tr>
<td>Estimated cost (0-10ft $13/CY, 10-20ft $8/CY, &gt;20ft $3/CY)</td>
<td>$15,310,254.00</td>
<td>$10,827,905.00</td>
<td>$6,724,904.00</td>
<td>$9,728,654.00</td>
</tr>
<tr>
<td>Estimated cost per CY</td>
<td>$8.22</td>
<td>$8.22</td>
<td>$6.50</td>
<td>$6.14</td>
</tr>
<tr>
<td>Ease of construction (= small number of pipe discharge locations, high % sand placed in deep water)</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Evenness of storm mitigation on day 1</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Evacuation route protection on day 1</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Added shoreline day 1 (LF)</td>
<td>5550 LF</td>
<td>10200 LF</td>
<td>5580 LF</td>
<td>11800 LF</td>
</tr>
</tbody>
</table>

(SD=sand delta, SS=sand spit) (L=large, M=med.)
Figure 2. Visualization of a mega-nourishment in the Virginia Beach Resort area, used in stakeholder meetings to communicate research intent and implications (diagram by M. Geffel).

We used two methods to assess the potential of these forms. In the first, we estimated the predicted performance of these different design strategies across a set of evaluation criteria that we developed after a review of the literature (see Tables 1 and 2). In the second, we applied a known predictive model, the Coastal Evolution Model (CEM), to the proposed forms in order to more rigorously project the shoreline patterns that might develop over time, given the specific parameters of sand transport in the region (see Figure 3).

Table 2. Model Analysis (Comparison among outcomes, 1= most, 4=least)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>SD1 L</th>
<th>SD3 M</th>
<th>SS1 L</th>
<th>SS3 M</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Ecological productivity (LF shoreline with reduced wave energy, day 1)</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>B. Risk of shoaling</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>C. Speed with which the shoreline thickens by accretion</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

(SD = sand delta, SS = sand spit, 1 or 3 = number of features, L=large, M=med.)

3.3 Modeling Coastal Change Over Time

Predicting the change over time of mega-nourishment landscape interventions like the Sand Engine is a complex task that requires specialized knowledge from the sciences. Morphodynamic modeling has been used over the last five years to test the effect of human interventions on coastal morphology (Slott, 2010). One useful modeling approach for predicting both natural and anthropogenic morphodynamic change at large temporal and spatial scales is known as a “one-contour-line model.” This approach assumes that the cross-shore beach profile remains constant over time. Since the Sand Engine is a large intervention intended to erode over many years, we used the Coastal Evolution Model (CEM)—a one-contour-line model—to explore potential changes in form of different Sand Engine plan-view shapes as waves and wind transport of sand alter these shapes.

CEM models gradients in the alongshore sediment transport flux, which are the primary driver of change in shoreline position. As waves approach the shore and move into shallow water, bottom influences begin to affect wave movement. Wave velocity decreases when the seabed begins to interfere with the wave motion. When waves approach the shore at oblique angles, the portion of the wave crest overlying shallow water moves slower than the portion over a greater depth. It is this refraction of the wave as it enters the shallow nearshore that causes energy to be transferred in the alongshore direction. This energy produces a current parallel to the shore that is responsible for the transport of sediment along...
a coast. Perturbations in the coastline generate gradients in the alongshore sediment flux, leading to changing patterns of erosion and accretion. The magnitude of this flux is predominantly determined by the size of the breaking waves and the wave approach angle. Angles of 45° or greater between the deep-water wave crest and the shoreline orientation maximize alongshore sediment transport.

![Image](73x538 to 230x668)

**Figure 3.** (a) The Coastal Evolution Model (CEM) assumes effective shore-parallel contours over long timescales. (b) The shape of the cross-shore profile does not change in a one-contour-line model, it shifts landward with erosion or seaward with accretion. (c) The need for more dredge placement equipment drives up costs in shallower water.

CEM is an exploratory model intended to examine how wave climate and alongshore sediment transport instabilities influence shoreline evolution (see the example in Figure 4). The model assumes coasts are comprised of mobile and sandy sediments, and is designed for spatial scales on the order of hundreds of meters and temporal scales of years to centuries (Ashton, 2001; Ashton, 2006). The model is simplified to consider gradients in alongshore sediment flux and ignore smaller scale processes that may also influence the shoreline. The inputs for CEM include a digital representation of a shoreline and information about the magnitude and approach angle of waves relative to shore. In our modeling experiment, we used a 2010 Median High Water shoreline, generated by the NOAA National Coastal Data center, as an initial condition (NOAA).

This initial line was modified to represent four proposed plan-view form alternatives for a Sandbridge Sand Engine: one 356,900 m² delta, three 140,800 m² deltas, a 165,240 m² sand spit, and three 80,800 m² sand spits (see Figure 5). We used a wave climate generated from a series of wave roses developed from modeling studies and fieldwork (Maa and Hobbs, 1998; Komar and Allen, 2008; USACOE, 2012). The key wave parameters are an asymmetry value representing wave angle direction, and an angle parameter representing the proportion of high-angle waves influencing the shore.

![Image](373x538 to 538x674)

**Figure 4.** The incoming wave distribution creates a flying spit and embayment configuration. The simple sand spit was the initial shape, and a flying spit (curving spit) develops over time.
Figure 5. Sand spit and sand delta design alternatives in Sandbridge, VA, relative to existing structures and roads. Box 1 shows the placement of 3 smaller spits or deltas, and Box 2 shows the placement of a single large spit or delta. The City of Virginia Beach is to the north (left) in this map.

Figure 6. Model results for various geometries (1 sand delta or sand spit; 3 deltas or sand spits) are compared qualitatively between runs with similar wave distribution and wave intensity.
Map resolution was a challenge in using CEM. In order to differentiate among the geometries of our interventions, we needed to model these modified shorelines using a 10 m grid. The CEM was developed to model geometries using a 100 m or larger grid, and simulates deep-water waves assuming shore-parallel contours (Ashton, 2006). At a 10 m scale, nearshore bathymetric complexities would influence wave propagation. To achieve model stability with the higher resolution grid, we scaled-down the magnitude of the wave climate used in the model based on the historical wave data. Therefore, we chose to use a wave height of 0.1 m, an order of magnitude smaller than the mean significant wave height of 0.7-1.2 m typically noted in the area (USACOE, 2009; Fenster and Dolan, 1999; Basco, 1999; Dolan, 1988). CEM is not meant as a quantitative tool for shoreline engineering; model output is intended to display shifts in overall shoreline morphology. By comparing across our series of modeling experiments, the results provide some interesting clues as to how different plan-view Sand Engine geometries would change over time under our site’s historical wave climate (see Figure 6).

The most important goal of mega-nourishment is that the sand ultimately thickens the shoreline. Both of the singular, large forms exhibited the formation of a sandbar-like flying spit near the seaward tip. This formation has the potential to isolate nourishment sand offshore, preventing the full amount of nourishment sand from thickening the beach. On the other hand, the complex shapes resulting from these flying spits create an intricate network of small-scale crescentic forms that suggest potential habitats for common species such as mole crabs that are a valuable food source for less-common shorebirds (Bowman and Dolan, 1985). The complexity and instability of these forms over time could also provide significant visual interest for beach tourists and residents. By contrast, when sand is distributed in multiple small forms, the sand is predicted to merge more quickly with the existing beach. Multiple small deltas did not develop a flying spit like the large delta. Multiple spits produced multiple smaller flying spits.

In this model output, the forms also produced changes in adjacent shorelines. For example, in timesteps 1-5 of the large delta and the spit, sediment is lost from the shoreline immediately north of the spit. This sediment loss reverses later as the sand mass ultimately begins to merge with the coast (Figure 6).

These plan-view diagrams provide a compelling way to frame ideas about change over time on coasts by linking the spatial patterns of proposed interventions directly to mathematical equations that represent significant shoreline processes. Iterative modification and testing of designs with CEM and/or other morphodynamic modeling packages will help designers achieve proposals that meet key spatial and programmatic criteria while working with natural coastal erosion and accretion processes.

3.4 Local responses

We discussed the proposal for a mega-nourishment project in the Virginia Beach area with a number of local stakeholders. A single meeting was held with most groups, except the City of Virginia Beach staff, with whom we met twice. Meetings were held with coastal engineers and public works officials for the city of Virginia Beach (8 stakeholders), hotel owners in the Virginia Beach resort district (2 hotel representatives active in local affairs), members of the Sandbridge VA Civic league and Beaches and Waterways commission (4 members of the League), and biologists at the USFWS Back Bay Wildlife Refuge (2 staff members). No tourists were included, but their needs were referred to by the hotel stakeholders. We chose this set of stakeholders because we were interested in the reactions of a group that we believe has historically had the greatest influence on beach management decisions in this region.

The concept of an alternative beach nourishment approach that could reduce costs and increase ecological and recreational value of the resort beaches was well-received by these stakeholders. The potential cost savings per cubic yard of sand, and longer interval of protection before new nourishment is required was of interest to city officials. However, they commented that they would most likely continue to support the existing practice of more regular, linear nourishment until there was stronger pressure from regulatory agencies or budget constraints to find other ways of replenishing the beach.

Hotel owners and city officials also expressed concern that visitors to the area would be put off by an unconventional shoreline, and that the politics of deciding where initial sand placement would create the benefits of beach nourishment sooner would be highly contested. Since the shoreline created by a wave-based mega-nourishment project would vary in width, local business owners also expressed skepticism that tourists would be willing to walk a greater distance to reach the water. However, the wider beach created with mega-nourishment, and the potential to extend the recreation season for surfing sports by creating a new point break with a spit or delta form, could expand the tourism economy in new ways.
The issue of equity was also noted by several local officials and business owners, since the properties located near the mega-nourishment would receive storm protection and recreational benefits as soon as it was in place, while several years would pass before other properties would experience the accretion of nourishment sands on their part of the shoreline. Some might even experience erosion before accretion.

Biologists at the USFWS Back Bay Wildlife Refuge expressed interest in a method of nourishment that might support vulnerable elements of the local coastal ecosystems. Species such as the sea turtle and piping plover are of interest to many coastal residents, and all parties we spoke with expressed strong support for beach nourishment that could more effectively support coastal habitat. Although the net movement of sand in the Virginia Beach area is to the north, 25% of the sand is understood to move south. Staff at the Back Bay Wildlife Refuge to the south have observed accretion on the refuge coastline following nourishment at the resort area. Beach nourishment to the north could therefore add to coastal habitat within the refuge, where direct beach nourishment is prohibited by federal policies.

The primary concern expressed by all stakeholders was that of cost. In the mega-nourishment approach, the initial cost of nourishment is greater because a larger quantity of sand is moved. However the cost per cubic yard of sand, based on both the Dutch example and on inquiries to American dredging companies, would be lower, and the time interval before the beach would be nourished again would be longer. Despite these longer term cost savings, persuading municipalities to make the investment in mega-nourishment would be a challenge. City officials and local business owners responded favorably to the suggestion of a smaller scale pilot project that could introduce the practice of mega-nourishment to the area, and which could be scaled to a size that would be effective for testing its storm protection value. Additionally, their position was that a smaller scale pilot would lay the administrative and logistical groundwork for a larger mega-nourishment project, addressing concerns over the environmental and other permitting that would need to be approved for a mega-nourishment project to be built.

In general, the business leaders, elected officials, and public agency staff of the City of Virginia Beach seemed to be well informed on the issues of sand transport, storm protection and coastal ecology. Among those interviewed in this research were those who deal directly with the condition of the beach every day, either as a city official, coastal property owner, or scientific researcher. Reactions might be considerably different among people in the broader public of the Virginia Beach community who are less familiar with these issues. Additionally, funding for annual beach nourishment in Virginia Beach was restored in summer 2012, and with the removal of that stress on the beach nourishment agenda, both city and local residents seem content to resume beach nourishment via the standard methods. There is no source of pressure to innovate or pilot new methods of beach nourishment at this time. We concluded that a small sand spit or delta at Sandbridge would be most likely to receive broad support as a pilot for potential future changes in management or nourishment strategies on the main resort beach.

4 LESSONS LEARNED

This research yielded a number of interesting insights, ranging from the predicted movement of sand to the priorities of local residents, business owners, officials and scientists. Initially, the Virginia Beach Resort area was targeted as a potential site of a mega-nourishment due to its character as an iconic landscape in the region and central location of tourism and real estate value/investment along the coast. However, a number of factors suggest that the smaller resort community to the south of Virginia Beach, Sandbridge, would be preferable for a pilot project that could introduce mega-nourishment as a beach-building technique in the United States. The factors that shifted interest from Virginia Beach to Sandbridge also highlight concerns that may be generalizable to coastal adaptation and design in other areas of the United States.

Areas with a continuous line of hotels rely for their business success on a linear beach with a consistent width. Without a consistent width, tourists might preferentially select hotels closest to the water’s edge. If the edge of the water formed coves and lobes, resort properties would likely increase or decrease in value for the period of years it would likely take for the beach shape to be smoothed by wave action. Similarly, linear beach shorelines dominated by private residences might face inequities of beach access if the beach shape was altered. Changes in beach nourishment practices that produce “winners” and “losers” along the beach, even for only a few years, may be unacceptable to adjacent private landowners unless there is no other way they can afford to protect their property from storms and maintain a recreational beach.
Mega-nourishment may be an appropriate strategy in areas where land use is not uniform along the coast, and so beach nourishment can create a variety of physical conditions, such as the more urban coasts of New Jersey, Long Island, NY, and San Francisco Bay. In areas where funding for annual or semi-annual beach nourishment is uncertain, mega-nourishment may present a method for maximizing the benefits of beach nourishment over a longer time period, if an initial capital investment is possible. Areas with undeveloped land and few individual owners, similar to conditions at the Dutch Sand Engine, can also be an excellent fit for this adaptation strategy, as the complications of maintaining a status quo for multiple land-owners are reduced, and the potential ecological benefits of mega-nourishment can be realized.

While mega-nourishment may be a more cost-effective way to provide multiple benefits as a response to coastal erosion than methods currently being utilized in the United States, it is still not a permanent one. The expense of beach nourishment, even when it is less frequent, as well as projected storm frequencies and sea-level rise will have significant land use and urban design implications that beach nourishment may not ultimately solve. Additional fortifications, such as a strong dune line, may be needed in conjunction with beach nourishment to meet the environmental changes that are likely to exist after 2050.

The public experience of these coastal landscapes also requires attention. The way residents and visitors experience sandy beaches may have a direct role in shaping attitudes and cultivating interest in adaptive coastal designs and infrastructure that are different from the status quo. Designers can take the lead in developing the shoreline forms that will perform the functions discussed in this paper, communicating the implications of these designs, and shaping the experience of visitors to these places in ways that may lead to their implementation in additional locations. Furthermore, designs such as the sand engine can increase our awareness of wind and wave action as it affects the future of our coastlines, as opposed to annual nourishment that obscures the effects of coastal erosion. In this way, beach nourishment can be a tool not only for storm protection and coastal ecology but also for shaping our understanding of large-scale natural processes and informing our responses to changes in climate, including rates of sea level rise and storm patterns.

This research also highlights the need for designers to build partnerships that allow them to more rigorously predict the performance of alternative spatial proposals. Modeling programs such as Coastal Evolution Model can be applied as an initial design and communication tool, while adding rigor and scientific validity to forecasting design performance. As scientific theories and observations change, designers will be able to take advantage of scientific insights more quickly if our methods for testing our own spatial proposals make use of the same tools that scientists are using to refine their theories.

5 REFERENCES


Landscape Research Record No.1


PRESCRIBED GOAT GRAZING IN URBAN SETTINGS: A PILOT STUDY OF THE LEGAL FRAMEWORK IN NINE U.S. CITIES

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1 ABSTRACT
This paper provides a preliminary assessment of how municipal codes affect prescribed grazing efforts in U.S. cities. Throughout the U.S., landscape architects, planners, and other land management professionals are experimenting with the use of goats and sheep as biological agents for controlling invasive plants and assisting in the restoration of ecological function in woodland and riparian environments—a land management technique known as prescribed grazing. Recent experiments in public settings such as park systems and airports have spurred interest in this practice, and generated growing market demand for prescribed grazing services on private lands. In responding to this demand, however, land planners and prescribed grazing contractors enter a legally ambiguous terrain. To assess how municipal ordinances may affect the use of prescribed grazing as a method for managing invasive vegetation, the authors conducted a literature review and a review of land-use regulations in nine U.S. communities where prescribed grazing activities are underway. Among these municipalities, few regulations currently are in place to allow and effectively govern prescribed grazing on privately-owned urban lands. Consequently, many prescribed grazing efforts in these cities may be illegal or only quasi-legal—a situation that may limit further testing of prescribed grazing methods while also potentially placing animals, humans, and the environment in jeopardy. The paper concludes with suggestions for how public policy-makers, planners, environmental contractors, and landscape architects may collaborate on research and environmental remediation via prescribed grazing, and how existing codes might be altered to support this emerging frontier of urban land management.

1.1 Keywords
goats, law, land management, livestock, prescribed grazing
2 INTRODUCTION

2.1 Prescribed Grazing as a Landscape Management Technique

In cities throughout North America, landscape architects, planners, and other land management professionals are experimenting with the use of goats and sheep to control invasive plants and assist in restoring ecological function in woodland and riparian environments. This land management technique, known as "prescribed grazing" or "targeted grazing," is defined as "the application of a specific kind of livestock at a determined season, duration, and intensity to accomplish defined vegetation or landscape goals" (Launchbaugh and Walker, 2006, p.3). In the past, prescribed grazing was used primarily to reduce wildfire risk or control weed species in rangelands (e.g., Martin and Huss, 1981; Tsiouvaras et al., 1989). Recently, however, land management professionals in the U.S. and abroad have become interested in using the technique to manage vegetation in urban settings—a trend that has received publicity via media coverage of prescribed grazing in public landscapes such as parks and airports. For example, Boulder, Colorado's parks and recreation department has used 300 goats to manage vegetation in the Boulder Reservoir (Schlaufman, 2010). Similarly, goats and sheep have been used in Atlanta to remove invasive plants from future parkland and to manage vegetation at Hartsfield-Jackson International Airport (Massara, 2012; Wheatley, 2010). Goats have also been employed at Chicago's O'Hare Airport and to clear land for construction on the University of Wisconsin-Madison's campus (Green, 2011; Sfondeles, 2012). Recently, prescribed grazing has achieved notoriety through media coverage of "eco-mowing" experiments in Paris, France (Beardsley, 2013). If city officials are satisfied with the results, ruminants may soon be seen grazing amidst some of the world's most iconic urban landscapes.

In line with such publicity, demand for prescribed grazing services has grown within the private sector. Goat and sheep farmers have begun renting their animals to property owners for land clearing purposes, and in a number of U.S. cities entrepreneurs have founded businesses that specialize in providing prescribed grazing services (e.g., Livestock for Landscapes, 2012). Landscape architects also have participated in this trend. Indeed, depending on the particular circumstances and needs of the project, prescribed grazing may prove to be a viable method for land clearing or vegetation management in urban landscapes (Beatty, 2005; Landscape Architecture Magazine, 2005).

Public and professional interest in prescribed grazing is partially fuelled by a perception that the technique represents a more "natural," low-impact alternative to conventional vegetation control methods that rely on mechanical equipment or chemical herbicides (e.g., Beatty, 2005; Manning and Miller, 2011). Unlike gas-powered chainsaws, "brush hogs," and "weed-whackers," goats and sheep do not consume fossil fuels or generate acute noise pollution, and they may present less risk to human and environmental health than chemical herbicides. Due to their relatively small size and weight, goats and sheep are easy to handle and transport. At the same time, goats and sheep are well adapted to ranging over steep and rugged terrain that would be inaccessible to humans with mechanical equipment (Hart, 2001; Manning and Miller, 2011). In comparison to cattle, goats and sheep include a higher proportion of browse in their diets, making them especially useful for removing woody invasive species (e.g., Hart, 2001; Poischel, 2006). If managed appropriately, prescribed grazing may prove to be an effective and cost-efficient means of controlling invasive non-native vegetation and improving ecological function in urban green infrastructure systems, as well as a strategy for turning weeds into a saleable final product (livestock) (e.g., Kleppel and Girard, 2011; Launchbaugh and Walker, 2006).

2.2 Legal Status of Prescribed Grazing in U.S. Cities

In many U.S. communities, the legal framework governing domestic livestock was developed decades ago, and it reflects a view of animal husbandry and other agriculture-related activities within urban settings as "nuisance" land uses (Henry, 2006). In communities that have enacted land use zoning ordinances, livestock grazing typically is allowed only in areas that are specifically zoned for agriculture. By using prescribed grazing to manage vegetation in non-agricultural zones, property owners and contractors subject themselves to adverse legal action by disgruntled neighbors or enforcement by the municipality against quasi-legal or illegal urban animal husbandry. This risk may dissuade property owners and contractors from experimenting with prescribed grazing on private land, or compel them to undertake such efforts illicitly. Neither of these outcomes is conducive to increasing our understanding of the possible ecological, economic, and social merits of prescribed grazing in urban contexts.
Consequently, the uncertain legal status of prescribed grazing may limit the extent to which the technique can be considered a viable management option for landscape designers, planners, and managers.

2.3 Prescribed Grazing in Athens, Georgia: A Case in Point

The issues mentioned above were highlighted in a prescribed grazing initiative recently launched at the University of Georgia campus in Athens-Clarke County, Georgia. Entitled the “Tanyard Creek Chew Crew,” the effort was conceived as a pilot study to test the effectiveness, management requirements, and community engagement potential of using goats to remove invasive vegetation in a heavily urbanized setting. Since spring 2012 the Chew Crew project has engaged local goat and sheep farmers, student volunteers, university faculty and staff, local children, campus facilities management personnel, and local contractors in an effort to improve the aesthetic quality and ecological function of a wooded stream corridor. Local goat and sheep farmers expressed interest in the prospect of providing prescribed grazing services outside of the Tanyard Creek project area; however, these farmers were hesitant to enter the market—and private land owners were hesitant to hire them—due to the uncertain legal status of prescribed grazing in the community. Later conversations with Athens-Clarke County officials proved their hesitance was well-founded, as prescribed grazing practices were deemed to be illegal in any zoning district other than agricultural zones. This discovery led the authors to question how municipal regulations might affect the development of prescribed grazing as an urban land management tool.

2.4 Purpose of the Current Pilot Study

The current study, an outgrowth of the Tanyard Creek Chew Crew initiative, is intended to provide a preliminary survey of how municipal codes may affect prescribed grazing efforts in U.S. cities. It is not intended to offer a comprehensive, scientific assessment of the full range of regulatory issues that may exist with respect to prescribed grazing in U.S. municipalities. Rather, as a pilot study, the current effort is a small-scale investigation focused on building a preliminary understanding of the issues that may be relevant when considering the legality of urban prescribed grazing. The limited scope of the investigation is consistent with pilot studies, which generally aim to refine a research question, test a research protocol, identify logistical problems, collect preliminary data, and estimate the variability in data and outcomes (Baker, 1998). As the pilot study developed, the goals became three-fold: (1) determine generally how existing municipal regulations may affect the practice of prescribed grazing in urban settings within the United States; (2) determine what regulations may be necessary to protect the health, safety, welfare, and morals of the community, and to support continued experimentation and use of this potentially useful land management technique; and (3) begin conceptualizing a process for establishing beneficial and effective regulations.

3 METHODS

3.1 Multiple-case Study Approach

According to the U.S. Census Bureau (2007) approximately 36,000 non-county, municipal or township governments exist in the United States. Since a comprehensive review of every municipal code was beyond the scope of feasibility, the authors elected to complete a thorough review of a small sample of the total set of possible cases. A multiple-case study approach was adopted, since the authors were interested in obtaining an overview of the regulatory issues that may pertain to prescribed grazing, rather than producing results that would be generalizable to all U.S. communities. Such macro-level analysis involving multiple cases is a common strategy in political science research (Swanborn, 2010, p.22). Thomas (2011, p.513) notes that cases studies in social science research typically focus on “persons, events, decisions, periods, projects, policies, institutions, or other systems,” and that individual “cases” may be defined as “an instance of a class of phenomena that provides an analytical frame—an object—within which the study is conducted and which the case illuminates and explicates.” Yin (2009, p.9-12) states that case studies are best equipped to address questions of “how” and “why,” and they are well-suited to describing contemporary events. Accordingly, with respect to the relationship between municipal regulations and prescribed grazing practices, the authors elected to examine a small number of municipal ordinances in order to describe how and why these practices are currently governed.
3.2 Selection of Cases

In selecting cases for analysis the authors employed an information-oriented sampling approach rather than random sampling—i.e., cases were selected on the basis of known information, rather than via random selection from among the more than 36,000 possible cases. The authors employed two case selection strategies: opportunity sampling, and cluster sampling (Cochran, 1977). Opportunity sampling (sometimes also known as accidental, grab, or convenience sampling) occurs when a study set is obtained from data that is close at hand. In this case, the municipal code of Athens-Clarke County, Georgia, constituted the initial data of the opportunity sample. Conversations with local planning and code enforcement officials yielded an additional set of data from four municipalities that Athens-Clarke County officials view as model or “aspirational” communities. These were Bloomington, Indiana; Boulder, Colorado; Chapel Hill, North Carolina; and Madison, Wisconsin. All of the communities in the opportunity sample are medium-sized cities, with populations ranging from 233,209 (Madison) to 57,233 (Chapel Hill) (U.S. Census Bureau, 2010). All four cities also are home to major public research universities.

Four additional cities were added to the study set via a cluster sampling technique that utilized data obtained from the Internet. Cluster sampling involves selecting from a population wherein individuals have been grouped or clustered according to some common criterion or criteria. Since the pilot study sought to uncover the range of strategies that municipalities currently employ to regulate the use of livestock for prescribed grazing, the authors sought to target U.S. cities where private citizens were known to be engaged in these activities. Thus, the existence of an “active prescribed-grazing community” became the primary variable by which the authors sought to cluster municipalities.

The authors utilized the Google Search engine and Google Trends to gauge citizen interest in prescribed grazing in metropolitan areas and cities across the United States. Publicly-accessible, aggregate Google search engine data has recently been employed in a number of social research fields ranging from political science (e.g., Reilly et al., 2012) and economics (e.g., Goel et al., 2010) to epidemiology (e.g., McCarthy, 2012). As a further measure of public interest in the topic, the authors researched Facebook posts related to urban livestock and prescribed grazing experiments. As with Google Search data, social scientists are increasingly analyzing Facebook and other social media outlets as sources for popular discourse about politics and other topics (e.g., Williams and Gulati, 2013). With respect to the present study, the authors’ approach assumed that cities with active prescribed grazing initiatives would be prominently represented in Facebook posts and Google Search traffic. The authors compiled a rank-order list of U.S. cities with the highest volumes of Internet traffic about the topic of urban prescribed grazing, as measured via Google Trends and Facebook posts. The four highest-ranked cities were selected for inclusion in the pilot study: Atlanta, Georgia; Charlottesville, Virginia; Oakland, California; and Seattle, Washington. When added to the municipalities identified through opportunity sampling, the total study set included nine municipalities that ranged in population from approximately 43,000 (Charlottesville) to 609,000 (Seattle) (U.S. Census Bureau, 2010). Although the findings of this study should be regarded as preliminary and suggestive, it is hoped that they will prove useful in developing a more systematic and comprehensive analysis of municipal codes, as well as more thorough consideration of the regulatory issues associated with prescribed grazing.

3.3 Keyword and Content Analysis Using Municode

After determining the cases to be examined, the authors analyzed the ordinances of the nine targeted cities to determine whether or how they addressed practices related to prescribed grazing. To do this, the authors located the online version of each city’s municipal ordinances either via the city’s official website or via Municode, an online publishing service that updates and maintains municipal codes (Municipal Code Corporation, 2013). Within each code, keyword searches were performed using the terms “livestock,” “goat,” “sheep,” and “grazing.” These searches generally returned results that allowed the authors to determine whether and how the municipality regulates the keeping of small livestock on private lands. In this way, the authors found all references to such animals within the city’s code, and then traced all of those references through the relevant ordinances in order to determine the degree to which prescribed grazing practices would be subject to municipal approval and regulation.
4 FINDINGS

4.1 The Illegal Landscape of Prescribed Grazing

The land management practice of prescribed grazing is not explicitly addressed in any of the municipal codes examined through this pilot study. The municipal code analyses further suggested that many instances of prescribed grazing on privately-owned, non-agricultural lands may be illegal within the nine case-study cities. Some of the cities have adopted ordinances that explicitly permit citizens to keep goats on city property as pets, however, and others have codes that do not explicitly prohibit urban goat-herding, thus casting the practice into a quasi-legal gray area. The nine municipalities of the pilot study may be grouped into three general categories: (1) cities that explicitly allow residents to keep a small number of goats as domestic pets; (2) cities that tacitly allow urban goat-keeping (i.e., the municipal code does not explicitly prohibit livestock such as goats); and (3) cities that explicitly prohibit urban goat-keeping. Although municipalities in the first category have made it possible for goats to be considered part of the urban landscape, none explicitly allows prescribed grazing as a land-management tool.

4.2 Cities that Explicitly Allow Urban Goat-keeping

Keyword searches within the municipal codes of Seattle, Charlottesville, and Boulder led directory to regulations that explicitly address conditions under which residents may keep one or more goats on privately-owned property. In each city, ordinances permitting “backyard goats” were recently enacted in response to citizens’ interest in keeping goats as pets or as sources of home-produced milk or meat. The regulations governing backyard goats included the following requirements: neutering of males, dehorning, maximum size limit, stocking rate limit, minimum setback requirement, and license fees. Only Seattle’s ordinance encompassed all of these, however all of the ordinances included a stocking rate limit. Stocking rate is the maximum number of goats allowed on a parcel, usually expressed as the number of goats per unit of land area. Seattle’s limit begins at three goats per lot, but increases to four goats once a lot is at least 20,000 square feet in size, with an additional goat allowed for each additional 5,000 square feet (Seattle Municipal Code (SMC), 23.42.052(A)). Similarly, Charlottesville places an across-the-board limit of three goats per lot (Charlottesville City Code, Ch. 4, Sec. 4-9).

4.3 Cities that Tacitly Allow Urban Goat-keeping

The municipal codes of both Oakland and Atlanta include regulations that imply that urban goat-keeping is allowed, along with other regulations that seem to imply the opposite. For example, the Oakland code explicitly bans goats from apartments, hotels, and business districts (Municipal Code Corporation 2013f, 6.04.290), yet elsewhere the building code requires that structures used to house or raise goats must be impervious to the ingress of insects and rodents (Municipal Code Corporation 2013f, 15.08.230). Beyond these two sections and three others dealing with meat and dairy standards and prohibiting animals from public parks, the Oakland ordinances do not specifically address issues related to goats. Despite this regulatory ambiguity—or perhaps because of it—Oakland has a vibrant urban goat-herding scene (Esch, 2010; Richards, 2010).

4.4 Cities that Explicitly Prohibit Urban Goat-keeping

In cities that do not allow urban goat-keeping, such as Athens-Clarke County, Bloomington, and Madison, goats are included within the definition of “livestock.” The codes treat the keeping and raising of livestock as an “agricultural use,” which is permitted only on land zoned for agricultural uses, or within the largest of the residential zones. Such parcels are generally few in number and tend to be located near the outskirts of the municipal boundary. This restriction acts as a major impediment to prescribed grazing implementation, as most cities explicitly do not allow agricultural uses in areas not zoned for such use, even under special use permits.

5 DISCUSSION

5.1 Grazing Landscapes in Limbo

Although most instances of prescribed grazing in the nine case-study cities are probably illegal, or quasi-legal at best, contemporary Internet data and news media suggest that such activities are underway in each of these communities. From conducting preliminary interviews with some individuals involved in prescribed grazing activities, the authors have learned that such work often occurs illicitly, or with the tacit
approval of neighbors and city officials who choose to turn a blind eye to relevant code violations. Although a few cities, such as Boulder, Charlottesville and Seattle, have enacted legislation that is more permissive of livestock in urban environments, the resulting ordinances do not necessarily facilitate prescribed grazing. On the contrary, municipal codes designed to allow backyard goats may actually complicate attempts to implement prescribed grazing. This is because backyard goat-keeping and prescribed grazing, while both forms of animal husbandry, involve fundamentally different relationships among humans, animals, and the environment. Some of the restrictions placed upon backyard goat owners in an effort to protect the health and safety of animals and the community would compromise the feasibility of a prescribed grazing program on the same property. As a result, prescribed grazing initiatives may be most “legal” in communities where livestock such as goats hold a legally ambiguous status, such as Atlanta and Oakland. Even in these communities, however, it is questionable whether the uncertain legal status of prescribed grazing is a desirable state of affairs, or whether it provides the best environment in which to advance our knowledge about this land management tool.

5.2 Urban Backyard Goat-keeping Versus Prescribed Grazing
Maintaining goats as backyard pets or as sources of milk or meat is fundamentally different from employing such animals as part of a land management regimen. Backyard goat-keeping is conceived as a long-lasting arrangement between animals, their human caregivers, and a particular parcel of land. Regulations that backyard goats are intended to minimize the impact of long-term animal husbandry on the environment and the surrounding community. Hence, residents are generally allowed to keep only a small number of goats on their property, and they may be required to observe minimum setbacks for the placement of goat shelters. The animals themselves must be dehorned, and male goats must be neutered. Additionally, backyard animals may be limited in size (e.g., less than 100 pounds in weight). In contrast, prescribed grazing involves placing goats or sheep on a property for shorter periods of time. Most prescribed grazing regimens are enacted over two or more growing seasons, but the system does not entail maintaining a herd on the same parcel of land continually and indefinitely as in a typical pasturage arrangement. Similarly, the fencing, shelter, and other structures needed to ensure the health and safety of the animals are likely to be of a more temporary nature. Moreover, in order to achieve the desired impacts on vegetation, many prescribed grazing programs would require higher stocking rates and larger animals than would be permitted under backyard goat-keeping allowances that currently exist cities such as Seattle or Charlottesville. The existing backyard goat-keeping provisions in these cities do call attention to some of the issues that should be addressed in any effort to govern prescribed grazing practices in urban settings, however. These are highlighted below.

5.3 Backyard Goat-keeping Regulations That Are Compatible with Prescribed Grazing
The backyard goat regulations of Seattle, Boulder and Charlottesville include some requirements that would likely prove applicable in a prescribed grazing framework, such as regulations requiring neutering and dehorning. In an urban setting it is very important to neuter male goats, as adult male goats can emit a formidable odor and exhibit other behaviors that may prove troublesome or offensive to neighbors. Additionally, neutering will effectively eliminate concerns about feral goat populations becoming established as feral cats have in many cities. Dehorning, although perhaps more controversial, can protect the safety of both goats and humans. Inquisitive horned goats sometimes get their heads stuck in tight places, particularly in fences. Dehorning significantly reduces this hazard, while also eliminating the danger that horns may pose to humans who are unaccustomed to handling goats (MacKenzie and Goodwin 1993).

5.4 Backyard Goat-keeping Regulations That May Interfere with Prescribed Grazing
Both Seattle and Charlottesville set a maximum size for goats kept within the city. While small animals may be well-suited to living comfortably in close quarters, even well-known backyard goat advocates such as Jennie Grant contend that the current size limit, 100 pounds, is too small (Grant, 2012, p.43). The issue of size limits may be even more problematic with respect prescribed grazing programs. Small breeds may be less useful as defoliators; larger animals may be expected to consume larger quantities of vegetation and prove better capable of navigating difficult terrain. Similarly, setback requirements that make sense in a backyard context may act as obstacles to efficient prescribed grazing
practices. While it may be perfectly reasonable to prohibit owners from constructing permanent goat structures or enclosures immediately adjacent to a neighbor’s residence, much of the value of prescribed grazing stems from its flexibility as a land-management tool. Often in grazing a particularly difficult property there are few viable spots for providing adequate shelter for the animals. If these areas are within the setback range, the setbacks may effectively prohibit prescribed grazing as a land management option despite the temporary nature of these housing structures. More limiting still are setback requirements that affect goat enclosures in addition to housing structures. In the case of small parcels, these setback requirements could leave much of the property unavailable to grazing. Seattle’s goat licensing fee raises a final concern. If operators must pay an annual fee of $20 per goat within the city, this could inflate the costs of a prescribed grazing regimen to a level that makes the practice less competitive with mechanical or herbicide techniques.

5.5 Backyard Goat-keeping Regulations That Conflict with Prescribed Grazing

A necessary aspect of all backyard goat-keeping regulations is limitation of the number of goats allowed on a particular property. Of the three cities in this study that allow backyard goats, each takes a different approach to regulating stocking rates. Charlottesville imposes a flat maximum number of animals per property. Boulder ties the number of permitted goats to the parcel size: one goat per half-acre of lot size. Seattle has adopted a hybrid of these two approaches: the city permits an initial maximum of three small animals per parcel, but allows for up to four animals per 20,000 square-feet and one additional animal for every 5,000 square feet beyond 20,000 square feet. Seattle’s framework is slightly complicated by the inclusion of multiple species of animals in these numbers, forcing property owners to choose from among goats, cats, dogs, and pot-bellied pigs. Restrictions such as these may be appropriate in a backyard context, wherein too many animals in a small lot could easily lead to environmental degradation and risks to both human and animal health. However, they may present challenges to the effective operation of a prescribed grazing program, wherein the chief objective is to carefully control the grazing activity of goats or sheep in order to defoliate unwanted plants. Thus, a stocking rate limit that may be ideal for long-term backyard goat husbandry may effectively render prescribed grazing impractical.

5.6 The Case for Regulation

In the United States, the chief argument in favor of regulating prescribed grazing, as with any human activity that is fairly subject to civic approbation, rests on a government’s responsibility to protect the health, safety, and welfare of its citizens. In the case of prescribed grazing, regulation must be conceived and implemented to ensure the health and safety of humans, animals, land, and water. Additionally, prescribed grazing regulations should effectively consider and limit harm from noise, smell, escaped animals, and increased traffic. Absent or improper regulation of prescribed grazing could lead to a host of problems, including the spread of disease to humans, noise and odor nuisances, and injury or property damage caused by escaped animals. On some sites, excessive stocking rates could cause soil erosion, or impair surface water quality. The animals themselves may suffer from overcrowding, disease, malnutrition or dehydration, exposure to inclement weather, death or injury from predators, and the uncontrolled spread of feral populations. Just as municipal regulations commonly seek to mitigate these issues for the millions of dogs and cats that Americans keep as pets, communities could likewise develop policies and standards to safeguard the well-being of the animals that are employed in urban prescribed grazing services. Aside from direct consequences to the community, property owners and service-providers currently may be at risk from adverse legal action against quasi-legal or illegal prescribed grazing projects—a condition that could suppress the growth of prescribed grazing as a form of ecological restoration and land management. By adopting regulations that govern the use of small ruminants as a land-management tool, a community may allow citizens to realize the potential economic and ecological benefits of this vegetation management technique, open a new environmental service sector for local entrepreneurs, and exercise some control over where, when, and how the practice is implemented.

6 MEANS OF REGULATION

The inclusion of goats within the definition of agricultural use is ubiquitous among cities that prohibit urban goat-keeping. This restriction impedes prescribed grazing implementation. In order to get beyond this, the definition of agriculture may need to be revised, which could require the revision of the
entire zoning ordinance. Alternatively, a special exception could be instituted that allows goats or sheep to be used outside agricultural zones in a prescribed grazing context, thus avoiding revision of the zoning ordinance. Aside from these changes, however, other code modifications would be required to permit and effectively govern prescribed grazing practices. A community’s approach to regulation could take different forms, depending on the community’s needs and its capacity for code administration and enforcement. In the case of prescribed grazing, the major options presented are: (1) legalization with general requirements (i.e., general regulation); (2) a permitting system with requirements tailored to each project; or (3) a licensing system, possibly in coordination with a third-party licensing organization.

6.1 General Regulation
A general regulation strategy would entail an ordinance that explicitly allows prescribed grazing within the urban areas of the city as long as certain requirements are met. Boulder’s ordinance allowing urban goat-keeping is an example of a general regulation. It allows goats to be kept within the city with only one limit: at least one-half acre of land per goat. The foremost benefit of legalization with only general requirements is that the governing entity is minimally involved in each individual site, and thus minimizes administration and enforcement costs. In instances where the regulations are likely to be followed, and the consequences of not following them are either minimal or readily apparent (and thus amenable to quick response on the part of enforcement officials), a general regulation may be adequate. This strategy may be sufficient for many communities, although some municipalities—for reasons relating to unique environmental, social, or political conditions—may prefer one of the other two options.

6.2 Permitting System
A permitting system would allow property owners to stock their land with greater numbers of larger goats or sheep than would be allowed under typical backyard goat-keeping standards. However, animals would be allowed to remain on a parcel only for short periods of time, and only on land specified through the permitting process. Such a process could work similar to construction permitting, although the process may be more streamlined. If the government is allowed to determine requirements on a case-by-case basis, it will be better able to adapt its regulations to the unique circumstances of each prescribed grazing project. For example, if the usual setback requirement for goat enclosures is 20 feet, but a project would be infeasible unless the setback requirements is reduced to 15 feet, a government may be able to determine whether it could allow the smaller setback without compromising the intent of the regulation. Alternatively, the government could require the contractor to meet stricter requirements in other areas of the project in order to compensate for the setback-reduction. A permitting system would give municipalities greater flexibility and control over prescribed grazing practices within the city, but at increased cost to the government: in order to issue a permit, administrators must invest time and effort in judging whether a proposed project meets the required standards. In order to mitigate this cost, many special use permits include a fee that must be paid by the applicant. This fee would effectively increase the cost of each prescribed grazing project, if only by a small amount.

6.3 Licensing System
A third strategy for regulating prescribed grazing in urban areas is to create a system that educates and certifies citizens to be licensed prescribed grazing operators. Similar to a permitting system, a licensing procedure would afford the government more control over prescribed grazing practices, although implementing such a system would require a similar investment of time and funds. In a licensing scenario, the governing entity would establish requirements that project coordinators must meet. Once those requirements are met, the government issues a license to the coordinator. These licenses would be required in order to enact a prescribed grazing project. By requiring documentation to be displayed on-site, the municipality may hold the licensed party accountable for any problems that may arise, while the government is assured that an experienced and qualified individual is responsible for managing any unique circumstances that may pertain to the prescribed grazing operation.

7 DATA REQUIRED TO EFFECTIVELY REGULATE PRESCRIBED GRAZING
As a land management technique, prescribed grazing is still in an experimental phase. Much remains to be learned about how to effectively utilize goats and sheep to eliminate or control unwanted
vegetation, and the application of prescribed grazing practices to urban environments foregrounds additional unknowns. Further research is needed in order to allow property owners and contractors to determine stocking rates and the duration and frequency of treatments required to achieve management goals. In addition, more information is needed regarding the kinds of supervision, fencing, shelter, setbacks, supplemental food and water, pet-interaction issues, escape management, and surveillance and monitoring that may be necessary in urban settings. Additional study also may be needed with respect to the municipal costs associated with regulation, the costs and benefits of licensing fees, third-party certification options, and capacity development in support industries such as veterinary services.

In establishing baseline minimums for factors like fencing and stocking rates, a municipality must ensure that the limits adequately protect public health, safety, and welfare, and also justify the specific limits set by the regulations. Unfortunately, no entity has yet compiled best-practices standards for prescribed grazing in urban settings. Resources exist for determining minimum shelter requirements and fencing heights because this information is needed by all goat- and sheep-herding enterprises, whether they occur within a quarter-acre city lot or a sprawling ranch. There is no compilation of maximum stocking rates for non-pasture lands, however. Effective and appropriate stocking rates will likely vary between different regions of the country. Even within an individual city, two parcels of the same size could have different carrying capacities based on vegetation type, foliage density, soil, slope, terrain features, and water quality and availability. Moreover, the carrying capacity of a single site will likely vary during the course of a prescribed grazing treatment in response to changes caused by weather. Depending on species composition and other factors, grazed vegetation may rebound at varying rates, requiring different grazing recurrence intervals. In sum, municipalities may not be able to effectively regulate stocking rates for prescribed grazing in the manner used by cities to govern backyard goat-keeping. The factors that determine whether a prescribed grazing treatment can achieve the desired management goals while safeguarding environmental quality and animal health are too numerous and variable to be accommodated by a simple rule establishing a maximum number of animals per unit of land. Most likely, determinations about acceptable stocking rates and grazing regimens will need to be made on a case-by-case basis—a situation that, particularly in communities where environmental quality and health issues are of high concern, might favor a regulation strategy based on permitting or licensing.

This is not to say that beneficial prescribed grazing regulations could not be written in the absence of perfect and complete data. For example, setback requirements do not rely on detailed information related to factors such as appropriate stocking rates, but are informed by the aesthetic requirements of the community and other health and safety regulations. Moreover, while all of the issues mentioned above may factor into determining the success of an urban prescribed grazing effort, a municipality may not need to address each of them directly. For example, a governing entity may determine that it does not need to require access to water for goats or sheep involved in prescribed grazing because it is in contractors’ best interest to ensure their animals’ health. Regarding issues such as fencing, a municipality may choose to grant significant discretion to property owners and contractors, aside from requiring that fencing used for prescribed grazing projects meet a minimum height requirement. After the private sector takes up prescribed grazing the market may also help ensure that it is carried out efficiently within the bounds set by the regulations. Nonetheless, our knowledge of best practices is likely to increase only in step with expanded experimentation with prescribed grazing. Herein exist opportunities for collaboration among municipalities, property owner, private contractors, and research institutions.

8 EXPANDING THE LEGAL LANDSCAPE OF PRESCRIBED GRAZING: AN AGENDA FOR RESEARCH AND COLLABORATION

The data required to develop effectively regulate prescribed grazing can be obtained only if grazing experiments continue, and the resulting data is collected, analyzed, and disseminated to municipal officials, contractors, planners, landscape architects, and citizens who may be interested in using this technique to remove invasive exotic vegetation from their properties. Continued experimentation and monitoring of the results of prescribed grazing programs are needed in order to devise methods for determining appropriate stocking rates and other environmental management parameters. Data related to these factors may be available from two general sources: (1) prescribed grazing efforts implemented by contractors and other land managers; and (2) grazing experiments conducted by research institutions for the purpose of generating new knowledge about best practices.
8.1 The Role of Private-sector Practitioners and Public-sector Land Managers

Although many prescribed grazing efforts on privately-owned urban lands may be technically legal or quasi-legal, these activities nonetheless are underway and they are generating potentially valuable knowledge. In addition, some of the most extensive urban prescribed grazing experiments have occurred on public lands—such as parks, college campuses, and airports—settings that may be less subject to the strictures of the local zoning code and where grazing can proceed under the watchful eye of government administrators. The farmers, contractors, and other land management professionals who have been involved in these efforts thus represent significant, untapped sources of practical knowledge and experience. Knowledge obtained from such professionals is likely to be both general (e.g., the herding behaviors and care requirements of goats and sheep) as well as local (e.g., the distinct environmental and social factors that exist in a particular site, community, or region). This knowledge would benefit efforts to create model legislation for prescribed grazing. Prescribed grazing projects such as those undertaken at O’Hare International Airport or within the park systems of Boulder, Charlottesville, and Atlanta, already represent a form of public/private collaboration. By supporting continued government-sponsored experimentation on public lands, a municipality may retain control of the experiment, while also allowing government employees to gain experience that would be needed to enforce future prescribed grazing regulations on private property.

8.2 The Role of Research Institutions

If ongoing and already completed initiatives represent a potential source of information about urban prescribed grazing best practices, who will collect this data and make it usable for property owners, land managers, and public-policy makers? Private business owners and government officials are unlikely to have the time and resources to devote to this public service. Moreover, it is not clear that individual business-owners or municipal governments would be best equipped to disseminate this knowledge to the array of individuals and institutions who may be interested in the technique. However, such a role would seem to fit well within the mission of research and education institutions—particularly the public "land grant" universities that exist in all U.S. states. Most state land-grant universities include academic programs in agriculture and animal husbandry, environmental sciences, law and public policy, and environmental planning and design—disciplines that converge in the practice of prescribed grazing. Moreover, these institutions typically support cooperative extension services that facilitate education of citizens and policy-makers, as well as networking among urban and rural entrepreneurs. All of these features suggest that land-grant institutions are particularly well-situated to play an important role in advancing potentially beneficial land management practices such as prescribed grazing.

Aside from collecting and synthesizing knowledge that already has been acquired through prescribed grazing experiments in urban areas, public universities could advance research of best practices by establishing controlled prescribed grazing experiments on public land. Such efforts would introduce goats and sheep to the community in a prescribed-grazing context, while also functioning as a means to gather scientific evidence about best practices. An example of this is the Chew Crew pilot study on the campus of the University of Georgia. In Georgia, as in many states, state property is not subject to local zoning regulations. This exemption allows experimentation to occur in the kinds of urban areas where prescribed grazing normally would not be allowed. Furthermore, by situating research sites in such settings, prescribed grazing experiments may become educational resources for faculty and students in fields such as urban ecology, agriculture, and landscape architecture—experts and future professionals who may wish to work with prescribed grazing in the future.

8.3 Options for Disseminating Prescribed Grazing Data

For knowledge generated through prescribed-grazing research to effectively influence community-level regulation, it must be shared among those who are interested in using this land-management technique. Currently, there is no central clearinghouse for information about urban prescribed grazing. The University of Idaho maintains an online resource for information about prescribed grazing, although much of it focuses on rangeland management issues (University of Idaho, Rangeland Center, 2012). Similarly, Kathy Voth, a rancher and livestock consultant based in Loveland, Colorado, maintains a website that is an excellent source of information on prescribed grazing (Livestock for Landscapes, 2013). Both of these resources suggest how centralized information clearinghouses might play an important role
in gathering and disseminating information about urban prescribed grazing, including study results, best practices, and model legislation. As noted above, since some of the variables affecting best practices are likely to be region-specific, regional information centers may prove to be more effective than a single national clearinghouse. Once again, these conditions suggest that the cooperative extension systems or other outreach programs that exist in many state land-grant institutions may be logical candidates for fulfilling this role. Moreover, if a significant number of communities adopt a licensing approach to regulating prescribed grazing, an existing cooperative extension service might be a viable vehicle for providing the training and certification that would be required of prospective contractors.

9 CONCLUSION

The current municipal codes of the nine communities selected for this pilot study either prohibit prescribed grazing on most urban lands, or grant it only quasi-legal status. None of the communities have regulatory frameworks in place that specifically permit prescribed grazing or govern the practice in order to ensure its effectiveness and to protect the health and safety of the animals and the community. Some cities, such as Atlanta and Oakland, tacitly allow grazing in certain urban areas. Other cities have enacted ordinances that specify conditions under which residents may keep a small number of goats on their properties. While the regulatory frameworks of cities address aspects of small livestock husbandry that are relevant to prescribed grazing, the ordinances themselves would need to be extensively modified in order to permit and effective govern prescribed grazing as a land management practice. There are three options for such changes: general regulation, permitting, and licensing. In order for any of these to be effective, however, further data is needed about best-practices and safe limits for prescribed grazing. The data could come from private actors as well as from studies led by research institutions. Once the database is created, it must be collected, compiled, and disseminated by a clearinghouse, which may either be a public or private institution. The database may in turn be used to develop model legislation and support the burgeoning field of prescribed grazing in the United States.

10 REFERENCES


REIMAGINING A SUSTAINABLE FUTURE FOR MINE-SCARRED LANDS

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1 ABSTRACT

Surface mining has historically dominated the economy and landscape of West Virginia and Central Appalachia. While coal mining remains an important industry to the area’s economy, it is no longer the major employer and has left the region with a degraded and polluted landscape. Processes associated with mining have led to increased stormwater runoff, soil degradation, contamination of streams, accumulation of airborne toxins, and loss of biodiversity. These processes and their impacts pose serious risks to environmental and human health. Faculty and students are working on an EPA funded research project to envision a sustainable future for a 600-acre former coal mine in McDowell County, West Virginia. Plans for the site will provide a green energy industry alternative to coal through sustainable development initiatives, while restoring, to the extent possible, ecosystem services adversely impacted during mining operations. Community engagement focus group meetings and a multi-disciplinary environmental assessment were used to build a framework that demonstrates the viability of alternative energy and green infrastructure practices that respond to a local need for mixed-use development. Using cultural vernacular, recreation, housing, commerce and transportation will blend practices such as biomass, solar, and wind energy production. The site will not only generate local economic growth through the development of renewable technologies, but will restore ecosystem services that foster ecological and social benefits within the community. The visioning for this space may become a model for sustainable energy and low impact re-development on mine-scarred brownfield landscapes throughout West Virginia and the Appalachia Region.

1.1 Keywords

mine reclamation, green infrastructure, renewable energy, ecological succession, ecological design
2 CONTEXT

2.1 Social and Cultural Context

McDowell County is a predominately rural county located in the mountainous coalfields of Southern West Virginia. Due to the forested landscape and high quality coal seam that stretches throughout Central Appalachia, timber and coal have been the predominant industries in the region since early settlement (Omernik, 2007). Although reference to Appalachia is often synonymous with poverty, the region has a history of economic vitality. At one time, McDowell County was the leading producer of coal in the country. Cities were created in proximity to coal reserves, which were considered the best in the world. The Pocahontas No.3 coal seam stretches nearly 900 square miles across several counties in West Virginia. The coal seam below is highly valuable because of its low-volatile and low sulfur content. In spite of the thick overburden layer, extraction, using mountaintop removal processes are economically advantageous. As coal company towns began to grow, people flocked to West Virginia to find work in the coal mines. By 1950, the population in McDowell County grew to nearly 100,000.

While the coal industry has always been susceptible to boom and bust periods; deindustrialization, mechanization of mining practices and disinvestment in the area led to an economic decline for Appalachian communities dependent on the coal industry. Today, the population has fallen below 20,000 and McDowell County is the third poorest county in the United States (2011 US census). 2011 US Census statistics related to poverty, employment and education reveal the economic devastation of the area. With only 39.6% of the population in the work force and 39.4% completing high school, poverty is far reaching. Nearly 40% percent of McDowell County residents with children live below the poverty line. These numbers climb to 60% when considering families with children under the age of five. High welfare rates, child abuse, teen pregnancy and drug use continue to plague the county (WV State Journal, 2012).

In addition to poverty, Appalachia is often culturally characterized by individualism, traditionalism and fatalism (Myers, 2008). While little wealth associated from the natural resource extraction throughout West Virginia remains within the community, the culture of many residents continue their commitment to the corporate coal industries that once brought prosperity to the region. Another contributing factor beyond the allegiance to the industry is the rugged topography that makes access to the region challenging. These combined characteristics have led to economic and cultural isolation from mainstream society. Many are said to suffer from "mountain isolation" which extends reclusion to the psychological realm, where resistance to change further contributes to people's disadvantaged situation. With 80% of land in McDowell County owned by non-resident corporations for future timber harvest and coal extraction, there are few opportunities for those who remain to develop the land in order to stimulate economic recovery.

2.2 Environmental Context

Appalachians exhibit a strong social and cultural attachment to their landscape. The people not only rely on the landscape for economic and subsistence resources, but as "templates for patterning life", synchronizing gardening, hunting, and gathering. The landscape of the region can be characterized by forested, mountainous topography (Butler, 2009). The Central Appalachian Mountains are the world's oldest and most biologically diverse temperate forest. Soils along the ridges and valleys formed from layers of sandstone, shale, limestone and coal. The region's rivers and streams hold an extraordinary diversity of fish, mollusks and shellfish. The unglaciated, mixed-mesophytic forest serves as a refuge for species and has earned the nickname "mother forest" (Butler, 2009).

Coal extraction, particularly through mountaintop mining with valley fills (MTM/VF), has resulted in significant environmental consequences. MTM/VF is a process of removing the summit or "overburden" of a mountain and disposing the waste in adjacent valleys in order to expose the coal seam. Mountaintop removal has replaced biologically diverse areas with a degraded and polluted landscape. Deforestation, soil compaction, topsoil loss, alternation of hydrologic flow regimes and coal processing waste practices have significantly altered the ecology of the region. It is estimated that approximately 800,000 acres of forest, 470 mountains and 1900 miles of headwater streams have been destroyed by surface mining in Appalachia (Butler, 2009). Primary impacts of MTM/VF include: increased stormwater runoff, soil degradation, contamination of streams and accumulation of airborne toxins, loss of biodiversity and decline in human health.
Many residents living in McDowell County rely on surface or well water for domestic use. Mountaintop removal and other forms of coal mining are primary contributors to dissolved solids and metals such as aluminum, iron, and manganese which are present in the water column. McDowell County is located within the Tug River Watershed, where over 90% of streams are designated as “impaired” as a result of mining operations (EPA, 1998).

Post-mining restoration practices do very little to recover a healthy landscape. Despite the passage of the Federal Surface Mining Control and Reclamation Act, which requires that the site be restored to promote the succession to the original condition and that grading be to the “approximate original contour”, reclamation often results in compacted, low fertility soils planted with non-native grasses. Even when there are attempts to plant native trees, they typically do not survive due to the lack of topsoil and compacted grades. The terms of many permits allow the restoration monitoring process to end once vegetation beyond bare soil is established. Without long-term restoration management non-native species invade the landscape. These species yield very little ecological value; modifying hydrologic cycling, providing little wildlife food and habitat and negatively influencing soil development and erosion control potential. Invasive species may extinct and prohibit native species establishment through hybridization and alternation of nutrient cycling.

2.3 Reimagining a Sustainable Future

As the coal industry continues to decline, leading to further job loss and degraded landscapes throughout McDowell County, planning and management of post-mining uses is especially critical. In a report to the Lewis Foundation, titled ‘A new shared economy for Appalachia: An economy built upon environmental restoration, carbon sequestration, renewable energy and ecological design’, John Todd presented a strategy towards sustainable development with a carbon neutral economic foundation. His overarching design goals are based on building blocks influenced by natural systems that self-organize, self-repair and self-replicate to heal the landscape. As soils repair, natural resources such as forestry, biomass production and ecological agriculture establish. A renewable infrastructure that responds to regional resources soon follows. The final building block of Todd’s strategy is societal ownership and economic diversification. This is especially critical for a region with a long history of dependence on a single resource for its livelihood. While Todd’s principles are grounded in natural succession, human influence and public support guide the recovery process toward a sustainable future.

The principles outlined in Todd’s plan provided a foundation for envisioning a sustainable future for a former coal mine in McDowell County. Plans for the site provide a green industry alternative to coal through sustainable development initiatives, while restoring, to the extent possible ecosystem services adversely impacted during mining operations. Social, cultural and environmental context were central to the planning process. A participatory process was designed to engage local citizens, officials and experts to gain an understanding of local concerns, needs and opportunities for connection to the greater community. Through community engagement, energy experts, and environmental assessment, a framework for a sustainable energy park integrated low impact development and green infrastructure initiatives that re-build ecological values and functions into the landscape. Recreation, housing, commerce and transportation, blend practices such as biomass, solar and wind energy production. It is anticipated that the site will not only generate local economic growth through the development of renewable technologies, but will restore ecosystem services that foster ecological and social benefits within the community.

2.4 McDowell County Site Description

The McDowell County site is a 600-acre former coal mine exhibiting scars from former surface mining operations. Rock highwalls remain in place and surround the site, exposing layers of geological development. The forest perched above is comprised of hardwood species dominated by Allegheny-Cumberland dry oak forest of red, black and scarlet oaks (Quercus rubra, Quercus velutina and Quercus coccinea) and Appalachian cove forest species such as red maple (Acer rubrum) and yellow poplar (Liriodendron tulipifera). Vegetation contained within the site is comprised of mainly invasive pioneer grasses, forbs and sparse shrubs and trees. Soils are compacted with gravelly berms and minimal topographic change beyond the steep valley fill areas. Hydrology is heavily engineered with deep swales surrounding the exterior of the site and valley fills. The valley fill areas are evidenced by excessively
steep, grassy terraces with stone weirs directing water to the remaining valley reaches. Currently, the site is void of significant ecological value.

3 HOLISTIC RESTORATION PLANNING AND DESIGN

3.1 Reclamation Strategy and Hierarchy

Following Todd’s recovery model towards a sustainable future an ecological and participatory approach to design and reclamation of the McDowell County site will shift from a traditional focus of form to an emphasis on ecological function and a carbon neutral economic foundation grounded by public support. The design responds to the existing environmental and community concerns while incorporating elements to rehabilitate the landscape by recovering ecosystem functions and providing alternative energy sources.

Landscape healing is the foundation of the model. While returning the landscape to pre-disturbance conditions will not be possible, establishing a geological and hydrological stable landscape can help make it useful again. The first stage in landscape healing is to understand the site’s current ecological composition. In order to comprehend the effects of former surface mining operations on the landscape, an environmental assessment of the site’s soils, vegetation and hydrology was completed. Soil pH testing and water samples were gathered and vegetation observations helped to confirm soil and hydrology testing results. The site was further analyzed to identify opportunities and constraints associated with landscape restoration and development. In addition to field observation and measurements, GIS data was collected and analyzed. Data included topography, land cover, soils, road alignment, and hydrology. Aerial LIDAR imagery and 3-dimensional spatial modeling was used to communicate, analyze, design and plan for the sustainable energy park. Combining this knowledge and case study research, new unpredictable ecologies responding to the scars of the former mining operations were made possible.

Educational, economic and recreational opportunities were identified and incorporated into a comprehensive master plan for the site. In order to understand local concerns, needs and opportunities for connection to the greater community, a multi-faceted participatory planning engaged community groups, local officials and experts in sustainable energy. The data collected included interviews, invited critiques, focus group meetings, and workshops. The site was also assessed for long-term economic development opportunities of alternative energy types (biofuels, wind and solar) on mine-scarred lands. Combining this knowledge with the environmental assessment identified complex relationships between organic, mineral, economic and social phenomena.

The final stage in the reclamation strategy for the McDowell County site was the consideration of landscape architecture and art to design a synergistic development supported by the public. By recognizing landscape function as the primary driver, the design shall also respond to place and community need. Design language is used to express landscape pattern and function, while using cultural vernacular to reflect the site’s historical past and sustainable future.

3.2 Integrative Futures; Education, Business/Industry & Recreation

Researchers designed the participatory process to obtain input from a broad cross-section of the local population. Information collected was integrated into the planning and decision-making process in considering alternative futures for the project site. Interviews were conducted with regional experts in alternative energy fields. Focus groups were administered to gain a deeper understanding of the social, economic and environmental context of the site. The three main areas of emphasis in focus groups included: education, business/industry, and recreation. Local youth were engaged in presentations, workshops and discussions. The information contributed greatly to the evolution of the overall vision for the site.

Primary findings from the ‘education’ focus group pointed to integrating site development with programming opportunities. A review of existing programs at the local schools, the regional community college, and at FCI-McDowell found strong potential ties for overlapping alternative energy park goals with pedagogic and curricular objectives. Creation of focused programs in the areas of green job certification; and recreation and tourism industry job training were important. The key component of education programming in reference to the community college and prison was preparing students for professional careers with livable wages that could fit into, and enhance, the local economy. With regards to high school
education, local leaders perceived a strong potential connection to the WVU’s Health, Science and Technology Academy (HSTA) program. Curricular opportunities discussed included focusing on environmental mitigation, and framing the site as a laboratory for water resource management and biodiversity studies.

‘Business and Industry’ stakeholders identified projects adjacent to or within the study area boundary that could create strong connections to the site. The local landfill is planning to develop a ‘waste to energy’ facility so infrastructural improvements would be mutually beneficial. Stakeholders identified the existing prison as a potential consumer of alternative energy. The participants identified a need for a tourism visitor center on the site as a gateway into the region. They also described a need for housing. Many local employees commute long distances to work places, especially at FCI-McDowell. Focus group participants envisioned different businesses and services that could be a part of the site development that were lacking in the area. New expressway and utility development were seen as necessary elements in the development of the region creating better access into and out of the area. Newly planned expressway extensions intersecting at the center of the site would provide a connection between existing site developments and the McDowell County site.

Participants in the ‘Recreation’ focus group had witnessed the positive economic influence of recreational tourism in the region and envisioned the site playing a significant role in drawing All-Terrain Vehicles (ATV) tourists to the area. A connection to the nearby Hatfield-McCoy Trail was seen as an opportunity as plans are already underway to connect to the nearby town of Welch, WV. Trails for hiking, biking, and dog-walking, as healthy living improvements, were mentioned as potential new facilities for the site development. The group envisioned open space with water, a playground and integrated environmental education within the site. Participants mapped trail connections to a recreational site already under development. A need for a wellness center was discussed and issues and gaps in facilities at local parks were revealed. Popular activities that could be facilitated with new development include a golf driving range, a firing range, and radio controlled aircraft piloting. Participants discussed creating a non-profit for managing recreation sites or a public/private partnership developed similar to the Hatfield-McCoy organizational structure.

3.3 Alternative Energy Economic Future

The development of a green energy industry alternative to coal forms the carbon neutral economic foundation for the site. Long-term economic opportunities for the development of biofuels, wind and solar were assessed. When combining the economic potential with natural site conditions, it was determined that the McDowell County site was a good candidate for biomass and solar production, but wind speeds were less than ideal for energy production investment. In addition to the outputs and profit outlined in Table 1, it is anticipated that jobs related to the alternative energy development will bring further economic investment and prosperity to the site.

<table>
<thead>
<tr>
<th>Alternative Energy Source</th>
<th>Allocation</th>
<th>Production Capability</th>
<th>Installation/Production Cost</th>
<th>Net Profit/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>50 acres</td>
<td>5,000 - 10,000 tons</td>
<td>$8,571.00</td>
<td>$240,000.00</td>
</tr>
<tr>
<td>Wind</td>
<td>30–2MW turbines</td>
<td>30 - 60 MW</td>
<td>$180,000,000.00</td>
<td>$11,439,630.00</td>
</tr>
<tr>
<td>Solar</td>
<td>20 acres</td>
<td>4 MW</td>
<td>$18,500,000.00</td>
<td>$2,629,800.00</td>
</tr>
</tbody>
</table>

(Paul Ziemkiewicz, 2013)

3.4 Succession and Building a New Ecology

Ecosystem response to land use change is complex and uncertain, occurring on various spatial and temporal scales (Nancy B Grimm, 2008). Therefore, restoration must respond to a multifold of variables with social, physical and biological interactions that are unique to each community. Ecological succession serves as the foundation for successful ecologically sound mine reclamation. Succession, from an ecological perspective, is defined as the change in the composition of plants, animals and microbes over time. Primary succession is when a new ecosystem dynamic occurs from un-vegetated
terrain with no biological history, while secondary succession follows a landscape disturbance (Burton V. Barnes et al., 1998).

The McDowell County site is a secondary successional landscape, with ecologies significantly altered by surface mining operations. While the forest perched above and fragmented patches within the valley fill areas are comprised of historic hardwood forest species, vegetation contained within the rock highwalls are comprised mainly of pioneer non-native and invasive species. Soils are heavily compacted with low soil fertility.

When planning the reclamation of previously mined landscapes to yield a productive second life, it is important to recognize that the landscape cannot be restored to its original condition. Biologist Peter Del Tredici notes that it is import that designers and planners recognize that the “ecological clock cannot be turned back” (Del Tredici, 2008). His approach emphasizes the successional processes with intervention to ensure that adjacent landscapes and downstream resources are not negatively impacted by the redevelopment. He suggests a four step model towards an ecologically sound reclamation: 1. Complete an environmental assessment of the landscape to ensure that the substrate is suitable to support vegetative growth; 2. Vegetation strategies should focus on soil building and nutrient cycling, herbaceous grasses and perennials that develop symbiotic relations with mycorrhizae fungi; 3. Re-vegetation strategies should not focus on native species, but those that will be able to tolerate site conditions, prevail with minimal maintenance, colonize quickly, and have a minimal capacity to spread by seed to surrounding sites; and 4. Acknowledgement that maintenance and long term care requires both financial and community support for successful landscape healing.

3.5 Taking Root Through Soil Building

Establishing vegetation to facilitate the development of a healthy soil profile and stabilizing slopes to reduce sediment transport are significant elements for restoration. Fast colonizing species and cover crops that have the ability to fix nitrogen from the atmosphere were important considerations. Planting many smaller bare-root species that can spread aggressively is critical for establishing vegetation quickly. Large planting massings that mix trees, shrubs, and herbaceous perennials allow micro-climate features to determine the placement of plants.

The McDowell site is comprised of terrestrial and hydric ecology. With few tree species extending beyond fragmented patches of historic oak (Quercus) and maple (Acer) vegetation, establishing a forest canopy is a priority. Black locust (Robinia pseudoacacia) has started to colonize terrestrial upland and valley fill areas. This species has the ability to fix nitrogen from the atmosphere in a form that is accessible for plant uptake. Black locusts (R. pseudoacacia) also provide additional benefits through their symbiotic relationship with mycorrhiza fungi. As referenced by Del Tredici previously, this fungus is an important component for soil life and chemistry. It has the ability to facilitate the cycling of nitrogen and phosphorous between plants. The black locust (R. pseudoacacia) and introduction of other leguminous species will be important for rehabilitating soils throughout the mine scarred lands (Del Tredici, 2008). Other proven successful disturbance –adapted species recommended for site rehabilitation are trembling aspens (Populus tremuloides), and grey dogwoods (Cornus racemosa). These species can reproduce aggressively on ecologically stressed sites by producing new shoots from their roots, a process known as suckering.

Aggressive species establishment can extend through hydric areas as well. Current hydric vegetation includes cattails (Typha), sedges (Carex), and woolgrass (Scirpus cyperinus). While the cattails (Typha) are invasive, creating a concern for the establishment of native plants, they perform a valuable function of removing pollutants associated with mining operations. Since their growth remains in control at this time, there appears to be no immediate need to eradicate them. It is recommended that stormwater plants that are aggressive enough to withstand the cattail rhizomial growth should be planted to enhance the stormwater areas. Willow species (Salix spp), would be an excellent addition, as their stoloniferous roots (horizontal root runners) are similar to rhizomial growth, allowing them to outcompete with many species. Research has shown that this species has successfully cohabitated with cattails (Typha) (Street, 2012). While providing wildlife food and habitat, willows (Salix) are effective biofiltrators, easily cultivated and their soft texture and yellow fall color provide aesthetic value to the site. Willows (Salix) in addition to the established sedges (Carex), and woolgrass (S.cyperinus) will help build the soil profile to allow for additional colorful forbs that attract pollinators necessary to ecosystem health.
3.6 Seamlessly Integrating Green Infrastructure into the Landscape Fabric

Low impact development and green infrastructure initiatives that re-build ecological values and functions into the landscape provide a framework for the sustainable development. Low impact development (LID) is an approach to land development that protects natural resource systems while reducing infrastructure costs by working with nature to manage stormwater close to its source. LID is used to restore or maintain a watershed’s hydrologic and ecological function by managing hydrology in a way that promotes natural stormwater movement while reducing the impacts of hardscape and building elements. Treating stormwater as a valuable resource rather than as a waste product, LID principles include: maintaining natural drainage patterns, preserving vegetation, understanding soil conditions, and disconnecting impervious surfaces to slow cleanse stormwater runoff (EPA, 2013). Because former mining operations have left the landscape with highly engineered hydrologic systems and a degraded landscape, it will be important to recognize where key opportunities for building ecosystem function into the landscape exist. By employing LID practices that influence development form while responding to these opportunities, the landscape can begin to heal.

In addition to LID practices, a network of green infrastructure elements helps to restore and sustain ecological values and functions to the site. Green infrastructure generally refers to methods that mimic natural processes through a collection of open space, parks, wetlands, healthy stream and infiltration-based low impact development. These initiatives have the potential to filter air and water pollutants, provide flood control, reduce solar heat gain, enhance and stabilize soil and provide wildlife habitat, building biodiversity while improving human health and strengthening people’s connection to nature and place (Benedict, 2002).

Due to the current environmental conditions on site, establishing low impact elements and green infrastructure is challenging. Most of the site is comprised of nutrient poor, highly compacted soil with sparse vegetation. Soils following mining operations are often referred to as “pavement”, due to excessive compaction that creates an impermeable barrier, stormwater infiltration is not likely possible. Since infiltration is limited, green roofs will play an important role in managing stormwater. They have the ability to reduce the total stormwater runoff by 60% depending on growing medium. (A. M. Hathaway, 2008). Responding to the development goal of energy production, solar panels are considered, forming a hybrid system with green roof construction. Research has shown that northerly facing green roofs are far more productive regarding plant growth and habitat value than southerly facing roofs (Joanne Westphal, 2012). In response to this, the street grid and building layout maximizes green roof and energy production capability.

While green roof application manages a considerable amount of stormwater within compacted areas, efforts to weave a surface hydrology framework throughout the site were made. Responding to the assumption that soil is impenetrable, the design considers successful stormwater applications in brownfield redevelopment (Roon, 2005). Grading in strategic areas considered the application of cap (12” or greater) to be placed over areas and used for stormwater treatment. The cap created grade changes that were used to form stormwater swales, rather than traditional trenching methods. While the placement of fill is expensive, it establishes a healthy soil medium for vegetation development, volume for stormwater infiltration and cleansing, provides a suitable base for building infrastructure and can buffer the development from elements remaining in the soil substrate from former mining operations. Building orientation and soil profiles are explained in Figure 1.
Although most of the site is impermeable, there are functioning drainage swales, surrounding the site boundary along the rockwall highwalls. Hydric vegetation and dry summer soil conditions are contained within these heavily engineered networks that extend for considerable distances. Reshaping swales to create more broad topography provides greater opportunities for stormwater infiltration, while merging more seamlessly into the landscape to better reflect LID principles. Swale movements are interrupted by expansive flat areas allowing water to disperse and infiltrate while creating usable outdoor public space for people. Using design language that expresses landscape pattern, process and practices throughout public space promotes environmental awareness, influencing the human propensity to effect landscape change (Gobster and Nassauer, 2008).

Links between landscape science and landscape design are integral components towards sustainable design. The success of green infrastructure cannot rely on science alone, but should focus on the dynamic interactions between nature and society living in a mutually supportive habitat (Dickson, 2003). This approach expands the discipline of landscape ecology to include human dominated environmental and place-based problems (Musacchio, 2009). It is commonly accepted that ecological sustainability is only realized to the extent for which societal disposition is aligned with the perceived value of the ecosystem services (Nassauer, 2007). The intent of this holistic approach and integration of ecological processes throughout common green areas is to inspire people to experience nature, while increasing their ecological literacy. An example of a public stormwater park envisioned for the site is shown in Figure 2.
3.7 Culture Vernacular Reflecting the Past Through Design

Just as the human dynamic was integrated into landscape restoration; culture and placemaking are also woven into design. Placemaking is a form of design that responds to community assets, culture, potential, and motivation (Lynda H Schneekloth, 1995). This design strategy can transform a massive undefined area into a memorable center for community gathering and interaction. Using indigenous landscape intervention and cultural vernacular, design can improve both landscape performance and resiliency (Lister, 2009). When design responds to place, society is often more responsive and accepting, which fosters community pride and care for the land (Nassauer, 2008). Cultural vernacular is expressed through landscape form and function and through architecture and art that combine to create recreational, residential, commercial areas that blend practices of biomass, solar, and wind energy production.

Just as landscape recovery responds to a mine-scarred foundation for growth, it is important to recognize that mining culture serves as the foundation of today’s Appalachia community. As development strives to provide an alternative future for the landscape and its inhabitants, it is important that design responds to the historical development of place. The reclamation process should not strive to obscure the site’s extractive history, but rather apply the past setting as precedent for the ecological future. In order to respond to the past, many of the centrally located public spaces use materiality and form to create movement through spaces that reflect the site’s history. Reflective spaces can be intimately experienced at the base of the valley fill, explored through the valley fill climb or be viewed from the proposed freeway above (Figure 3). Observing past ecologies of the historic forested spaces that are interrupted by rigid mining reclamation; the visitor gains an intimate knowledge of landscape constraint, which is a necessary component towards landscape healing.
4 CONCLUSION
The vision for the site blends ecological succession with new ecologies for sustainable landscape recovery while providing a green industry alternative to coal through development. As the landscape heals, sustainable energy and other building infrastructure are interjected into the site dynamic. Responding to community needs for housing, economic development and educational and recreational spaces, the master plan for the McDowell County site (Figure 4) incorporates five main areas; industrial, alternative energy production, commercial, residential and recreational opportunities. Wind turbines along the ridges and solar and biomass fields provide educational opportunities for the prison and are anticipated to attract alternative energy industries to the site. While residential areas are connected to the surrounding neighborhoods through recreational spaces. Stormwater weaves through the site connecting public open spaces that not only restore ecology, but provide opportunities for integrated environmental education and public gathering. These elements not only consider ecology of the site, but respond to people and place while providing a carbon neutral economic foundation for development. The site will not only generate local economic growth, but will restore ecosystem services that foster ecological and social benefits within the community.
As the successional landscape healing unfolds; orderly frames of development respond to societal needs and cultural values while being interrupted by the chaos of biological patterns. Development patterns respond to economic potential and progression from landscape healing. Biomass plantings form the final stage of soil building and provide a transition from ecological restoration into development. Alternative energy production of solar, followed by wind will provide a carbon neutral foundation for road and building infrastructure. It will take considerable time for the landscape to heal through both natural and introduced ecological intervention. Figure 5 demonstrates a time scale comparison of ecological succession and development. Ultimately it is the bond between ecology and community that creates the energy to drive the healing process forward.
Figure 5. A time comparison of ecological succession and site development.

5 ACKNOWLEDGEMENTS
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RETHINKING STORMWATER MANAGEMENT IN A CHANGING WORLD: EFFECTS OF DETENTION FOR FLOODING HAZARD MITIGATION UNDER CLIMATE CHANGE SCENARIOS IN THE CHARLES RIVER WATERSHED

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1 ABSTRACT
Climate change is projected to have impacts on increased temperature as well as frequent and intense rainfalls in the northeast region of the United States. Integrated green infrastructure planning with both structural and non-structural stormwater management practices has emerged as a critical climate change adaptation strategy. Under the uncertainty of climate change impacts on long-term flooding hazards, this paper employed SWAT hydrological modeling for an empirical study examining the effectiveness of using detention area for the mitigation of a 45-year period riparian flooding hazard under 36 climate change conditions. Statistical results illustrated a weak yet positive effect of using detention for flooding hazard mitigation. A range of from 12 to 18% and 0 to 8% of the drainage area would be required for on-site detention in order to achieve policy goals for zero flooding hazard indices and to the level of current climate conditions respectively. Under the constraints of limited adaptive uses of lands or the availability of large land areas for natural detention in the urbanized watershed, this paper suggested that innovations in employing on-site detention techniques in impervious and non-natural pervious areas play an important role in mitigating climate change-induced flooding hazards. Integrating on-site detention functions (wet and dry detentions) as part of the green infrastructure network in urban stormwater management systems is therefore crucial in landscape architecture planning and design practices for climate change adaptation.

1.1 Keywords
detention, climate change, flooding hazard mitigation, green infrastructure
2 INTRODUCTION

Climate change has posed increased risks to environmental hazards (e.g., flooding, droughts, hurricanes) in addition to new challenges under climate change impacts (e.g., early snow melt, rising sea levels, heat waves) (IPCC, 2007). Floods are omnipresent in almost every city in the United States and account for more economic losses than any other single geophysical hazard (White and Haas, 1975; Gall et al., 2011). Previous climate change studies have suggested trends of increased temperature and changing precipitation patterns as well as increased intensity and duration of storm events that are likely to result in more flooding events in the Northeast (IPCC, 2007; Rock et al., 2001). Since the early 1900's, flooding hazard mitigation strategies in the United States have focused on structural engineering solutions such as dams and dikes along streams and rivers (Godschalk, 1999). In recent decades, scholars have called for biological and non-structural strategies such as green infrastructure (Thomas and Littlewood, 2010) and land use planning (Burby, 1998; Godschalk, 2004) to be integrated into planning and design interventions for comprehensive hazard mitigation and stormwater management.

Detention and retention are among the most prevalent stormwater management practices for flooding hazard mitigation; however, without an empirical study, the perceived benefits of these approaches could be overestimated (Beecham et al., 2005). If growth development trends continue to increase impervious surfaces and consume more floodplains, wetlands, forest and agricultural lands, fewer open lands would be available for natural on-site detention and retention (i.e., depressional land areas designated for temporary surface water runoff or flood storage). Landscape architecture plays a critical role in implementing stormwater detention and retention that can serve as a climate change adaptation strategy for mitigating climate change-induced flooding. This paper aims to use empirical studies to support the hypothesis of using green infrastructure design for climate change adaptation by answering the question: To what degree does on-site detention and retention mitigate riparian flooding hazards induced by climate change?

3 BACKGROUND

3.1 Climate Change Impacts on Stormwater Management

Climate change is likely to increase the intensity, magnitude and duration of precipitation patterns affecting the hydrologic cycle (Frederick and Major, 1997; IPCC, 2007) and therefore magnify urban hydrological impacts (Wood, Lettenmaier, and Palmer, 1997; Frederick, Major, and Stakhiv, 1997). More frequent and intense storm events are likely to occur in some areas such as the New England region (Rock et al., 2001). The consequences of irregular and intensified flooding events have significant impacts on populated urban regions where current water infrastructure is designed based on past climate trends and conventional knowledge (Ashley et al., 2005; Means, West, and Patrick, 2005). In addition, alternative structural stormwater design may be needed for accommodating climate change effects (Semadeni-Davies et al., 2008). Consequently, increased capital investment in upgrading necessary drainage infrastructure (Muller, 2007; Arisz and Burrell, 2006) would impose additional socio-economic impacts in society. As a result, enhancing stormwater management and flooding absorption capacity for building capacity of communities in coping with climate change-induced flooding hazards is an emerging priority for resilient cities (Beatley, 2009).

3.2 Urbanization Impacts on Flooding

Increased impervious surfaces derived from the urbanization process are the leading cause for excessive runoff, lack of infiltration, and insufficient aquifer recharge (Leopold, 1968; Booth and Jackson, 1997; Schueler, 1994; Brabec, Schulte, and Richards, 2002; Brabec, 2009). For example, compared to natural ground cover, which has 10% runoff and 50% infiltration, urbanized areas that have surfaces over 75% impervious result in less than 15% infiltration and contribute to more than 55% of runoff (NRCS, 1998). In addition, impervious surfaces have been highly associated with shorter lag times between the fall of precipitation and runoff mass that instigates the increase of flashy variation of streamflow or a peak discharge in a short period of time (Simmons and Reynolds, 1982). In completely impervious basins, the lag time can be as little as one eighth of that in the natural state (Anderson, 1970), resulting in significant increases in stormwater runoff and flash floods in urban areas (Hosseinizadeh, 2005; Sala, 2003).

As for the impacts of urbanization on riparian flooding, Leopold (1968) found a positive relationship between the ratio of the number of overbank flooding events and urbanization effects. When
the watershed was 50% sewered, the overbank flooding events were nearly four times more than those in the natural state (Leopold, 1968). Numerous studies have supported the correlation between increased stormwater runoff associated with imperviousness and the increased magnitude and frequency of flood events (Ng and Marsalek, 1989; Allen et al., 1979; Huang et al., 2008; Moscrip and Montgomery, 1997). Nevertheless, the effect of impervious areas decreases with the increase of flood recurrence intervals (Hollis, 1975) and eventually becomes negligible (e.g., a study showed a threshold of 50 year intervals in metropolitan Charlotte, North Carolina (Martens, 1968)).

Urbanization increases the frequency of small and regular flooding events many times more than the rare and extreme flooding events (Hollis, 1975). Moreover, critique has focused on the understudied impacts of urbanization impacts on baseflow (Price, 2011; Hollis, 1975). In the natural state of the stream, baseflow is largely sustained by groundwater. Correlation of urbanization with decreased baseflow can be found as a result of increased evapotranspiration and decreased infiltration (Price, 2011). Since increased impervious surfaces are associated with decreased baseflow (Shuster et al., 2005), urbanization could contribute to negative effects on riparian flooding while flash floods remain dominant in cities (Lasda et al., 2010).

In addition, it is critical to make the distinction between the total impervious areas (TIA) (i.e., all roads, roofs, building footprints that are impervious) and effective impervious areas (EIA) (i.e., hydrologically connected impervious areas). Effective impervious areas are hydrologically connected through curbs, gutters and pipes; by contrast, non-effective impervious areas drain to pervious areas, such as disconnected downspouts from roof areas to adjacent lawns (Alley and Veenhuis, 1983). Most studies have used total impervious area that conflate both effective and non-effective impervious areas (Brabec, Schulte, and Richards, 2002) and therefore overlook the accuracy and effectiveness of using impervious area as an indicator for stormwater management (Brabec, 2009). Further studies are needed to understand the true effects of urbanization, incorporating multiple indicators in addition to effective impervious areas on streamflow, particularly the baseflow. This analysis can then be used to develop appropriate corresponding watershed planning and stormwater management practices for mitigating urbanization impacts on the hydrological function of the watershed.

3.3 Green Infrastructure and Stormwater Mitigation

Green infrastructure, in lieu of grey infrastructure, is a system that “uses natural systems—or engineered systems that mimic natural processes—to enhance overall environmental quality and provide utility services” (EPA, 2012). The concept of preserving natural areas and using ecological design for protecting, enhancing, and restoring ecosystem services in order to improve environmental quality and provide hazard mitigation is fundamental in the concept of green infrastructure (Fabos, 1995; Benedict and McMahon, 2006; McDonald et al., 2005; Ahern, 2007). Its origin lies in the paradigm of “design with nature”, which integrates natural resources and hazard assessment in order to design sensibly and responsibly with the environment (McHarg, 1969).

Stormwater best management practices (BMPs) embrace both structural and non-structural strategies to manage stormwater runoff (Urbonas, 1994). Structural BMPs emphasize ecological engineering design including detention basins, infiltration trenches and wells, vegetated swales and rain gardens, vegetated buffer strips, porous pavements, constructed wetlands and greenroofs. Non-structural BMPs emphasize policy and regulations that help to alleviate the root of the problem—urbanization—and to engage the public. These include, but are not limited to, land use planning, natural resources management, streams and wetlands restoration, management of household chemicals, on-site programs of runoff management and flood insurance (Ellis and Marsalek, 1996; Ellis, 2012).

In summary, urbanization alters the natural hydrological cycle, which is further impacted by climate change. The changing water cycle, particularly in urbanized watersheds, affects the ability of stormwater management programs to restore watersheds to their pre-development states. Therefore, it is critical to explore innovations in stormwater management practices in order to maximize their ability to mitigate urbanization impacts while in the mean time serving as climate change adaptation strategy for communities (Figure 1).
4 STUDY AREA CONTEXT

The Boston Metropolitan Area has a population of 3 million with an estimated increase of 11 percent (181,000 people) in 2030, according to the Metropolitan Area Planning Council (MAPC, 2009). As population growth continues, it is likely that more vulnerable populations will be exposed to flooding hazards in the region. Recent vulnerability research has been conducted in central Massachusetts for drought hazards (Polsky, Neff, and Yarnal, 2007; Yarnal, Polsky, and O’Brien, 2009) and for impacts from projected sea level rise in Massachusetts coastal communities (Kirshen, Knee, and Ruth, 2008). However, recent significant flooding events in 2010 and 2011 were mainly non-coastal floods, suggesting further research on inland flooding is needed. Moreover, further vulnerability research is needed as Massachusetts urged that “the need to perform risk and vulnerability assessments was widely recognized across all sectors” in its Climate Change Adaptation Report (Cash, 2011, p.3). Finally, the State further identified green infrastructure as “ecosystem-based adaptation” strategy for climate change planning (Cash, 2011, p.29).

The Charles River watershed was chosen out of nine watersheds in the Boston Metropolitan Area for several reasons. First, the entire 778 km² watershed is predominately within the Boston Metropolitan Area with minimal coastal lines so that the influence from coastal flooding was minimal in this study. In addition, the watershed is comprised of 35 municipalities, including the City of Boston, and is the most densely populated in the state. Finally, it consists of the most socially at-risk populations in the state, defined as Environmental Justice populations considering minority, low-income, and English isolation groups by the Massachusetts Office of Geographic Information (MassGIS)—implying potential higher social vulnerability to climate change impacts. Given these factors, research for climate change impacts in this watershed is particularly timely and critical for further social-economic impact studies.

The Charles River watershed consists of rural-urban gradient in land use and land cover composition (Figure 2). The natural areas cover half of the watershed—36% of forests, 11% of wetlands, 3% of water bodies. The other half of the watershed is heavily influenced by human activities—44% of urbanized areas (i.e., commercial, industrial, residential, transportation, institutional, junkyard, utilities), 3% of agriculture lands, 3% recreational lands. Within the urbanized areas, 21% of the watershed area are covered by impervious surfaces (e.g., building footprints, streets, parking areas) while the remaining 23% of the watershed area consists of non-natural pervious areas (e.g., lawns, planting beds).
METHODS

5.1 SWAT Modeling and Data Source

To achieve the goals of this study, the capacity of incorporating climate change data and detention functions into stream flow impact simulation is critical. The Soil and Water Assessment Tool (SWAT) (Arnold and Allen, 1996; TAMU, 2011) has been successfully used to study climate sensitivity and impacts on hydrology at a regional watershed scale (Wu, 2007). In addition, multiple General Circulation Models (GCMs) and IPCC climate change scenarios have been incorporated in SWAT for studying hydrologic cycles, stream flows and water availability (Takle et al., 2005; Bekele and Knapp, 2010). Combined with GIS compatibility, SWAT can simulate the temporal and spatial variability of the hydrological processes at the subbasin level defined in the model (Santhi, 2008).

Originally developed for rural environments (Arnold and Allen, 1996), SWAT has progressed in modeling urbanized watersheds with rural-urban gradient similar to the Charles River watershed (e.g., stream flow simulation in an area of 127 km$^2$ and 38% urbanized watershed in Korea (Lee et al., 2012), a water supply modeling in an area of 33 km$^2$ watershed with the river flowing from rural to urban areas in Mexico City (Jujnovsky et al., 2012)). In a case study of the Neponset watershed that consists of southern portion of the City of Boston and is due south of the Charles River watershed, Tian et al. (2012) found SWAT is capable simulating streamflow well in growing seasons yet less effectively simulating snow melt in areas with large impervious areas for modeling dissolved organic carbon in stream flow. In addition to the capacity of modeling climate change impacts and detention functions, SWAT is chosen in this study for the purpose of simulating stream flows in a rural-urban watershed for riparian flooding that primarily occurs in the growing seasons.

The 30 m grid-based Digital Elevation Model (DEM) generated by the USGS National Elevation Dataset (NED) was used for the initial delineation of watershed and subbasin boundaries. In order to better match the size of census tracts to integrate a Social Vulnerability Index in the flooding risk assessment (Cheng et al., 2012), additional outflow points were manually added to the main channel. The median size of census tracts in the watershed, 1 km$^2$, was used as the minimum size for additional subbasins. As a result, a total of 54 subbasins were delineated, ranging from 0.5 to 35 km$^2$ with a mean size of 14 km$^2$.

Within each subbasin, the water balance is simulated for each of the Hydrologic Response Units (HRUs). Each stream channel outflow volume is the sum of the water balance in all HRUs within the respective subbasin. The HRU was determined based on land uses and hydric soil types. Four major urban land use categories (UCOM, URHD, URMD, URLD) and four non-urban SWAT land use categories (AGRL, FRST, WETL, WATR) were derived from a 2005 state-wide land use dataset and based on the similarity of development intensity and characteristics of urban (e.g., commercial, industrial, residential) and non-urban (e.g., agriculture, forest, wetlands, water) land use categories. Considering that the combined agricultural and recreational land areas comprised only 6% of the watershed area, the land
cover was assumed to have similar grassy characteristics for the purpose of modeling the streamflow in this study. Soil data was derived from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The SSURGO-certified soil datasets have met all standards and requirements approved by the NRCS and possess the most detailed information developed by the National Cooperative Soil Survey. The hydric soil groups used for delineating HRUs included hydric soil group A (35% of watershed area), group B (30% of watershed area), group C (24% of watershed area), and group D (11% of watershed area). A total of 1470 HRUs were then identified with a combination of SWAT land use type and hydric soil group properties.

Daily observed weather data between 1990 and 2011 was obtained from the National Climatic Data Center (NCDC) at three stations—Walpole 2 (USC00198757), East Milton Blue Hill Observatory (USW00014753), and Boston Logan International Airport (USW00014739). The three variables used to calibrate the watershed were maximum temperature, minimum temperature, and total precipitation. The completeness of daily records poses the greatest constraint for gathering observed weather data. The weather stations were chosen because the complete historical daily records in addition to their locations were immediately due south and in close proximity to the upper, middle and lower basins respectively.

Calibration is the process of adjusting model parameters to minimize the difference between simulated output and observed values (NRC, 2009). Validation is the process of using part of the dataset as an input in the calibrated model in order to compare the calibrated model results with the observed values. The observed daily streamflow data between 1990 and 2011 was obtained from the United States Geological Survey (USGS) database at stream gage number 01104500 located in Waltham, Massachusetts, at the lower basin along the Charles River main stream. This study used a 2-year warm-up period (1990 to 1991), a 14-year calibration period (1992 to 2005) and a 6-year validation period (2006 to 2011). The results of the Nash-Sutcliffe model efficiency coefficient (NSE) (Nash and Sutcliffe, 1970) were 0.81 for the calibration period and 0.93 for the validation period, which represented a high level of confidence in the simulated model in its resemblance to the basin properties. A NSE value of 1 represents a perfect match and 0.6 is considered a good model fit (Moriasi et al., 2007).

5.2 Climate Sensitivity Tests
In the climate change impact assessment using climate sensitivity tests (Ficklin et al., 2009), a combination of three weather variables were examined—mean temperature (0,+1,+2,+3˚C), mean precipitation (0,+10,+20%), and variation of precipitation(0,+10,+20%). A total of 36 climate change conditions including the current climate conditions (0,0,0) were applied to the calibrated SWAT model (Figure 3).

5.3 Flooding Hazard Index (HI)
The output of stream outflow was used to compute flooding Hazard Index (HI) along with climate change impact assessment (Figure 3). HI was defined as the probability of number of days in a study period of 45 years when the stream outflow (Qi) in respective climate change conditions would exceed the bankfull discharge volume (Q0) in current climate conditions.

\[
HI = \frac{{\text{Days when } Q_i > Q_0}}{{365 \text{ days a year } \times 45 \text{ years}}} 
\]

\(P\): Probability

\(Q_i\): Stream outflow in climate change conditions

\(Q_0\): Stream bankfull discharge in current climate conditions
5.4 Detention Tests and Analyses

To assess the detention functions for the flooding hazard mitigation strategy, SWAT has an impoundment water routing function for modeling water that is temporarily stored and hydrologically connected in the watershed. Besides reservoirs, wetlands, and ponds, which were controlled by land use in this study, the function of potholes was employed to simulate the function of stormwater wet detention (i.e., retention). Potholes are closed depressions in the watershed functioning as temporary water storage areas and in this model function most similarly to wet detention ponds. For the remainder of this paper, we will refer to these as detention functions.

Surfacewater and precipitation are the main source of the inflow to the potholes and when storage exceeds the maximum volume assigned for each pothole, the excessive volume then joins the surfacewater system. Potholes contribute to stream baseflow through infiltration, and will impact total stream flow when capacity is reached. In addition, potholes lose water through evaporation. In the SWAT model, only one pothole in each subbasin was created by assigning one hydrologic response unit (HRU). To optimize water storage functions in the model, HRUs with the largest AGRL SWAT land use category (i.e., agricultural and recreational land uses) were selected as potholes. In addition, 100% of the selected HRU area was assigned as the drainage area for each respective pothole (POT_FR=1). Furthermore, for the consistency of the flooding hazard defined in this study, the maximum storage for each pothole was the volume of bankfull discharge volume in the respective subbasin. Finally, a linear regression was employed for analyzing the relationship between the percentage of detention areas in the subbasin drainage areas and HI under each climate change condition.

\[
Y = aX + b
\]

Y: HI of each drainage subbasin area under given climate change scenario
X: Fraction of detention functions (pothole/wet detention) area in the drainage subbasin area
a: X variable coefficient
b: Intercept constant

6 RESULTS

A total area of 3.2% of the Charles River watershed area was modeled as detention functions in this study. Among 32 climate sensitivity tests, only 10 present weak yet significant effects between the flooding hazard indices (HI) and the presence of wet detention (Pr ranges from -.27 to -.39; R^2 ranges from 0.07 to 0.15, p<0.001) (Table 1).

Considering the parameters of climate change and flooding hazards for landscape planning, two hazard mitigation policy goals were examined: (1) reduce flooding hazard indices (HI) to zero, and (2) mitigate flooding impacts to the level in Current Climate Conditions (HI=0.013, which is the intercept of the regression equation) (Table 2). The results illustrated that an average of 14% with a range of 13 to 18% of detention area in a sub-watershed would be needed for reaching the first goal, while an average of 5% and up to 8% of the wet detention area would be needed for reaching the second goal.
Table 1. Summary of mean and standard deviation of the flooding hazard index (HI) and Pearson’s correlation coefficient between HI and the fraction of wet detention area in drainage subbasin area under climate change conditions (combination of climate variables of temperature & precipitation).

<table>
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<tr>
<th>Climate Change Conditions</th>
<th>HI Statistics</th>
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*p<0.05  **p<0.001  temp: temperature; precip: precipitation; var: variation
A steeper slope represents a greater effect from applying detention functions in respective climate change combinations. Increasing the mean precipitation resulted in a trend with a steep slope, while increasing the mean temperature resulted in a trend with a gentle slope (Figure 4). For example, when the temperature increases 1°C in combination with a mean precipitation increase of 20%, every 1% increase in detention area could decrease the HI between 0.25% to 0.28%. However, no detention was needed to mitigate climate change-induced flooding hazards to current climate conditions when only temperature increased with no precipitation change. It is worth noting that a general trend of climate change impact assessment in this study reveals that increasing temperature reduces flooding hazard indices, possibly due to the increased evapotranspiration in this particular watershed. As a result, detentions appear to be less effective when temperature increases to 3°C (Table 1).

Table 2. Results of regression coefficients and percent detention area required for reaching flooding hazard mitigation goals for zero hazards (HI=0) and to the level of current climate conditions (HI=0.013).

<table>
<thead>
<tr>
<th>Climate change variables</th>
<th>Regression coefficients</th>
<th>Min.% detention area to reach</th>
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<td>Temp mean (+°C)</td>
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*p<0.05  **p<0.001  temp: temperature; precip: precipitation; var: variation
Figure 4. The effects of detention in mitigating flooding hazards in 10 climate change conditions in relation to percent of detention area in respective drainage subbasin.

7 DISCUSSION
7.1 Effects of Detention on Flooding Hazard Mitigation
Climate change impacts on hydrology are complex and varied from watershed to watershed (Praskievicz and Chang, 2009). The climate sensitivity assessment of the long-term flooding hazard index (HI) illustrated increasing temperature would result in lower HI due to higher evapotranspiration, while increasing both mean and variation in precipitation would result in a higher HI (detailed assessment methods and results can be found in Cheng, in press). For example, detention coefficient became positive values and detention requirement became negative when the mean temperature increased 3˚C indicating that the HI was already lower than the baseline HI. There was no clear threshold point for the effects of detention areas revealed under climate change impact assessment due to the fact that climate change impacts on hydrology was complex and varied from watershed to watershed (Praskievicz and Chang, 2009). In addition, there is a positive yet a weak correlation between the increased amount of detention area and reduced HI, which implies that wet detention alone is not the most effective strategy. Moreover, SWAT has limitation in modeling additional dry detention functions with infiltration enhancement, which could be a more effective flooding hazard mitigation strategy for capturing, storing, and infiltrating stormwater.

7.2 Innovations in Green Infrastructure for Climate Change Adaptation
Green infrastructure has multiple functions in landscapes. In addition to providing ecological services such as stormwater management and flooding hazard mitigation, it is integrated into landscape planning and design to provide recreation as well as aesthetic values for communities (Echols and Pennypacker, 2008). In response to climate change impacts (IPCC, 2007), recent research has investigated the role of green infrastructure for mitigation and adaptation to climate change. For example, planting design combined with aesthetics and ecological resilience functions (e.g., structural diversity, redundancy, biodiversity) can mitigate effects from increasing temperature as well as enhance adaptive capacity of the landscape in responding to climate change uncertainty (Hunter 2011). In addition, Gill et al.
found increasing vegetated land cover in the Greater Manchester metropolitan areas can help to reduce increased stormwater runoff and temperature, which are induced by climate change.

Built upon previous studies on the role of using green infrastructure for climate change adaptation, this study focused on using detention functions as one of the stormwater BMPs for flooding hazard mitigation. Detention functions require depressional land areas that can be inundated with water for a period of time. Applying this concept to landscape planning and design, those detention areas could possibly be applied on public recreational lands such as athletic fields and parks. Currently, 3.6% of the Charles River watershed is for recreational uses, including cemeteries, golf courses, passive and active recreation, marinas and beaches. Excluding privately owned golf courses and cemeteries, only 1.7% of the land area could potentially be used as detention functions, which is up to 6% short of reaching the current climate conditions level of the HI and 10% to 15% short of reaching the zero hazard (HI) goal.

Rainfall is the major source of stormwater runoff and flooding. On-site storage and rainwater harvest is therefore the key for managing urban stormwater (Tjallingii, 2012; Beeham, 2005). With limited natural open space and recreational land use areas that could possibly allow for wet detention areas in an urbanized watershed, achieving policy goals for reducing flooding hazards will require more innovative and aggressive land use planning and design in both minimizing impervious surface and maximizing the availability and use of pervious areas. For example, on-site detention functions could be implemented on residential lots. In addition, projects in Chicago and other areas of the country have successfully implemented detention functions beneath impervious road, parking and other impervious surfaces (e.g., Streetscape and Sustainable Design Program at www.cityofchicago.org/Transportation). As a result, innovations in green infrastructure design such as greenroofs, cisterns, rainbarrels, and underground storage underneath pavement or buildings can function as detention. Thus, a network of green infrastructure in landscape planning and design can help to mitigate climate change impacts and in turn to enhance adaptive capacity of communities for climate change (Gill et al., 2007).

8 CONCLUSION

This study has demonstrated a range of potential climate change impacts on riparian flooding hazards and the effectiveness of using detention functions (wet detentions) for their mitigation. Since climate change has implications for long-term environmental hazards associated with water resources and management, the findings are particularly timely.

We examined two hazard mitigation policy goals, for achieving a zero flooding hazard index (HI) and maintaining the hazard index associated with current climate conditions. Even though the zero percent chance of flooding hazard is an ambitious policy goal, it provides an upper boundary for developing policy frameworks with feasible intermediate goals. In addition, it is worth noting that wet detention alone has limited potential for flooding hazard mitigation and is no substitute for integrated green infrastructure network, land use and watershed management strategies such as open space and floodplain protection and wetlands restoration (Brody and Highfield, 2013) as well as engaging the stakeholders and the public to “Make room for the River” (Wolsink, 2006) for comprehensive flooding hazard mitigation.

Stormwater management has evolved to look beyond the effect of imperviousness and structural BMPs in order to examine their balance with pervious surfaces and non-structural BMPs (Brabec, 2009). Urbanization associated with unsustainable development patterns and living styles is the root cause of climate change and urban flooding. There is no single solution to resolving the effects of climate change. As climate change is an integral factor of anthropogenic influence in the hydrologic cycles in this changing world, this is a critical time for rethinking green infrastructure for mitigating climate change impacts and serving as strategies for climate change adaptation. Landscape architecture planning and design thus play an important role in achieving innovations in integrated green infrastructure network systems, particularly in urbanized areas, for coping with climate change.
9 REFERENCES

225
http://water.epa.gov/infrastructure/greeninfrastructure/.


PEOPLE-ENVIRONMENT RELATIONSHIPS

Edited by Karen Wilson Baptist and Deni Ruggeri
RESIDENT ATTITUDES TOWARD STAPLETON’S STORMWATER PARKS

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1 ABSTRACT
The past few decades have experienced an increase in the implementation of multifunctional stormwater management systems. This emerging trend can, in part, be attributed to more recognition that stormwater infrastructure, when designed and engineered with utility and amenity in mind, can have added community values such as aesthetics, recreation, and wildlife (Echols and Pennypacker, 2008; Stahre, 2008; Meyer, 2008). Few studies, however, reveal user attitudes for large scale, multifunctional stormwater management systems. Stapleton, in Denver, Colorado, has multifunctional stormwater management systems in several of its community parks. Stapleton’s stormwater parks integrate native/naturalized vegetation, critical habitat, and passive recreation amenities alongside stormwater infrastructures. Given that stormwater parks are an atypical urban park typology, resident attitudes and use habits for these parks become important. By understanding the nuances behind resident attitudes, we can better plan and design communities that combine natural systems and stormwater infrastructure with amenity in parks. To understand how stormwater parks are perceived within the urban community of Stapleton, we conducted a structured mail survey in May 2011, followed by in-depth walking-interviews in May 2012. This paper presents findings from our in-depth walking-interviews, revealing why Stapleton residents enjoy their stormwater parks.

1.1 Keywords
Stapleton, preference, walking-interview, stormwater, parks, multifunctional
2 INTRODUCTION

The literature shows a paradigm shift in the planning, design, and management of urban stormwater systems (Echols and Pennypacker, 2008; Starhe, 2008; Wenk and Gregg, 1998). Rather than direct stormwater off-site and downstream as quickly and efficiently as possible, through buried pipes and concrete channels, new systems use natural hydrological processes and vegetative strategies to slow, filter, and treat stormwater on-site (Bernhardt, 2007; Starhe, 2008; Thompson and Sorvig, 2000). “Green” infrastructure, unlike conventional “gray” infrastructure, has many added environmental benefits, including improved water quality, erosion control, and groundwater recharge. When green infrastructure is integrated into parks and coupled with amenities like trails and seating alcoves, it can become a multifunctional asset, adding aesthetic, educational, and recreational benefits.

In this study stormwater parks are defined as landscapes with stormwater infrastructure that provide hydrological functions that protect public health, safety, welfare, and aquatic habitat, while also providing amenities, which can increase the landscape’s attractiveness or value (Echols and Pennypacker, 2008). As communities seek to improve environmental and human health, stormwater parks can play a role. However, resident attitudes will ultimately affect how stormwater parks are used and maintained over time (Nassauer, 1995; Mozingo, 1997; Spirn, 1998; Gobster et al., 2007). Therefore, to better plan and design parks that integrate park amenities alongside stormwater management systems, we must understand resident attitudes and use habits, as well as the factors that influence perception and use.

3 BACKGROUND

Located in Denver, Colorado, Stapleton is a 4,700 acre New Urban style infill community whose physical form and urban character are defined by its multifunctional stormwater management system. Planning for the Stapleton community began in the late 1980’s with a group of concerned citizens. Initial ideas about environmental responsibility, social equity, and economic opportunity laid the foundation for the 1995 Stapleton Development Plan (Stapleton Citizen’s Advisory Board, 1995). Recognizing that the community’s stormwater could be an asset, not a liability, a central component of the plan was to integrate conveyance, detention, and treatment structures into applicable parks. To ensure a cohesive overall parks system, the 2002 Stapleton Parks & Recreation Master Plan outlined how each park should function and look, including specific recreation amenities, planting palette, habitat types, and design character (Park Creek Metropolitan District, 2002). The parks with significant stormwater functions (Westerly Creek, Greenway, Sand Creek, and Bluff Lake) are physically located in areas most suitable for capturing, conveying, and treating local stormwater runoff (Figure 1). Collectively, Stapleton’s stormwater parks look and function differently than the community’s traditional parks, though individually, each stormwater park offers a unique set of amenities and aesthetic qualities. Stapleton’s stormwater parks encompass approximately 430 acres, or about 76% of the total developed park area in Stapleton South at the time of the study.
3.1 Stormwater Park Descriptions

Westerly Creek Park, designed primarily for flood protection, is approximately 105 acres and runs north-south through the heart of the community. While the airport was in operation, Westerly Creek flowed in culverts buried beneath its runways. The stream has since been daylighted and restored through two thirds of the park (Canfield, Cunningham, and Koehler, 2011). The landscape is mostly a mix of high-plains prairie grasses and shrubs. There are few trees outside the riparian zone along the stream’s edge. The park provides paved walks, gravel trails, seating, small gathering spaces, and public artwork.

Greenway Park runs east-west through the community, and is approximately 35 acres. Unlike Stapleton’s other stormwater parks, this park contains active recreation amenities, including a skate park, several play features, and an expansive play lawn, as well as restrooms, picnic tables, and barbecue grills. Like the other stormwater parks, Greenway Park has paved walks, gravel trails, and seating. The park’s drainage ways are lined with native/naturalized riparian vegetation, whereas the remainder of the landscape is irrigated lawn with swaths of ornamental grasses, shrubs, and shade trees.

Sand Creek Park is the largest stormwater park in the development at approximately 165 acres. This area was adopted into the Stapleton Parks system, and is part of a larger 14-mile regional greenway. This park sits on the northern edge of Stapleton South and borders a light-industrial area to the north. Sand Creek, a tributary to the South Platte River, runs through the center of this park. Its banks are lined with mature and overgrown riparian vegetation. After being adopted into the Stapleton Parks system, this area has undergone partial ecological restoration, and a trail now connects it to Westerly Creek Park.

Bluff Lake Park is adjacent to Sand Creek Park and includes a portion of the tributary. This approximately 125 acre site served as Stapleton Airport’s crash zone, and was inaccessible when the airport was in operation. The area has since undergone ecological restoration and been transformed into a destination park. At the center of the park is a 9-acre lake, ringed by a nature trail/boardwalk. The site also houses an official nature center with restrooms and paved parking lot, a small amphitheater, seating, and interpretive signage. Because of the park’s significant wildlife population and habitat, dogs are prohibited in this park.
METHODS

To learn how stormwater parks are perceived by Stapleton residents, we used a mixed-methods approach. We first conducted a structured mail survey in May 2011 to capture resident attitudes via a Likert-type scale questionnaire. Then, for further insight and clarification on reasons behind survey responses, in-depth walking-interviews were conducted in May 2012. This paper provides a brief summary of findings from the 2011 Canfield and Gibson Stapleton Parks Survey for contextual awareness, but focuses primarily on presenting the qualitative findings from the 2012 in-depth walking-interviews.

To first assess resident attitudes of Stapleton’s stormwater parks, as previously noted, a structured mail survey was sent to a stratified sample of 1000 Stapleton households, approximately one quarter (1/4) of all households in the community at that time. Participants received a labeled map of the Stapleton parks (listed in no particular order) and then, using a 1-5 Likert-type scale were asked to assess each park using three designated criteria: scenic quality, perceived safety, and frequency of use. To avoid bias due to demand characteristics, participants were not shown photographs, and the park typologies were not disclosed. Instead, participants were asked to evaluate the parks based on personal experience.

As a follow-up to the survey, in-depth walking-interviews were conducted as a way to expand and explore the initial survey responses (Morgan, 1997). The unit of analysis for the follow-up study was the same as in the initial survey: individual attitudes for differing parks. The sample frame included 50 respondents to the initial survey who indicated interest in participating in a follow-up interview, as well as other Stapleton residents. The sampling technique included emailing invitations and advertising in community forums. To accommodate participant schedules, five one-hour follow-up sessions were
offered, with a total of 9 participants. Segmenting groups by gender, age, ethnicity, education or other demographic differences was not necessary because of the limited number of participants, although group demographics were recorded and considered during analysis. To initiate conversation with participants about the parks, the follow-up interviews took place outdoors in the parks themselves. However, spatial constraints meant physically visiting each park was not feasible during any one given session. Therefore, two one-hour walking routes were designed to allow discussion of all parks included in the survey. The sessions consisted of predetermined, structured questions, building directly on the survey, and unstructured dialog to explore unforeseen topics. Each walking-interview session was digitally recorded and later transcribed.

5 FINDINGS & DISCUSSION
5.1 Mail Survey

From the initial 2011 survey, 263 were returned complete, securing a 26% response rate. Demographic analysis revealed 63% of respondents were female and 37% male; 88% were White, non-Hispanic, 4% were Black, 3% Asian, 3% Hispanic/Latino, and 2% did not indicate ethnicity. Nearly half of all respondents held a graduate degree, and nearly all (98%) reported having at least some college education. According to the 2010 US Census records for Census Tracts 41.06 and 41.07 (encompassing all of Stapleton); the demographics are in line with the character of the community (United States Census Bureau, 2010).

A summary of the findings from the 2011 Stapleton Parks Survey are provided for reference (Table 1). Analysis of the Likert-type responses revealed that Westerly Creek Park is the most favored in regard to scenic qualities, and it is most frequently used. Greenway Park rated highest in terms of perceived safety. Sand Creek Park, on the other hand, rated lowest in terms of scenic qualities and perceived safety. Bluff Lake Park was found to be the least used. To understand what factors may have contributed to these responses we conducted the walking-interviews.

<table>
<thead>
<tr>
<th>Park Name</th>
<th>Scenic Qualities</th>
<th>Perceived Safety</th>
<th>Frequency of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>Mean</td>
</tr>
<tr>
<td>Westerly Creek</td>
<td>1.12</td>
<td>0.09</td>
<td>1.17</td>
</tr>
<tr>
<td>Greenway</td>
<td>1.09</td>
<td>0.80</td>
<td>1.24</td>
</tr>
<tr>
<td>Sand Creek</td>
<td>0.03</td>
<td>0.93</td>
<td>0.08</td>
</tr>
<tr>
<td>Bluff Lake</td>
<td>0.78</td>
<td>0.91</td>
<td>0.59</td>
</tr>
<tr>
<td>TOTAL AVERAGE</td>
<td>0.76</td>
<td>--</td>
<td>0.77</td>
</tr>
</tbody>
</table>

Notes: N=263 respondents; Values for scenic qualities: -2=very low, -1=low, 0=unsure, 1=high, 2=very high; Values for perceived safety: -2=very unsafe, -1=somewhat unsafe, 0=unsure, 1=somewhat safe, 2=very safe; Values for use: -2=never, -1=annually, 0=monthly, 1=weekly, 2=daily.

5.2 Walking-Interviews

Walking-interview participants included a mix of males and females, ranging in age from 25 to 55+. All were professionals, and about half were retired. Again, this sample is an analogous representation of the Stapleton community at large. One third had young children, and all but one participant owned their homes in Stapleton Three participants had experience in park design and planning, and all were park advocates. (Table 2).
5.3 Westerly Creek Park

Survey participants rated Westerly Creek highest in scenic qualities and frequency of use, and walking-interview participants confirmed this sentiment. The wildlife in the park seemed to add to the park’s overall scenic appeal. However, several participants noted seeing coyotes in the park, which generated some concern for the safety of their dogs.

*I think the prairie dogs are pretty cool. They don’t bother me. They don’t seem to have many predators, and are happy here.*

*I love the prairie dogs in Westerly Creek.*

*Westerly has all sorts of birds, which is nice. Swallows live under the bridge. You can hear toads at night. Beavers take down some of the trees.*

*This park helps us connect with nature in the city.*

*I love the naturalized look and experience, it’s a tranquil escape.*

The lack of pedestrian lights, occasional litter, and post-storm debris were mentioned as negative aspects of the park, but these comments were tempered by several other positive sentiments.

*There aren’t lights, but it doesn’t seem dark out. I prefer to walk at dusk because there are fewer people.*

*Trash is a big issue. A large area of Aurora drains into the creek and trash gets hung up in the vegetation. City crews come out after storms and do a wonderful job of cleaning up branches and weeds.*

*The community does a wonderful job of picking up the trash, a neighbor runs a volunteer cleanup group.*

Most participants use Westerly Creek for its trails, for walking and bicycling, but they noted seeing other activities occur in the park as well. One participant noted regularly seeing children play along the stream, while another noted seeing adults using the space as an extension of their private yards.

*Once our daughter gets older we will probably go look for tadpoles along the stream. We see parents and kids in there all the time.*

*I’ve seen neighbors walking through at dusk with a glass of red wine.*
People like to make their own trails, and don’t seem to stay on actual trails. Several walking-interview participants remarked they had not known Westerly Creek Park provided flood protection until seeing a significant flood event in June 2011. Knowing the park’s infrastructural purpose seemed to strengthen fond sentiments.

We didn’t know it [Westerly Creek] was manmade until last summer when we saw it flood. We were surprised because it doesn’t seem deep enough to be a flood zone. I always thought it was a nice park, but once we saw it “work,” it changed our perceptions. It’s even cooler to know it is not natural and has an important function.

People don’t know that Westerly Creek Park is manmade. When we first moved in we could see the stormwater ponds, but it has grown in and now you can’t really tell anymore.

5.4 Greenway Park

Survey participants rated the Greenway Park highest in perceived safety and second highest in scenic qualities. Walking-interview participants reaffirmed both of these sentiments, especially those with children. The park’s wide variety of passive and active recreation amenities seem to attract the most diversity, including non-Stapleton residents. Participants noted feeling comfortable walking, jogging, bicycling, and playing lawn games in the park, even in the evening. Though the park is lower in elevation than the adjacent urban grade, pedestrian lights, and open sight lines within the park likely provide residents with a sense of security.

I like the big green lawn—I see people flying kites and playing lacrosse. The skate park attracts all kinds of people, and even ones from outside the community.

The Greenway is one of the coolest parks, it has all sorts of activities and attracts all different people, especially at the skate park.

Having kids changes your desires and needs for amenities, you can use this park in so many different ways.

Most walking-interview participants appreciated seeing manicured lawn paired alongside the more “wild” looking vegetation found in the drainage ways. One participant explained that while the community was under construction many residents complained about the aesthetics and safety of the park’s drainage ways, stating they looked “weedy” and like a “mud puddle.” Many expressed concern about mosquito infestations and the threat of West Nile virus, and some even expressed regret about purchasing a home bordering the park. This participant noted that over the past few years, as the park has matured, complaints have lessened, and perceptions seem to have changed. Participants with children especially appreciated the shallow drainage ways and riparian vegetation adjacent to the playground. This area of the park offers children opportunity for structured and nature play. Additionally, the trees in this area are some of the largest in the park, offering ample shade.

Residents seem to really like the shade that the riparian vegetation offers—especially around the children’s play area.

The water in the swale is normally just a trickle, however sometimes in big storms the playground mulch gets washed downstream.

I don’t think people have any idea that this park manages stormwater. It would be nice if there were little signs that talked about it.
5.5 Sand Creek Park
Survey participants rated Sand Creek lowest in terms of scenic qualities and perceived safety. Walking-interview participants were surprised by this finding. They speculated that lingering pre-conceived notions of the park, based on its prior condition, likely were the cause of any low ratings. Since the park is not centrally located within the community, its “remoteness” seems to influence perceptions as well.

*There used to be a homeless population here, but it is cleaned up now.*

*Initial connections to Sand Creek were weak, but they have improved.*

*The park feels removed from the community.* (expressed as a negative sentiment)

*The park is not as well maintained as the others. Sometimes there is a lot of litter, especially after storms, but there are volunteer cleanups all the time.*

Participants who use Sand Creek regularly do so for bicycle commuting and/or for dog walking. Formal access to this park from within the community has not yet been established, though there is a temporary connection via Westerly Creek Park.

*The park feels removed from the community.* (expressed as a positive sentiment)

*Sand Creek and Bluff Lake create nice buffers for the community, helping keep the area quiet.*

*I see a lot of joggers and bicyclists using the park.*

5.6 Bluff Lake Park
Survey participants rated Bluff Lake lowest in terms of use, and second lowest in scenic qualities and perceived safety. Most walking-interview participants had not visited the park, which limited further clarification on our initial findings. Though adjacent to Sand Creek Park, Bluff Lake Park is a separate entity, open daily from sunrise to sunset. Limited access, distance from the center of the community, and a no dog policy seemed to be significant deterrents.

*We don't go because dogs aren't allowed.*

*It’s a long walk to get to the front gate of Bluff Lake.*

*It’s a nice place to take visitors.*

Though our studies found Stapleton residents use Bluff Lake Park less than Stapleton’s other parks, its nature center, amenities, and educational programs have a regional draw. In 2011, the park hosted 7,500 area students and 40,000 visitors (Brown, 2012).

7 CONCLUSION
In summary, we found that Stapleton’s stormwater parks were perceived more favorably than not, given certain physical contexts. A park’s location within the community seemed to have the most influence on perceptions of safety and frequency of use. Stormwater parks located along the periphery were less favorably perceived than those more centrally located within the community. In some cases, knowing a park’s stormwater function seemed to improve residents’ overall attitudes of a park. Participants especially enjoyed the wildlife, tranquility, and sense of escape that the stormwater parks offered. The riparian vegetation was highly regarded, particularly for its shade. Residents could overlook occasional litter/debris, because they knew the stormwater parks were well cared for and maintained. Interestingly, the quantity and type of amenities found within each stormwater park seemed to have little influence on resident attitudes.

Participants of the walking-interviews, though in keeping with the demographic profile of Stapleton, were clearly passionate about their parks, and likely why they volunteered for this study. It would be of interest to interview residents who think poorly of their parks, and to understand what factors
influence their attitudes. A limitation of this study is that attitudes can be influenced by social factors, such as the presence of a companion or dog while in a park. We did not collect detailed data, other than frequency, on how the residents use the parks. This study could be further expanded to understand specifically how residents use stormwater parks. Additionally, another study could be developed to see if residents from a similar type of community have similar sentiments about their multifunctional stormwater parks.

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COMBATING OBESITY WITH TREE COOKIES AND MUD PIES: A CASE STUDY OF THE HEALTH IMPACTS OF A COLLABORATIVE DESIGN PROCESS ON THREE NATURAL PLAY SPACES IN NORTHWEST MINNESOTA

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1 ABSTRACT
With rising obesity rates community health is suffering, human connections to nature are dwindling, and social capital is in decline. A growing body of research highlights positive connections between human health and relationships with natural places. Early public parks capitalized on provided benefits to community health and some argue that urban planning and public health policy have since diverged. Given that parks provide opportunities to improve physical, mental, spiritual, social, and environmental health, reevaluation of the relationships between community health and parks should be a revitalized component of community dialog (Maller et al., 2002). Natural play spaces are reemerging as a method for engaging children to improve health through physical activity and provide opportunities for less structured free play with natural materials in outdoor environments. In 2010 public health officials, researchers and concerned citizens set out to design and implement natural play spaces in communities throughout Northwest Minnesota with dual goals of promoting an increased sense of community ownership and promoting healthy, active lifestyles to curb disparate obesity rates. This case study examines the collaborative process between academic, local government, and community stakeholders in the planning, design and implementation of three natural play spaces in rural Northwest Minnesota and evaluates the ability of these types of spaces to foster social capital and provide a setting to improve community health through reconnecting people with nature.

1.1 Keywords
nature play, children, health, engagement
INTRODUCTION

Obesity, loss of social capital, and fewer connections to nature are three community health issues faced by many. As entertainment becomes more isolated and electronically based, people are staying indoors more and interacting less within the community. Increased indoor time, especially among children, reduces physical activity and leads to health problems associated with obesity. Isolated entertainment results in less community interaction which then reduces the depth of relationships between community members and thereby weakens community networks. Less time spent outdoors in nature decreases the understanding of and fosters apathy towards the functioning of the natural world. These three, seemingly unrelated topics have historically overlapped within the physical and social realm of city parks.

In contrast to traditional park play features, natural play spaces are playground like elements of parks or school yards that are uniquely positioned to address many of the challenges associated with increasing obesity, loss of social capital, and fewer connections to nature. In 2010 public health officials, researchers and concerned citizen set out to design and implement natural play spaces in communities throughout Northwest Minnesota with dual goals of promoting an increased sense of community ownership and promoting healthy, active lifestyles to curb disparate obesity rates. This case study examines the collaborative process between academic, local government, and community stakeholders in the planning, design and implementation of three natural play spaces in rural Northwest Minnesota and explores the ability of these types of spaces to foster social capital and provide a setting to improve community health through reconnecting people with nature.

BACKGROUND

Health problems associated with affluence are common among developed countries. Access to overabundant food along with increases in sedentary lifestyles have led to a suite of health problems associated with obesity: high blood pressure, high cholesterol, and diabetes. In the United States, rates of obesity and severe obesity, particularly from 2000-2010, have skyrocketed among all age groups and ethnicities (Sturm and Hattori, 2012). The daily activities of recent generations of children have also changed dramatically. Non-adult structured freeplay has been replaced with primarily indoor organized activities and media centered entertainment (Clements, 2004, p.68-80; Karsten, 2005, p.275-290; Hofferth and Sandberg, 2001, p.1-7). Younger age groups have historically been less prone to being overweight, however children are also suffering from the results of excessive caloric intake and reduced physical activity (Ogden et al., 2012). This trend is being experienced by adults and children alike, primarily in developed and developing countries that are more affluent (Flegal et al., 2010, p.235-241).

Increased indoor activities have decrease opportunity for community connections. Loss of community networks, norms and trust weakens community resilience. Trust is a vital factor in political and economic transactions. Television viewing, the aging "civic generation" (born 1926-1940), increased in women’s labor force, and rising income inequality are suspect agents (Putnam, 1995, p.664-683; Costa and Kahn, 2001). In relation to health, Campbell (2001, p.182-196) argues there is a connection between health and social capital, yet there is still debate about the exact mechanisms. Government and other civic institutions can build social capital in communities (Warner 2001, p.187-192) and participatory community development can be an important method for accomplishing this (Dale and Onyx, 2005, p.1-10). Landscape architects have a long had a history of organizing community desires into shaping of local spaces (Hester, 1975; Lawson, 2007, p.119). These designs can enable communities to quickly take control of the shape of local spaces. This process also builds within communities the knowledge, community network, and trust necessary to address future design and planning issues. However, with completed designs in hand, communities are often left without the resources or knowledge to implement the planned works (Lawson, 2007, p.119-120). To address this issue, community designed open spaces are often self maintaining, low energy landscape, small scale, low cost, locally controlled and reflect values of the community (Francis, 1984, p.10). When community members spend their resources while engaging in the shaping of community spaces, wether those resources be time or money, cognitive dissonance theory indicates that they will likely feel an increased sense of value for the space as a result of their efforts and feel more user satisfaction (Francis, 1984, p.177; Sommer et al., 1994, p.174).

One activity common to past generations of children that engages the body and stimulates the mind is freepay in nature. Health benefits associated with unstructured play in parks, woodlots and fields are being discovered (Hinkley et al., 2008, p.435-441; Kimbro et al., 2011; Wolch et al., 2010; Wheeler et
al., 2010, p.148-152) while at the same time this type of play is experienced less and less by children today. Parental concerns about dangers of crime, abduction, injury, and diseases perceivably associated with unstructured freeplay in nature combined with greater parental time constraints are primary reasons for this decline (Valentine and McKendrick, 1997, p.205-220; Veitch et al., 2006, p.383-393; Timperio et al., 2004, p.39-47). Community shaping and involvement in local spaces, especially those that involve gardening can be therapeutic, especially for at risk populations (Pudp. 2008, p.1228-1240).

The creation of parcels of land developed with lighter touches of open space with grass, ponds and wooded fields within cities has afforded access to nature to residents of densely populated areas, access that historically was only available to the wealthy and powerful. Early proponents of these parks recognized the deep need that people have to be connected to nature and capitalized on this fact to create momentum for the establishment of these civic landmarks (Pregill and Volkman, 1993, p.423-463). Parks provide a setting for enhancing community health. Easily observed in parks is the engagement of physical activity; walking, running, cycling, and a wide variety of individual and team sports. In addition to the active uses of parks, they also provide settings for spiritual connections. A day spent in the energy intensive whirlwind of any large city juxtaposes the mental rejuvenation experienced in nature filled landscapes. When maintained well parks can serve as middle ground between communities, generations, connecting diverse neighborhoods, and fostering social capital. Numerous ecosystem services and ecological connections can be created, enhanced and restored in the open spaces and networks of parks.

There is tremendous diversity in the composition of parks, from heavily manicured to wild and wooly. However one common design theme in parks are the areas designated for children. Often designed for the benefit of adult guardians, children’s playgrounds are often flat for unobstructed observation, free of excessive dirt, and filled with structures increasingly vetted for safety. However biophilia research suggests that the more engineered a park, the less beneficial to human health (Maller et al., 2002; Wells, 2006, p.1-24). To explore this primal connection to less structured nature, natural play spaces are reemerging (Hall, 1897) as a method for engaging children to improve health through physical activity and provide opportunities for less structured free play with natural materials in outdoor environments.

### 3.1 Project Description

This project was a result of collaborations begun at the Connecting Children and Nature information and networking conference held September 2010 in Crookston, MN. Staff at the University of Minnesota’s Northwest Regional Sustainable Development Partnership and at the Polk County Public Health office began by identifying potential partners for the project. Engaging a broad range of partners helped to break down some of the traditional barriers that inhibit effective progress on such projects by increasing communication and understanding of the topic. These connections were crucial to local engagement and feedback, and to ensure that health improvement goals were being met.

Along with the social and community connections, assistance was needed with the design of the natural play spaces. This was addressed by horticulture and landscape installation faculty and students at the University of Minnesota Crookston (UMC). Additionally, researchers from the Center for Sustainable Building Research’s Design for Community Resilience program at the University of Minnesota Twin Cities (UMTC) campus provided design assistance and community engagement expertise with graduate landscape architecture students from the College of Design’s Landscape Architecture program. These partners comprised the “design team”.

A series of weekly conference calls brought the diverse partners together to define the roles, responsibilities and goals of an integrated design process that included academics, public health officials, community service groups, early childhood educators, and designers. This integrated approach consisted of holding initial community meetings convened by County Public Health partners. A variety of methods were used to inform the public (Table 2). Invitations were sent to targeted individuals, city administrators, Early Childhood Family Education (ECFE) coordinators, daycare providers, doctors, family members, and community service clubs. Additionally, signs were posted at various community locations to publicize the event.

The first community meeting was an opportunity for everyone interested in the project to meet and to become familiar with the project, as a community member or one of the organizing partners. Additionally, it was an opportunity for the project partners to introduce the concepts that underlie natural play spaces. For inspiration and discussion, the partners showed local, national and global examples and
precedents. Participants were encouraged to share about their own experiences in nature, why they thought nature play was beneficial, as well as any fears or concerns they might have. Through a series of discussions and playful design exercises, the attendees shared their ideas and aspirations for the natural play spaces. Participants were organized into small groups and encouraged to come up with a schematic plan for the natural play space using base maps, sticky notes and markers and shared it with the other groups.

As part of the evaluation plan for the project conducted by a graduate student and guided by faculty in the School of Public Health, community stakeholders were invited to take a pre-survey that assessed their sense of community ownership, increased use of natural play spaces, and attitudes and belief around physical activity and connecting children and nature.

Over the course of the project, as the partners interacted with more communities, especially children from those communities in proactive involvement (Francis, 2002, p.162) a few tools were developed to facilitate the initial community design exercise. One of these was a booklet that described various natural play space elements, or modular features, such as mazes, climbing logs, sand mounds, or water flow features. Each entry in the booklet contained sample images, a brief description of the feature, the types of play or activity that it encouraged, the materials needed for its construction, and an estimate of the cost of installation. Another tool developed was a set of game pieces to utilize a collage method to planning (Francis, 2002, p.165). Each gamepiece symbolized one of the features listed in the booklet, and could be placed on the basemap like a board game. These tools provided easily-accessed technical information and increased the sense of play in the design of the play spaces.

The ideas, drawings, and layouts emerging from the initial community meetings were documented and organized, and then the design team (comprising landscape architecture and horticulture students guided by faculty researchers) integrated the ideas into a few possible design layouts. The design layouts were drawn to professional quality, rendered in color, and completed with annotations and scale. A second community meeting was held to present the layouts for critique, input, and suggestion. Using the results of this last meeting, the design team created the final designs that were to be installed (Figure 1).

Figure 10. Final plans for the natural play spaces (2011). Designs by Eric Castle, Bethany Jenkins, Kristen Murray, and Kristine Neu
As volunteer efforts were used, the installation of the natural play spaces was organized into two phases: preparation and installation. The designs were subdivided into modular features (previously mentioned as described in the booklet) which could be constructed by itself. Once all the features were completed the design would stand as a whole, yet until that point each feature could stand as a play feature on its own. Materials for each feature were acquired through donation, city sources, or were purchased. As many of the materials were tree based, connections with local arborists proved a valuable source of free materials. Lists of tools needed to construct each feature were compiled and collected. Individuals from community partner groups volunteered to serve as crew leaders during the volunteer workdays and received detailed written instruction on how to construct each feature. Volunteer workdays were planned and advertised using a variety of media (Table 2). As volunteers arrived to begin working, crew leaders would direct their efforts in the construction of features. This process was repeated until the modules were finished.

4 METHODOLOGY

No formal methods were used in assessing the effectiveness of the collaborative design of the natural play spaces. Establishing such a process would be important as the work continues. That said, the informal methods used to review effectiveness of the design during the process were as follows:

- Feedback and input to the collaborative design by members of the design team (horticulture and landscape installation faculty and students at the University of Minnesota Crookston (UMC) and researchers from the Center for Sustainable Building Research’s Design for Community Resilience program at the University of Minnesota Twin Cities (UMTC) campus with graduate landscape architecture students from the College of Design’s Landscape Architecture program).
- Feedback and input to the design and collaborative design by other partners including community representatives and city officials in weekly conference calls and in person. This input included discussion of practical implementation and maintenance of the design.

Moving forward, an approach to assess the effectiveness of a collaborative design for a natural play space could include: assessment of how the design addresses health, social and environmental benefits; assessment of how the design supports implementation and long-term maintenance; and assessment of changes made to design during implementation; assessment of user behavior on the site that indicates design effectiveness and suggests changes for future designs.

5 RESULTS AND DISCUSSION

Through community engagement during the process of planning, designing, installing and then disseminating this project impacted physical health, social capital, and connections to nature in the respective communities.

5.1 Health

The creation of three new play spaces for children has allowed increased outdoor play. Due to the modular nature of many of the features, activity by users is often evident through the manipulation of the pieces and parts. Reporting on regular visits, community stakeholders often remarked that the play features were constantly being used by children as evidenced through their changed locations. One example was a temporary life size maze constructed of straw bales, meticulously designed and placed according to the plan with consistently sized pathways and enough turns and dead ends to create interest. The day after the maze was finished the designer returned to the site to find that all the straw bales were relocated by users to form a terraced and walled enclosure.

Play in nature has many benefits like improved motor skills (Fjørtoft 2004, 21-44) and encourages more physical activity (Cooper et al., 2010, p.7; Hinkley et al., 2008, p.435-441; Wheeler et al., 2010, p.148-152) which reduces the likelihood of significant increases in BMI (Wolch et al. 2010). Exposure to and even mere viewings of nature increase manageability of childhood Attention Deficit Disorder and increases self discipline and self control (Taylor et al., 2001, p.49-63; Taylor et al., 2001, p.54-77). As childrens home ranges have diminished (Karsten, 2005, p.275-290) the importance of locating nature
closer to where children live through building of natural play spaces in local parks can increase opportunities for interactions in nature, which are critical during middle childhood (Kellert, 2005).

Figure 11. Natural play space located in proximity of naturally managed open space. (2013) Image source: USDA, all other data created by author.

Location of the play spaces can have secondary impacts on encouraging physical activity. When play spaces are located near or connected to trail networks or undeveloped natural areas they can entice users to the vicinity then users can springboard into these adjacent amenities (Figure 2). This can reintroduce natural areas that are unknown to today’s children. Throughout the project it was common for community volunteers, many in advanced stages of life, to comment on how the adjacent woods provided countless hours of entertainment and play and how they were excited at the prospect of helping children today have similar experiences.
### Table 3. Partner roles in each phase of the project

<table>
<thead>
<tr>
<th>Polk County Public Health</th>
<th>Planning Phase</th>
<th>Design Phase</th>
<th>Implementation Phase</th>
<th>Dissemination</th>
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<tbody>
<tr>
<td>Arranged local meetings with community partners - including all local media events surrounding. Arranged special community planning events. Contacted community partners for financial, strategic and implementation support. Convened local advisory councils related to project.</td>
<td>Convened local advisory councils related to project. Hosted events for community members and partners (from multiple backgrounds and multigenerational) to learn about natural play spaces, to dream big and get ideas on paper. Weekly meetings with design team.</td>
<td>Provided support to U of M with supplies. Hub for information distribution. Fiscal agent. Scheduled, arrangement and publicity of work days: schedule, media, food, water, some supplies, support systems (porta potty/water). Planned, arranged and publicized Grand Opening Celebration.</td>
<td>Participated in planning and implementation of natural play space workshop. Ongoing support and facilitation of Castle Park Natural Play Space Advisory Team in developing future programming.</td>
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<tr>
<td>U of M Center for Sustainable Building Research</td>
<td>Provided explanation and examples of natural play spaces to community groups. Engaged community members in planning and design and compiled suggestions and feedback. Worked with UMC to create designs.</td>
<td>Worked with U of M Crookston to integrate community feedback into final design. Prepared material for client feedback meetings. Created game pieces used to gain community input.</td>
<td>Supported School of Public Health graduate student and faculty on developing an evaluation plan and pre-survey.</td>
<td>Presented &quot;lessons learned&quot; and ran breakout session at natural play space workshop. Assisted in efforts to publish work through scholarly venues.</td>
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<td>U of M Northwest Regional Sustainable Development Partnership</td>
<td>Presented the NW RSDP’s interests and rationale to putting a priority on connecting children and nature as essential to the goal of sustainability in the region.</td>
<td>Coordinated design efforts of two design teams. Conducted meetings to facilitate stakeholder feedback on preliminary designs. Finalized stakeholder approved designs.</td>
<td>Created construction documentation, materials lists and process methodology to coordinate en masse volunteer work days. Procured construction materials and equipment. Directed volunteer efforts to implement designs.</td>
<td>Connected University with design team reps, public health and others to hold natural play space workshop.</td>
</tr>
<tr>
<td>Provided feedback on preliminary designs.</td>
<td>Created construction documentation, materials lists and process methodology to coordinate en masse volunteer work days. Procured construction materials and equipment. Directed volunteer efforts to implement designs.</td>
<td>Provided feedback on preliminary designs.</td>
<td>Presented &quot;lessons learned&quot; and ran breakout session at natural play space workshop. Led efforts to publish work through scholarly venues.</td>
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<tr>
<td>U of M Crookston</td>
<td>Assisted and collaborated with community partners during planning meetings. Compiled, organized, and summarized community input into a design program.</td>
<td>Coordinated design efforts of two design teams. Conducted meetings to facilitate stakeholder feedback on preliminary designs. Finalized stakeholder approved designs.</td>
<td>Created construction documentation, materials lists and process methodology to coordinate en masse volunteer work days. Procured construction materials and equipment. Directed volunteer efforts to implement designs.</td>
<td>Presented &quot;lessons learned&quot; and ran breakout session at natural play space workshop. Led efforts to publish work through scholarly venues.</td>
</tr>
<tr>
<td>Citizen advisory boards</td>
<td>Ensured representative of stakeholders. Advise city gov/Park Board (governing body). Developed goals of the group and NPS efforts. Contacted potential supporters: financial, design, implementation.</td>
<td>Spread the word and participate in design workshops. Provide feedback on prelim designs. Seek input from others.</td>
<td>Volunteer at work days. Spread the word about work days. Assist with planning and grand opening activities. Participate in marketing efforts. Help find volunteers with specialty skills for work days. Guide work groups at work days.</td>
<td>Ongoing support and facilitation of Castle Park Natural Play Space Advisory Team including formation of Castle Park Natural Play Space Education Committee and ongoing planned educational events at Castle Park (CastleKits).</td>
</tr>
<tr>
<td>Community partners (Rotary Club, Lions Club, early childhood groups, Jaycees, daycare providers, teachers, 4H)</td>
<td>Assisted with financial planning needs as well as held fundraisers and letter campaigns.</td>
<td>Public Health presentations to community partners . Provided design feedback to Public Health staff.</td>
<td>Recruited volunteers for workdays. Served as crew leaders and volunteers on workdays.</td>
<td>Crookston Early Childhood initiative continues to support and discuss play opportunities in Crookston. Local service groups available for further clean-up/work days. Local media available and engaged in process.</td>
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</table>
5.2 Social Capital

Responding to declining rates of decreased community connections, initial goals of the project were to foster community engagement that would result in increased community resilience. Additional goals of a community engaged in the common efforts of planning and designing the natural play spaces. To avoid a reoccurring situation where communities have a professionally designed space and little money or expertise to install or maintain the space once completed (Lawson, 2007, p.119-120), the project engaged community volunteers to install the natural play spaces and advisory boards were formed to guide the long-term maintenance. These steps have led to an increased sense of ownership among those involved in the project. Increased sense of ownership can contribute to the long term success of these spaces. Community engagement efforts were spearheaded by the Polk County Public Health office. This engagement was leveraged by their intimate knowledge of community culture and their connections within the communities.

Table 4. Community outreach efforts through a variety of communication outlets

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<td>Castle Park, Crookston, MN</td>
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<td>advisory board meeting</td>
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<td>social media</td>
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<td>Mason Park, Fertile, MN</td>
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<td>community event booth</td>
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<td>social media</td>
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</table>

Table 1 illustrates the methods and timing of community engagement efforts. Success of these engagement efforts in the communities of Crookston, MN (pop. 7,891) and Fertile, MN (pop. 842) is highlighted by the total hours (750 and 250, respectively) spent by community volunteers on the planning, design, and implementation of the natural play spaces. As Sommer (et al., 1994, p.174) found, this willingness to spend time and physical effort is clear evidence of increased sense of ownership and is favorable to the long term success and utilization of the play space.

The project also provided initiative to erode institutional barriers commonly found in communities. Disconnect between academia, the public and various scales of governmental can lead to ineffective efforts, mistrust and unhealthy competition. When united in a common project these groups can effectively synergize with positive results. Reaching out to a variety of stakeholders at the onset of the project led to
successful goal setting and realization of the project aims. Efforts were divided among community partners according to interest and ability. Table 2 outlines the efforts engaged by the wide variety of community partners during the various stages that culminated in the successful installation of three natural play spaces.

Engagement efforts through social media and web based venues spread interest well beyond the physical geography of the project communities. As a result of this interest in reconnecting children to nature, a workshop was held to advise interested groups from other Minnesota communities on how to develop a similar process. This day long workshop helped officials from state parks, state natural resource agencies, school groups, academics, and concerned citizens to build upon the methods used in this project and strengthened community connections at a wider, regional scale. Each of the original community partners on the project also contributed to the dissemination of the project (Table 2).

Additional evidence that this project strengthened community relationships was provided by observation that other civic groups are mimicking the project methods. At the end of 2012 a group interested in redevelopment of neglected city spaces consulted with partners of this project to find ways to emulate the success found by collaborating with a wide range of community groups. Consultation with this group is ongoing.

The primary goals for the design team were to provide planning, design and implementation services to the various communities involved. Once completed, the hope was that sufficient community ownership would allow the design team to step back and let each community guide further development and management of the play spaces. As the play spaces were completed summer 2012, it may be too soon to evaluate if this goal was met. However initial results are positive, with Citizen Advisory Boards having met multiple times in the Winter 2013 to discuss the upcoming plans for summer 2013. These efforts have resulted in a significant number of well attended community events that utilized the natural play spaces as a focal point of the event. As Dendy found (1998, p.126) the formation and activity of the advisory committee significantly adds to the increase in community social capital.

Any park or greenspace can provide the setting for physical activity that reduces BMI, but for very little investment, natural play spaces can provide increased parental buy-in or a community sense of ownership because of parental involvement in the process, which can potentially mitigate parental concerns about safety (Valentine and McKendrick, 1997, p.205-220).

5.3 Connections to Nature

One striking difference that natural play spaces have when compared to traditional playground equipment is the use of natural materials. In addition to the low cost of these play materials logs, branches, straw, soil, rocks, and sand offer a variety of opportunities for exposure, familiarity and education. Material composition of rocks and physical deformations can be used to teach natural history and geology. Many of the boulders used in this project had striations that tell the story of immense pressure and power of this regions glacial past. Local sand can stir visions of waves lapping the shores of vast ancient inland lakes. As the organic matter in logs and straw begin to decay there can be direct observation and contact with the organisms and processes of this essential ecosystem function. This decomposition contributes to soil carbon and feeds soil building organisms. As the play functions of these materials decay along with the cell walls, there is opportunity for reinvention of the space; new opportunity to rebuild community connections to revitalize the play space and social capital.

From a long term perspective, play in nature can impact environmental health. Experience in nature is significant in forming an affinity towards the environment in children (Cheng and Monroe, 2010, p.31-49) adolescents (Müller et al., 2009, p.59-69) and adults (Chawla, 2006, p.57-58). Socialization in nature, direct unstructured contact with nature, and volunteering in nature were experiences that natural history professionals had in common (James et al., 2010, p.231-256). Hence the more connections to nature as a youth, the more likely adults may be to make pro-environment choices.

6 CONCLUSION

Benefits of a socially engaged method in the creation of natural play spaces include a the synergistic effect on a range of community health issues. Throught this project exciting play spaces were built that entice children outdoors to be physically active and increased physical activity reduces the probabilities of a suite of health maladies, both of the mind and body. Involving the community in the process of planning through to implementation forged familial bonds as well as community networks and
trust. There was room for all age groups to meaningfully contribute to this efforts. Grandparents helped a rising generation rediscover the joy of unstructured freeplay. Generation’s X & Y were able to make meaningful contributions to the cause of making a better community and helping kids connect with nature. Children, equally involved in the planning and installation processes were able to built stick forts, shape earthen mounds, create mud pies and laydown pathways of log slices, which they dubbed “tree cookies”. Continued programming efforts, led by a community oversight committees sustained involvement, will guide future engagement and strengthen the increased social capital gained by communities throughout this project. Institutional barriers, so often restricting and inefficient, were broken down through collaborative efforts in a united purpose. When children play in these spaces, engaging with the piecies and parts of natural materials, they feel and smell the soil, interact with the critters that habitat therin, and hopefully create lasting memories. Thus the creation of natural play spaces, through a community involved process is an effective method for improving physical health, community vitality and knowledge of and connection to the natural world.

Future research opportunities can include more quantitative and qualitative measurements that can more fully explore the relationships of health, social capital, and environmental stewardship examined in this case study. Additional aspects to focus on can include the long term involvement of community members in the reshaping of the space as the construction materials naturally decay and relationship of the original design and the long term maintenance.

7 ACKNOWLEDGMENTS

This project would not have been possible without financial support from the following donors: Otto Bremer Foundation, United Way of Crookston, University of Minnesota’s Clinical and Translational Science Institute, Center for Urban and Regional Affairs (CURA), University of Minnesota Crookston Undergraduate Research Opportunity Program (UROC), and Polk County Public Health Opportunity Grants. The authors would like to thank the many volunteers from the communities of Crookston, Fertile, and Warren, MN for all the support for this project. We would also like to thank the many project partners for their dedication in helping create exciting spaces for children: Anna Lawrence Bierbrauer, Kirsten Fagerlund, Annie Fedorowicz, Eileen Harwood, Bethany Jenkins, Kristine Neu, Linda Kingery, Kristen Murray, and Sarah Reese.

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INTO THE WOODS: A STUDY EXPOSING CHILDREN TO OUTDOOR CLASSROOMS

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1 ABSTRACT

All day/all weather outdoor classrooms, known as forest kindergartens, are governed by four educational principles: 1) create opportunities for creativity and curiosity; 2) direct sensorial contact with nature; 3) build self confidence and trust through risk-taking; and 4) provide unstructured play for development of sociality and conflict resolution (Moore and Marcus, 2008, p.164). A 2003 study found that forest kindergarteners performed as well as their conventional peers on fine motor skills and significantly better on tests of gross motor skills, academic achievements, creativity, attention spans, stress levels, and happiness (Grahn et al., 1997; Robertson, 2006 p.4-6; Watkins, 2011, p.1-3). While research evidence has fueled the increase of forest kindergartens throughout the world, especially in Europe, it has done little to encourage their development in the United States.

A survey given to parents and faculty of a childcare center located in Muncie, Indiana, determined the impediments to establishing forest kindergartens. Because of positive survey results, for comparative analysis, a classroom of seventeen three to five year old children were observed. Landscape architecture students conducted behavioral mappings to determine the length of time the children spent at a given space, the activities they engaged in, and the density of the children in each space, in order to establish design principles based on child-reaction to natural settings. Based on the observations, three design principles must be followed to establish forest kindergartens: 1) engagement in a diversity of spatial configuration, dimension and materials; 2) utilization of pathways between nature classrooms as learning spaces; and 3) the facilitation of deep immersion in nature for all day/all weather classrooms.

1.1 Keywords
forest kindergarten, children, outdoor education, childcare
2 INTRODUCTION

Children are developing aversions to interacting with and in natural landscapes. Policies that have give priority to automotive access in public space are paired with fenced in play areas for children (Pangburn, 1927, p.178). The landscapes children are allowed access to - home, school and public spaces - limit the diversity of natural and ecologically dynamic experiences of children. With natural landscapes missing in their formative years, it is no wonder that a third of all children are nervous about getting dirty (Day, 2007) and that overall wellness is in decline (Health, 2011, p.2-8).

When Friedrich Fröbel established the first formal kindergarten in Germany in 1840 (Mills, 2009, p.3), Fröbel decided to, “call the institution ‘kindergarten’ to mirror his pedagogical view; he saw the child as a plant and the teacher as a gardener who was to make the plant flourish” (Ånggård, 2010, p.6). Fröbel believed that children needed a direct connection with nature. In his curriculum, children learned to love nature early, gaining their appreciation for nature through experiences and observations (Ånggård, 2010, p.5).

Fröbel’s contemporary, Jean Jacques Rousseau, believed that children should be brought up in nature to avoid the damaging influences of society. Children were to learn through their own experiences in nature rather than through instruction (Ånggård, 2010, p.5). Nature became a source of knowledge through physical interaction with the world, beginning with a child’s closest environment and gradually including more. Rousseau also believed that children needed to spend considerable time outdoors preferably lightly dressed and barefoot (Ånggård, 2010, p.5).

By 1856, kindergartens were introduced in the United States and started to multiply rapidly. As kindergartens spread throughout the world, the underlying concept of children connecting with nature was lost. In the 150 years that have passed, children have become increasingly sedentary and spend less time outside. As a result, children are less connected with nature (Braccidiferro, 2006, p.1; Taylor and Kuo, 2006, p.124).

In recent years, a public educational movement to teach children in the outdoors has steadily increased in Europe. Preschool classes, known as forest kindergartens, allow children ages three to five to be in outdoor “classrooms” learning, interacting, and playing with each other within natural landscape settings. Although referred to as forest kindergartens, the natural settings are not limited to forests, some might include woodlands, prairies, wetlands, etc. Forest kindergartens are governed by four principles: 1) create opportunities for creativity and curiosity; 2) direct sensorial contact with nature; 3) build self confidence and trust through risk-taking; and 4) provide unstructured play for development of sociality and conflict resolution (Moore and Marcus, 2008, p.164).

The first forest kindergarten started in Denmark in 1950 (Coleman, 2011, p.2) and then spread through Scandinavia. In the 1990’s, the movement became popular in Germany (Weissshaar, 2006, p.1) when it became legally recognized as a public child care option. For many years the outdoor kindergarten was only available to the very wealthy (a condition still prevalent in the United States and Canada). The break-through legislation in Germany gave all children equitable access to the benefits of outdoor learning: higher competencies in all areas of educational performance through high school and improved social and physical health (Taylor and Kuo, 2006, p.124).

A recent study (Grahn et al., 1997) conducted in Sweden compared forest kindergartens to traditional preschools. The study showed that children who attend forest kindergartens have a higher attendance rate, have better concentration, have better motor functions, and play more imaginatively. They also found that forest kindergarteners performed as well as their conventional peers on fine motor skills and significantly better on tests of gross motor skills and creativity (Robertson, 2006, p.4-5; Watkins, 2011, p.1-3).

Design for this type of educational experience may necessitate parameters for empowered child-centered learning, which is distinctly different than designing outdoor spaces for the controlled and safe environments that exist in contemporary playgrounds built in a car-dominated world. The legislators in Germany recognized that being able to play outdoors during recess or being able to have access to natural playgrounds were good achievements but these were still different in the benefits observed from engaging in “all day, all weather” outdoor learning.

Although these preschools continue to be popular and are spreading throughout Europe, they have been slow to emerge in the United States because of legislative restrictions which include mandatory access to restrooms and hand washing stations; children not being able to be outside in temperatures below 25 degrees with wind chill; and children being elevated from the ground while taking a nap (IFSSA,
Other barriers include perceived limited outdoor space, safety concerns, and parental backlash. As a result, benefits of the “all weather” outdoor classroom are only available to a limited number of children, where circumstances and happenstance facilitate the opportunity in spite of the fear and control issues of the governing bodies.

3 THE SETTING

Apple Tree YMCA Child Development Center, located in Muncie, Indiana, has a long standing positive relationship with Ball State University. Because of previous experiences with Ball State and because of Apple Tree’s interest in providing the best possible child care, Apple Tree partnered with the authors in a research project to observe a classroom of three to five year olds in a forest setting to identify the design principles for a forest kindergarten setting.

Cooper Farm and Skinner Field Area, a Ball State University owned research field station, operated by scientists and landscape architects, was used as the research site. This location was used because of its close proximity to Apple Tree and because of its old growth forest and restored prairie ecosystems.

An environmental analysis of Cooper Woodland was conducted and GIS, an analytical tool frequently used by landscape architects, was used to overlay existing conditions of the site, soil characteristics, and other information to generate the characteristics of the locations within the forest that the children gravitated towards.

The portion of Cooper Farm and Skinner Field Area that was used for the study is known as Cooper Woodland and is approximately 20 acres in size. The woodland has a path that meanders through it, making it accessible to all children. The woodland provided a landscape full of possible outdoor classrooms because the trees, landform, understory, and ground conditions formed natural edges making windows, thresholds, and “classrooms” that children and adults could perceive.

The vegetation in Cooper Woodland is a mixture of ash, oak, and maple trees. It also has wild flowers, sedges, and grasses that provide a varied ground cover throughout the seasons. Because the native aspect of the woodland is maintained, poison ivy is prevalent during the late spring and summer months. The woodland floods during heavy precipitation; this causes a dense mosquito and tick population during the spring and summer seasons.

4 THE RESEARCH

Observational research was conducted at Apple Tree and at Cooper Woodland to gain a better understanding of how the physical and temporal conditions in a classroom and in a natural setting limits or promotes learning. The research hypothesis was that the child’s responses to spatial and temporal configurations in a diverse landscape would be different than those in an indoor classroom.

The director of Apple Tree and of the YMCA in Muncie felt that observing the children’s experiences in the woods would help them better understand how outdoor experiences could be integrated in the design of and access to outdoor classrooms. The outcome from the experience in the woods could yield more specific spatial and temporal design parameters for the design of outdoor classrooms conducive to the educational and emotional needs of the preschool children specifically but not limited to Apple Tree YMCA Child Development Center.

Clare Cooper Marcus’ book, People Places: design guidelines for urban spaces (1997), was used as a reference for the behavioral mapping method. The methods identified by Robin Moore’s group (2010) were used as guidelines to specifically map the behavior of small children. (Cosco, p.514)

Three sets of observational data were collected: the indoor classroom, the playgrounds, and Cooper Woodland. At each setting, the observers, students from Ball State’s Department of Landscape Architecture, who were all Institutional Review Board (IRB) trained to work with small children, watched and documented the length of time the children spent at a given space, the activities they were engaged in, and the density of the children in each space.

4.1 Indoor Classroom

The first set of observational data was collected in an indoor classroom at Apple Tree. The visits to the indoor classroom established a student-teacher and student-student relationship between the observers and the children.
In the indoor classroom, the preschool children typically behaved in a certain way. They knew what stations they were allowed to be at and how many people could be there at one time. They knew when it was snack time and when it was nap time. Their day was completely scheduled and regulated. Because of this structure, their behavior within the indoor classroom was very structured and regulated as well. The rules of the indoor classroom were known by each child and by the teachers; as a result, the children were able to govern themselves and each other according to how well they understood the rules. When the children did not govern themselves, the teacher used the rules to acknowledge the children's lack of self-governance.

The idea of educational content and regulation is important to understand because it is embedded with spatial messages that are reinforced every day. This, in part, explains how and why the preschoolers grouped themselves socially and why they interacted with each other the way that they did. For example, in the classroom at Apple Tree, the children stayed in clusters of three and the average time spent at a station was between three to five minutes. This repeated observation happened because the teacher encouraged small groups at the stations and encouraged the children to move to another station after a period of time. When the group became too large one of the members would leave or would inform the teacher of the intrusion by the other child. The children's duration at a particular station had to do with interest in the activity and the teacher's management of the group.

4.2 Playground at Apple Tree

The second round of behavioral observations was observing the children experiencing the outdoor playgrounds. Three playgrounds at Apple Tree are used by the three to five-year olds. The playgrounds are primarily grassed areas with built-in play structures. All of the playgrounds are secured with chain link fence. Within each playground, there are only a few natural features, trees, flowers, and rocks.

The first playground is referred to as the "truck pit". The truck pit has a concrete ground area where children play with tricycles and other large play elements. The second playground is known to the children as "the slides" and houses a typical plastic round-edged playground structure that was installed a few years ago. The structure is surrounded by approved fall zone material. The third playground is known as the geodome. It has a dramatic play area in the form of a grass bermed amphitheatre and is home to the geodome greenhouse that currently is not being used.

The observations on the playgrounds established how the children typically played outside. The rules that govern the playgrounds are different than the indoor classroom, which allows the children to act and socialize differently. There are still rules and regulations on the play equipment, and the children know what they are allowed to do.

The playground, in a way, is very similar to the indoor classroom; the rules for the play equipment are enforced and regulated, with the teachers being the regulators. A universal rule for all of the playgrounds is that the children must be in sight of one of the teachers at all times; this limits how the children play. Even with this rule, the children tended to hide in the small spaces of the playground and play equipment.

Consistent with the indoor classroom, the children usually played in groups of three to four. In the playgrounds (truck pit and geodome) where there were more choices of toys to play with, the children transitioned between activities every three to five minutes. On the slide playground, where there is little variation offered, the children's duration was longer with a play activity; however, the children tended to become bored on this playground, which increased their lack of self-governance.

4.3 Cooper Woodland

The final set of observations occurred in the woods at Cooper Farm and Skinner Field Area. The observations occurred during regular business hours of Apple Tree, so as to not interrupt the parents' or children's routine. The observers recorded the children's spatial and temporal relationships. Observers recorded how the children interacted in the woods and how they related to each other in the wooded space. Both mapping and timers were used to record observations within the structure of space and time.

A 14-passenger activity bus was used to transport the children to the woods. The class was divided into two groups because of childcare regulations and limited seating on the bus. Two adults were on the bus at all times and at least two teachers were in the woods with the children at all times to ensure the safety of the children.
In preparation for the preschoolers' initial visit to the woods, the undergraduate researchers (observers) visited Cooper Woodland. They were asked to identify rooms within the forest based on edges, both physical and visual. The researchers were given walkie-talkies so that they could communicate with each other while exploring the forest. Three classrooms were initially identified by the researchers. The classrooms were marked with surveyor's tape so that they could be easily recognizable. Two other classrooms were later identified by the preschool children during the subsequent visits.

The initial visit with the researchers, not only identified possible classrooms, it also ensured the safety of the children when they visited the woods. By becoming comfortable with the woods before the children visited, the anxiety caused by not being familiar with an area was limited.

5 CLASSROOMS IN COOPER WOODLAND

Both researchers and children identified classrooms in the forest. One classroom found by the researchers was a fallen log with a deteriorated middle. The researchers thought this would be a good area for the preschoolers to develop their gross motor skills. The log provided a place on which the children could walk, balance, climb and test their own fears as they mastered it.

Another classroom identified by the researchers was found around a large tree with fallen logs that provided a seating area. The classroom resembled "waldsofas" that are common in European forest kindergartens. A waldsofa or "forest couch" acts as a central gathering place for a forest kindergarten. As the seasons progressed, the classroom flooded, becoming a place where the children experienced and played in water instead of a place to wait and gather.

The last classroom identified by the researchers was a part of the forest that did not have physical barriers, but had visual ones. There were several fallen logs that acted as edges; however, the children did not seem to notice because of the spacing between the logs. This classroom ended up being used for hide-and-seek.

The two classrooms that were discovered by the preschool children occurred during later visits to Cooper Woodland.

The first classroom discovered by the preschoolers was close to the fallen log classroom. This classroom had several fallen logs as well as standing water. Although similar to the other classrooms, this classroom gave the preschoolers an opportunity to explore water and a fallen log at the same time. The roots of the fallen log made a space for the preschoolers to climb in and around, similar to a den.

The second classroom that the preschoolers discovered had defining edges due to fallen trees and limbs. When the preschoolers found this classroom, they unknowingly stayed within the walls that the classroom naturally had. A defining feature of this classroom was a tree that had fallen to form an arch. The top of the arch was about 8 feet high.

With these five distinct classrooms, an outdoor classroom typology was discovered. Based on the research, one type of outdoor classroom either has a central feature or attraction, like the waldsofa classroom or the fallen log classroom. Another type is the classrooms defined by edges. The arch classroom or the hide and seek classroom are examples of edge classrooms. The other type of classroom is along the way. The transition spaces between the outdoor classrooms is similar to a hallway in a tradition school building; the purpose being way finding, while being educationally enriched.

6 THREE VISITS TO COOPER WOODLAND

6.1 Visit 1

The first visit to Cooper Woodland was in November. The leaves on the trees were a golden color and lots of leaves were on the ground. The children were dressed in cold weather gear. The children clung to the teachers and the undergraduate researchers and stayed in a line as they entered the forest. They were very careful to stay on the path. While walking on the path, some of the children were curious about the trees and plants, but were too nervous to touch them.

As the children approached the fallen log, the children were unsure of what they were allowed to do, looking to their teachers for direction. They asked for help to get on and off the log and were scared to try to play on it. They all clustered in a couple of areas of the log that were very close to the ground (Figure 1).

As they became more comfortable on the log, the children began to be less clustered and allowed each other space to maneuver. The children were very aggressive as they were climbing on the log,
almost acting like this opportunity would be taken away at any minute and that they needed all the time they could get on the log. (Figure 1)

They were at the log for at least twenty minutes and would have stayed there longer. This was the first indication that the temporal experience of the children in the outdoor classroom could be much longer than was currently programmed in the indoor classroom. As a result, researchers began observing the duration of attention spent on task in the outdoor classroom and comparing it with the attention spent on task in the indoor classroom.

So that the children could experience all of the identified classrooms, the group was moved to the waldsofa classroom. (Figure 2) The children were asked to identify the corners and the edges of the classroom. A few did this exercise, but as more and more were called upon they went and stood next to their friends instead of identifying a wall or corner.

One of the preschoolers decided to pick up a branch and wanted to build something with it. All of the classmates joined in to build a house. (Figure 2) Although the branches were bigger than they, the preschoolers were aware of each other and of the branches so no one was injured.

Once the house was built, the children were then taken to the hide and seek area. One of the undergraduate researchers was the seeker. The children hid behind logs and in hollowed stumps, either individually or in groups of three to four (the grouping reflective of their indoor classroom behavior). Once found, they would hide again immediately (Figure 2).

This classroom was where the children were allowed to run free because there was a greater visual distance. In this space there were not things to manipulate or move, but the children began to understand their connection to the woods. They also began to explore on their own and were not afraid to.

The first visit to Cooper Woodland was successful. The preschoolers were given an opportunity to go into the woods and personally experience it. In retrospect, the teachers and researchers were very much in control of this visit. However, by the end, the teachers and researchers learned to not be overbearing or overprotective, but to let the children learn and experience on their own.

6.2 Visit 2

The second visit to the woods happened in early February. The day was chilly and the children were again dressed in their winter gear. Another entrance into the woods was used in order to have direct access into the woodland. The paths in the woods were very muddy. This gave the children an excuse to leave the paths.
The children followed the teacher into the woods, and then were allowed to direct where they wanted to go. They initially stayed in groups and were fascinated by the lack of color in the woods at the time. The children, unknowingly, found the log with the deteriorated middle. They were allowed to climb and master the log without the aid of adults. The adults acted as spotters to ensure the safety of the children.

This time, the children were not as timid and were willing to climb the other side of the log which is about seven feet off the ground. (Figure 3) At some points, a preschooler was higher than the teacher could reach. The children learned that they were safe, even if they were not within the reach of an adult.

Some of the preschoolers moved off the log to find another area. They found another fallen log that had made a cave with its roots (Figure 3). Only a couple of children could fit in that space at a time and they were very selective in whom they allowed in.

Next to this log was a puddle of water. The children at first walked around, afraid to get wet. Then one child with boots on, trudged through the water. After that, the rest of the children were splashing and running through the water (Figure 3). Some children stayed out of the water because they did not have proper boots. None of the children immersed themselves in the water; however, when they got to the bus, water poured out of their boots.

During this visit, the children were allowed to explore the woods under their own direction more than the first visit. Because of licensing regulations, the children were always in the appropriate child to adult ratio, which for that age group is 10:1. The children were also always within view of the teachers. The children were never in danger of getting lost, or critically injured at any time.

6.3 Visit 3
The third visit was in March, during a time when there was uncharacteristically warm weather in Muncie, Indiana. Early signs of spring were showing; the golden leaves of the fall had dropped, the rains had created pools in the low areas and the woods had greater visual porosity.

The children were in coats and boots because of the recent wet weather. The children were very excited to be in the woods because it had become familiar to them; several of the preschoolers indicated that this was their favorite place to be. It was obvious to the researchers that the children felt more comfortable with the woods, and that the adults had loosened their control, allowing the children to explore on their own.

The children were asked to look for hiding places and shapes within the woods. Some participated in the exercise, but most were distracted and more interested in playing and exploring. Because of this exercise, the children found an entirely new classroom. The space was marked by fallen logs on three sides; the other side had trees that acted as an open wall. The children stayed in this defined space without really realizing why they were contained in that area.

In this new classroom there was a hiding spot within a tree stump (Figure 4). The children were at first scared of going in, but again, as soon as one of their classmates went in, they all had to try. The same thing occurred when an arch made from a fallen log was discovered. The peak of the arch was at least eight feet tall. As soon as one of the preschoolers climbed to the top, several others had to try (Figure 4). The children also noticed that a log was lying on another log and realized that it could be a teeter-totter.
At the same time, some of the other children had gone exploring. They found an enormous puddle of water. This puddle was exactly where the waldsofa classroom was (Figure 4). The house that they had built with the branches during the first visit was still intact. The children, and a few of the teachers, did not recognize the space as one of the original classrooms because of the large presence of water.

Unlike the previous visit, the children were up to their waists in the water, and some fell in. The forest character that they knew from the previous visits had changed entirely due to the season and the presence of the flood. The same “play” area was entirely different in material and use. Now instead of engaging with soils and leaves, the children were splashing each other in the very same location. By the end, most of the children were soaking wet. This became a bit of a problem when they got back to their indoor classroom. They all had to be changed into dry clothes.

7 FINDINGS AND LIMITATIONS

Because the outdoor classroom experience was similar to a “field trip” it was not possible to consider behavioral response to an “all weather, all day” forest kindergarten. This limited the effect of a forest kindergarten to a couple of hours once a week grossly curtailing the opportunity to fully understand the magnitude of temporal exposure on their spatial preferences.

The childcare teachers were unfamiliar with the idea that the outdoor classroom that was trying to be replicated was not a special event but a normal condition. The trips to Cooper Woodland were often seen as fun and the child had to be good to be allowed to go. In a traditional forest kindergarten, the children are outside no matter what, attendance has nothing to do with behavior.

Teachers’ attitudes and preferences also factored into the experiences in the woods. Some teachers were not comfortable in the forest and this projected onto the children. Because there is not a forest kindergarten in the area, it was difficult for the teachers to grasp the concept of child-led learning. This compromised the data and showed how the next steps in the research would have to include teacher training in forest kindergarten pedagogical methods.

The collected observational data was important in understanding the children’s interaction with the outdoor environment. The behavioral observations and mapping of the children showed how the seventeen three to five year olds recognized space in the indoors and outdoors, and how their unfamiliarity and comfort level with their surrounding environment affected their learning. These observations yielded three distinct design principles that need to be followed when establishing a forest kindergarten.

The first design principle the observational data verified is that children need diversity in spatial settings that seasonally change. The variety of settings allows children to be engaged as individuals as well as in small and large groups. Because of their regulated group size in their indoor classroom, the children struggle in larger groups and by themselves. Without the limitations of group size and with the spatial diversity that occurs naturally in an old growth forest, the children are allowed to self-regulate their activity and engage with friends as desired.

The second design principle addresses the perceived connection between the classrooms in the form of pathways. The outdoor classrooms with Cooper Woodland ranged across 20 acres of space. The running and walking distances between classrooms went beyond 100 meters. The children climbed well above double their height. The “stations” where they played were bigger by a power of 10. During the observations, the transition space between the classrooms became an important place for learning and for gathering. Like a hallway in a conventional school, the transition space or pathway is a place of way finding, direction, and learning.
The duration of play was also grander in scale, shifting from 3 minute intervals to half hour intervals when outside. Whether this was a result of self-regulation or the changing qualities of the woods is not known. Teachers reported that some children had a calmer and longer attention span after the outdoor experience even when they returned to the indoor setting.

The final design principle is that of facilitating deep immersion. Because of the size of Cooper Woodland, the children were able to get immersed in the woods. They were not able to see the subdivisions that are along the edges, they could not hear the cars that were passing by. The teachers’ comfort with deep immersion was paramount to the children’s access to deep engagement with nature. What the children experienced during the deep immersion at Cooper Woodland was the direct sensorial contact with nature that is fundamental to the establishment of a forest kindergarten. When the children walked back to the edge, their immersion would lessen, as well as their free range attitudes.

Taking children to the woods and other native landscapes allows and gives children opportunities to behave in ways that they are not allowed to in regulated settings including playgrounds and classrooms. Because of their visits to Cooper Woodland, their courage and creativity increased as well as the amount of time they spent engaged in exploring whatever they were seeing and doing.

8 CONCLUSIONS
Reflecting on how these “free range” children experienced that hour or two in their day, the scale of unprecedented dimensions is a critical part of the design of forest kindergartens. A couple of acres are the size of one classroom - not several – and those acres are embedded in acres of quiet and solitude. The larger mammals in the woods have similar habitat range. For example, a bobcat needs 25 square miles, so perhaps children are not so unique. Would children with attention problems start to behave differently after their brains had stayed on task for several half-hour sequences? Would our children develop confidence in their “can do” capacity after successfully climbing in places not pre-determined by either a designer or a regulator to be safe? The free range motion of the children in the woods contributes something to their spatial and cognitive development or it does not. That is to be determined in future research.

With the enormous legacy of parks and public lands across North America, land is not the constraining factor. Nor is public or parental will a daunting constraint. The biggest hindrance to giving children access to these kinds of spaces is in the hands of the educators, planners, and landscape architects who contribute expertise to the politicians who make the rules and regulations that govern what kind of environments are suitable and safe for children to grown in.

Access to deep woods experiences are difficult in highly urbanized landscapes especially when the critical impact of those experiences are diminished by the similar benefits children obtain by playing with natural elements like water, trees, rocks or dirt. “...you [do not] need to be in the countryside to be able to [have] a forest kindergarten... It’s true that finding natural spaces can be more challenging [in an urban setting] but it’s vital that children growing up in the city also have access to learn through nature too” (Watkins, 2011, p.3). In the deep urban experience, a forest kindergarten exists in landscapes where children can roam freely, feel empowered and are able to concentrate on whatever they are interested in for hours at a time. A forest kindergarten is a child’s place that is designed and managed by an adult who can slip respectfully into a child’s spatial and temporal reality.

9 REFERENCES


TEMPORAL AGENTS AND THE POWER OF PLAY IN THE BUILT ENVIRONMENT

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1 ABSTRACT
Researchers have long touted the many developmental benefits of physical play for children. More recently, evidence has been accumulating of the importance of play for people of all ages. Some of the documented personal and community benefits of play include improved fitness, greater social cohesion, stress relief, greater creativity and productivity in the workplace and improved interpersonal relations. In order to bring the benefits of play to a greater number of people and communities, designers must begin to explore opportunities for introducing unexpected and limited-duration 'play interventions' in settings where people are otherwise going about their daily routines. Though artists have been at the forefront of this movement, landscape architects are well positioned to understand, allow for, and encourage such interventions in the built urban environment. Designers, artists and community and civic organizations have offered important examples of these principals in action that are worth understanding and emulating. Through precedent studies and reviews of behavioral research, the significance of time-limited and unexpected events and interventions within the urban built environment are presented not only as a topic of design consideration for landscape architects and students of landscape architecture, but also as an urgent contemporary planning issue with greater ramifications for the physical and psychological health of the community.

1.1 Keywords
play, temporal, participatory, interventions, environments
INTRODUCTION

In the spring of 2012, the Parks and Recreation Department of the City and County of Denver announced a competition to create a multi-seasonal, multi-generational play space of the future, replacing a rather ordinary, though much beloved, playground in City Park that had reached the end of its useful life. The competition was called “Re-imagine Play” and invited participants to “challenge currently accepted definitions of play and...re-think play as a unique, multi-faceted experience in an urban, multi-generational space” (Denver Parks and Recreation, 2012). The authors teamed with a talented and inspiring group of designers and consultants to prepare a proposal. Through several rounds of public exhibits and presentations, their team was selected as one of three finalists in the competition. Though not the eventual winners, the experience sparked a deep interest in the role of play in the built environment, as well as the role of the built environment in play. The accommodation of play activities has many fascinating angles to be explored and perhaps one of the most intriguing is the way play can sometimes sneak into our urban environments for a few hours or days when it is least expected. Such ‘temporal interventions’ and their importance to the experience of the built environment are the focus of this paper.

PLAY

A common link among all higher-order animal species is that we play. Much more than a squandering of valuable time, play is a critical developmental process that continues to provide benefits throughout one’s lifetime. Play is also a powerful incentive to increase physical activity, a decline in which over the past several decades has been linked to the growing epidemic of obesity in the United States and elsewhere (Caballero, 2007).

3.1 Defining Play

If we are to view physical activity, and design accommodations for it, through the lens of ‘play,’ it is critical to first establish an understanding of what, exactly, constitutes play. Psychologist Peter Gray offers a suitable definition of play as having five intrinsic components (Gray, 2008):

1. Play is self-chosen and self-directed; players are always free to quit
2. Play is activity in which means are more valued than ends
3. Play is guided by self-chosen or freely-accepted rules
4. Play is non-literal, imaginative, marked off in some way from reality
5. Play involves an active, alert, but non-stressed frame of mind

In other words, play is any activity a person freely chooses to participate in, that is enjoyed for the process more so than the outcome, is bound by rules that the players freely accept, includes some aspect of fantasy or imagination (losing oneself in the moment) and actively engages the mind. As the title of Gray’s article suggests, by defining play more precisely than simply as ‘leisure activities,’ we begin to reveal the many benefits conferred by play. Dr. Stuart Brown, founder of the National Institute for Play, has spent a career studying and articulating the many advantages of play.

3.2 Importance of Play

Research in animal behavior has shown that play is a critical survival tool that teaches sound judgment, recognition of social cues, navigational skills and threat detection among many other lessons (Brown, 2009). For humans, in addition to learning survival and socializing skills, play frees the mind from stress, sharpens thinking skills and problem-solving abilities, stimulates physical activity, enhances creativity, improves learning and counterfactual reasoning (Gopnik, 2012), and perhaps most importantly, imparts a sense of joy and ecstasy that invigorates us physically and mentally to continue to meet life’s challenges. For these reasons, our minds and bodies crave play; in fact, it is an instinctual behavior that does not need to be taught. Play provides what psychologists call ‘psychological arousal,’ which means it incites excitement and ecstasy (Brown, 2009).

Play has its benefits not only for individuals, but for groups as well. For the community, play enhances cooperation and understanding, forges common bonds, builds relationships, promotes inclusion and produces broad-based improvements in physical and psychological health. The individual benefits are multiplied many times over, producing more tightly-knit communities that function more smoothly (Brown, 2009).
3.3 Accommodations for Play

The psychological and social advantages of play and recreational activities have long been recognized by governments and social organizations as critical to a content and productive populace. However, accommodating these play and recreational activities in the built environment has often presented significant challenges to urban planners and landscape architects. The current system of land allocation, which seeks to assign land to ‘optimal uses’ based solely upon economic value creates a conundrum for individuals and communities seeking to improve physical fitness and increase activity levels for the many health benefits such activities provide. As a result, accommodations for play activities in our urban environments have largely been a marginal concern for urban planners. Structures and spaces designed for physical activities often require large areas of land, which is typically unavai

able or far too valuable in the real estate market to be devoted to such uses that do not generate income, particularly in urban centers. The solution all too often is for individual tracts to be ‘set aside’ for use specifically as play or recreational areas. Location is key, however, as studies have shown that physical activity levels increase substantially when opportunities for such are easily accessible and conveniently situated for individuals to take advantage of (Kahn et al., 2002).

Recently, however, the extensive benefits of play have begun to gain widespread traction. Traditionally, of course, what allowances have been made for play have been focused on children’s activities, typically in the form of playgrounds. Though certainly an important niche focus for some designers, urban playgrounds have largely been typified over the past half century by a static and familiar composition of mass-produced play equipment, creating a numbing variety of sameness. Even disregarding the aesthetic indignity posed by such arrangements, it is questionable whether they are even developmentally appropriate for their intended audience (Frost, Wortham, and Reifel, 2012). Furthermore, beyond all these shortcomings, playgrounds are only intended for a small slice of the population; indeed, they are often specifically off-limits to any adults who are not accompanied by children (Newman and Schweber, 2010). The realm traditionally left for the older children and adults has been the recreational fields for organized team sports. Though certainly valuable, these facilities leave much to be desired in the attempt to lure sedentary adults to an active lifestyle. Partially filling this gap is the ‘adult playground’ (Hu, 2012) or fitness circuit. But these, too, are little more than outdoor gyms which offer physical activity without the promise of those powerful attractants, fun and play. A new model is needed in order to bridge the gap between children’s play and adult exercise. After all, play is an important aspect of life at all ages, and given the opportunity and permission to do so, adults will engage in active play.

4 SURPRISE

Perhaps one of the most stimulating reasons for living in any city is the regularity of chance encounters, discoveries and surprises that greet its citizens. Unexpected events, whether sanctioned or unofficial, offer the opportunity for engagement and delight that provide a new lens through which to view and understand the urban environment. Since antiquity, cities have been gathering places where these types of events naturally unfold, allowing for a constantly changing kaleidoscope of uses embedded in a seemingly permanent urban fabric. These time-limited occurrences may have a variable longevity, ranging from a few minutes to a few months, but all are temporary in nature. Given that humans are innately curious creatures with a powerful psychological drive to explore the unknown (Loewenstein, 1994), it is precisely this transitory nature that in many ways makes these events so compelling and so appropriate for urban environments.

4.1 Temporal Agents

All landscapes are, of course, impermanent. Whether it’s the growth and seasonal changes of vegetation or the changing appearance and weathering of materials due to wind, rain and ice, all built (and natural) landscapes are constantly changing, if only at a seemingly glacial pace. The changes of interest here, however, are those that occur quickly, either through an environmental change or a shift in use patterns. Due to their transitory nature, such changes are frequently extremely limited in scope and expense, particularly as compared to more typical construction projects. Yet they are capable of producing dramatic effects, altering the community’s perception of places they may know intimately.
4.2 Precedents

One of the simplest and yet most profound examples of this phenomenon is the weekly event known as ‘ciclovía,’ which started in Bogotá, Colombia in 1976 (Wood, 2007). Translated literally as ‘bicycle path,’ the ciclovía is an official closing of certain urban streets, typically main thoroughfares, to motorized traffic and opening them for the exclusive use of cyclists, skaters and pedestrians. This reversal of the urban transportation routes occurs on a grand scale, transforming some 70 miles of roadway that are typically off-limits to pedestrians into acres of public open space, attracting 1.5 million participants weekly (Kent, 2007). At various points along the ciclovía routes, other group activities are organized, such as dances and aerobic classes. Though the change is relatively simple, involving only a diversion of traffic, the relocation of familiar recreational activities into an unfamiliar setting has the effect of powerfully reframing the urban environment for the participants each Sunday morning.

Many Americans are familiar with the ciclovía concept, as the phenomenon has spread worldwide, often referred to as ‘Open Streets’ in English-speaking countries. As graduate students at Harvard, the authors were frequent participants of one such long-running event in Cambridge, Massachusetts, which opened miles of Memorial Drive along the banks of the Charles River and created indelible memories of the possibilities for urban open space. Other American cities that have successfully implemented ciclovías include Portland, Boulder, San Francisco, Baltimore and Miami.

Temporary physical modifications to a space are another common aspect of temporal events. Farmers’ markets are a fixture of many cities across North America and around the world, transforming otherwise ordinary open spaces into bustling marketplaces for a day or two each week. Similar to the ciclovía, the change is a relatively modest one, implemented on a small scale by many participants in the form of individual stalls or tents. Taken in aggregation, however, the transformation is striking, creating a carnival of sensory experiences. Many farmers’ markets, of course, are a combination of both environmental and use alterations, transforming public streets, parking lots and public squares into urban bazaars.

Other examples of temporal events range from street fairs to concerts, art installations, parades, celebrations, rallies and street performances. The most compelling of these, from the standpoint of community engagement, tend to be those that are participatory experiences, drawing people into unfamiliar or unplanned activities. These offer a break from one’s daily routine that place the participant, if only for a moment, firmly in the ‘here and now,’ detached from the concerns that only minutes earlier may have seemed all-consuming. Such models for temporal interventions offer a glimpse into the possibilities of an urban experience that promises new opportunities for civic interactions.

4.3 Barriers to Temporal Interventions

Unfortunately, despite the success and popularity of many of these temporal agents there are numerous obstacles to bringing such projects to reality. The legal and procedural barriers to temporal interventions are often burdensome and can vary widely from city to city. Indeed, these events appear to be a decidedly local phenomenon, with some cities hosting many dozen such events each year, and others hosting few, if any. Some of the barriers faced by organizers include lengthy ‘event permit’ application processes and requirements, insurance / liability concerns, security concerns / need for police detail, objections from civic groups, private property rights, etc. There are often also physical barriers to temporal interventions, which may include inadequate pedestrian and bicycle accommodations and dangerous vehicular traffic. Of course, there are also organizational impediments, such as lack of funds or material resources.

5 NEW APPROACHES

Despite the many obstacles, temporary interventions are still far easier to implement than more "permanent" urban improvements and there are some groups that are successfully navigating these barriers to create vibrant, though temporary, urban environments that offer additional opportunities for urban play.

The vanguard for this new thinking about play at all ages is composed largely of interactive urban artists and designers who are rethinking contemporary means of civic engagement and personal experience. Sometimes working within the established channels of local governance and at other times working around them, they are creating some of the most compelling and inviting urban experiences to be
seen in many years. These designers seem to have a keen understanding of human curiosity and motivations, tapping into our deep-seated need for fun.

The temporary nature of their works have allowed for the freedom to direct their energies not towards the building of static objects and the challenges that come with constructing large-scale ‘permanent’ designs, but rather towards the creation of more meaningful and purposeful ways of engaging the public. Inviting participation with their works, the designers devise playful opportunities for powerfully transformative collective experiences.

6.1 Participatory Interventions

An invitation to play is often all that’s needed to bring people together to participate in a collective activity. Daily Tous Les Jours, an interactive design firm based in Montreal, Canada specializes in creating irresistible invitations to play. One such piece is “21 Balançoires,” a temporary installation consisting of 21 swings set on a wide, empty median, surrounded by vehicular traffic. But these were no ordinary swings; each was equipped with an LED light on the underside of the seat that was activated only when the swing was in motion. Further, each swing played a musical note in response to the motion. The piece was conceived as a participatory game, producing melodies out of the seemingly random sounds when participants synchronized their swinging with that of their neighbors (Daily Tous Les Jours, 2012). In the end, the experience is a journey of discovery, first inviting participation through the novelty of swinging in a median, which in turn invites others through the beacon of moving lights and finally inducing cooperation amongst friends and strangers to create musical melodies. It is an ingenious and irresistible trail of clues that leads the community to work together to unravel the mystery and meaning of the piece.

A similar project, the “Sit and Spin Shanty,” designed by the artists’ collaborative Art Shanty Projects, recalls that beloved toy of childhood vertigo, the Sit ‘n Spin. The artists created an adult-sized version for groups of friends and strangers. Installed in the winter season, it was part of a series of twenty interactive art installations scattered along the shores of a Minnesota lake. The oversized egg-shaped structure features a central table inside the egg with a wheel that participants must operate in order to physically spin the structure. According to the artists, this rotation generates “heat through activity and potentially light through the capture of rotational energy” (Roff et al., 2012). Here, participants again discover that communication and physical cooperation are needed to bring the piece to life. The apertures in the walls of the structure allow for changing views as one spins, while from the outside, passersby can witness changing patterns of light emanating from the spinning eggs.

Some of the most transformative temporal agents, however, go beyond the moment to live beyond their intended span. The temporal agent becomes a catalyst for more permanent change, in effect. Collectively, these short-term interventions that are inspiring long-term change have become a movement known as ‘Tactical Urbanism.’ One prominent example of this is the Better Blocks Project, a variety of temporal intervention on a grander scale that seeks to transform an entire city block. Started in Dallas in 2007, this movement relies on volunteers and donated materials to temporarily transform derelict and poorly-functioning urban streets into a more vibrant and attractive version of urban life. A recent example was a project in San Antonio in 2012 that transformed a disused segment of West Commerce Street into a viable pedestrian environment. Through the addition of temporary seating, park areas, bike lanes, cafes, musical entertainment and pop up shops, they successfully created a vibrant neighborhood for a single day (Better Block Project, 2012). Perhaps most promising about this movement is the aspect of play that it introduces to the urban environment; both the creation of the Better Block and the enjoyment of its fruits are forms of imaginative adult play. Experiments such as this likewise point toward future opportunities to improve urban living through both time-limited and permanent changes. In fact, some cities, such as New York and San Francisco are trying to learn the lessons of these interventions by creating programs that allow for the creation of experimental urban spaces, with the most successful of these being funded for more permanent build-out (San Francisco Planning Department, 2009). Although they are typically only in place for a matter of days or hours, some of these initiatives have resulted in permanent changes to the blocks they sought to revitalize, in the form of new businesses and municipal investment in street furnishings and infrastructure (Better Block Project, 2012).

6.2 Exploratory Interventions

An alternative to the participatory intervention is one which simply invites people to follow their natural curiosity and explore an unfamiliar landscape. On such piece is “The Gates,” by Christo and
Jeanne-Claude, which was a site-specific temporary art installation consisting of 7,503 saffron-colored fabric panels mounted on posts along 23 miles of paths in New York’s Central Park in 2005. The gates altered the familiarity of Central Park, seemingly creating a different, unrecognizable place. Attracting visitors by the tens of thousands, it invited exploration, including at night, which itself is an unusual experience for many urban parks. The design was intended to be viewed in motion, rather than as a static object, in order to give the full experience of the ever changing play of light and shadow against the billowing fabric and varying backdrops of the park (Christo & Jeanne-Claude, 2005). It highlighted a meandering path and created a sense of a “golden ceiling” as one walked beneath. This project offered a template for ways to not only engage visitors, but to also engage their environment.

Similar in effect but quite different in execution, the interactive works by Howeler + Yoon, architects by training, have garnered much attention for using modern technology to create unique and playful environmental pieces. One of their early projects, commissioned for the 2004 Olympic Games in Athens, was entitled “White Noise White Light.” The piece is a site-specific installation that sits on a plaza directly beneath the Acropolis. Consisting of a gridded field of 400 fiber-optic “stalks” that were custom designed with sensors capable of detecting the distance of visitors, the stalks would illuminate and produce sounds through hidden speakers as the motion of the visitors was detected. As visitors moved away from the piece, the sound and light dissipated. This created a heightened awareness of the presence of others within the field and a poetic play of motion and sound effects, depending upon the variable movement of people though the space. The designers intentionally designed their installation to be juxtaposed against the historic Acropolis to create a dialogue about the past and future, with one architecture fixed in time and the other set in motion by human interaction (Yoon & Howeler, 2009).

7 FUTURE DIRECTIONS

Presuming that this trend in temporal interventions continues and grows, one question must be asked: what role, if any, is the landscape architect to play in promoting public health and welfare through temporal agents and the encouragement of play activities? Perhaps the most important factor here is the education of design students, who are the next generation of designers, in the understanding of these events and elements in the built environment. If nothing else, landscape architecture is ultimately an exercise in the ordering of relatively uncontrollable elements; temporal agents are simply one more variety that needs to be accounted for and accommodated to varying degrees. There are clearly some public spaces that are more amenable to these activities than others, allowing for them to co-exist with the normal day-to-day functioning of an urban environment without presenting impediments to the normal ebbs and flows of movement.

Streets, sidewalks, alleys, parking lots, parks, plazas and vacant land are among the many public spaces already in abundance in every urban environment that can offer opportunities for temporal interventions if designed appropriately. The totality of this space potentially provides a powerful democratizing force for the distribution of temporal agents and play opportunities in cities. Understanding the dynamics of temporal agents will allow landscape architects to better accommodate them in the design of our public spaces, as well as apply the lessons learned from them to the design of more permanent features. Looking forward, the increasing availability of play for all ages in our urban environments is an imperative for reasons of psychological, physical and community health. Temporal play agents provide an important low-cost, low-risk laboratory for the testing of urban play concepts that landscape architects need to be mindful of in creating built spaces. A constantly changing field of research invites designers and public entities to create, as well as allow for, more opportunities for temporal interventions that make play a part of each person’s daily life.
8 REFERENCES


THE COGNITIVE PLAY BEHAVIOR AFFORDANCES OF NATURAL AND MANUFACTURED ELEMENTS WITHIN OUTDOOR PRESCHOOL SETTINGS

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1 ABSTRACT
Considering the significance of natural environments for children’s mental and physical development, outdoor preschool settings can be critical resources in providing chances for daily contact with nature. Based on Gibson, affordances are functional properties of the environment that suggest specific behavioral options to individuals. Through the application of affordance theory, this study aimed to explore how the physical environment features of two outdoor learning environments composed of a variety of manufactured and natural settings, can afford cognitive play behavior of children. Additionally, the research intended to extend knowledge relating to the association of naturally designed outdoor preschool settings and children’s cognitive play behavior. Through behavior mapping of 62, four-to-five year old children, 471 data points were collected. The results revealed the significance of natural elements in affording all five types of cognitive play behaviors. Natural loose elements had considerable potentiality in affording constructive, dramatic and exploratory play behaviors. In contrast, manufactured fixed elements mostly afforded one type of cognitive play behavior: functional. Exploratory play was the least afforded type of behavior within both outdoor preschool setting which suggests the increase of implementing natural features affording discovery and engaging play opportunities. The results of this study points out the reconsideration of implementing manufactured fixed elements that mostly afford a one-dimensional cognitive function for children. The findings also accentuate the importance of integrating natural elements that can be shaped, explored, and experimented by children in outdoor preschool settings, while providing them daily opportunities to acknowledge nature and develop a sense of stewardship.

1.1 Keywords
affordance, outdoor learning environment, cognitive play behavior, natural elements, manufactured elements
2 INTRODUCTION

Humans have a strong physical, mental, and spiritual connection with nature, explained with theories such as Biophilia (Maller, Townsend, Brown, and St Leger, 2002). Direct contact with natural outdoor environments enables children to develop a bond between themselves and nature (Kahn and Kellert, 2002; Kellert, 2002), while having many positive effects for child development (Freuder, 2006). However, current children in U.S. are growing disconnected from nature’s healthy benefits (Louv, 2005). In fact, urbanization has reduced nature-based recreation (Van den Berg, Hartig, and Staats, 2007) and contact opportunities with natural elements for children (Rivkin, 1990).

On the other hand, while today’s children have limited time for outdoor play and contact with nature spaces (Cosco, Moore, Thigpen, Verzaro- O’Brien, and Mendel, 2005), the physical features of outdoor learning environments are not corresponding to children’s appeal for diverse, stimulating learning environments (Fjortoft and Sageie, 2000; Francis, 1998). The association between the type of equipment and its assembly on children’s behavior and experience has been recognized by designers (Frost and Campbell, 1985). Several studies have explored the relationship of various outdoor environments on children’s play behavior (Frost and Campbell, 1985; Frost and Klein, 1983, etc.). However, these studies mostly focus on the association of outdoor equipment on children’s behavior, without considering the impact of the various existing attributes of the play environment (Kytta, 2003). Additionally, most of these studies have concentrated on school–age children, not providing adequate insight on preschool children’s environmental requisites (Hart & Sheehan, 1986).

2.1 The Affordance Theory

Gibson (1979) describes affordances as functional properties of the environment that suggest specific options to the individual. He explains that Individuals understand information by perceiving the relation between objects, and happenings, space layout and their abilities. Heft (1988) explains how describing and analyzing environments based on their functional significance alters the way we see and perceive the environment. Differentiating environmental features based on functional variation would be a more meaningful approach in terms of a psychological perspective. The taxonomy of outdoor environments based on their functional attributes can provide a standard form-based organization that has a psychological value (Heft, 1988). If specific environmental attributes can be related to children’s behavior, we can identify practical or pedagogical importance of the relationship between physical environment global quality and children’s developmental status (Kontos et al., 2002).

To understand the functional properties of an environment, the environment-behavior relationship can be explored associated with the type of occurred activities. Heft (1988) explains how each activity can be defined in relation to some functional characteristics of the environment, referring to the particular individual. In other words, each activity is conjunct with some affordance. Object classification based on their functional attributes distinguishes which of them have the same type of property, while differentiating objects that are usually considered similar but differ in terms of their functional properties (not all trees afford climbing). Hence, this taxonomy distinguishes objects based on functional properties than form (Heft, 1988).

Few studies have implemented the affordance theory to explore functional properties of the physical environment for children. For instance, the results of the study of 143, 8 to 9 year old children in Finland by Kytta (2002) revealed rural villages to have higher potentialities in affording social behavior than city environments. Rural environments also revealed a high potentiality in providing children’s play affordance. In another research by Kytta (2003), children were interviewed about their perceived affordances, focusing on children’s memories, perceptions, and activities. The interview was concerned about where the affordances were perceived, and to what extent children utilized them.

Sandseter (2009) conducted a qualitative research through observation and interview on risky play affordance of two type of Norwegian preschool playground (natural and traditional) based on Gibson’s theory of affordance. The results indicated natural playgrounds to afford higher risky play opportunities, compared to the traditional settings. In another research conducted by Cosco’s (2006), three childcare centers with diverse outdoor play environments were compared in terms of the physical activity affordance. The results from a sample size of 90 preschool children suggested diverse play areas, and natural elements to be more stimulating for children’s physical activity.

These examples points out how the concept of affordance can be applied to recognize functional properties of the physical environment. However, to date no research has systematically identified specific
environmental attributes affording cognitive play behaviors for preschool children. Complementing existing environment-behavior research, this study will focus on how the physical environment attributes of preschool outdoor settings composed of natural loose, natural fixed, manufactured fixed, toys and cycling elements can afford various cognitive play behaviors for young children. The following section will briefly define cognitive play behavior and how it can be coded through observation.

2.2 Cognitive Play Behavior

Play provides opportunities for developing cognitive skills. Studies have shown that children can learn “vocabulary, language skills, concepts, problem solving, perspective taking, representational skills, memory, and creativity” through directed or free play (Zigler and Bishop-Josef, 2006, p.22). Cognitive play is associated with a child’s a cognitive approach and ability to interact with the environment (Schaefer, Gitlin, and Sandgrund, 1991). The importance of recognizing afforded cognitive play behaviors within the environment can be interpreted through the implied interrelation of children’s cognitive development traced through play (Belsky and Most, 1981; Cornett, 1998; Farmer-Dougan and Kazuba, 1999; Malone, Stoneman, and Langone, 1994). Research indicates that poor cognitive development in children does not result from genetic but lack of learning experiences (Feuerstein, 1979), accentuating the significance of providing adequate learning opportunities for children in their associated spaces. Nevertheless, most of what is known about cognitive development is unexpected and without a scientific qualification (Flavell, 1992).

Design interventions can supplement educational procedures to contribute children with academic and learning difficulties, or disorders to learn effectively (Cornett, 1998). To extend knowledge about cognitive play behavior in relation to learning environments, the current study is intended to explore how children’s interaction with the physical attributes of the outdoor learning environments can associate with children’s cognitive play behavior. Through identification of special attributes of the environment stimulating cognitive play behavior, preschool outdoor environments can be designed to enhance children’s exploration, discovery, problem solving, and interaction with the environment, and subsequently cognitive development.

One of the major sources of knowledge is based on Piaget (1962). Based on observation he classified play behaviors into three successive stages: practice play, symbolic, and game with rules. Following that, Smilansky (1968) clarified Piaget’s categories and labeled them as: functional, constructive, dramatic, and game with rules. More recently, Rubin (2001) has enhanced this scale through incorporating the exploratory play behavior. This study will employ Rubin’s cognitive play behavior hierarchy described as:

a) Functional play- Simple repetition of muscle movement, with or without objects. Functional play is concerned with repeated actions that are not always associated with other objects (Reifel and Yeatman, 1993).

b) Constructive play- Constructive play is where the child links previous knowledge of functional play to manipulate objects towards a direct goal, which can be construction or creation (Cornett, 1998; Rubin, 2001).

c) Explorative play- Exploration can involve the whole body movement supporting children’s physical, social, and cognitive development (Pellegrini, Horvat, and Huberty, 1998). Exploratory play is an indication of the current level of cognitive functioning, and environmental learning, correlating with cognitive development (Belsky and Most, 1981).

d) Dramatic play – When meaning in play is detached from particular immediate representation of objects, persons, and circumstances constructive play evolves to a de-contextualized development termed as imaginative play (Belsky and Most, 1981). Dramatic play is the discovery of new situation and characters through implementation of language, concepts, symbols, gesticulations, and emotions (Wardle, 2000) to represent objects or words (Cornett, 1998).

e) Games – with – rules- Games-with-rules is the final stage of development in which specific rules with associated meanings involve the play behavior (Reifel and Yeatman, 1993). The development of practice and symbolic play are necessary for the learning and development of children reflected in the acquisition of the game with rules stage (Rubin, 2001).

f) No Play- coded during on looking, transitional, conversation, or unoccupied play behavior.

Several studies have applied this hierarchy to study children’s cognitive play behaviors within outdoor environments. For instance, Campbell and Frost (1985) observed 45 second-grade children’s
cognitive play behaviors in traditional and creative playgrounds. The results indicated game with rules, and then constructive play to be afforded the least type of behavior in both playgrounds. In addition, the traditional playground afforded the most game with rules opportunities. Similarly, Henninger (1985) employed Smilansky's cognitive play categories to compare three-to-five year old children's outdoor and indoor play. The results suggested equipped and stimulating outdoor environments to have certain advantages in supporting specific types of play. Pack and Michael (1995) also compared the cognitive play behavior of 30 five-year-old children within outdoor and indoor environments through Rubin’s categories. The results displayed children’s tendency to engage in functional play within outdoors more than indoors. The researchers assumed this result to be associated with the available play structures such as slides, climbing structures, etc. Additionally excessive motor activities were not acceptable from teacher due to safety.

Although such studies have been conducted to explore children's cognitive play behaviors, there is a requirement to study the functional constituents within outdoor learning environments that afford cognitive play behaviors. Based on a design perspective, it is necessary to understand what type of elements can afford which type of cognitive play behaviors, and which elements have more potentialities in affording these behaviors. In this way, children's abilities can be amplified through interacting with these elements in play environments. Cosco (2006) has categorized children's interaction with elements as: a) Fixed: such as pole, platform, trellis, bench, manufactured play structure; b) Natural – fixed: such as shrubs, trees, large rocks; c) Natural-loose: for instance flowers, sand, dirt, leaves; d) Toys: such as truck toys, dolls, shovels; e) Wheel: such as tricycle, cart, scooter. This study will focus in detail the extent natural loose, natural fixed, manufactured loose, toys, and wheel elements can afford different types of cognitive play behaviors.

3 METHODE

The purpose of this study was to determine the cognitive play behavior affordances of various elements in outdoor preschool settings. To address this purpose, the study pursued one main question: How do elements within a diverse outdoor environment afford different type of cognitive play behavior? The results of this study will provide an insight towards the type of cognitive play behaviors afforded in particular environments by certain elements. Through this understanding, we can enhance the opportunities for various cognitive play behaviors through the application of predefined elements.

For this study, two preschool settings were purposefully selected. The reason for this selection was due to the complexity and variety of elements existing in the associated settings, contributing to understanding the difference between elements. The playgrounds of these preschool settings have been designed by “Natural Learning Initiative” team to function as an “Outdoor learning environment.” Center 1 referred to as Bright Horizon's SAS preschool, is located in Cary, NC. The playground was composed of various play settings, although based on school policy different age groups play in a certain area. The focused setting for this study was composed of plenty of climbing or fruit trees; bushes; pergola; wooden platform; movable boxes; graded garden plot; bicycle track around the grass and a storage area for bicycles. Center 2, called “First Environments” preschool, is located at Durham, NC. This site was also combined of various settings and elements. The areas under study included trees, hill, two sand-play areas, a combined manufactured play equipment, swings, a gazebo, a music wall, many toys, bicycles, and scooters. The environments consisted of grassed, dirt, or paced circulation surfaces.

Data were collected from 62, 4-to-5 year olds during recess, using the behavior mapping technique. Through this technique, the unit of analysis is not the individual children, but the actualized affordances provided by the elements (Cosco, Moore, and Islam, 2010). Prior to the data collection, the research methods, and parental consent forms were reviewed and approved by Institutional Review Board (IRB). Parental consent forms were printed and given to each child, and simultaneously emailed to all four to five year old children's parents. The consent forms allowed the researcher to observe and occasionally capture photos from children.

Each center was observed twice, with observation sessions conducted during morning outdoor playtime (center 1 session = 50 min, center 2= 60 min). The outdoor play environments were divided into particular observational zones, with a specified location in each zone to stand and observe. The procedure included a 15-second for observing, and 20 second for recording each child’s behavior.

The observation procedure consisted of a systematic circulation of the observer through the playgrounds based on pre-defined zones. The observer coded for each observed child’s cognitive play
behaviors, gender, and the type of interacting elements during play (such as pole, tree, bike, etc.). For this paper the calculations regarding gender was not taken into consideration.

Each observational data point was later recorded in Geographical Information System (GIS) program. The data was then exported into SPSS program and analyzed for descriptive and crosstab statistic. Additionally, the type of elements were further congregated into manufactured fixed, natural loose, natural fixed, toys, and cycling devices (Table 1). Descriptive analysis allowed comparison of elements in relation to their afforded cognitive play behaviors. Observed cognitive play behaviors were considered as dependent variables, while the types of elements were recognized as independent variables. Correlational analysis was conducted to examine the association between the type of elements and afforded cognitive play behaviors. In some instances, chi square analysis could not be employed due to low cell values.

Table 1. Examples of Grouping Elements into Categories

<table>
<thead>
<tr>
<th>Examples of Elements</th>
<th>Manufactured-Fixed</th>
<th>Natural Fixed</th>
<th>Natural Loose</th>
<th>Toys</th>
<th>Cycling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Play structure, green tube, swings, gazebo, climbing structure</td>
<td>Tree, bush, boulder, tree trunk</td>
<td>Stone, dirt, sand, leaves, stick, creatures</td>
<td>Shovel, bucket, dolls, rope</td>
<td>Scooter, bike</td>
</tr>
</tbody>
</table>

4 RESULTS

Through behavior mapping observation 471 data points were collected (SAS=234, and FEELC=237). Figure 1 presents the resulting GIS maps illustrating the distribution of these data points in relation to the site attributes.

![Figure 1. Behavior Mapping Results of FEELC and SAS](image)

In general, 33 types of elements were recorded during children’s play. Initially, elements were compared in terms of their cognitive play behavior affordances. Compared to other elements, children were highly observed during functional play within the pathways. The results indicated play boxes, pathway, bikes, tree, grass or dirt, and woodchip surfaces to significantly afford higher functional play opportunities, compared to other elements (p<0.01, df=33). Sand had the highest capability to afford constructive play (p<0.01, df=33). Compared to other elements, adjustable pipes afforded a recognizable number of constructive and exploratory plays. Dirt and grass, sticks, and toys were the most potential
elements in affording imaginative play. Finally, grass or soil, play structure, and platforms were the most potential elements in affording game with rules play behavior. In general, grass or soil, pathway, and sand significantly afforded more cognitive play behavior interactions compared to other elements. In addition, manufactured fixed structures were coded for functional, imaginative, game with rules, and no-play play behaviors (p>0.05, df=6).

To examine the relationships between the type of elements and cognitive play behaviors with a more generalized approach, the elements were classified into natural loose, natural fixed, manufactured loose, manufactured fixed categories (Figure 2). Table 2 compares different category of elements in terms of their cognitive play behavior affordances. Table 3 displays the percentage each category of elements afforded a type of cognitive play behavior. Chi square analysis was not conducted to compare these results as some cell values were lower than five.

![Figure 2. Results comparing different type of elements in terms of cognitive play behavior affordances. Diagram by authors](image)

### Table 2. Percentage of Afforded Cognitive Play Behaviors within Cognitive Play Behaviors.

<table>
<thead>
<tr>
<th></th>
<th>Functional</th>
<th>Constructive</th>
<th>Exploring</th>
<th>Imaginative</th>
<th>Game.W.R</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manu_Fixed</td>
<td>20.8</td>
<td>0.0</td>
<td>11.1</td>
<td>30.2</td>
<td>39.6</td>
<td>24.7</td>
</tr>
<tr>
<td>Nat-Fixed</td>
<td>9.4</td>
<td>0.0</td>
<td>22.2</td>
<td>7.5</td>
<td>0.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Nat-Loose</td>
<td>0.0</td>
<td>85.5</td>
<td>38.9</td>
<td>28.3</td>
<td>12.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Toy</td>
<td>7.3</td>
<td>14.5</td>
<td>0.0</td>
<td>34.0</td>
<td>18.8</td>
<td>8.6</td>
</tr>
<tr>
<td>Cycle</td>
<td>15.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.1</td>
</tr>
<tr>
<td>None</td>
<td>47.4</td>
<td>0.0</td>
<td>27.8</td>
<td>0.0</td>
<td>29.2</td>
<td>63.4</td>
</tr>
<tr>
<td>Sum</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Table 3. Percentage of Afforded Cognitive Play Behaviors within Category of Elements.

<table>
<thead>
<tr>
<th></th>
<th>Functional</th>
<th>Constructive</th>
<th>Exploring</th>
<th>Imaginative</th>
<th>Game.W.R</th>
<th>None</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manu_Fixed</td>
<td>39.2</td>
<td>0.0</td>
<td>3.9</td>
<td>15.7</td>
<td>18.6</td>
<td>22.5</td>
<td>100</td>
</tr>
<tr>
<td>Nat-Fixed</td>
<td>58.1</td>
<td>0.0</td>
<td>25.8</td>
<td>12.9</td>
<td>0.0</td>
<td>3.2</td>
<td>100</td>
</tr>
<tr>
<td>Nat-Loose</td>
<td>0.0</td>
<td>56.6</td>
<td>16.9</td>
<td>18.1</td>
<td>7.2</td>
<td>1.2</td>
<td>100</td>
</tr>
<tr>
<td>Toy</td>
<td>24.6</td>
<td>14.0</td>
<td>0.0</td>
<td>31.6</td>
<td>15.8</td>
<td>14.0</td>
<td>100</td>
</tr>
<tr>
<td>Cycle</td>
<td>96.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>3.3</td>
<td>100</td>
</tr>
<tr>
<td>None</td>
<td>52.3</td>
<td>0.0</td>
<td>5.7</td>
<td>0.0</td>
<td>8.0</td>
<td>33.9</td>
<td>100</td>
</tr>
</tbody>
</table>
As displayed in Table 2, functional play was mostly afforded when children were interacting with manufactured fixed, or no elements. The results suggested the presence of natural loose elements to be highly associated with children’s constructive play. Imaginative play was highly observed when children were interacting with manufactured fixed and toys. Considering hard surfaced pathways as manufactured fixed elements, the results indicated game with rules to be mostly observed when interacting with these elements.

Table 3 implies manufactured fixed, natural fixed, toys, cycling devices, and interaction without any elements to be mostly potential in affording functional play compared to other types of cognitive play behaviors. In addition, natural loose elements appeared to be mostly applied for constructive play. In addition, descriptive statistics imply toys to be highly affording imaginative play. The results point out functional play to be afforded the most (40.3%), and exploratory play the least (7.5%) type of cognitive play behaviors (p<0.001, df=5).

5 DISCUSSION

To date, some studies have compared the relationship between children’s cognitive play behavior and different type of play environments (Henniger, 1985; Hart and Sheehan, 1986; Pack and Michael, 1995; Sanders and Harper, 1976, etc.). On the other hand, some researchers have applied the concept of affordance to explore how outdoor environments can afford physical activity levels (Fjortoft and Sageie, 2000; Cosco, 2006), socialization (Clark and Uzzell, 2002), self-regulation (Korpela, Kytta, and Hartig, 2002), or independent mobility (Kytta, 2004). However, additional research is required to configure how specific elements incorporated in outdoor learning environments can afford different types of cognitive play behaviors. This research attempted to extend knowledge in terms of understanding the afforded cognitive play behaviors supported by various elements within outdoor learning environments for young children.

Due to time and budget limitations, the observation sessions in this study were limited, suggesting future studies to strengthen the results through comparing multiple sites and conducting adequate observation sessions. Furthermore, it has to be into consideration that this research was conducted in only two early childhood settings and in a period of time, with specific children. Hence, different children or contexts may report non-equivalent results (Einarsdottir, 2005).

The results of this study are consistent with previous research suggesting defined pathways to have considerable functional play behavior affordance for young children (Moore, 1986; Cosco, Moore and Islam, 2010; Striniste and Moore, 1989). This potentiality may be a consequence of their flat and relatively smooth surface (Cosco, 2006; Cosco et al., 2010; Heft, 1988; Kytta, 2002) which afforded tricycle riding, running, etc. Additionally, as suggested by previous research (Cosco, 2006; Cosco et al., 2010), the curved pattern of the pathways may have contributed to children’s attraction into engaging in functional play behaviors. However, supporting previous research (Cosco et al., 2010) the results displayed a decreased level of functional play behavior on soft surfaces such as sand, woodchips, or soil compared to hard asphalt coverings. It can be assumed this quality is partially related to the fall observance, softness, and malleability dirt and sand possess, stimulating a sense of safety (Moore and Wong, 1997; Striniste and Moore, 1989).

Contradictory with previous findings (Campbell and Frost, 1985; Fjortoft and Sageie, 2000) which imply manufactured fixed elements to afford the least cognitive play behavior affordances, the results displayed these fixed structures to afford different types of cognitive play behaviors (functional, imaginative, game with rules, and exploratory). This can be explained by pointing out that the play structures in these two preschool settings were composed of different complex and engaging elements, affording gathering, exploring, climbing, pulling, hiding, or movement opportunities. This is in accordance with the results of the study by Moore (1985) and Monore (1985) suggesting children’s preference for compound play structures than isolated items. However, future research on different types of play structures and cognitive play affordances can contribute to the accuracy of this finding. Additionally, the results confirm previous studies (Frost and Klein, 1983; Moore, 1985; Wolley and Lowe, 2011) that manufactured fixed equipment mainly develop children’s functional play behaviors.

The observational findings from this study accentuate how combining manufactured fixed elements with natural settings and elements (water, sand, etc.) can enrich play setting, affording various developmental opportunities for children. Confirming previous research (Bixler, Floyd, and Hammut, 2002; Fjortoft and Sageie, 2000; Lester and Maudsley, 2007), natural settings enabled children to engage in constructive, exploratory, and imaginative play behaviors. Supporting Moore and Wong’s (1997) research,
the findings of this study points out how vegetations, trees afford functional, imaginative, exploratory play behavior (hiding, holding, climbing, etc.). The results also supported Moore (1986) and Sandseter’s (2009) results on how trees and vegetation can afford climbing, hiding, exploration, and fantasy play. As suggested by designers (Hart, 1979; Marcus, 1998), the existence of climbable fruit trees and bushes in playground settings stimulated functional and exploratory play behavior through stimulating children’s sense of curiosity. The climbable trees provided lookout opportunities, while adding to the variety, challenge, and complexity of the play setting.

Educational settings can be more appealing through the application of manipulative components or loose parts (Moore and Cosco, 2010). In fact, comfortable and less stressful environments possess elements that are soft or stimulate touch like sand, dirt, or water, called “loose parts” (Weinstein, 1987). Manipulative environments allow children to change, and engage in problem solving, while developing their imagination abilities (Johnson and Hurley, 2002). While this opportunity is not afforded in most built environments, research indicates that play environments that contain high amount of loose parts stimulate cognitive, social-cognitive and cognitive – motor play (Moore, 1985). Previous studies by NLI (2007) have reported how adding loose element such as toys can enhance children’s dramatic play and interaction. In support of prior findings, the results implied loose element such as sticks, toys, or dirt to be mostly potential in affording imaginary play. Loose elements provided opportunities for alteration, interaction and understanding their environment, developing imaginative and creative play (Woolley and Lowe, 2011).

Natural settings provided a variety of “loose parts” that enabled children to shape their environment, developing their creative and constructional cognitive abilities (Fjortoft and Sageie, 2000; Moore, 1985; Moore, 2003; Moore and Wong, 1997; Weinstein, 1987). Confirming the findings of Woolley and Lowe (2011), loose parts had the highest constructive and imaginarily play affordance and helped children to create imaginative spaces, elements and stories (Moore and Wong, 1997). For instance, the findings accentuate sand’s manipulative quality to enhance children’s opportunities to shape, pour, mold, move, and dig this element. Consistent with Moore and Wong’s (1997) finding sand noticeably afforded constructive and exploratory, and imaginative play. The results confirmed previous findings (Moore and Wong, 1997; Weinstein, 1987) that manipulative and less structured materials, such as sand, boxes, and pipes can afford greater variety of imaginative and games with rules play behavior. Interestingly, game with rules was mostly afforded by manufactured fixed, and toy elements.

Research indicates six to seven year-old children to be more engaged in game with rules behavior (Pack and Michael, 1995; Rubin, Fein, and Vandenber, 1983). Consistent with previous literature (Campbell and Frost, 1985; Pack and Michael, 1995), game with rules play behavior was one of the least afforded cognitive play behaviors. Recognized as manufactured fixed elements, the results suggested platforms, dirt surfaces, and play structure to have a high potentiality for this behavior. Platforms have been previously recognized as multi-purpose game settings, which provide opportunities for look out (Moore, 1989; Moore and Wong, 1997). Based on the observational results, these platforms offered flat, smooth surfaces that children gathered, compromised, and developed rules. In some instances, the platforms were combined in their games as a target point. In addition, the complexity of the play structure may have stimulated games in children. Children were observed, hiding, chasing, and developing self-initiated games, while interacting with the play structure. They also enjoyed running and chasing friends over the open grass or dirt surface. In support of Ozdemir and Corakci’s (2010) findings, the results suggest the requisite of adequate open spaces to stimulate game with rules.

Interestingly, children were observed interacting with no elements during many functional play behaviors. This stimulation may be associated with the environmental characteristics that promote children’s activities. As Cosco (2006) suggests, the variety, complexity, and responsiveness of the physical environment can promote children’s physical activity levels. While functional play is essential for children’s health and was the most afforded play behavior in the environment, children require stimulation to engage in higher levels of cognitive play, such as game with rules, which are not adequately provided by the outdoor learning environments. Further research is required to understand elements, contexts, and conditions that promote this type of play.

6 CONCLUSION

Children will learn and play more effectively in engaging places that can be created through landscape architecture. Through the application of natural elements, outdoor preschool environments can be designed in such ways that stimulate children’s sense of exploration, wonder, and imagination.
Nonetheless, despite the current attention for combining natural elements within children's daily outdoor experience, the potentiality of these elements in affording cognitive play behaviors within educational settings is less acknowledged.

The data from this study contribute to a growing body of environmental behavior research that attempts to explain the significance of incorporating natural elements within outdoor learning environments to increase children's opportunities for development. In general, elements such as fruit trees, compound play structures, sand, dirt, vegetation, grass, and trees offered considerable cognitive play behavior affordances. The results indicated how the flexible and complex quality of natural elements provided a variety of cognitive play behavior affordances that was more engaging for children than manufactured fixed elements. Natural fixed elements offered chances for exploratory and functional play behavior, while affording natural props for children's constructive, imaginative, fantasy play. Future research with different contexts and multiple observations is required to address how various outdoor learning environments with different design characteristics and elements afford cognitive play behavior. Further longitudinal research will also be beneficial to explore if daily interaction with natural elements can directly support children's cognitive development.

7 REFERENCES


THE SUBURBAN THRESHOLD AND THE POTENTIAL LINK TO COMMUNITY SOCIABILITY

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1 ABSTRACT
The suburban form has been the subject of much criticism over the past decades. Designers point to its lack of aesthetics and monotony (Dunhan-Jones and Williamson, 2009; Tacheiva, 2010), while medical professionals point to its link to obesity (Strum and Cohen, 2004) and American’s waning mental condition (Jackson and Tester, 2008). As designers we ask questions and examine the suburban context for clues that might shed light on why this form of development creates such negative consequences.

Existing research on community sociability focuses on “sense of community” (Brown and Croppe, 2001; Kim and Kaplan, 2004; Lund, 2002) as the key measure and explores the influences of the landscape context on social interactivity. Surveys of residents are the instrument of choice when investigating the potential relationship between a community’s landscape and the reported sense of community. This paper looks at a separate measure, “knowing,” to evaluate the level of community present in a neighborhood. Knowing, for the purposes of this study, is defined as the ability of one person to identify another.

This paper reports the results of a research project that was conducted in the Phoenix Metro area, exploring the “threshold’s” influence on knowing within the suburban context. The condition of the threshold was calculated based on its transparency or level of visual access to the public from within the residence. A survey was conducted on two neighborhoods within the Phoenix Metro area with varying degrees of threshold transparency to determine the level of knowing present.

1.1 Keywords
suburbs, sociability, community, knowing
2  SUBURBAN CONTEXT
The suburbs, a form of development generally characterized by garage dominated homes and reliance on the automobile (Dunham-Jones and Williamson, 1995; Tachieva, 2010), is now the home to over 50% of Americans (Dunham-Jones and Williamson, 1995: Girling and Helphand, 1996, p.8). This form of development has been highly criticized by designers and medical professionals for its contribution to many ailments typically associated with the American lifestyle, such as “...obesity, hypertension, non-insulin-dependent diabetes, colon cancer, osteoarthritis, osteoporosis, and coronary heart disease” (Ewing and others, 2003). A growing body of research is being undertaken to study a potential relationship between the built environment and the decline in the American’s health. In their study looking at this connection, Reid Ewing and others (2003), found an increased rate of obesity and hypertension amongst residents of sprawling communities and were able to draw a direct relationship between decreasing density and increasing Body Mass Index. Richard J.J. Jackson and June Tester (2008), suggest this link between the environment and human health, or “gene-environment interactions,” extends to mental health and requires additional research which they believe warrants Psychiatry to assume a new role in environmental design.

The decline in sociability, the desire or capacity for social interaction, has been measured across the American population in McPherson, Smith-Lovin, and Brashears study on social networks (2006). Sociability is on the decline in America due to many of the factors, particularly acute in the declining size of social networks from a mean of 2.94 confidants in 1985 to 2.08 in 2004. This study also found 10% of the respondents surveyed in 1985 reported that they had no confidants whereas the 2004 results found nearly 25% without a single confidant. Neighborhoods are also less likely to be the source of confidants, a decrease of 3% over 20 years, marking a measurable decline in neighborhood sociability (McPherson, Smith-Lovin, Brashears, 2006). Reduced sociability is a cause for concern due to the link between social interaction and sense of well-being. Social engagement within a community induces “…positive psychological states, including a sense of purpose, belonging, and security, as well as recognition of self-worth” (Kawachi and Berman, 2001). Social ties are particularly important for the elderly as the loss of their social network over time can lead to depression. A second demographic, women, have greater psychological need for social ties (Kawachi and Berman, 2001). With clear links between social interaction and mental and physical health, it is imperative that environmental designers look for methods to encourage interaction within communities.

3  SUBURBAN ISOLATION
Neighborhood sociability is the “…aggregate to those aspects of local, place-based, social engagement…” (du Toit and others, 2007) or the combination of environmental factors that contribute to opportunities for social interaction. While it is true that people have varying needs for social interaction and the suburbs may well be social enough for many, the issue of loneliness is of growing concern for suburban dwellers, particularly among stay-at-home mothers and elderly women (Cooper-Marcus and Sarkissian, 1986, p.186-188). Cooper-Marcus and Sarkissian note in their book, Housing as if People Mattered, “…suburban houses for sale have become increasingly ‘private’ over the past few decades – with floorplans changing from living rooms and large picture window at the front in the 1940’s and 50’s to living or family rooms at the back of the house facing onto a private patio or garden...” (Cooper-Marcus and Sarkissian, 1986, p 67).

A number of factors may have contributed to the changing social dynamics over the decades, arguably harming neighborhood based social interaction. Arnold and Lang suggest the increase in vehicular traffic along with the noise and pollution generated from the vehicles led to a fleeing of social interaction from the front porch to the interior of the home (Arnold and Lang, 2007). This movement to the interior of the home may also be the result of the advent of the air conditioner. Prior to central air being included in the FHA loan program in 1957, people congregated outdoors in the summertime to escape the trapped heat inside their homes (Gammage, Grady, 2003, p.19). Grady Gammage Jr. points to the invention of the air conditioner as the primary cause of Phoenix’s decline in sociability (Gammage, Grady, 2003, p.36), an idea echoed by Girling and Helphand who add the popularity of the television and the automobile to the trio of social detractors (Girling and Helphand, 1996, p.26). It may also be that the movement of the garage to the front of the home led to a drastic reduction in the aesthetic of the front yard social context, thus reducing the desire to spend time in these spaces. The number of garages has risen dramatically, from one half of all households in the 1970’s to approximately three quarters of all...
households today (Friedman and Krawitz, 2005, p.154). This represents a dramatic decrease in the aesthetic of suburban street scenes over the past 40 years.

The decline in neighborhood sociability can be attributed to a number of other factors, many of which do not appear to have foundations in environmental design. American’s embrace of communication technology has led to the simultaneous turning of attention inward, away from our immediate community, while turning outward, toward the national and international community (Rivlin, 1987). This phenomenon is likely more exaggerated today with the ubiquity of personal computers and our ability to communicate instantly and globally. Social networks and commerce have moved away from local contexts as have our workplaces and family structures (Rivlin, 1987), leaving the local context to act as mere storage of our existences. Hal Looney, Vice President of Shea Homes Arizona argues that the transient nature of American culture is the most critical factor in the reduction of neighborhood sociability. He believes that a family new to a neighborhood will find comfort in the home and wish to surround themselves with the family, shying away from the new community of strangers (H. Looney, personal communication, July 7, 2011). This notion is supported by the Systemic Model of urbanization impacts on human interaction as described by Richard Adams (1992). He states, “The more stable the neighborhood and the longer people live there, the more likely they will develop locally based social networks, be satisfied with their neighborhood…” (Adams, 1992). Other potential factors include “outmigration”, “change in family structure” including divorced parents and children who spend time in two households, and the fact that the “…automobile has extended horizons for people beyond their immediate areas, providing a wider range for shopping, visiting, and recreation” (Rivlin, 1987). The question de-localization presents for design professionals is: do we embrace isolation and design for this new paradigm or do we design to reestablish localism and neighborhood sociability?

4 INTERACTION AND HEALTH
To better understand the potential environmental design has to positively impact neighborhood sociability, it is important to gain a foundational understanding of the psychological principles of social interaction. The most understood phenomenon of social psychology is “suggestion,” the response to certain environmental factors which may encourage an interaction (Klineberg, 1940). Jan Gehl describes this phenomenon in his book Cities for People saying, “studies from all over the world illuminate the importance of life and activity as an urban attraction. People gather where things are happening and spontaneously seek the presence of other people” (Gehl, 2010, p.25). Whether a person responds to a suggestion is determined by two factors, categorized by Heider (1958) as either dispositional or situational. Dispositional responses are interactions attributed to a personality trait whereas situational responses are interactions attributed to an environmental condition (Heider, 1958 in Solomon, 1978).

This paper focuses on the ability of design to facilitate social interaction through interventions in the situation or environment. Particularly in context of community social behavior, homes and communities designed without visual access to activity may not contain the phenomenon of suggestion, or the lack of visual access to the social context of suburbia will negate the potential positive suggestions of engaging in social behavior.

5 MITIGATING SOCIAL ISOLATION
This paper proposes a new framework for evaluating the potential link between the indoor use patterns and neighborhood sociability. The term Threshold, for the purposes of this study, is defined as the barrier that separates a household’s interior spaces from the public exterior. This may be commonly referred to as the façade of the home; however this paper extends this barrier beyond the notion of a flat representation of the front elevation, understanding that the Threshold may at times also include portions of the side elevations and potentially rear elevations. This paper also qualifies the Threshold in terms of its Transparency, or the degree to which a homeowner has the ability to control access, both physically and visually. Transparencies include doors, windows, garage doors, and side gates. Combining these terms creates a new measure of a homes potential for providing social suggestion. Threshold Transparency is found by determining the percentage of time (recorded in decimal format) a family unit utilizes an indoor space adjacent to the Threshold and multiplying it by a Transparency factor related to the condition of window or door treatments. Specifically, a room with a transparency that faces a public space, which is usually covered by blinds or drapes, receives a multiple of 1 whereas a transparency that is usually uncovered receives a multiple of 4. A Likert scale employed in a research instrument, either through
observation or survey, describes this varying degree of transparency. This method allows researchers to describe the location of a family’s indoor activity and the transparency of the room using a single comparable measurement.

6 METHOD FOR EVALUATING LINK

This paper explores a pilot study to explain the potential difference between a typical suburban home built in the 1990’s with very little threshold transparency and a suburban home built in the mid-century with picture windows and a higher threshold transparency to determine the affects this environmental condition has on suburban sociability. To create an effective approach for evaluating the link between threshold transparency and sociability, this paper first reviewed previous literature for potential research method case studies. These case studies provided this paper with direction and narrowed down the methodologies to two methods with the highest likelihood of successfully demonstrating the existence of the hypothesized link. The two most promising methodologies reviewed were an observation method designed by Suminski, R. Petosa, E. Stevens (2006) and a survey method designed Du Toit and others (2007). Each of these methods was adjusted for the specific research intent of this paper and employed. Both methods provided insight into the functional differences in social quality of neighborhoods of varying threshold transparency; however, the survey method shows greater promise for further study of this issue going forward.

6.1 Threshold Transparency Method: Neighborhood Selection

In order to find a potential relationship between the suburban threshold and the level of social activity occurring in a neighborhood, this research determined that the general framework in which to study this phenomenon was to compare neighborhoods with varying threshold design conditions. This study was conducted in Maricopa County, the most populous county in the State of Arizona. Prior to selecting study neighborhoods, an analysis of potential variables was completed to determine the potential factors which may impact the social condition of the neighborhood. Demographic factors relating to sociability considered in this research were average age, racial make up, ethnicity, average income, and length of residency. As this research relied on US Census Block Group data for demographic information, average length of residency was not included in the neighborhood selection criteria; however, this factor is presumed to be critical in evaluating and comparing neighborhoods and is discussed further in the results analysis portion of this paper. To ensure the study neighborhoods selected were comparable in every aspect within the control of this research, it was determined that selecting a base line demographic character to guide the selection of neighborhoods would allow elimination of much of the study region. This included ensuring that the study neighborhoods were relatively similar in demographic conditions, eliminating any differences in sociability that may differ between racial, ethnic, or income groups. The demographic character was based on the average makeup of Maricopa County in age (33.3 years of age), race (73% white), ethnicity (29.6% Hispanic), and household income ($55,223) (MAG Demographics, 2011). Utilizing US Census Block Group data, accessed through Maricopa Area Governments website (geo.azmag.gov/maps/demographic), blocks were identified as which met those demographic characteristics similar to the whole of Maricopa County. As the data available is provided in ranges, each category was defined as follows:

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Maricopa Average</th>
<th>Analysis Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>33.3 years of age</td>
<td>30-46 years</td>
</tr>
<tr>
<td>Race</td>
<td>73% white</td>
<td>56-85% white</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>29.6% Hispanic</td>
<td>12-45% Hispanic</td>
</tr>
<tr>
<td>Household Income</td>
<td>$55,223</td>
<td>$52,000-$72,000</td>
</tr>
</tbody>
</table>

Once Census blocks were identified to be within the acceptable range of demographic characteristics, neighborhoods within these blocks were evaluated based on a second tier of characteristics that might potentially impact sociability. Proximity to open space and elementary schools was identified as a baseline geographic reference for neighborhoods where some degree of walking could be assumed to be present. Neighborhoods that met demographic and geographic criteria were further evaluated to provide this research with a varying degree of threshold transparency. The threshold character of the homes in each neighborhood was first reviewed utilizing Google Maps and Bing Maps
“bird’s eye” imagery functions. This technology allowed the researcher to view the threshold condition for dozens of neighborhoods, easing the process of selecting neighborhoods with varying degrees of garage dominance. Neighborhoods were narrowed down to 12 potential sites which were visited in person to evaluate their potential candidacy for inclusion in the study. From this analysis, 3 neighborhoods were selected; one neighborhood in the City of Chandler which was found to be a garage dominated suburban development, and the second neighborhood in the City of Scottsdale which was found to be dominated by picture windows with garages attached to the side of the living space. A third neighborhood in Chandler was selected as a trial neighborhood where research methods could be tested prior to implementation in the two primary study neighborhoods.

The first neighborhood studied, Blakeman Ranch, was built in 1997 and 1998 by Morrison Homes, and located in Chandler, Arizona. This neighborhood can be described as garage dominated with the presence of 2 and 3 car garages located in front of the primary living spaces of the home. Homes generally face toward the rear of the lot and do not provide a high number of opportunities for threshold transparency. The homes range from 1779sf to 2660sf on a typical lot size of 6900sf with approximately 115’ in lot depth and 60’ in lot width. The front setback for this community is 17’ from back of sidewalk; however, living spaces are generally located 38’ from back of sidewalk. In the remainder of this paper, this neighborhood will be referred to as “1990’s Neighborhood”.

The second neighborhood studied, Scottsdale Estates 10, was built in 1960 by Hallcraft Homes, and located in Scottsdale, Arizona. This neighborhood can be described as a picture window community with the presence of large windows commonly demarking the location of the home’s family room. Garages for Scottsdale Estates 10 vary from single car carports to 2 car garages. Three car garages are not present. These homes generally face toward the street with a high number of opportunities for threshold transparency. The homes range from 1161sf to 1764sf on a typical lot size of 7396sf with approximately 97’ in lot depth and 70’ in lot width. The front setback for this community is 22’ from back of sidewalk which matches the location of living space. In the remainder of this paper, this neighborhood will be referred to as “1960’s Neighborhood”.

6.2 Measuring Sociability

The measure for sociability utilized in this study is “knowing” which establishes a respondent’s level of familiarity with their neighbors (du Toit and others, 2007). Knowing is described by du Toit and others (2007) as a component of social capital along with “feeling connected to the community, and trust.” In previous studies, knowing has been linked with proximity, finding that the closer a respondent is physically to a neighbor the more likely they are to know each other (Greenbaum and Greenbaum, 1985). This paper uses the measurement of knowing as an indication of the level of sociability present within the community. It is assumed, for the purposes of this study, that in order to gain familiarity with a neighbor to the level of “knowing”, a more than fleeting social interaction must be present.

6.3 Threshold Transparency Method: Observation

Using Suminski and others (2006) Block Walk Method as well as Zeisel’s (2001) recommendations for observation methods as a foundation, the researcher developed an observation method tailored to evaluate the social condition of the suburban context. There were several deviations from Suminski’s Block Walk Method allowing for a better cohesion with the specific questions being researched for this study. Similar to Suminski, this research utilized a walking method which allowed the researcher to observe neighborhood behaviors in their natural context. In order to avoid the “Hawthorne Effect,” Zeisel (1981) recommends that observers “…develop tasks to do while observing so that they can blend into the setting more easily.” For this reason, smart phone applications proved to be effective tools in conducting research, specifically the voice recorder application allowed for simple voice notations which could be written at a later time, a metronome application, listened to through an earpiece, assisted the researcher in keeping a specific pace, and the appearance of the researcher being a pedestrian having a conversation on a phone allowed the researcher to maintain unobtrusiveness.

The challenge for this research was to become nearly invisible so that a study of natural behaviors could be observed, free from influence by the researcher or as Zeisel (1981) describes the variability of intrusiveness. For the purposes of determining the degree of social activity occurring in a community context, it is critical that the observer not engage with the subjects in any manner that may alter their activity pattern. In order to get a clear view of the activity within a neighborhood, it was necessary to
become a recognized outsider (Zeisel, 1981). Observation will have some affect to be sure; however, minimizing this impact was a goal of this research design.

Observations occurred on three weekdays and one weekend day per neighborhood at varying times of the day. Monday, Wednesday, Friday, and Saturday were selected to provide a cross section of weekly neighborhood activity. Similarly, the hours of observation were selected to provide a cross sectional view of a days neighborhood activity. Mondays were observed between 10am and 11am, Wednesdays between 3pm and 4pm, Fridays between 5pm and 6pm, and Saturdays between 11am and 1pm. Similar to Suminski, this research regulated the “observation field” (Suminski and others, 2006), only recording activity which occurred within an imaginary place extending from the observers shoulders. Unlike Suminski, however, this research was interested in all visible neighborhood activity. Where Suminski stopped observing at the back of the sidewalk, this research observed and recorded all activity from the residential threshold on the right to the residential threshold on the left including within the public right of way. This revision from Suminski allowed the research to include any activity occurring in an open garage, on a driveway, on a front porch, or within a front yard.

The researcher recorded information related to the activity being performed, the number of people involved, the location of the activity, the approximate age of the actors, and the sex of the actors. Activities were typically categorized as walking/jogging, biking, sitting/leisure, playing/sports, chores, work, checking mail, and arriving/leaving by car. The number of people engaged in the activity together provided an indication of the level of social interaction witnessed in the neighborhood. The location of the activity allowed the researcher to understand how the neighborhood is being used by residents, categorized as being located in an open garage, on the driveway, in the front yard/turf, in the front yard/non-turf, front porch/patio, sidewalk, street, park, and park furniture. The approximate age of the actors was determined by the researcher through assumption and categorized as 5 years and under, 6 years to 12 years, 13 years to 17 years, working age adult, and retired age adult. These age ranges were determined to correspond to significant life stages. The sex of the actor was also recorded by researcher assumption except for the case of infant actors who were recorded as Undetermined. The results of the observation phase of this study were coded for analysis and the results of this research are discussed in more detail in the next section of this paper.

6.4 Threshold Transparency Method: Survey

For this paper, a research instrument was designed with a goal of determining the respondent’s level of knowing within the community. Surveys were first administered as “face to face interviews” (Marans, 1987) as the researcher went door to door filling in the answers provided by the respondent. Homes that were not available for an interview were later canvassed with a “self-administered questionnaire” (Marans, 1987) in a stamped business reply envelope. Simple random sampling of the study population was achieved through this survey as it was distributed to every household within the two study neighborhoods providing every resident of the neighborhood an equal opportunity to take part in the survey (Marans, 1987). Sample size was limited for this study as there was not a high rate of return on the canvassed surveys or a high willingness to participate in an interview:

<table>
<thead>
<tr>
<th>Survey Method</th>
<th>Rate of Participation</th>
<th>Neighborhood</th>
<th>Sample %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td>1 in 15</td>
<td>1990’s</td>
<td>6.6%</td>
</tr>
<tr>
<td>Self Reported</td>
<td>1 in 16</td>
<td>1960’s</td>
<td>6.0%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1 in 23</td>
<td>1990’s</td>
<td>4.2%</td>
</tr>
<tr>
<td></td>
<td>1 in 19</td>
<td>1960’s</td>
<td>5.1%</td>
</tr>
<tr>
<td></td>
<td>1 in 9</td>
<td>1990’s</td>
<td>10.7%</td>
</tr>
<tr>
<td></td>
<td>1 in 9</td>
<td>1960’s</td>
<td>10.8%</td>
</tr>
</tbody>
</table>

The questions asked were broken up into four categories: demographic character of residents, feelings toward the home and neighborhood, space utilization within the home and community, and the level of neighbor knowing. Demographic questions included ascertaining the number of people residing within the home, their age category, their race and ethnicity, and their length of residency. These questions help the researcher ensure the study population matches the demographic character of the data obtained from Maricopa Area Government (2011). The specific question of length of residency was important as this data was not available through the US Census Block Data and has previously been
shown to be a significant factor in neighbor knowing (Sampson, 1991). Questions about the feelings toward the respondent’s home and neighborhood were asked to determine if there was a relationship between the qualitative notions of community and the level of neighbor knowing. Space utilization allowed the researcher to determine the percent of time each respondent spends in indoor and outdoor spaces and determine the location of these spaces and how they relate to the public right of way. Space utilization also asked about the treatment of the threshold transparencies, allowing the researcher to determine the actual level of visual access a home has to the street.

The final category of questioning on the survey related to the level of neighbor knowing the respondent has. The survey asked respondents to review an image of a typical neighborhood lot with adjacent homes and determine their familiarity with the people living at the adjacent residences. The adjacent homes were labeled A through E, A being the home to the left of the respondent, B being the home across the street and to the left, C being the home directly across the street, D being the home across the street and to the right, and E being the home directly to the right of the respondent. The respondent was asked to select from three options for each home shown,

- I know all of the people at this home
- I know some of the people at this home
- I know none of the people at this home.

If no home was present, as might be the case for a home that fronts open space or is on a corner lot, the respondents were instructed to leave the answer blank. The findings from this survey are discussed in the following section of this paper.

7 FINDINGS

7.1 Observation Findings

The observation phase of this study found an equal amount of social interaction occurring in the view of the public right of way in both study neighborhoods. Over the four day observation for each neighborhood, the 1990’s neighborhood had 26 people engaged in an activity as a group and 16 people engaged in a solitary activity whereas the 1960’s neighborhood had 26 people engaged in an activity as a group and 19 people engaged in a solitary activity. Of those engaged in a social activity, there was a noteworthy difference in the sex of the participants. In the 1990’s neighborhood, 16 of 26 actors were male and in the 1960’s neighborhood, 15 of 26 actors were male. There was also a marked contrast between the 1990’s neighborhood and the 1960’s neighborhood in the location of activity. The 1990’s neighborhood exhibited a majority of activity in either the driveway or in an open garage, 13 instances on driveways and 10 instances in open garages, whereas the 1960’s neighborhood exhibited a majority of activity in the street, sidewalks, and driveways, 14 instances in the street, 10 instances on the sidewalk, and 12 instances on the driveways. The types of activities recorded in each neighborhood also provided an interesting contrast. The 1990’s neighborhood exhibited a higher level of leisure activity, 10 instances recorded, versus the 1960’s neighborhood which only had 3 instances recorded. The 1960’s neighborhood did have a higher level of recreational activity, exhibiting 5 instances of walking and 6 instances of biking versus the 1990’s neighborhood which only exhibited 2 instances of biking.

The results of the observation phase did not demonstrate a correlation between the threshold transparency and the level of social activity exhibited. Both the 1990’s and 1960’s neighborhoods recorded the same number of social interactions. The differences in activities recorded and the location of these activities between the two study neighborhoods can not be linked to the condition of the threshold and may be due to other environmental or social factors not studied in this paper. While this research method did find a contrast between these neighborhoods in the level of physical activity, it does not demonstrate an ability to reveal the level of sociability exhibited in the neighborhood.

7.2 Survey Findings

In order to generate a comparable number that would reflect a homes threshold transparency, the percent of time spent in a room with opportunities for threshold transparency was multiplied by the level of transparency that room actually has toward the public right of way. The survey asks respondents to determine the percent of their families waking hours spent in each room of the home. Respondent’s
answers were recorded in decimal format in a spreadsheet. The survey also asks respondents to determine the degree of transparency each room that faces the street demonstrates. A list of rooms within the home was provided followed by the question:

Of the rooms in your home that have windows that face the street, how are those windows treated?
   a. Always covered
   b. Often covered
   c. Often uncovered
   d. Always uncovered

Respondents would then mark either a, b, c, or d adjacent to the rooms listed, providing the researcher with knowledge of the rooms in the house that had adjacencies to the threshold and the condition of their transparency. A Likert scale was established from 1 to 4, 1 being “Always covered” and 4 being “Always uncovered”. This number was then multiplied by the percentage of time spent in those rooms to generate a threshold transparency figure for each room in the house. The numbers from each room were then added together to find the threshold transparency figure for the entire house.

The survey also determined the respondent’s familiarity with their neighbors by asking them if they knew the members living in each of their neighboring households. They were shown a map of a typical home and asked to categorize their knowledge of their neighbors as:

I know all of them
I know some of them
I know none of them

Answers to these questions were coded on a scale from 0 to 2, 0 being attributed to households the respondent knew none of, 1 being attributed to households the respondent knew some of, and 2 being attributed to households the respondent knew all of. The five responses were then averaged to determine the respondents “knowing factor”. On average the respondents of the 1990’s neighborhood scored a .75 knowing factor whereas the 1960’s neighborhood scored a .95 knowing factor. The residents of the 1960’s neighborhood do indeed know their neighbors more than those living in the 1990’s neighborhood but the reasons were not immediately clear.

The knowing factor was graphed (y) with the respondent’s threshold transparency figure (x) to determine a potential relationship between the threshold and knowing. The first graph exhibited no relationship as all sectors of the graph were inhabited by respondents. Some respondents residing in the 1990’s neighborhood demonstrated a high degree of knowing and some respondents residing in the 1960’s neighborhood demonstrated a low degree of knowing regardless of their threshold transparency. A second graph was created looking for relationship between knowing (y) and length of residency (x). This resulted in a clear relationship, confirming findings of prior research that the longer an individual resides in a neighborhood; the more likely they are to know their neighbors (Sampson, 2001).

The relationship between length of residency and knowing revealed a new question that could be answered through analysis of these research findings. If length of residency was limited to 10 years, eliminating the data from those who had lived in a neighborhood longer, could a relationship be found between a homes threshold transparency and neighbor knowing amongst newer residents? A third graph was created limited to 10 years of residency with knowing factor (y) and threshold transparency figure (x). This third graph does begin to demonstrate a relationship with an upward trend line. It appears the more transparent a homes threshold is the more likely the residents are to know their neighbors; however the low number of respondents in this study results in inconclusive findings. This potential relationship may also be due to a number of other environmental factors that were not considered for this study, such as the distance the home sits from a sidewalk or the amount of shade cover in the neighborhood. Future studies on threshold transparency should attempt to remove these additional environmental factors, and better isolate the threshold as the only independent variable.
7.3 Recommendations for Future Study

This research resulted in an inconclusive relationship between the threshold transparency and neighbor knowing. Further studies on this topic should focus their attention on surveys instead of observations as the observation phase of this research was unable to provide any relevant data. The survey design for this research was useful in looking at a number of demographic and environmental factors related to neighborhood sociability; however, the small sample size was detrimental to the findings.

The results of this research were limited to two neighborhoods with a combined total of 158 households. To receive a larger pool of respondents this survey would need to be sent or administered to a much larger study group. This research only achieved a 10% rate of response, leaving this researcher to assume that this survey would need to be broadened to expect a more conclusive sample size. The next step in this research would likely be to extend this survey to include two entire Census Blocks with varying degrees of threshold transparency. This would create a larger sample size and would also generate demographic characteristics more in line with the Census data.

8 REFERENCES


RESEARCH AND METHODS

Edited by Byoung-Suk Kweon
GREENROOF PERFORMANCE STUDY: PUGET SOUND REGION

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1 ABSTRACT

Green roof infrastructure is rapidly becoming a hallmark of sustainable building strategies in the U.S. and globally. Well known as a community that supports urban sustainability issues, the city of Seattle is increasingly promoting green roof infrastructure through regulatory and incentive based development strategies. The University of Washington Green Roof Performance study was initiated to assess the hydrological performance of extensive green roof infrastructure for the Seattle metropolitan region. The study evaluates continuous hydrologic data from five (5) experimental panels (600ft² each) to determine the capacity of extensive greenroof design strategies to alter the quantity and timing of runoff during storm events. Through one year (March 2011 through February 2012) of data collection, the panels retained 30 – 56% of all precipitation. During the regionally dry months (July and August) the panels retained 95 – 99% of all precipitation. However during the wet season performance dropped considerably with retention rates ranging from 28 – 55%. As expected, peak volumes and delay were strongly correlated to soil moisture conditions; however, during the most common storm events (0.01” – 0.25”) peak volumes were reduced 66 – 87% and median peak delays ranged from 2 to nearly 4 hours.

1.1 Keywords

green roof, performance monitoring, stormwater, retention, environmental benefits
INTRODUCTION

Green roof (also known as eco roof and vegetated roof) infrastructure is rapidly becoming a hallmark of sustainable building strategies in the U.S. and across the globe. While this design strategy is not new, it is only in the past two decades that green roof technology has emerged as a mainstream roofing option in North America and the U.S. Pacific Northwest. Each year since 2004, the industry has realized a significant increase in new projects (GRHC, 2012). A recent review of an industry leading green roof database (greenroofs.com, accessed August 21, 2012) contained more than 1,300 projects from 39 states and 25 countries, a total area of nearly 10 square miles.

Commonly categorized as extensive (2-6” soil depth) or intensive (>6” soil depth) there is wide variation in the strategies and characteristics of green roof design. Intensive green roofs, with a greater soil depth, support a wide variety of garden and planting options including planter boxes and trees. Often accessible to visitors and residents, this roof type generally requires a relatively high level of maintenance and is structurally engineered to accommodate increased load requirements. In comparison, extensive green roofs generally cover a significant portion of roof area with vegetation, are relatively light-weight, and, depending on the vegetation used, have low maintenance requirements.

The ecosystem services of green roof infrastructure have been widely disseminated in the infrastructure and environmental performance literature (see Oberdorfer et al., 2007 for a full review). In particular, extensive green roof types have been found to extend the life span of roofing materials (Saiz et al., 2004), decrease ambient temperatures and building energy consumption (Wong et al., 2003; Niachou et al., 2001), and provide habitat for insect and avian species increasing biodiversity in urban areas (Lundholm, 2006; Gedge, 2004).

Arguably, the primary benefit of green roof infrastructure is its capability to mitigate the impact of stormwater on drainage infrastructure and receiving bodies of water (Oberdorfer et al., 2007; Mentens et al., 2005). Rapid runoff from roof and other impervious surfaces in urban and urbanizing areas can exacerbate issues of flooding and degrade the water quality of urban waterways. Like other low impact development strategies, green roof infrastructure has the capacity to retain precipitation, and delay the release of excess water (Lundholm and Peck, 2008; Moran et al., 2003). Much of the hydrological performance research conducted on this infrastructure type reveals that overall; runoff reduction varies widely by region and design. However, roof performance consistently reveals a net gain in rainfall retention, a reduction in peak runoff volumes, and a delay in runoff timing during storm events (Mentens et al., 2005). Each is important for mitigating the impacts of stormwater runoff for urban drainage infrastructure. However, regionally-specific data examining green roof performance is necessary to influence local development policy (Getter and Rowe, 2006; VanWoert, 2005).

The University of Washington Green Roof Performance study (GRP) was initiated to assess the hydrological performance of green roof infrastructure for the Seattle metropolitan area. Well known as an urban region that supports environmental health and sustainability issues, the city of Seattle and the jurisdictions that comprise its greater metropolitan area are increasingly supporting green roof infrastructure through regulatory and incentive-based development strategies, and over the past decade have generated an impressive resume of green roof projects. In 2010 the Seattle area was in the top 10 U.S. metropolitan regions constructing green roofs by area (GRHC, 2012). A recent survey of green roofs in the city of Seattle identified 62 buildings have existing green roofs (extensive and intensive combined), with a total area of nearly 360,000 ft² more than 6 American football fields (McIntosh, 2010).

While the number of green roofs in the area continues to expand, few regional studies have been implemented to assess their hydrological performance. One recent study examined the percent runoff and peak flow reduction of three green roof structures in Seattle over a three year period. Their findings reveal a high degree of seasonal variation in runoff depending upon moisture conditions in the soil. When wet, some samples had negligible retention results with runoff nearing 100%; however, in dry soil conditions the study plots retained 70% or more of the total precipitation and reduced peak runoff by up to 53% (Cardno TEC, 2012). Another study examined the performance of five green roofs in the city ranging from 2 -8” substrate depth over an 18-month period. Cumulative runoff mitigation for these roofs ranged from 65% to 94% well above the common percentages found with volume reduction from extensive green roofs (Ganges, 2007).

This paper presents the data collected for runoff retention, detention, and flow timing for five (5) extensive green roof design strategies in the Puget Sound Lowland region. The data is presented as a cumulative response for a 12-month period (Section 5.1) and more specifically is analyzed for seasonal
variations (Section 5.2), and in terms of individual storm events (Section 5.3) taking wet/dry soil conditions, and performance based on the intensity of storm events measured by volume of precipitation into account.

3 MATERIALS AND METHODS

Located in the Northwest corner of the continental United States on the shores of Puget Sound, the climate of the Seattle Metropolitan region is temperate marine with mild, wet winters and warm, dry summers. Nicknamed the Emerald City due to the native coniferous forests that dominate the surrounding region, the area is known for its cloudy and wet weather. While the region does record more than 300 days of cloudy or partly cloudy weather annually, the total precipitation each year is approximately 38", less than other metropolitan areas in the U.S. such as New York (49.9") and Atlanta (50.2"). While the total amount may be relatively low, the pattern and intensity of daily and seasonal precipitation is important. There are on average more than 150 days annually with significant (>0.01 in) precipitation, yet on average only 1.8", is received in the summer (July/August). Thus, 95% of the annual precipitation is received during the other 10 months of the year (Mass, 2008).

The test site is located in Maltby, Washington, approximately 16 miles to the northeast of downtown Seattle. Constructed on top of an equipment shelter (100’ x 30’) [2% northfacing slope] the roof is divided into five panels, each with an area of 600 ft$^2$. Each panel drains to an individual roof drain system and flow monitoring station. Each test panel contains a distinct green roof system design – single-layer, multi-layer, and tray – with a slight variation in soil depth and plant palette (Figure 1). Four of the five panels (A, C, D, and E) are proprietary green roof systems developed by green infrastructure and roofing companies working in the region. In contrast, Panel B was designed and installed as a single-layer system to provide a design alternative to the multi-course and tray systems. Each of the test panels contains similar soil compositions. While proprietary mixtures were used on four of the five panels all contain less than 15% organic matter by volume. The plant composition on three of the panels (A, D, E) is composed entirely of sedum species with 100% coverage across the entire area. Panel C contains a mixture of sedum species and grasses (Carex spp.). During the testing period the panel increased from 85% to 95% coverage. Panel B was originally planted sparsely with native grasses and groundcovers and was further vegetated by volunteer species during the testing period.

3.1 Equipment and Research Design

A automated weather station is installed on the site to record meteorological parameters including ambient air temperature, relative humidity, and wind intensity and direction. A HOBO data logging rain gauge (Model RG3) is used to collect precipitation. Soil moisture probes (OnSet EcH20) were installed in 4 of the 5 test plots and calibrated twice over the study period. The precipitation tipping bucket, soil moisture probes, and weather station data is collected at 5 minute intervals.

Runoff data is collected using calibrated tipping buckets (Hydrological Services America TB1L) set to record total tip counts at 15-minute intervals. The tipping buckets are linked to the data logger with OnSet pulse adaptors. Data is stored on a HOBO mini-data logger system and manually downloaded at 2 to 4 week intervals. A control panel, also 600 ft$^2$, is located on top an adjacent building with a single-ply thermoplastic polyolefin (TPO) roof system. Stormwater runoff is collected from the control using an identical collection and logging system as the test panels.
Use of the tipping buckets for measurement of stormwater discharge has been reliable, although a unit did crack and data for one panel (C) for the period between the crack and installation of a replacement were discarded. Further the pulse adaptor for the control failed and was replaced. Runoff quantity and rate during the failure and replacement period for the control was determined by data collected during the rest of the collection period. We make the assumption that the rate and percent-runoff for each event does not vary significantly as the available data was consistent.

Continuous monitoring of the green roof test panels was initiated in December 2010 and for the control in February 2011. For the purpose of this study, we have selected a 12-month timeframe from March 2011 to February 2012. Over the period of study 129 independent rain events were recorded. Independent rain events are defined as periods of precipitation separated by 12 or more hours.

Soil moisture probes (OnSet EcH2O) were calibrated and inserted into four of the five test panels. The probes are used to determine soil conditions at the outset of a storm for classification (±0.00 mV) as a
“wet” or “dry” rain event. Nearly 85% of the cumulative sample of events is classified as wet. Of the 44 analyzed events 66% (29) are wet events. Each of the selected events is also analyzed for peak volume and delay. Peak volume is simply determined by the greatest number of tips per 15-minute interval for each storm event. Delay is determined by comparing the difference between time-to-peak for the control panel and each of the test panels.

4 ANALYSIS AND DISCUSSION

The analysis is structured into three categories – annual, seasonal, and individual storm events. Annual represents the entire period of collection, seasonal evaluates the performance characteristics in seasonally wet and dry periods, and individual assesses the capacity of these roof designs to provide stormwater retention for regionally common (<0.25”), substantial (0.25 – 1.25”) and more intensive (>1.25”) storm events. The data for each of these categories is analyzed by percent-retention and peak reduction and peak delay is analyzed for the individual sampling of events.

4.1 Annual

Over the 12-month span of continual testing, 43.7” (111.01 cm) of precipitation (rain) was collected in 129 individual storm events. Nearly 65% (82) of those events recorded less than 0.25" of precipitation. Only 5 (3%) of the recorded events was greater than 1.25", the greatest of which being 2.96" over a 28 hour period in November 2011. There was a wide variation in the rainfall retention capacity of the individual test panels, ranging from roughly 30 to 56% (Table 1). By volume, the multi-course (panels A and E) and modular (panel C) systems retained more rainfall over the 12-month period while the single-course (panel B) and shallow system (panel D) retained less, 32% and 30% respectively. The disparity was expected as the single-course system was not constructed with a layer of moisture retention fabric and panel D contains less soil media by volume.

Table 1. Monthly and cumulative retention (%) for test panels

<table>
<thead>
<tr>
<th>Year/Month</th>
<th>Rainfall (cm)</th>
<th>Panel A</th>
<th>Panel B</th>
<th>Panel C</th>
<th>Panel D</th>
<th>Panel E</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2011</td>
<td>17.48</td>
<td>34.24</td>
<td>36.38</td>
<td>15.99</td>
<td>8.50</td>
<td>21.92</td>
</tr>
<tr>
<td>April 2011</td>
<td>11.46</td>
<td>23.42</td>
<td>18.05</td>
<td>22.53</td>
<td>17.23</td>
<td>78.20</td>
</tr>
<tr>
<td>May 2011</td>
<td>10.67</td>
<td>37.63</td>
<td>32.05</td>
<td>65.45</td>
<td>31.54</td>
<td>57.91</td>
</tr>
<tr>
<td>June 2011</td>
<td>5.89</td>
<td>81.19</td>
<td>70.97</td>
<td>78.77</td>
<td>65.42</td>
<td>83.05</td>
</tr>
<tr>
<td>July 2011</td>
<td>2.50</td>
<td>98.60</td>
<td>99.37</td>
<td>96.10</td>
<td>98.42</td>
<td>98.38</td>
</tr>
<tr>
<td>August 2011</td>
<td>0.63</td>
<td>99.66</td>
<td>96.45</td>
<td>87.98</td>
<td>100.00</td>
<td>99.09</td>
</tr>
<tr>
<td>September</td>
<td>3.76</td>
<td>98.88</td>
<td>76.73</td>
<td>86.90</td>
<td>88.80</td>
<td>96.68</td>
</tr>
<tr>
<td>October 2011</td>
<td>9.91*</td>
<td>46.52</td>
<td>54.18</td>
<td>54.17</td>
<td>39.88</td>
<td>74.52</td>
</tr>
<tr>
<td>November 2011</td>
<td>15.16</td>
<td>22.51</td>
<td>3.09</td>
<td>42.81</td>
<td>4.66</td>
<td>70.51</td>
</tr>
<tr>
<td>December 2011</td>
<td>4.27</td>
<td>14.10</td>
<td>3.82</td>
<td>79.34</td>
<td>18.85</td>
<td>11.49</td>
</tr>
<tr>
<td>January 2012</td>
<td>18.49*</td>
<td>23.94</td>
<td>19.79</td>
<td>80.04</td>
<td>32.56</td>
<td>33.76</td>
</tr>
<tr>
<td>February 2012</td>
<td>10.99</td>
<td>29.72</td>
<td>33.24</td>
<td>77.91</td>
<td>41.16</td>
<td>61.28</td>
</tr>
<tr>
<td>TOTAL</td>
<td>111.01</td>
<td>35.96</td>
<td>31.56</td>
<td>55.56</td>
<td>29.66</td>
<td>55.77</td>
</tr>
</tbody>
</table>

Table 1. Monthly and cumulative retention (%) for test panels

The annual retention rates of the extensive green roof panels fall within the range of long term (>6 months) retention for similar studies, as reported in the literature (Table 2). Of the examined studies there is a wide variation in annual retention performance (15 – 87%), eventhough all of the studies examined utilized an extensive roof structure, similar planting palettes, and predominately inorganic soil composition.
Table 2. Comparison of average annual runoff retention for extensive greenroof infrastructure
(Adapted from Spolek 2008)

<table>
<thead>
<tr>
<th>Average annual retention (%)</th>
<th>Test Site</th>
<th>Location</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 - 56</td>
<td>Test Panels</td>
<td>Maltby, WA</td>
<td>This Study</td>
</tr>
<tr>
<td>15</td>
<td>Education Center</td>
<td>Seattle, WA</td>
<td>Cardno Tec 2012</td>
</tr>
<tr>
<td>29</td>
<td>Fire Station</td>
<td>Seattle, WA</td>
<td>Cardno Tec 2012</td>
</tr>
<tr>
<td>53</td>
<td>Offices</td>
<td>Seattle, WA</td>
<td>Cardno Tec 2012</td>
</tr>
<tr>
<td>29</td>
<td>Dormitory</td>
<td>Portland, OR</td>
<td>Spolek 2008</td>
</tr>
<tr>
<td>18</td>
<td>Offices</td>
<td>Portland, OR</td>
<td>Spolek 2008</td>
</tr>
<tr>
<td>57</td>
<td>Community Center</td>
<td>Toronto, Canada</td>
<td>Liu and Minor 2005</td>
</tr>
<tr>
<td>57 - 87</td>
<td>Offices</td>
<td>Raleigh, NC</td>
<td>Moran et al. 2005</td>
</tr>
</tbody>
</table>

4.2 Seasonal

Seasonally, the retention response for the test panels was distinct (Table 1). During the dry season for the region (July / August) only 11 rain events were recorded; totaling less than 1.2” of precipitation. Only two of the events generated more than 0.25” of precipitation. Retention performance was high for all of the test panels, ranging from 95 – 99%. The month of August contained the least amount of rainfall (0.24”), and during this time, the shallow, 4” panel (D) retained 100% of precipitation. The high retention rates are to be expected as the dryer soils during these months have a greater capacity for retaining precipitation (Berghage et al., 2009).

Nearly 97% of the precipitation for the test period occurred during the wet season (September – June), and the individual test panel responses in the wet season are closely aligned with the annual retention rate. Yet when examined on a monthly basis performance across the panels varied greatly, ranging from 3% to 91%. The lowest monthly average percent retained for all the panels occurred in December, following a very wet November (6.0”) which concluded with a series of back-to-back storms. Such retention performance variability has been identified in similar studies without specific conclusions as to the its causes (Cardno Tec, 2012; Moran et al., 2005). While likely attributable to weather conditions including air temperature and the frequency of rain events, more detailed study needs to be conducted.

4.3 Individual Storm Events

Individual storm events are categorized as light (<0.25”), moderate (0.25 – 1.25”), and heavy (>1.25”). Of the total (129) events during the sampling period, 34% (44) representing each of the intensity categories were examined for cumulative retention rates, peak reduction, and peak delay during events with wet (29) and dry (15) soil conditions. See Figure 2 for an example of the data analyzed.

As reported in Section 5.2, all of the test panels performed well in dry soil conditions, retaining more than 96% of the precipitation generated for each storm event and significantly decreasing the volume and delaying the peak runoff as compared to the control panel (Table 3). In general, performance decreased as the intensity of the storm increased. Samples for only light and moderate storm events were assessed as a heavy event with dry soil conditions was not recorded during the sampling period. Though all panel designs performed well, the multi-layer panels (A and E) were the most efficient, retaining 100% of the precipitation in light storm events, and in moderate events delaying peak runoff for multiple hours.
For the sampled wet events, performance for the light storm events did not drop off significantly from that found with the dry events, and peak delay commonly remained at multiple hours. During moderate and heavy storm events however, performance dropped off considerably with all tested variables. For all of the panels, except for the multi-layer panel E, the variable with the most prominent decrease in performance was peak retention. Though all of the panels continued to delay peak flows and decrease total runoff, the relative measure of peak runoff decreased substantially. As expected, during heavy storm events the panels functioned less effectively across all measures, yet in general the multi-layer systems with 6” of soil media and moisture retention fabric (A, D and E) were the most effective across all measures for mitigating runoff.

Table 3. Total Retention, Peak Reduction, and Peak Delay for Individual Storm Events

<table>
<thead>
<tr>
<th>Event Intensity</th>
<th>Selected Events (n)</th>
<th>Panel A</th>
<th>Panel B</th>
<th>Panel C</th>
<th>Panel D</th>
<th>Panel E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total Retention (%)</td>
<td>Peak Reduction (%)</td>
<td>Peak Delay (hrs)</td>
<td>Total Retention (%)</td>
<td>Peak Reduction (%)</td>
</tr>
<tr>
<td>Wet</td>
<td>&lt; 0.25&quot;</td>
<td>10</td>
<td>91</td>
<td>89</td>
<td>89</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>0.25 - 1.25&quot;</td>
<td>15</td>
<td>73</td>
<td>73</td>
<td>73</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>&gt; 1.25&quot;</td>
<td>4</td>
<td>47</td>
<td>35</td>
<td>40</td>
<td>17</td>
</tr>
<tr>
<td>Dry</td>
<td>&lt; 0.25&quot;</td>
<td>10</td>
<td>100</td>
<td>98</td>
<td>98</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>0.25 - 1.25&quot;</td>
<td>5</td>
<td>99</td>
<td>97</td>
<td>97</td>
<td>98</td>
</tr>
</tbody>
</table>

5 CONCLUSIONS

The findings from this study, support previous research indicating that regardless of type and structure, green roof infrastructure can significantly decrease runoff and locally mitigate the impacts of stormwater on transfer infrastructure and receiving water bodies.

1. All types and structures of green roof infrastructure tested show the potential for making a significant contribution in managing stormwater in the Puget Lowlands.
• Over a 12-month period, the panels retained 30-56% of all precipitation.
• During seasonally dry periods the panels retained nearly 100% of all precipitation.
• With individual storm events, panel performance decreased with an increase in storm intensity with an average retention of 94% for one panel (E) during light events and as low as 17% for another panel (D) during heavy events. Peak delay also decreased with storm intensity, but the average delay for all panels and storm intensities with dry and wet soil conditions was nearly two hours.

2. Monitoring performance is necessary to assess the effectiveness of green infrastructure strategies.
• The monitoring protocols used in this study worked well, despite some functionality issues with equipment.
• Continued monitoring efforts in the Seattle metropolitan area will build a regionally significant foundation for making design and policy decisions regarding the most responsive and effective use of green infrastructure strategies in development.

6 REFERENCES


PERFORMANCE AND ECONOMIC BENEFITS OF FOUR STREETSCAPE RENOVATIONS: A COMPARATIVE CASE STUDY INVESTIGATION

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1 ABSTRACT

The demonstration of landscape performance benefits has become increasingly important in landscape architecture practice and in communicating to interdisciplinary audiences. This paper provides an overview of the Landscape Architecture Foundation Case Study Investigation (CSI) program and introduces four built streetscape projects investigated in the 2012 CSI program, including a large-scale permeable pavement project in Charles City, Iowa, and the American Society of Landscape Architects’ award-winning projects in Missouri, California, and Colorado. Unlike traditional streetscape design that mainly focuses on safety and engineering principles, these four streetscape projects tackled unique design challenges, and more importantly, have captured baseline data that help demonstrate landscape performance benefits and the effectiveness of design. Totally 32 performance benefits are captured through the CSI program (e.g., visual quality enhancement, and water and energy conservation). This paper specifically illustrates the 14 economic benefits. For each project, detailed methodology is provided for a selected economic benefit example demonstrating how the performance benefit was monetized. Findings suggest compelling economic benefits such as South Grand’s streetscape project (Missouri), which is expected to provide $3 million annual savings to the City through significant reduction of traffic speed and accident rates and also the enhancement of pedestrian and ADA accessibility. The paper ends with a discussion on how streetscape projects can be improved through CSI research and key lessons learned from the CSI program (e.g., limited time-frame of conducting research and lack of financial support for first-hand data collection).

1.1 Keywords
sustainability, post-occupancy evaluation, Design Workshop, Conservation Design Forum, ecosystem services
2 INTRODUCTION

In 1999, Mark Francis wrote a report based on a research project he was commissioned to do for the Landscape Architecture Foundation (LAF). This report analyzed the pertinence of case studies for the advancement of the landscape architecture profession and developed a Case Study Method. Two of the final steps in the production of case studies recommended by Francis are that the completed case study be analyzed and the findings be disseminated and easily accessible for practitioners, academicians, and the public alike (Francis, 1999). Francis stressed the importance of having another party (academics, journalists, and users) involved in producing the case study to ensure objectivity. He also indicated the importance of taking a systematic approach to gathering information so that cases can be compared and replicated (Francis, 2001).

This paper is an attempt to help fulfill the above recommendations. As part of the 2012 LAF Case Study Investigation (CSI) program, four streetscape projects were evaluated with an emphasis on quantifying the economic, social, and environmental benefits. Project analyses were conducted collaboratively by a Utah State University research team, the design teams (i.e., Design Workshop and Conservation Design Forum), city officials, and other parties based on the original performance objectives set out by the design teams. This paper discusses key economic performance benefits for each project, data sources, and examples of methodologies that were used to quantify the economic benefits. The paper also provides recommendations on streetscape design and insights into the improvements of future LAF CSI programs.

3 LANDSCAPE PERFORMANCE RESEARCH INITIATIVE

The LAF defines landscape performance as the measure of efficiency with which landscape solutions fulfill their intended purpose and contribute toward achieving sustainability (Landscape Architecture Foundation). In 2011, the LAF established a seminal research initiative—Landscape Performance Series (LPS)—to assess the value of high-performing landscape projects through quantifying environmental, social, and economic benefits. LPS is designed to fill a critical gap in the marketplace and make the concept of “Landscape Performance” as well known as “Building Performance” (Landscape Architecture Foundation). The LPS is not a rating system, but rather a hub that compiles information and innovations from research, professional practice, and student work about landscape performance. LPS presents the latest information on performance benefits and best design practices and is organized by four categories: Case Study Briefs, Benefits Toolkit, Fast Fact Library, and Scholarly Works. They provide methodologies and references for researchable evaluation and measurements of landscape performance.

Case Study Investigation (CSI) is a LAF-funded research program that brings together academia and the industry to investigate and document the benefits of exemplary, high-performing built projects. Each year, eight to ten research teams composed of landscape architecture faculty members (serving as Research Fellows), research assistant(s) (e.g., students), and firm practitioners are selected across the United States. This CSI research program lasts 3-4 months. It focuses on evaluating performance benefits of built landscape architecture projects and the products from the CSI studies comprise the database of LAF Case Study Briefs.

CSI was launched in the summer of 2011, conducted again in 2012 and 2013, and is expected for the years to follow. The 2011 CSI program exemplifies the performance benefits of best design practices, balancing project types, scales, and geographic locations. The 2012 CSI program further poised the LAF on the research front by becoming more rigorous in case study selection, encompassing a broader spectrum of sustainability metrics (e.g., projects must document social, environmental, and economical benefits), and emphasizing the importance of social benefits, which has yet to become a strength of landscape architects.

4 STREETSCAPE DESIGN AND PERFORMANCE BENEFITS

Streetscape design is a vital component of street public spaces and impacts the way people interact in the street public realm. A well-designed streetscape improves the aesthetic quality and safety of the street, boosts economic growth, and promotes social activity and comfort of communities (Jacobs, 1995, p.4). Streetscape design involves meeting legal and functional requirements. Although the design process goes beyond a simple exercise that aims at moving vehicles conveniently, traditional streetscape
design largely focuses on vehicle mobility, leading to unsafe and unfriendly pedestrian and bicycle environments.

Developing a sustainable framework for streetscape design is gaining traction for both transportation and landscape architecture professionals. For instance, Greenberg (2009) proposed the three “E” (environment, equity, and economy) sustainable street design framework—“multimodal rights-of-way designed and operated to create benefits relating to movement, ecology, and community that together support a broad sustainability agenda” (Greenberg, 2008, p.29-39). The four streetscape projects evaluated in the CSI program address the above values and illustrate how social, economic, and environmental interactions form a sustainable streetscape design.

4.1 Case Study Sites

These streetscape projects are: Charles City Permeable Streetscape in Charles City, Iowa (Conservation Design Forum and Charles City, 2009; Yang, Zhang and Blackmore, 2012a); Cherry Creek North Improvements in Denver, Colorado (Design Workshop, Inc., 2011; Yang, Zhang, and Blackmore, 2012b); South Grand Boulevard Great Streets Initiative in St. Louis, Missouri (ASLA, 2011; Yang, Zhang, and Blackmore, 2012c); and the Park Avenue Redevelopment in South Lake Tahoe, California (Design Workshop, Inc., 2010; Yang, Zhang, and Blackmore, 2012d). The first one, designed by Conservation Design Forum, is one of the largest permeable pavement projects in the United States. The remaining three are designed by Design Workshop, all of which are American Society of Landscape Architects’ award-winning projects. Project locations, size, and year of completion are shown in Figure 1.

![Figure 1. Streetscape project location, project size, and year of completion](image)

The four projects tackled unique design challenges and captured baseline information. These projects were assessed by Performance Benefits and Sustainable Features. Some key Sustainable Features include stormwater management, pedestrian right-of-way improvement, safety and transportation enhancement, and use of green infrastructure and recycled materials. Several compelling Performance Benefits include safety and accessibility, visual resource and aesthetics enhancement, and water and energy conservation. The corresponding metrics are shown in Figure 2.
For example, the social benefits of South Grand Boulevard showcase intriguing features. Landscape architecture firm Design Workshop worked with the Missouri School for the Deaf and the Missouri School for the Blind, the major schools in the project site, to improve ADA accessibility at all intersections to 100%. Revised streetscape design and visual and audio cues help orient the visual and hearing impaired students and allow them to familiarize themselves with urban environments. In addition, as a result of the revised design, the traffic speed was reduced from 42 mph to 25 mph, and the probability of pedestrian fatality on vehicular impact was reduced from 100% to 25% (McLean, Anderson, Farmer, Lee, and Brooks, 1997). Related benefits include an 85% decrease in traffic accidents and an expected $3 million savings in medical care for the city of St. Louis over the next 25 years (Yang et al., 2012c).

In addition, to effectively communicate Sustainable Features and project aesthetics to the designers, clients, and decision makers, LAF requires a pair of images to show the before vs. after or the traditional vs. sustainable conditions. Figure 3 is an example in the Park Avenue and U.S. 50 Redevelopment streetscape project. Before project redevelopment, unplanned development along Park Avenue degraded the environmental and scenic assets of the area. The revitalization replaced visual clutter with consistent building massing, signage, awnings and overhangs, street trees, planted areas, and street furniture, creating a comfortable, safe, and enjoyable pedestrian environment (Val, 2007; Yang et al., 2012d).

Figure 3. Park Avenue and U.S. 50 Redevelopment streetscape project before (left image) and after (right image) conditions (Source: D. A. Horchner/Design Workshop. Used by permission)
4.2 Economic Benefits Assessment

A key component of CSI research is to assess the Performance Benefits through valid datasets and methodologies. Estimating the economic value of certain landscape projects is perhaps the most challenging aspect in CSI research. The Utah State University research team assessed totally 32 Performance Benefits for these four streetscape projects (producing 26 pages of methodology documents). Although it is beyond the scope of this paper to introduce a complete list of these methodologies (available online, see Yang et al., 2012a, 2012b, 2012c, 2012d), this paper highlights the economic benefits as a result of streetscape design interventions and innovations.

One way of assessing the economic benefits is through the process of monetization, which transforms the direct and indirect benefits into a dollar value (Macdonald, Sanders, and Anderson, 2009). While not every performance benefit can be or should be represented in monetary value, a comparison between different alternatives is an effective and persuasive way to demonstrate project performance and contribution to environmental stewardship, economy, and society (U.S. EPA, 2012). The economic benefits and detailed data sources are presented below.

Case Study 1: Charles City Permeable Streetscape, Iowa

This project is the first permeable paving project in Charles City, which consists of 16 blocks in a historic residential district. The district suffered from crumbling streets and stormwater flooding. Instead of using conventional concrete or asphalt paving, the project combined durable permeable pavement with cobble infiltration and bioretention to tackle stormwater problems. It also eliminated the replacement of the existing storm sewer system.

The project reduced stormwater peak flows by 75% and runoff volume by 60% for 10-year storm events. Economic Benefits of the project include:

- Saved $57,000 by preserving 192 street trees (Data source: Conservation Design Forum)
- Secured $731,000 in additional funding that would not have been available (Data source: ASLA Green Infrastructure and Stormwater Management Case Study, Case 191)
- Saved approximately $395,000 in construction and permitting costs when compared to cast-in-place porous concrete (Data source: Conservation Design Forum and Charles City. 2009. Charles City Green Streets Evaluation and Design Report)

Case Study 2: Cherry Creek North Improvements and Fillmore Plaza, Colorado

This project revitalized Denver’s premier retail district and created a pleasant social and commercial multi-purpose place. The new streetscape strengthens the retail environment, preserves the district’s history and character, improves identity, beautifies the area and improves the shopping experience in this district. Economic Benefits of the project include:

- Increased the District sales tax revenues by 16% (over $1 million) in the first year after construction (Data source: Sales Tax Revenues: Cherry Creek North BID year-end financial statement)
- Decreased retail vacancy rates from 13.6% in 2009 to 7.2% in 2012 (Data source: Newmark Knight Frank, Cherry Creek North Aggregate Historical Vacancy Report.)
- Reduces annual water consumption for irrigation by 3,376,000 gallons, saving $17,600 annually (Data source: Hydro Systems, Inc.)
- Estimated to save an additional $10,000 per year in reduced maintenance costs (Data source: Irrigation system designer)
- Reduces annual energy consumption for outdoor lighting by 223,000 kilowatts, saving $12,700 in energy and $1,000 in maintenance and material costs each year (Data source: Cherry Creek North BID and Scanlon Szynskie Group lighting consultant’s power consumption spreadsheet)
- Saved $188,000 by reusing 331 light pole footings and bases in place, on-site (Data source: Design Workshop, Inc.)

Case Study 3: South Grand Boulevard Great Street Initiative, Missouri

South Grand aimed to mitigate the negative impacts (noise, accidents, mobility, and excessive
traffic speed) of the existing streetscape design. The street is refigured to still allow for vehicular mobility, but at speeds that are safer and less likely to cause accidents. By installing tactile crosswalk striping, visual and audio cues, and detectable warnings and signalization, the project improves ADA accessibility, creating an environment that is usable for people of all abilities. Economic Benefits of the project include:

- Increased annual tax revenue more than 14% in the first year after redevelopment (Data source: South Grand East-West Gateway)
- Expected to reduce traffic accidents by 85% due to dropping traffic speed from 42 mph to 25 mph (projected), resulting in an expected $3 million annual savings to the City (Data source: Taylor, Lynam, and Baruay, 2000)
- Projected to increase revenue by 19% over a 10 year period (Data source: Design Workshop, Inc.)

**Case Study 4: Park Avenue & US 50 Redevelopment Phase 1, California**

The project is a major tourist gateway in Lake Tahoe, California. The biggest design challenge was the “scenic quality”, which was recognized as the most important asset of the region. By redefining the setbacks and creating several view corridors, landscape architects met stringent environmental guidelines on visual quality preservation while achieving project economic goals. The improvement of the streetscape created a sense of arrival and helped increase aesthetic value of the community. Economic Benefits of the project include:

- Achieves a total annual tree benefit of $11,424 by preserving 112 Jeffrey pine (Data source: Online National Tree Benefit Calculator)
- Reduced fertilizer consumption by approximately 70%, saving an estimated $880 annually (Data source: California Agriculture and Natural Resources information)

### 4.3 Sample Methodologies


**Case Study 1: Charles City Permeable Streetscape, Iowa**

*Economic Benefit:* The project uses permeable interlocking concrete unit pavers as a high-performance, cost-effective pavement, which saves approximately $395,000 in construction and permitting costs when compared to cast-in-place porous concrete for the 5,670 linear feet (LF) of streets that were replaced.

*Methodology:* Based on the Charles City Green Streets Evaluation and Design Report, the estimated unit cost of a permeable paver road is $530/LF to construct the road cross section proposed for the City. The estimated unit cost of porous concrete road is $590/LF. The above price includes removal of the existing pavement and installation of the stone base, required drainage, curbs, and the permeable pavers. The project covers 6 streets and the overall length in this project is 5,669 LF. The Contingency and Design and Permitting Fees rates are 10% and 6%, respectively. Therefore the overall costs savings are:

\[(590/LF - 530/LF) \times 5,669 LF + (590/LF - 530/LF) \times 5,669 LF \times 16\% = 395,000\]

Where: LF = Linear Feet

**Case Study 2: Cherry Creek North Improvements and Fillmore Plaza, Colorado**
Economic Benefit: Instead of using traditional turf-grass, more than 50% of the planted areas were replaced with low-water-use landscaping, reducing annual water consumption by 3,376,000 gallons. This saves approximately $27,600 annually from the irrigation water budget (Yang et al., 2012b).

Methodology: All of the following calculations are based upon project baseline data of 2008. Data of 2011 were used as the year for comparison. The project replaced over half of the spray-irrigated turf areas with drip-irrigated, water-wise perennials and shrubs. This resulted in a reduction of annual landscape water consumption from 9,582,000 gallons in 2008 to 6,206,000 gallons in 2011. In addition, Denver utility statistics showed that 2008 winter irrigation consumption (October 28 through May 2) was 0 gallons, and summer (May 3 through Oct 27) was 9,582,000 gallons. In 2011, after the above landscape improvements, winter water consumption totaled 378,000 gallons, and summer 5,828,000 gallons. The total amount of water saved can be calculated as follows:

Irrigation water rate in Denver is $1.20 per 1,000 gallons in winter (October 28 through May 2), and $4.81 per 1,000 gallons in summer (May 3 through Oct 27). Water savings were calculated by subtracting water costs in 2011 by 2008:

\[
\frac{4.81}{1,000 \text{ gals}} \times 9,582,000 \text{ gals} - (\frac{1.20}{1,000 \text{ gals}} \times 378,000 \text{ gals}) + (\frac{4.81}{1,000 \text{ gal}} \times 5,828,000 \text{ gals}) = 17,602.72
\]

Moreover, the low-water-use landscaping requires less maintenance than turf. Calculated by the irrigation system designer, the annual operating budget was reduced by approximately $10,000. Therefore, the total saving annually would be: $17,603.17 + $10,000 = $27,603.17

Case Study 3: South Grand Boulevard Great Streets Initiative, Missouri

Economic Benefit: Reduced traffic accidents by an expected 85% through dropping traffic speed from 42 mph to 25 mph, resulting in an expected $3 million annual savings to the city. The probability of pedestrian fatality upon vehicular impact dropped from 100% to 25% (ASLA, 2011; Yang et al., 2012c).

Methodology: Speed is an aggravating factor in the severity of all crashes. The relationship between speed and the outcome of a crash is directly related to the kinetic energy that is released during a collision. The more kinetic energy to be absorbed in a collision, the greater the potential for injury to vehicle occupants and pedestrians hit by the vehicle (Walz, Hoeflinger, and Fehlmann, 1983). On average, each 1 mph reduction in speed may reduce accident frequency by 5% (Taylor, Lynam, and Baruay, 2000).

In South Grand Boulevard, traffic speeds reduced from an average of 42 mph (68 km/h) to 25 mph (40 km/h). Therefore, the reduction in accidents can be estimated as \((42 \text{ mph} - 25 \text{ mph}) \times 5\%/1\text{mph} = 85\%\).

According to the U.S. Department of Transportation and the National Highway Traffic Safety Administration (2000) adjusted to 2010 dollars, the median cost of a crash is around $44,000. This includes costs typically absorbed by local governments (police department, emergency services, property damage). In addition, the median value of the total cost is about $319,000. This estimate includes quantifiable economic impacts as well as emotional impacts that affect the lives of crash victims and their families. There was, on average, 90 accidents per annum along this section of South Grand Boulevard from 2004 to 2009. Therefore, the average accident cost ranges from $3,960,000 to $28,710,000 per year.

Based on the above analysis, accidents are expected to be reduced by 85% compared to the existing conditions. Taking the value of 90 annual crashes and multiplying it by 85%, indicates a forecasted 76 fewer crashes. This will yield a range of savings between $3 million and $24 million per year.

\[
\frac{44,000 \times (90 \times 85\%)}{100} = 3,300,000
\]

\[
\frac{319,000 \times (90 \times 85\%)}{100} = 24,400,000
\]

Case Study 4: Park Avenue & US 50 Redevelopment Phase 1, California

Economic Benefit: Reduced fertilizer consumption by approximately 70% through using slow-growing turfgrass and organic fertilizer, saving an estimated $880 annually.

Methodology: The University of California Agriculture and Natural Resources recommend the fertilizer application rate for the traditional turfgrass as 1 lb per 1,000 square feet, 4 times a year (i.e., 4 lbs/1,000 square feet/year) (http://www.ipm.ucdavis.edu/TOOLS/TURF/MAINTAIN/fertamt.html). In comparison, this project uses approximately 1.3 lbs of Biosol or other organic fertilizer per 1,000 square
feet/year.

The site has 5.9 acres (257,004 square feet) of dwarf turf grass (Aurora Hard Fescue, Mokelumne Fescue, or other types). Biosol costs around $83 for a 55 lb bag from a California distributor (http://www.ssseeds.com/ssseeds/display.php?key1=fertilizer&olimit=0&zid=1&lid=1&cartid=201210166152409). A 40 lb bag of traditional fertilizer from Lowe’s costs $54 (http://www.lowes.com/pd_90204-4463115_0__?productid=3047138). Fertilizer cost savings is calculated below.

Annual traditional turfgrass fertilizer cost:
4 lbs/1,000 sq. ft/yr × (257,004 sq.ft./1,000 sq.ft.) = 1,028 lbs/yr
$54/40 = $1.35/lb; $1.35/lb × 1,028 lbs/yr = $1,387/yr

Annual Dwarf turfgrass with Biosol fertilizer cost:
1.3 lb/1,000 sq. ft/year × (257,004 sq.ft./1,000 sq.ft.) = 334 lbs
$83/55 lb = $1.51/lb; $1.51/lb × 334 lbs = $504/yr

Annual Fertilizer consumption reduction:
(4 lbs – 1.3 lbs)/4 lbs = 68%

Annual fertilizer cost savings:
$1,387 – $504 = $883

5 DISCUSSION
5.1 Revelations on Streetscape Design and Performance Assessment

Despite the promising evidence of streetscape performance, several issues emerged which warrant future investigations that can better promote sustainable streetscape designs. First, communication becomes paramount when implementing innovative streetscape designs vs. conventional designs in order to adapt the mindset of clients and users. Because of public involvement on South Grand, the redeveloped streetscape overcame initial objections and achieved consensus and strategic trade-offs. Likewise at Park Avenue, coordination with the Tahoe Regional Planning Agency allowed zoning changes that enabled more diverse pedestrian environments. Conversely, maintenance issues seem to be a problem when users do not understand maintenance expectations associated with unconventional designs. For example, the cobble infiltration areas in the Charles City permeable streets created excessive maintenance because of debris clogging the system and were removed in further stages. Hence, maintenance regimes should be decided in advance with budget constraints and maintenance responsibilities clearly identified. This is especially important when innovative designs have been implemented and city codes and ordinances are not applicable, and people’s mindsets have not yet adjusted to new maintenance procedures. By documenting this performance and evidence, LAF case studies will provide a powerful tool for designers to convince future developers and city officials.

Second, baseline data collection is essential to demonstrate performance. It was found that the level of success in communicating landscape performance is closely correlated with how well the design-research paradigm was established. For example, Design Workshop’s Legacy Design uses a rigorous metric system to document baseline data and evidence, allowing the research to take place relatively smoothly. Where baseline data were not captured, other tools are used, which oftentimes lead to assessments that are rather general, resulting in suspicion of reliability. Because no two projects are identical, competing objectives for each project create differing processes and outcomes, making it difficult to compare case studies (Culbertson and Martinich, 2012). If baseline data are captured using standardized methods, this aspect can be vastly improved.

Third, the Return on Investment (ROI) has not been fully addressed in the economic equations in these case studies. It is often believed that sustainable design would present more upfront cost. Increased emphasis on the ROI, though a limitation of the current study, would improve understanding of potential economic impacts of sustainable streetscape redevelopment. In Park Ave, for example, this ROI issue became obvious. A newly built parking structure, located out of visibility for improved aesthetics, is not generating its anticipated revenue because tourists who are unfamiliar with the area do not know where it is located. The visitors instead park in nearby free lots, occupying local business’ stalls. Foresight from
these case studies may help improve economic viability of similar future projects if more emphasis is placed on the ROI.

5.2 Lessons Learned from the CSI Program

The LPS research initiative and the CSI program in specific, have solidified LAF’s leadership in advancing landscape architecture research. The landscape architecture profession cannot rely on other disciplines to generate empirical knowledge (Milburn, Brown, Mulley, and Hilts, 2003). In this sense, LPS and CSI are making headway in promoting original research and evidence-based design. In addition to the successful stories presented above, the research team has the following observations and recommendations. First, the evaluation of streetscape project performance, similar to other sustainable project assessments, is an intertwined, multi-disciplinary effort (Brown and Corry, 2011; Culbertson and Martinich, 2012). The constraints of time and resources have limited the extensiveness of the case studies. With limited travel funding and project sites scattered across the United States, the research team did not have the opportunity to travel to the sites. This restricted the team’s understanding of each site, giving limited interaction with clients and users.

Second, the case study production is primarily conducted in the summer months. This limited time frame may also reduce the quality of the study. For instance, there was minimal time to capture additional data, so some benefits could not be assessed, even though the team understood that they could have been analyzed with more time. This may not be a good image to other disciplines suggesting that “cheap, quick” research is being performed in landscape architecture. What is encouraging, though, is that the LAF has reported increased visibility with 2012 activity on the LPS website, doubling 2011’s activity. LAF also indicated that the most visited portion of the LPS website in the past year is the Case Study Briefs (http://www.lafoundation.org/news-events/blog/).

Third, it is important to mention the necessity to conduct long-term assessment and/or monitoring of project performance, in addition to the “one-time shot” analysis. A research team consisting of the same authors of this paper is currently conducting a 5-year stormwater quality monitoring study in the Daybreak community of South Jordan, Utah. To its credit, Daybreak is published in the 2011 CSI program and it is one of the most discussed CSI case studies (Yang and Goodwin, 2011; Yang and Blackmore, 2013).

6 CONCLUSION

The above analyses show that innovative streetscape design can yield multiple performance benefits and the economic benefits are quantifiable. Through the CSI research, not only is the landscape profession as a whole benefiting from CSI, but participating firms and students are also reaping rewards. Firms taking part in CSI benefit from unbiased post occupancy evaluation of their work, which promotes their sustainable practices. Students are learning new methods to gauge the quality of their own work including methods and tools that may not be covered in their curricula. As a result of the CSI experience, they may never approach design the same way again. Finally, to make a lasting impact, it is important for future CSI teams to disseminate research findings in peer-reviewed venues and approach a large audience.

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8 REFERENCES


REFLECTIONS ON DEVELOPING LANDSCAPE PERFORMANCE CASE STUDIES

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1 ABSTRACT
Increasingly landscape architects are being asked to design and evaluate high-performing, multi-functional landscapes. To grow the profession’s knowledge about landscape performance, in 2010 the Landscape Architecture Foundation (LAF) launched the Landscape Performance Series (LPS). The centerpiece of the LPS are case studies, which aim to illustrate the sustainable features and subsequent benefits of high-performing built works. Though LAF has established guidelines for the content and format of its LPS case studies, a formalized procedure for identifying and quantifying a project’s landscape performance benefits has yet to be developed. As foundation for a forthcoming set of performance benefit guidelines, we reflect on our experiences in identifying and quantifying landscape performance benefits as part of LAF’s Case Study Investigation program (CSI). We provide an overview of the CSI program and LPS case study briefs, examples of quantified performance benefits, and conclude by identifying opportunities for strengthening and furthering ongoing work.

1.1 Keywords
landscape performance, case study, performance benefits, Landscape Architecture Foundation, methodology
2 INTRODUCTION

Increasingly landscape architects are being asked to design and evaluate high-performing, multi-functional landscapes. Such landscapes not only support a diverse array of human needs, but simultaneously provide targeted ecosystem functions as well (Nassauer and Opdam, 2008; Lovell and Johnston, 2009; Musacchio, 2009; Design Trust for Public Space, 2010). Though the concept of a multi-functional landscape is arguably not new, the concept of landscape performance is still emerging. The Landscape Architecture Foundation (LAF) defines landscape performance as the measure of efficiency with which designed landscape solutions fulfill their intended purpose and contribute to sustainability (Landscape Architecture Foundation, 2011). As an evidence-based design discipline, landscape architecture increasingly depends upon empirical evidence to inform design and guide decision-making (Brown and Corry, 2011; Francis, 2001). Thus, understanding a landscape’s performance and subsequent social, environmental, and economic benefits can help justify and support sustainable design practices.

Performance assessments can be a challenging task, especially for design firms with limited physical and financial resources. Though there are formal sustainability assessment and rating systems, such as in the Leadership in Energy and Environmental Design (LEED) and the Sustainable Sites Initiative (SITES™). These systems can be cumbersome and costly to produce (U. S. Green Building Council 2009). Additionally, these systems provide little understanding of post-construction performance and subsequent benefits. To amass a knowledge base on post-construction performance, the LAF launched the Landscape Performance Series (LPS) in 2010. The LPS is not a formal rating system, but a venue for the procurement and dissemination of research pertaining to landscape performance. The center piece of the LPS are peer-reviewed case studies, which seek to illustrate the “value” of sustainable design practices to a diverse audience, including students, practitioners, developers, clients, and municipalities. Though LAF has established guidelines for the content and format of the case studies, a roadmap for identifying and quantifying landscape performance benefits has yet to be developed. In this paper we offer insight into our experiences and processes of identifying and quantifying landscape performance benefits during our participation as research fellows in the 2011 and 2012 LAF’s Case Study Investigation program (CSI). We also discuss current limitations and future research opportunities for continued landscape performance research.

3 OVERVIEW OF THE LPS CASE STUDY INVESTIGATION PROGRAM AND CASE STUDY BRIEFS

In 2011, LAF launched the seminal CSI program to initiate the development of LPS case studies. The CSI program sponsors collaborations between university faculty, students, and design practitioners to advance landscape performance research. To participate in the CSI program, faculty-student teams submit proposals with research qualifications, and design firms submit proposals of high-performing built works. The selection process for CSI projects is highly competitive. After review, LAF forms collaborative teams, factoring in geographic proximity, relevant expertise, and prior working relationships. University faculty are awarded a research fellowship to support student research assistants. Faculty-student teams are assigned up to three built projects, from one or more design firms. In 2011, the inaugural CSI program ran for 10 consecutive weeks, with 10 faculty-student teams and 11 participating firms. In 2012, the CSI program lasted 20 weeks, providing more time for data collection and analyses and the solicitation of external reviews. In 2012, there were 10 faculty-student teams and 20 participating firms. To date, approximately 70 LPS case studies have been produced.

During the CSI program, university research fellows and students work directly with design firm liaisons to obtain project documents, applicable data, and to collaboratively identify all potential landscape performance benefits. Faculty-student teams are responsible for identifying methods for quantifying the project’s social, environmental, and economic benefits. LAF staff offer guidance on the quality and clarity of project content, as well as conducts reviews of the case study drafts. Completed case studies go through a rigorous double blind peer-review process, first internally by the LAF Research and Education Committee, then externally by a committee comprised of academics and practitioners well versed in sustainable design. CSI teams are required to revise and resubmit per reviewers’ feedback. The final accepted LPS case studies are published on the LAF website (http://www.lafoundation.org/research/landscape-performance-series/case-studies/).
To maintain consistency in format, all case studies contain the following content: basic project information; project overview; significant design challenges; significant design solutions; quantified performance benefits; a list and description of all sustainable features; at least one cost-comparison (between a sustainable and traditional feature/practice); a list and description of lessons learned during project design and implementation; project photos (illustrating before and after or traditional versus sustainable conditions) (Figure 1); supporting images (site plan, additional photos, diagrams, etc.); and a methodology document that includes data sources and calculations for each performance benefit.

**Figure 1.** (a) Example of a “traditional” design solution for a commercial landscape in southern California, as compared to (b) a “sustainable” design solution at the Frontier Project in Rancho Cucamonga, CA (2012). Photo (a) by Jessica Canfield, photo (b) by EPT Design.

### 4 LANDSCAPE PERFORMANCE ASSESSMENT

#### 4.1 Identifying Landscape Performance Benefits and Data Sources

LAF’s aim is to develop case studies of built works which exhibit a full array of social, environmental, and economic benefits. To help researchers and practitioners identify these potential performance benefits, LAF developed seven landscape-performance-benefit categories, further detailed in 31 sub-benefits: (1) Carbon, Energy & Air Quality: energy use & emissions, air quality, temperature & urban heat island, carbon storage & sequestration; (2) Economic: property values, O & M savings, economic development, job creation; (3) Habitat: habitat preservation, habitat creation/restoration; (4) Land: transportation, land efficiency/preservation, soil creation/restoration; (5) Materials & Waste: reduced/recycled materials, local materials, waste reduction; (6) Social: recreational & social value, public health & safety, educational value, noise mitigation, food production, scenic quality/views; (7) Water: stormwater management, water conservation, water quality, flood protection. Though this list provides a starting point, guidelines for selecting relevant benefits and corresponding metrics have yet to be formally developed. Thus, participants in the inaugural years of the CSI program used individual strategies for identifying and quantifying performance benefits.

We experienced a significant learning curve in identifying and quantifying performance benefits. To identify a project’s potential landscape performance benefits, all sustainable practices and features needed to be identified. We found it essential to fully understand a project's history, including original and revised design goals, the scope of design services, the construction practices employed, and any ongoing maintenance regimes. Direct dialogue with a project's design team and consultants, as well as physical site visits were ideal sources for first-hand data. However, secondary-data from project cut-sheets, award submission narratives, client presentations, photographs, and design development documents was also helpful. Staying organized and keeping track of all sources was imperative, especially in the event conflicting information was found. Close and regular communication with the design firm liaison was imperative.

Each performance benefit statement, as required by LAF, needed to include a quantified measure of a sustainable feature’s performance, as well as an indication of the significance of the performance. If a performance benefit statement did not pass a “so what?” test, in other words, if the significance or
meaning of the performance was not clear, the benefit was re-worked to better communicate its message. Note that LAF requires performance benefit statements begin with a verb (e.g., reduces, eliminates, improves, adds, etc.).

Example draft performance benefits and potential data sources

Social

- Benefit: *Increased community park space by xx acres or xx%, providing active recreation opportunities for xx people daily*
  Data: Site plan (pre- and post-construction) and field observations or user surveys
- Benefit: *Provides xx sustainable design workshops, educating xx students annually*
  Data: Visitor logs or client’s tracking of educational program offerings and attendance

Environmental

- Benefit: *Reduces stormwater runoff volume by xx%, thereby increasing annual groundwater recharge by an estimated xx gallons*
  Data: Calculations produced by the civil engineer for LEED documentation.
- Benefit: *Increased species richness xx% by adding xx acres of critical habitat*
  Data: Habitat Assessment and Sensitive Species Survey produced by a consultant

Economic

- Benefit: *Increased adjacent property values by xx% with the addition of xx acres of new public park space*
  Data: Municipal tax/property value records
- Benefit: *Saved $xx in waste disposal and hauling fees by reusing existing pavement as sub-base*
  Data: Demolition plan and cost estimates

The type of performance benefit informed the type of data needed. For example, when illustrating the social benefits of a project, data from post occupancy user surveys or data from on-site observations of user behavior was useful. Environmental benefits typically required data from water quality reports or tree surveys. Economic benefits typically required data on property values or water costs. In assessing environmental and economic performance benefits, relevant data was often extracted from project documents, such as technical reports, pre- and post-construction photographs, construction documents, and design specifications. Each performance benefit typically required data be gathered and synthesized from multiple sources.

The validity of performance benefit statements largely depends on the quality and reliability of data sources. First-hand, verified data is most desirable for performance analyses, though it was not always feasible to obtain due to geographical limitations, cost implications, and/or the short duration of the CSI program. Thus, existing, readily obtainable second-hand data was extremely useful. However, the validity of such data can be questionable, especially if the original data collection criteria and procedures were not clear. If first-hand data collection was feasible, research teams needed to carefully consider the time and cost of developing protocols for collecting and analyzing the data. Many state universities have extension programs that, for a small fee, can analyze soil and/or water samples. Depending on the type of test and laboratory availability, sample analysis can take a few days or several weeks. If collecting user survey data, sufficient time needs to be allocated for developing a survey questionnaire and obtaining formal approval from the university’s Institutional Review Board (IRB). This approval process differs from institution to institution and can take 2-6 weeks to complete. All universities require IRB approval before any research involving human subjects.

4.2 Identifying Metrics and Quantifying Landscape Performance Benefits

While simultaneously drafting benefit statements, research teams also conducted a literature review to find applicable metrics, and to help identify applicable data sets. Without prior experience in conducting performance assessments, we experienced a learning curve in identifying and employing various metrics. A significant limitation for choice of metric was due to the CSI program’s short time frame, which limited complex data collection and analysis. For example, to evaluate the causal relationship between property value dynamics and green space, property value data must be coded at the parcel level, which is time consuming and likely not feasible within the given time frame. Factors, such as a project’s
size, age, type, context, and climate also impacted which analysis tools to use. The EPA’s Rational Method, for example, is applicable for use on sites less than 200 acres. Other metrics require longitudinal studies, with data taken over a period of years. Another limiting factor in metric selection was a need for external expertise. If the data collection or quantification procedure required specific expertise, like that of an ornithologist for example, the CSI team either needed to seek external assistance or choose a different metric.

In quantifying performance benefits, a number of published LPS case studies have used basic arithmetic and data that represent pre and post-conditions. Some performance benefits have been calculated with assumptions/interpretations of similar projects’ performance within the same geographic region, however this strategy tends to overlook site specific nuances. A number of LPS case studies have also employed online calculation toolkits to determine performance benefits, such as the National Tree Benefit Calculator (https://www.arborday.org/calculator/index.cfm) which assesses the multifaceted benefits of certain tree species (Figure 2); the Plant Stewardship Index (PSI) (http://www.bhwp.org/psi/) which evaluates the overall ecological quality of the site; and the Walk Score (http://www.walkscore.com/) which examines how walkable a site is, based on trips that run errands. However, these online toolkits are based upon scientific calculations that need to be specifically examined. Before using a third-party calculator, users must understand the required variables and how the tool is calibrated (e.g., any baseline assumptions used) to ensure results are meaningful to specific site conditions.

Figure 2. Example calculation from the National Tree Benefit Calculator. By entering a project’s zip code, the tree species and diameter, and the land-use type that the tree is nearest to, the calculator will provide an estimate of annual benefits related to: stormwater interception, property value, energy, air quality, CO₂, and overall monetary value. (Image source: https://www.arborday.org/calculator/index.cfm)

All published LPS case studies include a standalone methodology document, which can be downloaded from the LAF website. Here we highlight two quantified benefits as examples.

**Performance Benefit Example 1: High Desert Community, New Mexico**

The High Desert community in Albuquerque, New Mexico honors low-impact design practices of water conservation, wildlife habitat restoration, material recycling and cultural endowment. This project changed water-conservation and landscape planting ordinances at city and state levels. Through this master plan, the design firm (Design Workshop, Inc.) strives to balance environmental sensitivity, community connections, artistic beauty and economic viability with metrics that gauge the success of outcomes (Yang and Goodwin, 2011).
A unique aspect of the project’s performance lies in its water conservation success within a desert environment, where culinary water for irrigation is scarce. Because of this success we chose to demonstrate the compelling performance benefit of water conservation and we relied upon first- and second-hand data sources. Water price data were obtained from city’s website (first-hand). Landscape irrigation area was calculated based upon construction documents, using AutoCAD (second-hand).

Performance Benefit:
Reduces potential annual landscape water use by 80%, by about 28.7 million gallons, with water-efficient native plants and limited areas of irrigated landscape, saving on average $300,000/year in water costs over the traditional city-based allowance in 2010 (Yang and Goodwin, 2011).

Data:
1,660,416 sf of irrigation only area (source: area calculated from construction documents)
7,456,085 gallons water used in 2010
36,227,405 gallons water allowed in 2010
$7.83 per unit water cost; 1 unit = 748 gallons

Calculations:
36,227,405 – 7,456,085 = 28,771,320 gallons saved
28,771,320 / 748 = 38,464 units, 38,464 units x $7.83 = $301,175.71 in cost savings annually
7,456,085 / 36,227,405 = 0.2058, or 80% savings over allowance

Performance Benefit Example 2: Frontier Project, California
The Frontier Project is a non-profit organization and demonstration facility, created specifically to showcase the application of sustainable design practices and technologies most suitable for use in Southern California. Providing citizens with an array of educational resources and implementation tools, the project seeks to encourage visitors to incorporate energy efficient and water-wise practices in their own homes. Seamlessly integrated with the LEED Platinum building, the indigenously inspired landscape showcases a comprehensive stormwater management system, the Inland Empire’s first green roof, and visually stunning, low-maintenance, water-wise plantings (Canfield and Fagan, 2012).

One of the project’s most significant sustainable features is its rainwater cistern and adjacent infiltration basin. To express an environmental benefit of this feature, we chose to calculate how much runoff was being prevented, and thereby eliminated from the local storm sewer. Since the site was less than an acre we chose the Rational Method. We worked closely with the design firm liaison to obtain applicable data, which was found in a small area unit hydrograph that was produced by a project consultant.

Performance Benefit:
Collects 100% of stormwater runoff on site from storm events up to a 5-year event, preventing an estimated 48,900 gallons from entering the municipal storm sewer for each 5-year event (Table 1) (Canfield and Fagan, 2012).
Table 1. Frontier Project Small Area Unit Hydrograph (2012). Reproduced with permission from the Landscape Architecture Foundation

<table>
<thead>
<tr>
<th>Condition</th>
<th>A = Drainage Area (ac)</th>
<th>Tc = Time of Concentration (min)</th>
<th>Q = Peak Discharge (cfs)</th>
<th>Volume per Tc (ac-ft)</th>
<th>Volume (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Development</td>
<td>0.79</td>
<td>7.81</td>
<td>1.36</td>
<td>0.0146</td>
<td>4,758</td>
</tr>
<tr>
<td>Developed (w/o BMP mitigation)</td>
<td>0.86</td>
<td>6.28</td>
<td>1.9</td>
<td>0.1561</td>
<td>50,868</td>
</tr>
<tr>
<td>Developed with BMPs</td>
<td>0.86</td>
<td>7.95</td>
<td>1.21</td>
<td>0.15</td>
<td>48,878</td>
</tr>
</tbody>
</table>

Source: Area from EPT Design 16029-BSCN.dwg (2008); All other figures from RFB Consulting, Frontier Project Small Area Unit Hydrograph

Data:
Figures for time of concentration, peak discharge, and volume were obtained from a small area unit hydrograph prepared by the stormwater consultant. Drainage area figures were obtained from project construction documents.

Calculations:
The Rational Method was used to calculate peak discharge. $Q = C \cdot i \cdot A$, where $Q$ is peak discharge, $C$ is the runoff coefficient of the land cover material, $i$ is the average intensity of rainfall on site at the time of concentration ($T_c$), and $A$ is the drainage area.

In its pre-development condition, the site was estimated as producing 4,758 gallons of runoff during a 5-year, 24-hour storm event. Once developed, the site was estimated to produce 50,868 gallons of runoff during a 5-year, 24-hour storm event (without inclusion of stormwater Best Management Practices). If developed with stormwater Best Management Practices (thus increasing the time of concentration and decreasing the amount of runoff), the site was estimated to produce 48,878 gallons of runoff. These figures helped the design team size the stormwater infiltration system, which included a 2,000 gal. subgrade cistern, and a 50,000-gallon overflow infiltration basin. Thus, during a 5-year, 24-hour storm event, 100% of on-site runoff is either captured and stored in the site’s underground cistern (for future irrigation use) or recharged in the overflow infiltration basin.

5 MOVING FORWARD
The landscape architecture profession cannot rely solely on other disciplines to generate empirical knowledge about landscape performance. The LPS and CSI research initiatives are making big strides in promoting landscape architecture research. Though, for the LPS case studies to be of greatest value, results must be generalizable, enabling case studies to be compared. With an array of methods/metrics currently in use, this is not yet feasible. However, LAF has recently initiated a new research program that aims at strengthening the validity of the CSI program’s methodology. As this program takes shape, and as the production of LPS case studies continues, we offer the following suggestions for further research:

(1) Assess the extent to which existing metrics in the published case studies are a valid representation of the claimed performance benefits.
(2) Determine to what extent the methods used in these case studies are appropriate for the targeted performance metrics.
(3) Evaluate the strengths and weaknesses of the methods for their applicability of use in design practice and/or in the classroom.
(4) Conduct a literature review of each type of metric used. This will help to identify any potential limitations or known problems, as well as the level of difficulty to use it.
(5) Solicit design practitioners’ input for improvements in case study preparation, evaluation, and dissemination.
(6) Determine the impact of the LPS case studies. Find out which agencies or advocacy organizations have made use of specific benefits. Also provide examples of how specific benefits can be used for design decision making or for policy improvements/revisions.

(7) Develop a set of landscape performance benefit guidelines or a roadmap that provides recommendations on which performance benefits to measure, which metrics to use, the best type of data to collect, and any potential limitations of the metrics and methods.

6 REFERENCES
SERVICE-LEARNING AND COMMUNITY ENGAGEMENT

Edited by Paula Horrigan and Cheryl Doble
FOUR-LEGGED ECOREVELATORY AGENTS OF ENGAGEMENT: PRESCRIBED GRAZING AS A TOOL FOR COMMUNITY BUILDING, ECOLOGICAL RESTORATION, AND PUBLIC INTERACTION

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1 ABSTRACT
This paper describes the results of an ongoing, university-initiated project, The Tanyard Creek Chew Crew, which utilizes sheep and goats to catalyze community involvement in urban ecological restoration. Throughout the United States, landscape architects, planners, and other land management professionals are experimenting with the use of goats and sheep as biological agents for controlling invasive plants and assisting in the restoration of ecological function in woodland and riparian environments—a technique known as prescribed grazing. For urban conservationists, prescribed grazing may be a cost-effective, non-toxic, non-polluting, and effective technology for managing pest plant species. Aside from these benefits, however, domesticated animals may offer opportunities to engage the public in the process of rehabilitating and re-inhabiting neglected urban green spaces. Using a degraded riparian woodland as a test site, the authors initiated a prescribed grazing program in a highly visible section of the University of Georgia campus. The effort was designed to capitalize on the charismatic nature of goats to attract students, curious passers-by, neighborhood children, and other community members to the site. The results of the project suggest that landscape architects should consider how domesticated animals may become valuable partners in managing urban cultural landscapes. The paper includes case-based suggestions for how landscape architects might design prescribed grazing initiatives to promote to greater knowledge of local nature, attachment to place, and participation in environmental stewardship.

1.1 Keywords
community engagement, ecological restoration, goats, landscape management, prescribed grazing
2 INTRODUCTION
2.1 From Junkscapes to Green Infrastructure

Across the United States, there is no shortage of underappreciated urban green spaces, examples of what ecologist and urban planner Nina-Marie Lister has labeled “junkscape.” Ranging from abandoned industrial sites, expanses of asphalt and barren flat roofs, to patches of untended greenery along highways and urban stream corridors, Lister defines junkscape as “space that is literally being wasted: Space within the landscape that is no longer functional, or has never been productively used” (2006, p.64). Some junkscapes have resulted from deliberate planning and design decisions, while others have emerged inadvertently from abandonment or neglect. As Lister notes, however, such wasted space is also the locus of tremendous potential and opportunity: “spaces that now lie dormant can and should be seen as awaiting reactivation through some new creative reuse” (Lister, 2006, p.64).

In recent urban design and planning practice, “regreening” junkscapes has emerged as a core strategy for building systems of urban green infrastructure. A term that gained currency in planning and design discourse during the 1990s and early 2000s, “green infrastructure” can refer to structures and engineered landscapes that strive to manage stormwater runoff in ways that incorporate or mimic natural hydrologic processes, or to regional-scale, multifunctional open-space networks (Rouse and Bunster-Ossa, 2013, p.1). Benedict and McMahon (2006, p.1) advocate a broad view of the concept, defining it as “an interconnected network of natural areas and other open spaces that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife.”

The notion of “ecosystem services” is implicit and integral to green infrastructure. A concept that likewise gained ascendency within the lexicon of environmental planning and design in the 1990s, ecosystem services encompass “the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life” (Daily, 1997, p.3). For landscape designers and planners, some of the unrealized potential of junkscapes exists in the form of enhanced ecosystem services. Aside from providing wildlife habitat, stormwater management, and air and water filtration, reclaimed urban green spaces may offer opportunities for passive recreation, enhancing the quality of life for people who live or work nearby. During the past four decades, scientists have documented numerous psychological and social benefits associated with access to “nearby nature” ranging from psychologically “restorative experiences” and improved physical health, to fewer incidents of aggression and domestic violence (e.g., Kaplan et al., 1998). Such effects apparently derive not just from experience in remote, large expanses of wilderness, but also from small and “unspectacular nearby places, such as parks, street trees, vacant lots, and backyard gardens” (Pretty and Barlett, 2005, p.299).

As concepts such as ecosystem services and biodiversity have gained currency in recent environmental planning and design discourse, conservationists likewise have increasingly embraced the notion that intelligent design and conscientious attention to human needs and values are essential aspects of ecological restoration. These themes resound through the writings of ecological restorationists such as William Jordan, III, and Eric Higgs. Jordan argues that the success of restoration hinges on the extent to which it engages communities, becoming interwoven into local cultures as forms of performance and ritual (e.g., Jordan, 2003). Higgs has embraced similar themes, calling for ecological restoration to be viewed in terms of cultural, social, and political processes. Like some of his contemporaries, Higgs (2003, p.274) argues that ecological restoration “is fundamentally a design practice.” The ideas presented by Jordan and Higgs resonate with bioregional approaches to planning and design (Thayer, 2003), as well as efforts to transform “junkspace” into multifunctional green infrastructure.

In attempting to enact such transformations, planners, designers, and restoration ecologists will need to effectively garner political support, and mobilize a substantial volunteer workforce to help repair and steward “nearby nature” in cities. While scientists and other experts play prominent roles in most ecological restoration efforts, the success of many conservation initiatives—particularly in urban settings—depends on how they engage ordinary citizens (Ingram, 2008). The invisibility of ecosystem services may be one impediment to mobilizing collective action, along with the tendency of many residents to overlook the small streams, patches of woodland, and other fragments of nature that survive in many urban environments. Moreover, the tools and techniques of ecological restoration sometimes seem incongruous with the underlying goal of enhancing the health of human and biotic communities. For example, conventional methods for controlling invasive plants often rely on mechanical removal or the application of chemical herbicides, or both. It seems reasonable to speculate that “restorative experiences” and other
potential benefits from volunteering in an ecological restoration project might be diminished, at least by some degree, by the fumes and noise emitted by gas-powered chainsaws and “brush hog” mowers, and the health risks that stem from operating such equipment or handling toxic chemicals. The desire to avoid or minimize potential negative side-effects of conventional methods of removing invasive vegetation is one factor motivating some land management professionals to explore alternative approaches.

2.2 Prescribed Grazing and Biophilia

“Prescribed grazing” is one alternative to relying exclusively on machinery or chemicals for invasive vegetation removal. Also known as “targeted grazing,” “intensive grazing,” “rotational grazing,” or “managed herbivory,” prescribed grazing is defined as “the application of a specific kind of livestock at a determined season, duration, and intensity to accomplish defined vegetation or landscape goals” (Launchbaugh and Walker, 2006, p.3). Prescribed grazing regimens typically occur over several growing seasons, as repeated cycles of grazing gradually exhaust the energy reserves of mature plants and slowly deplete the seed bank. Key inputs include infrastructure in the form of fencing and a covered shelter, costs associated with leasing the animals, and human labor to care for and assist the animals and remove defoliated plants from the site. Sheep and goats are the animals most commonly used in urban prescribed grazing initiatives. Increasingly, they are being employed to eliminate invasive plant species from parkland, or remove vegetation in preparation for construction (Hart, 2001). Near many U.S. cities, goat and sheep farmers have begun renting their animals to property owners for land clearing purposes, and entrepreneurs have founded businesses that specialize in providing prescribed grazing services.

Among humankind’s oldest species of domesticated animals, goats and sheep have been integral to many human civilizations for over 9,000 years. Their value to human communities derives in part from their ability to adapt to a wide variety of environmental conditions and their capacity to survive in marginal pasture lands (Clutton-Brock, 2012). Of course, this adaptability has proven to be a double-edged sword: instances of ecological devastation caused by overgrazing are numerous, and examples also abound of catastrophic collapses in biological diversity caused by feral populations of goats, particularly in island ecosystems (Pickering, 1984). Yet the characteristics that make grazing animals ecologically problematic also make them potentially valuable in reclaiming damaged and neglected green spaces. Their appetites and preference for a diverse diet—coupled with their ability to navigate rugged terrain and densely entangled vegetation—make goats and sheep well-suited to the task of removing invasive species from steep slopes, overgrown thickets, and small urban spaces filled with hard-to-access plants. Aside from representing a low-input, non-polluting and non-toxic alternative to conventional invasive plant control techniques, prescribed grazing may offer another benefit to the human communities that embrace it: the intellectual and emotional delight that can arise from interacting with other species—a phenomenon that biologist Edward O. Wilson described in 1984 as “biophilia.”

Wilson defines biophilia as “the innate tendency to focus on life and lifelike processes” (Wilson, 1984, p.1). In subsequent writings Wilson has emphasized the extent to which biophilia may be learned, i.e., a disposition that is reinforced, amplified, and expressed through human culture (Wilson, 1993). Researchers in the biological and social sciences, along with scholars in the humanities, have taken up Wilson’s concept (e.g., Kellert and Wilson, 1993), and numerous positive psychological and social effects have been linked to human-animal interactions. In clinical psychology and social work, data have clearly and consistently linked human-animal interactions with improved mood and reduced depressive symptoms, reduced apprehension and anxiety, and improved anger management (Katcher and Beck, 2011; Rossetti and King, 2010). Animals have been shown to improve communicativeness in patients, and enhance patients’ awareness of their social environments (Rossetti and King 2010). Moreover, studies in social psychology have demonstrated that companion animals such as dogs act as effective “social lubricants,” easing conversation and interaction between strangers (e.g., Gueguen and Ciccotti, 2008).

Wilson’s notion of biophilia as an innate human disposition that is honed through human culture is a concept that may reinforce William Jordan’s conception of ecological restoration as “an expressive and symbolic act—a context for the creation of meaning” (2003, p.21). Incorporating animals into the ecological restoration process—not merely as passive beneficiaries of restored wildlife habitats, but as active participants and partners—might enable landscape architects and conservationists to tap into and encourage biophilic tendencies and greater joy and fulfillment by users of landscapes. Research on the motives of people who volunteer for ecological restoration projects suggest that the intellectual, social,
and emotional dimensions of the volunteer experience are paramount: people participate in restoration activities out of a desire to make a difference and help the environment, explore and learn new things, socialize with others, and experience psychic restoration through being in nature (e.g., Ryan and Grese, 2005). The therapeutic effects of human-animal interactions would seem to complement the benefits of outdoor nature experiences, and align with the motives of ecological restoration volunteers. Thus, aside from prescribed grazing’s potential advantages as a low-input, biological method for controlling invasive species, the technique could also enhance the experience of volunteers in ecological restoration projects.

The prospect of employing animals as part of urban ecological restoration efforts raises a number of questions: What role could domesticated animals such as goats and sheep play in the larger effort to build, restore, and maintain urban green infrastructure systems? By incorporating animals into the process of repairing damaged urban natural areas, how might ecological restorationists catalyze public interest and encourage community participation? What adjustments would be required on the part of planners and landscape architects if invasive plant removal or vegetation clearing were conceptualized as a biological process involving animals, rather than a mechanical process involving machinery and chemicals? Finally, what logistical hurdles would be encountered in attempting to implement an ongoing prescribed grazing program in a heavily urbanized environment?

3 TANYARD CREEK CHEW CREW: A PRESCRIBED-GRAZING PILOT PROJECT

3.1 Project Background

In spring 2012, faculty, staff, and students at the University of Georgia launched a pilot project to explore the possibilities and the challenges mentioned above. Much of the university campus occupies rolling terrain that offers glimpses of the nearby North Oconee River. A number of small tributaries flow through and adjacent to campus and, where they are open to daylight, they create ribbons of green vegetation in a landscape mosaic dominated by buildings and paved surfaces. A few patches of woodland, often located along stream corridors or on rocky or steep terrain, also remain on campus. With few exceptions, however, these relic bits of urban “nature” qualify as “junkscapes.” Rarely visited by people, they are disconnected from the cultural and social life of the university. Many are repositories for human trash and urban pollutants, and are overpopulated with invasive, exotic species. Their ability to provide ecological services such as stormwater management, plant and animal habitat, and biodiversity conservation is highly impaired.

During fall 2010, a graduate landscape architecture studio in the University of Georgia, College of Environment and Design (UGA-CED), developed a conceptual green infrastructure plan for the campus that depicted an alternative vision for campus green spaces (Vick et al., 2010). The plan suggested how neglected and degraded riparian corridors, woodlands, and open spaces could be transformed to benefit human and biotic communities. Although not officially adopted by the university, the plan became a framework for subsequent discussions, and a guide for future planning. University planners and architects have begun implementing components of the plan incrementally, and the plan has informed recent design studio projects within the UGA-CED. One of these, a senior undergraduate landscape architecture studio conducted in fall 2011, analyzed the history and ecology of the Tanyard Creek watershed, which includes a significant portion of the university campus. Water quality monitoring data indicate that the creek suffers from fecal coliform and $E.\ coli$ contamination, elevated pH, excessive nitrogen and phosphorus levels, pollution from heavy metals, and invasive species (Unified Government of Athens-Clarke County, 2011). During the course of the studio, discussions about ecological repair and management options sparked the idea for a prescribed grazing program along a university-owned stretch of Tanyard Creek. The concept was given a name—The Tanyard Creek Chew Crew—and formalized into a proposal to the university’s Office of Sustainability. In early spring 2012, the proposal was awarded a small sustainability grant, and UGA-CED faculty, students, and university staff began developing the project.

3.2 Project Design

The Tanyard Chew Crew was not the first prescribed grazing experiment on the University of Georgia campus. Beginning in spring 2011, university architects and physical plant staff began experimenting with the use of sheep to clear invasive woody shrubs from a floodplain along Lily Branch, another small tributary to the North Oconee River. Since then, repeated prescribed grazing treatments with sheep have significantly reduced the abundance of invasive plants at the site. For the Tanyard Creek
pilot project, the university’s Office of Sustainability wished to further explore prescribed grazing’s potential for raising public awareness of local environmental issues, generating interest in green infrastructure development, and engaging the campus community in positive collective action toward realizing that goal.

Project designers elected to employ goats rather than sheep at Tanyard Creek, a decision that was influenced by perceived differences in the temperaments and grazing habits of the two species, and the physical characteristics of the Tanyard Creek site (Figure 1). Unlike the Lily Branch location, the 2.7-acre Tanyard Creek tract was characterized by steep slopes and rugged terrain. Chunks of concrete, asphalt and other construction debris were strewn in various locations, and in some places shrubs and vines formed an impenetrable wall of vegetation. The Tanyard Creek site also was more centrally located, more visible, and significantly more “public” than the Lily Branch site. At its southern end the site bordered Baxter Street, a vehicular and pedestrian thoroughfare that links the central portion of campus with student residence halls and the rest of the city. During weekdays and evenings, a nearly constant stream of motorists enter and exit from a large, multi-story parking deck located along the site’s eastern edge. The upper levels of the parking deck offer views into the site, while a flat grassy area located where the creek passes beneath the street provides a prime location from which to watch the animals at work.

All of these conditions made the Tanyard Creek site particularly well-suited to grazing by goats, which perform well in steep and rugged terrain. In comparison to sheep, goats generally prefer a higher proportion of “browse” (i.e., woody plants) in their diets, and are widely regarded as being more sociable with humans. Classified by Colblentz (1977) as “opportunistic generalists” because of their flexible diets, goats can adjust from 80% browse to 80% grass depending on plant species availability (Malechek and Leinweber, 1972). Their diverse diets, resistance to many plant toxins, and “browsing” eating style make them capable of defoliating most plant species (Fraps and Corey, 1940). At the same time, goats aid the cycling of nutrients sequestered in woody plants (Hart, 2001). Moreover, goats show preference for seeding stems, helping to prevent the further spread of invasive species (Allan and Holst, 1996). Goats are known as intelligent, curious, and gregarious animals—all qualities that make them potentially valuable partners in an effort to win the hearts of potential volunteers. Many goats are docile creatures that enjoy interacting in a playful and affectionate way with their human handlers (MacKenzie and Goodwin, 1993). These qualities made goats an appealing choice from a public relations perspective.

In addition to the considerations noted above, the design of the Tanyard Creek Chew Crew initiative reflected its status as a pilot project. Pilot studies are typically small-scale versions of larger experiments that are conducted in order to further the development of a research protocol, test various research or implementation techniques, collect preliminary data, and identify logistical problems that might occur in the course of a larger-scale effort (Baker, 1994). All of these imperatives applied to the Tanyard Creek Chew Crew: the project designers were interested in testing the effectiveness of prescribed grazing with goats as a means of controlling invasive plants and spurring community engagement in ecological restoration, as well as exploring the techniques and logistics that would be involved in using the approach more widely on campus. Accordingly, the project designers elected to deploy a relatively small herd of eight goats during a 5-6 week grazing period. The project’s small budget meant that critical infrastructure and labor would have to be supplied through donations or by volunteers—a condition that, perhaps
somewhat unintentionally, further tested whether the effort could inspire sufficient public support. In order to implement the pilot study, contributions of equipment, materials, and supplemental funding were needed from other sources on campus, along with cooperation from university administrators, and labor from volunteers. Would the community rally behind an effort to graze goats in the middle of campus?

With these considerations in mind, the designers of the Tanyard Creek Chew Crew pilot project identified the following key objectives: (1) assess the efficacy of goat browsing for reducing woody invasive species in the Tanyard Creek corridor; (2) explore the capacity of goats to garner news media attention and raise public awareness about invasive species and possibilities for ecological restoration; (3) explore the ability of goats to attract community support in the form of resource donations and volunteer labor; (4) determine the logistical requirements for implementing prescribed grazing with goats on campus; (5) identify potential problems related to protection of water quality, soils, and the health, safety, and welfare of both goats and humans.

3.3 Methods of data collection and evaluation

The limited availability of financial and human resources necessitated a frugal and pragmatic approach to launching the project and collecting data related to the five objectives. As a result, the status of most objectives was gauged by simple and easily-attained quantitative data (e.g., tallying volunteer hours), and qualitative assessments of community interest and volunteer experiences based on participant observation and interviews. Aside from reflecting logistical constraints, the approach is consistent with the intent of pilot studies, which generally aim to develop or fine-tune research questions, test the feasibility of a research program, determine the feasibility of a research protocol, and convince funding bodies and other stakeholders that the main study is worth supporting (Baker, 1994).

To monitor the environmental impacts of the prescribed grazing regimen, the project designers relied primarily on visual assessment. The impacts of goats on soil conditions was assessed through routine visual inspection of the site, while impacts on water quality were monitored through lab testing for *E. coli* and fecal coliform levels. An initial vegetation inventory provided information about the presence and distribution of species on the site. Three time-lapse cameras were installed in various locations to photo-document the site’s transformation and to allow researchers to estimate the reduction in invasive plant biomass over time. The time-lapse cameras also randomly captured human-animal interactions within and near the site. One camera recorded activity near the goats’ shelter, a natural place for both goats and human onlookers to gather. Another camera was strategically positioned to survey the activities of pedestrians and passers-by who stopped along Baxter Street to view the goats. The ability of goats to attract public attention to Tanyard Creek was measured in terms of news media coverage, and the number of people who viewed the goats or attended public education events. Community interest was documented in terms of the total number of volunteers who participated in the project, the number of hours they contributed, and the funds and other resources that community members donated. Volunteer experiences were recorded via participant observation, photographs and interviews. Finally, students who were involved in the project through service learning courses provided feedback via surveys and reflection papers. Perhaps the ultimate test of the pilot project, however, was the degree to which university administrators and members of the community were willing to support the experiment beyond May 2012.

4 RESULTS

4.1 Cross-campus Collaboration

The Tanyard Creek Chew Crew project began in late January 2012 with a budget of $3,000, a human “crew” of one undergraduate student and one faculty advisor, and a small circle of university faculty and professional staff who were willing provide assistance and advice. By the end of April, the Chew Crew’s human volunteers included twelve faculty members, sixteen university staff persons, nearly 150 students, and dozens of community members. The initiative also obtained the infrastructure needed for its implementation, none of which was included in the project budget: a solar-powered electric fence enclosed the project site, and a wooden structure provided shelter for the goats during inclement weather. Many people helped make these results possible. The director of the university grounds department committed for the paddock fence, and the department provided mulch, pruners, saws, and weekly debris removal. The Office of Legal Affairs, Office of Animal Care and Use, Office of Sustainability, and the University Architects also provided support. The UGA-CED’s Materials Reuse Program (MRP), a program
specializing in the salvage, reuse and upcycling of building materials, was instrumental in the project’s early stages. The MRP provided building materials for the goat shelter, along with student volunteers from the Terry College of Business and supervision of the construction process.

4.2 Volunteer Recruitment and Service Learning
The Chew Crew garnered participation from faculty and students involved in service-learning courses, and from general recruitment of volunteers from the university and the wider community. Three professors in a range of disciplines expressed interest in incorporating the Chew Crew into their service-learning classes—on the condition that students were sufficiently interested in the project. In the end, 32 students in the three courses chose to focus their service-learning experiences on the Chew Crew pilot project. Within the UGA-CED, graduate students in landscape architecture, historic preservation, and environmental planning programs developed a number of public education activities and organized community outreach events. Students in an undergraduate service-learning class in the English Department and another group of undergraduates enrolled in a photography course collaborated to document and promote the project through written, audio, and visual media. Curricular involvement also came about in a more informal, serendipitous fashion: two Journalism students who learned about the project early in the semester used the Chew Crew project as the focus of their semester-long studies.

Additional volunteers were recruited via press releases, announcements posted to e-mail listservs, flyers posted across campus, and a Facebook page. In keeping with the project’s goal of engaging the community, weekly volunteer days gave students and others a chance to interact with the Chew Crew, and to experience the site’s transformation. The work performed during volunteer days included trash and debris removal, selective pruning and removal of invasive plants, and various small construction projects. Although college-age young adults comprised the largest demographic group, volunteers ranged in age from over sixty to under five years old. The academic fields represented by student-volunteers included art, business, engineering, English, environmental planning and design, fashion design, historic preservation, horticulture, journalism, law, math education, photography, social work, and wildlife biology. During early March through April, 149 volunteers logged 420 hours of service during volunteer workdays. These numbers do not include the labor provided by students in service-learning courses, or the contributions of volunteers to community outreach events.

4.3 Infrastructure
With assistance from professionals in the Office of the University Architects, the campus grounds department, a local farmer, and a private contractor, a fence was designed and constructed around the perimeter of the site. With guidance and assistance from the UGA-CED’s Materials Reuse Program, student-volunteers from the landscape architecture, planning and business programs constructed the shelter using salvaged and re-purposed materials.

4.4 Public Outreach and Educational Events
Graduate students in the UGA-CED designed and organized three public events: a goat-themed festival focused on children, an Earth Day exhibition, and a community potluck. The first of these, a Saturday-morning event called “Kid Fest” (Figure 2), was designed to communicate the project’s goals to children and their parents. One student even dressed as a goat and sang an original goat-themed song entitled “Goats Rule, Sheep Drool.” Needless to say, countless smiles were worn by both children and adults at Kid Fest. Two weeks later, as part of the university’s Earth Day celebration, students hosted an event called “Meet the Chew Crew” outside the Tate Student Center, the busiest pedestrian hub on campus. The event featured banners, posters, brochures, and other materials that informed people about the project and raised awareness about the process of prescribed grazing. The highlight of Meet the Chew Crew was a small enclosure containing one female goat and three kids, and several crates filled with cuttings of invasive plants, which visitors were allowed to feed to the goats. To celebrate the end of the semester, students organized a potluck supper at Terrapin Beer Co., a local craft brewery with a large outdoor beer garden space. The event featured posters documenting the Chew Crew community’s accomplishments, live music, food contributed by attendees, and goat-themed dishes prepared by local restaurateurs. More than 250 people attended the celebration.
4.5 Media Coverage and Communication

Student volunteers used video and audio recorders, as well as professional-quality cameras to capture the transformation of the site, human-animal interactions, and volunteers’ experiences. Students in the university’s journalism, English, and photography programs developed a Facebook page, You-Tube videos, and a time-lapse photograph sequence—a multi-media package dubbed “The Chew Crew Chronicles.” These tools generated additional media coverage in the print and online editions of local, regional, and national newspapers. The Associated Press (2012) documented the project in a video distributed to more than 7,000 news outlets such as Yahoo! News and the online edition of The Washington Post.

4.6 Site Transformation

The prescribed grazing treatment resulted in a dramatic change in the site’s appearance, particularly within the southern end of the paddock where the herd spent much of its time (Figure 3). After the goats had defoliated a significant portion of the site, volunteers lopped or pruned the skeletonized invasive plants at the base, thereby opening sight lines into the creek and forcing the plants to regenerate by sending up basal sprouts. After six weeks, where an impenetrable wall of invasive shrubs and vines had once obscured all views into the site’s interior, pedestrians along Baxter Street could see the glistening streambed. Within this area the goats effectively eliminated shrubs up to six feet in height. Volunteers also collected and hauled away several pick-up truck-loads of trash and debris. Where bare soil was exposed, clover and annual rye seeds were sown and covered with straw mulch. By early summer, a lush herbaceous groundcover stabilized the slopes.

Figure 13. Child, goat and parent at Kid Fest (2012). Photo by Meg Diamond

Figure 14. Views of the site before (left) and after (right) grazing. Photo by time-lapse camera
4.7 Public Awareness and Volunteer Experiences

The project drew attention to Tanyard Creek and engaged hundreds of people in monitoring its evolution, and the Chew Crew goats appear to have played a significant role in helping the project achieve these results. First, the goats’ constant presence at the site ensured that “ambassadors” were continually there to represent the project and its goals to the public. Unlike conventional invasive plant removal efforts, in which humans often work intensively in an area for a few days or a few hours using saws, pruners, or herbicides, the Tanyard Creek Chew Crew was at work twenty-four hours per day for nearly six weeks. Initially, the novelty of seeing goats in an unfamiliar setting drew attention from both the news media and casual passersby. For example, on one occasion the authors observed a vehicle come to a screeching halt as it exited the adjacent parking deck. After a moment of silence, a youthful voice exclaimed from the car window, “SHUT UP! Are those goats!?”. The goat herd also compelled pedestrians to stop, look, and notice aspects of the site they had never noticed before. On several occasions, pedestrians were observed uttering remarks such as, “Is there a creek down there?” A number of the students, faculty, and staff who passed by the site on a daily basis apparently had no idea that a stream flowed through this part of campus. Interviews later revealed some pedestrians consciously incorporated a visit to the Tanyard Creek goat paddock into their daily commutes. The location of a prime viewing area along Baxter Street (Figure 4) encouraged passersby to stop, linger, and even strike up conversations with strangers—a prime example of the “triangulation” phenomenon described by social scientist William H. Whyte (1980, p.94). Apparently goats are capable of providing the magical “external stimulus” that enables strangers to talk to one another with comfort and ease.

Figure 4. Passersby stop to watch the herd at work. Photo captured by time-lapse camera

Triangulation also was observed during volunteer work events: the goats seemed to facilitate conversation and interaction among volunteers who did not previously know one another. For many participants, interaction with goats enhanced the overall volunteer experience. In a post-project interviews, a number of participants remarked that the goats made work fun, and several volunteers began referring to their time at the site—particularly the moments spent feeding and petting goats, or watching goats leap and play—as “goat therapy.” One volunteer noted that the goats “created a sense of community in the University of Georgia area by bringing students together to better the environment in a group effort.” Some students saw a connection between the Chew Crew project and their academic work. An undergraduate in the university’s landscape architecture program remarked that prescribed grazing reminded her of the historic role of livestock in the Picturesque style of landscape design: “The sheep of the Picturesque were used for aesthetic reasons, while the goats of the Chew Crew are used for more environmental reasons.” A number of participants stated that their interest in stream restoration had grown, and for some respondents their curiosity was tied to their perception of prescribed grazing as a more “natural,” “holistic,” or “full-circle” process. Wrote one volunteer, “I am definitely interested in the full circle aspect [of prescribed grazing]. Interested in the greater aspect of stream restoration, especially in urban settings.” Several respondents mentioned that their involvement in the project had generally increased their curiosity about the role of animals in urban landscapes. One volunteer even acted on that interest: “I’ve developed
an interest in raising animals for sustainable local food. I’ve bought four chickens that I am raising in my backyard and harvesting eggs.”

4.8 Continued Community and Institutional Support

Shortly after the conclusion of the initial phase of the Tanyard Creek Chew Crew pilot project in early May 2012, administrators in the university’s College of Environment and Design pledged to continue the initiative into the 2012/2013 and 2013/2014 academic years. The university’s Office of Sustainability committed to continuing its participation in the project, and the Office of University Architects and the Facilities Management Division likewise confirmed their continued support. During the fall 2012 semester, goats removed additional invasive vegetation from the site during a six-week grazing period. Hundreds of visitors visited the site, toured the creek corridor, and interacted with the goats during a special event held in conjunction with the university’s homecoming football game. By the end of 2012, an additional 69 volunteers had contributed 140 more hours to the Chew Crew via volunteer work day events.

5 CONCLUSIONS

5.1 Four-legged Agents for Landscape Change and Community Engagement

As landscape architects, urban planners, and restoration ecologists search for strategies to reclaim and re-envision forgotten urban landscapes, they should consider the potential usefulness of prescribed grazing. The Tanyard Creek Chew Crew pilot project suggests that prescribed grazing holds promise not only as a low-input and effective technique for managing invasive vegetation, but also as a strategy to enhance the visibility of overlooked urban natural areas, raise public awareness about the potential benefits of ecological restoration, and engage community members in the process of reclaiming neglected junkscapes. By incorporating domesticated animals into the landscape management process, coordinators of the Chew Crew extended the message of eco-revelatory urban design beyond the “choir” of landscape architecture, planning, and environmental engineering students. Indeed, some of the project’s most active and enthusiastic volunteers were students in such diverse fields such as journalism, photography, art, law, and math education. The project engaged a significant number of university faculty and staff, as well as citizens and children from beyond the campus community. Photographs, interviews, surveys, and observations of participants also suggested that animals positively influenced people’s experiences of the project and their attitudes toward the site.

Prescribed grazing’s low-input requirements and its low-impact on soil, water, and air quality, while still not entirely proven, are two potential advantages over more common methods of invasive vegetation management. Along with possible environmental and social benefits, the technique may challenge the current more conventional ways of planning urban green infrastructure systems. To incorporate prescribed grazing into project implementation, landscape architects may need to adjust their thinking about the temporal dimension of landscape, the timescale of implementation, and the interweaving of ecological and cultural processes. In situations where plants must be removed within a short timeframe, prescribed grazing may not be a viable option. In other cases the slower pace of prescribed grazing could be considered an asset of a green infrastructure development strategy. By integrating animals and community volunteers into the process of preparing the land for restoration or redevelopment, prescribed grazing efforts may be useful in building the constituency needed for the landscape’s future stewardship.

5.2 Suggestions for Possible Urban Prescribed Grazing Best Practices

The authors’ experience with the Tanyard Creek Chew Crew highlights a number of factors to consider when implementing prescribed grazing in urban or educational settings. Particularly if the effort is conceived as a means to catalyze community interest in urban green infrastructure systems, landscape architects should carefully consider (1) the site context and the siting of infrastructure elements; (2) the potential for collaboration within and across the community; (3) programming that will provide opportunities for direct contact and interaction with the animals, as well as occasions for serendipitous discovery; and (4) partnerships with journalists and other media professionals to document the project and help spread the word. With respect to the first consideration, landscape architects might regard prescribed grazing as a site design opportunity in its own right: visibility, surrounding land uses and building density, and pedestrian traffic patterns are all factors that affect public awareness and perception of the effort.
Providing opportunities for the public to watch the site’s transformation, view or interact with the animals, or experience the phenomenon of social “triangulation” may be especially important.

Prescribed grazing inherently touches upon a wide range of human knowledge domains. Agriculture and animal husbandry, animal science and veterinary medicine, botany and ecology, landscape architecture and urban planning are only a few of the disciplines and professions that could make vital contributions to the future evolution of this land management technique. Humankind’s long and rich history of living with domesticated livestock species also opens prescribed grazing to potential important contributions from the arts and humanities. Indeed, prescribed grazing offers seemingly endless possibilities for cross-disciplinary collaboration—a consideration that may be particularly important in an educational setting. Farmers, grocers, artists, writers, teachers, and scientists from a number of fields may become key collaborators who can offer varied perspectives and add a unique and deeply local dimension to the effort.

The authors’ experiences with prescribed grazing on the University of Georgia campus also suggests that simply placing sheep or goats on an overgrown urban site may not be enough to catalyze community involvement. Public events such as the Chew Crew’s “Kid Fest” may be critical to promoting public awareness of the project, as well as increasing general knowledge about the problems associated with invasive species and the possibility of restoring ecological functions within green infrastructure systems. The popularity of Chew Crew volunteer workdays demonstrates the importance of a structure that provides opportunities for interaction among people, animals, nature, and landscape. Workdays offer participants the chance to play a tangible, visible role in the restoration of damaged natural areas. The job of a workday coordinator is not only to lead groups in restorative activities, but to create a positive environment for volunteers to interact with animals and other humans, gather intimate knowledge about their ecosystem, and celebrate their roles in the restoration process.

5.3 Suggestions for Future Research

Although humans have herded grazing animals for millennia, much remains to be learned about how to effectively use livestock to achieve specific land management objectives. Particularly in urban settings, research is needed on factors such as the optimal timing and duration of grazing periods, the appropriate number of animals per unit of land area or forage biomass, and the effects of local environmental variables on the animals’ performance. Additional investigation of the possible biophilic dimensions of prescribed grazing also could enhance our understanding of the technique’s potential to engage communities in transforming “junkscapes” into valued urban natural areas. Are volunteers’ experiences in ecological restoration projects enhanced by working among and interacting with domesticated animals? Do people derive more enjoyment from working in a prescribed grazing context than from working with gas-powered machinery or chemical herbicides? Landscape architects—and particularly educators in the fields of landscape architecture, urban design, and planning—have important roles to play in answering these questions. In addition, those who work in college or university settings may be in a particularly valuable position in which to advance the art and science of prescribed grazing, while simultaneously enhancing green infrastructure.

U.S. cities face an uncertain future. Increasing scarcity of fossil fuels, global climate change, biodiversity loss, and growing social and economic inequities portend future urban landscapes that are vastly different from the ones we know today. In the face of such uncertainty, however, designers may find the impetus to imagine new and renewed environments that minimize waste and inefficiencies, conserve resources, and improve the quality of life for humans and other creatures. If so, the restoration, enhancement, and revelation of ecological processes is likely to become core to landscape architectural practice. For landscape designers, planners, and conservation biologists the junkscapes of America’s cities represent unrealized potential in the form of future multifunctional green infrastructure networks, as well as opportunities to restore ecosystem processes and to engage urban communities in activities that build environmental literacy and foster environmental stewardship. Toward these ends, prescribed grazing initiatives such as the Tanyard Creek Chew Crew pilot project may prove valuable. In the future, some of our most esteemed partners in the transformation of urban landscapes may have four legs.
6 REFERENCES


SUSTAINABILITY

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SUCCESES AND FAILURES OF THE FIRST SLOW CITY IN TURKEY:  
THE CASE OF SEFERIHISAR

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1 ABSTRACT

The movement of Cittaslow is an alternative approach to urban development and is based on local resources and strengths in terms of natural, economic, cultural and historical aspects (Mayer and Knox, 2006). The movement mainly includes a set of goals and principles such as improving the quality of life, promoting cultural diversity of individual cities and protecting the natural environment (Cittaslow International Network, 2012). Turkey decided to pursue the Cittaslow principles and set up its very first case in Seferihisar in 2009. Seferihisar is now part of the Cittaslow international network that has over 180 members in 28 countries (Cittaslow International Network, 2012).

After becoming accredited, the local government executed some projects to pursue the goals and principals of the Cittaslow movement. The aim of this study was to examine the successes and failures of the major projects that were conducted in Seferihisar. For this purpose, the case study methodology for landscape architecture was used (Francis, 1999; 2001). An evaluation form was designed to investigate both the successes and failures of the projects based on the Cittaslow policies and goals (requirements for excellence). The information was gathered from site visits and literature reviews for the projects. The results showed that Seferihisar was very successful in awareness, successful in environmental policies and infrastructure policies, but moderate for safeguarding autochthonous production, support to slow food activities and projects, finance and maintenance & management. It was poor for technologies and facilities for urban quality and hospitality. Eventually, by learning from its successes and failures, it is hoped that Seferihisar may be able to increase the successes and eliminate the failures.

1.1 Keywords

Cittaslow movement, sustainable life style, case study, Seferihisar, Turkey
2

INTRODUCTION

The Cittaslow international network has 182 members from 28 countries including Australia, Canada, France, Netherland, Italy, New Zealand and the USA. The movement mainly includes a set of goals and principles such as improving the quality of life, promoting cultural diversity of individual cities and protecting the natural environment (Cittaslow International Network, 2012). Founded in 1986, the Slow Food movement has grown into an international association with local chapters worldwide. The movement of Cittaslow is mainly a European concept with member towns primarily in Italy, Germany, Norway, and England. However, the movement can provide urban scholars in the USA some useful ideas about how to pursue an alternative urban development agenda (Mayer and Knox, 2006).

Turkey decided to pursue the Cittaslow principles and set up its very first case in Seferihisar in 2009. Seferihisar is now a part of the Cittaslow international network (Cittaslow International Network, 2012). Seferihisar and its vicinity have many distinctive natural and cultural characteristics. Therefore, the town proposed sustainable development strategies with the desire to preserve its local values and improve the quality of life. Having joined the Cittaslow network, Seferihisar become a center of interest and was considered a fine example of implementing some alternative development strategies in order to create a more livable and sustainable environment in the country. To pursue the Cittaslow principles and goals, the local government executed a number of projects in different areas in Seferihisar. The aim of this study was to examine successes and failures of the major projects that were conducted after accreditation. To accomplish this, the case study methodology for landscape architecture was used (Francis, 1999; 2001).

3

STUDY AREA

Seferihisar covers an area of 36523.75 ha and is located between the coordinates 38° 18' 37" and 38° 1' 51" North, 26° 44' 53" and 27° 1' 40" East. It is one of the 29 districts of the Izmir metropolitan area with a population of 27,422 people (TurkStat, 2011a). The town is located 29 miles southwest of downtown Izmir (Figure 1).

Figure 1. The location of the study area

Seferihisar represents a distinctive landscape with its natural features and its historical and archeological sites. It is also a popular tourist destination that attracts many nearby visitors from Izmir. The town and its vicinity present a good blend of tangerine and olive farming, artichoke production, goat
husbandry, and cheese making. The historical district of Seferihisar, Sığacık offers a weekly traditional farmer’s market where the locals sell their handcrafts and agricultural products.

Its mild climate, under the influence of Aegean Sea with cool rainy winters and hot sunny summers, (TSMS, 2012) is another aspect of the region that attracts visitors. Seferihisar also represents a notable example of re-emerged suburbanization in the Izmir metropolitan area. It contains primarily Mediterranean forest (18.3%), Mediterranean shrubland (maquis and garrigue) (60.7%), agricultural land (14.1%), olive plantation (3.18%), built-up areas (5.3%), and open space with little or no vegetation (0.9%).

4 METHODS

In this study, the case study methodology for landscape architecture was used (Francis, 1999; 2001) in order to examine the successes and the failures of major projects that were conducted in Seferihisar after accreditation. For this purpose, based on the Cittaslow policies and goals (requirements for excellence), an evaluation form was designed (Table 2). The form consisted of ten parts in total. The first part of the form had baseline information of the study area. The next seven parts included the Cittaslow principles in the evaluation form were rated based on a scale from 1 to 5 (1: very poor, 2: poor, 3: moderate, 4: successful, 5: very successful) (Table 1). The evaluation form was assessed based on whether the Cittaslow policies and goals were qualified by Seferihisar Municipality. For instance, if all the elements or topics of a certain policy were addressed, it was considered “very successful”.

Table 1. The rating scale of Cittaslow policies and goals

<table>
<thead>
<tr>
<th>Rate</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Very poor</td>
<td>No topic was addressed</td>
</tr>
<tr>
<td>2: Poor</td>
<td>Less than half of the topics were addressed</td>
</tr>
<tr>
<td>3: Moderate</td>
<td>Half of the topics were addressed</td>
</tr>
<tr>
<td>4: Successful</td>
<td>More than half of the topics were addressed</td>
</tr>
<tr>
<td>5: Very successful</td>
<td>All the topics were addressed</td>
</tr>
</tbody>
</table>

5 RESULTS: THE SUCCESSES AND THE FAILURES

5.1 Environmental Policies

The livability of a city depends on its environmental quality and sustainability. Environmental policies included eleven topics which were: (1) verification of air, water and soil quality of the city, (2) plans for the promotion and dissemination of differentiated refuse collection, (3) dissemination of industrial and domestic composting, (4) existence of a purification plant for urban sewage, (5) municipal plan for saving energy, with reference particularly to the use of alternative sources of energy, (6) ban the use of genetically modified seeds in agriculture, (7) regulation of advertisements and traffic signs, (8) control of electromagnetic pollution, (9) program for controlling and reducing noise pollution, (10) systems and programs for controlling light pollution, (11) adaptation of environmental management systems (Cittaslow International Charter, 1999). Based on environmental policies, Seferihisar was considered “successful” (Table 2).
### Table 2. The successes and the failures of Seferihisar by the Cittaslow policies and goals

<table>
<thead>
<tr>
<th>Baseline information/features</th>
<th>Status</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
<td></td>
<td>Located 29 miles southwest of downtown Izmir, Turkey</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td></td>
<td>36523.75 ha</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td></td>
<td>27,422</td>
</tr>
<tr>
<td><strong>Environmental policies</strong></td>
<td>Successful</td>
<td>6 out of 11 criteria were met</td>
</tr>
<tr>
<td><strong>Infrastructure policies</strong></td>
<td>Successful</td>
<td>9 out of 13 criteria were met</td>
</tr>
<tr>
<td><strong>Technologies and facilities for urban quality</strong></td>
<td>Poor</td>
<td>3 out of 9 criteria were met</td>
</tr>
<tr>
<td><strong>Safeguarding autochthonous production</strong></td>
<td>Moderate</td>
<td>5 out of 11 criteria were met</td>
</tr>
<tr>
<td><strong>Hospitality</strong></td>
<td>Poor</td>
<td>2 out of 5 criteria were met</td>
</tr>
<tr>
<td><strong>Awareness</strong></td>
<td>Very Successful</td>
<td>3 out of 3 criteria were met</td>
</tr>
<tr>
<td><strong>Support to Slow Food activities and projects</strong></td>
<td>Moderate</td>
<td>4 out of 7 criteria were met</td>
</tr>
<tr>
<td><strong>Finance</strong></td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td><strong>Maintenance &amp; management</strong></td>
<td>Moderate</td>
<td></td>
</tr>
</tbody>
</table>

The successes of Seferihisar:

- The quality of air of the town was monitored for 2 months by the Izmir metropolitan municipality. The quality of water has been monitored regularly (Keskin, 2010; Öztürk, 2012).
- Segregation of solid wastes has been encouraged. For this purpose, new recycle bins to separate plastics, paper, glass etc. were introduced to the town. A new recycling plant was established (Keskin, 2010).
- A new biological waste treatment plan was built with a capacity for 50,000 people (Keskin, 2010).
- Feasibility studies were made particularly on segregation of organic wastes and the possibility of producing manure and biogas to be able to heat greenhouses (Keskin 2010).
- Three beaches in the vicinity of Seferihisar were rewarded with The Blue Flag after accreditation (Öztürk, 2012).
- In order to develop environmentally friendly and sustainable ways, some co-operations and collaborations were initiated with different universities. For instance, in co-operation with Ege University, a 3 wheel bicycle was manufactured that is powered by solar energy to facilitate transportation for the disabled people and senior citizens (Seferihisar Municipality, 2012).
- Solar powered streetlights were installed on some of the streets of downtown Seferihisar.
- The city became a member of “no to GMO platform”. It was organized through a series of meetings named “good agricultural practices from field to table” to introduce and promote the locally grown products as well as organic farming (Keskin, 2010).
- The visual chaos caused by different types of signboards in various shapes, sizes and colors, including traffic signs, billboards etc. was one of the major sources of visual pollution in the city.
To eliminate this, all the existing signboards were replaced by newly designed ones (Keskin, 2010).

The failures of Seferihisar:

- Plans for the promotion and dissemination of differentiated refuse collection
- Existence of a purification plant for urban or cooperative sewage
- Program for controlling and reducing noise pollution
- Systems and programs for controlling light pollution
- Adaptation of environmental management systems

5.2 Infrastructure Policies

This second area included elements of urban and landscape design. There is a strong focus towards a priority of alternative forms of transportation and pedestrian orientated urban design (Radstrom, 2011). Infrastructure policies included the following thirteen subjects: (1) plans for improving and for the reclamation of historical centers and/or works of cultural or historical value, (2) plans for safe mobility and traffic, (3) bicycle paths connecting schools and public buildings, (4) plans for alternative transportation including mass transit, pedestrian and bicycle, (5) accessibility of public places and those of public interest, (6) promotion of programs to facilitate family life and social connections, recreation and assistance for those in need, (7) a center for medical assistance, (8) quality green areas and pedestrian accessibility, (9) a plan for the distribution of locally produced merchandise and the creation of commercial centers for natural products, (10) agreement with the shopkeepers with regards to the reception and assistance to citizens in trouble, i.e. “friendly shops” (maintaining commercial areas which are welcoming, hospitable and friendly), (11) revitalization of the city including upgrading and redevelopment of urban areas, (12) a program for urban restyling and upgrading, (13) integration of a citizen information office with a Cittaslow information window (Cittaslow International Charter, 1999).

Seferihisar was found “successful” in infrastructure policies (Table 2).

The successes of Seferihisar:

- After 46 years, archeological excavations in the ancient settlement of Teos were resumed (Cittaslow Seferihisar, 2012).
- In the historical neighborhood of Seferihisar, Sığacık, renovation of the streets and surveying-restoration of the ramparts of the Ottoman castle were launched. Some exhibitions and concerts were performed regularly in the castle for creating a socially vibrant atmosphere (Cittaslow Seferihisar, 2012).
- Seven urban parks, including a promenade-coastal park in Sığacık were designed and constructed (Öztürk, 2012).
- There has been an ongoing feasibility study for a light rail as a part of the public transportation system between Sığacık (a coastal neighborhood) and the town center (Keskin, 2010).
- Although cycling is encouraged throughout the town by providing free bikes, bike routes, parking lots etc., special emphasis was given to particular routes such as the ones between public buildings and schools (Cittaslow Seferihisar, 2012).
- The disabled were given special consideration in the process of designing new urban furniture and renovating existing public spaces, including sidewalks, toilets etc.
- In the context of pedestrian accessibility policies, Ataturk Street in the town center of Seferihisar was closed to vehicle traffic during the daytime. Additionally, some streets of Sığacık were closed to vehicles during the entire summer (Cittaslow Seferihisar, 2012).
- A working committee was set up with a group of artists and architects who had studied in Seferihisar before. They practiced on the facades of buildings to create unity in terms of architectural style and color (Keskin, 2010).
- The old sunshades of stores and cafes around Sığacık castle were completely renewed. A sculpture of a snail was constructed in the city center. This logo of Cittaslow was used on signboards, bus stops, brochures, cafes and all around the city.
- Thanks to several local farmers’ markets, a direct contact was established between farmers and buyers. The farmers got the opportunity to sell their items (traditional foods, handicrafts,
agricultural products such as locally grown tangerine and artichoke) to the buyers directly (Keskin, 2010; Öztürk, 2012).

✓ Using plastic bags is strongly discouraged in the market places (Keskin, 2010; Öztürk, 2012).

✓ An environmental master plan was prepared (History of Seferihisar, 2012).

The failures of Seferihisar:

✓ Promotion of programs to facilitate family life and social connections, recreation and assistance for those in need

✓ Center for medical assistance

✓ Agreement with the shopkeepers with regards to the reception and assistance to citizens in trouble; “friendly shops”

✓ Integration of a citizen information office with a Cittaslow information window

5.3 Technologies and Facilities for Urban Quality

This topic is related to technologies and facilities that provide a higher quality of life to the residents. This principle included nine topics: (1) window for bio-architecture and programs for the training of personnel assigned to the information project for the promotion of bio-architecture (2) equipping the city with cables for fiber optic and wireless systems, (3) adopting systems for monitoring electromagnetic fields, (4) providing refuse containers in keeping with the environment and the landscape and refuse removal according to established timetables, (5) planting environmentally suitable and autochthonous plants in public and private places, (6) providing services for the citizens, including dissemination of municipal services via the internet and plans for creating and educating the citizens in the use of an internet-based civic network, (7) a plan for controlling noise in specifically noisy areas, (8) a plan concerning colors, (9) promotion of telework (Cittaslow International Charter, 1999). Seferihisar was considered “poor” for technologies and facilities for urban quality (Table 2).

The successes of Seferihisar:

✓ E-municipality projects were implemented to speed up and improve the municipal services. An online problem solution department was also activated for residents (Seferihisar Municipality, 2012).

✓ Several municipal services became easily accessible for the people over the internet and cell phones.

✓ The municipality formed a website so that farmers and local producers could market their products online, free of charge.

✓ The native plant sea daffodil (Pancratium maritimum) was used in public and private gardens (Cittaslow, 2012).

✓ The municipality had a plan for the use of tents in the same color in the entire town.

The failures of Seferihisar:

✓ Window for bio-architecture and programs for the training of personnel assigned to the information project for the promotion of bio-architecture

✓ Equipping the city with cables for fiber optic and wireless systems

✓ Adoption of systems for monitoring electromagnetic fields

✓ Providing refuse containers in keeping with the environment and the landscape and refuse removal according to established timetables

✓ Plan for controlling noise in specifically noisy areas

✓ Promotion of telework

5.4 Safeguarding Autochthonous Production

This topic focuses on sustaining local, traditional industries and elements that represent the local identity. This policy area relates directly to local context and sense of place (Radstrom, 2011). It included eleven subjects including: (1) development of organic farming, (2) certification of the quality of artisan produced products and objects and artistic crafts, (3) programs for the safeguarding of artisan and/or artistic craft products in danger of extinction, (4) safeguarding traditional methods of work and professions at risk of extinction, (5) use of organic products and/or local products and the preservation of local
traditions in restaurants, protected structures and school cafeterias, (6) programs for educating taste and nutrition in schools in collaboration with Slow Food, (7) favoring the activities of wine and gastronomic Slow Food presidia for species and preparations risking extinction, (8) census of the typical products of the territory and support of their commercialization (updating of markets for local products, creation of appropriate spaces), (9) census of trees in the city and enhancing the value of large trees or “historical trees”, (10) promoting and preserving local cultural events, (11) promoting “urban” and school gardens for autochthonous cultures grown with traditional methods (Cittaslow International Charter, 1999). Seferihisar was found “moderate” for safeguarding autochthonous production (Table 2).

The successes of Seferihisar:

✓ The women began to play an important role in the local economy by producing and selling locally grown and hand-made products as a result of a series of capacity building efforts. They became producers rather than just consumers and participated more in the daily and economic life of Seferihisar.
✓ Local farmers were encouraged to do organic farming. “Eco” certification studies were initiated (Öztürk, 2012).
✓ The restaurants that use locally grown products were opened (Öztürk, 2012).
✓ Some projects were started to promote sustainable fishing and agricultural production (Öztürk, 2012).
✓ Open markets encouraged social interaction among different age and gender groups in Seferihisar.
✓ Regular festivals such as the tangerine and seed exchange festivals were organized.

The failures of Seferihisar:

✓ Programs for the safeguarding of artisan and/or artistic craft products are in danger of extinction.
✓ Safeguarding traditional methods of work and professions are at risk of extinction.
✓ Programs for educating taste and nutrition in schools in collaboration with Slow Food.
✓ Favoring the activities of wine and gastronomic Slow Food Presidia for species and preparations that are risking extinction.
✓ Census of trees in the city and enhancing the value of large trees or “historical trees”.

5.5 Hospitality

This section focuses on helping both residents and tourists to feel at home in a Cittaslow city. It directly relates to easy livability (Radstrom, 2011). The topic included five subjects that were: (1) training courses for tourist information and quality hospitality, (2) using international signs on the tourist signs at the historical centers with guided tourist itineraries, (3) reception policies and plans to facilitate the approach of the visitors to the city and access to information and services (parking, extension/flexibility of opening hours of public offices, etc.) with particular regards to scheduled events, (4) preparation of “slow” itineraries of the city (brochures, websites, home pages, etc.), (5) making the tourist operators and storekeepers aware of the need for a transparency of prices and the exhibition of rates outside the business establishments (Cittaslow International Charter, 1999). Seferihisar was found “poor” for hospitality (Table 2).

The successes of Seferihisar:

✓ Some of the signboards that indicate archeological, natural and historical places were renewed.
✓ The handbooks that show the historical places of the city and the bicycle routes were published. These books were also available on the website of the municipality. Around the city, seventeen different bicycle roads were designated (Cittaslow Seferihisar, 2012).

The failures of Seferihisar:

✓ Training courses for tourist information and quality hospitality.
✓ Reception policies and plans to facilitate the approach of the visitors to the city and access to information and services (parking, extension/flexibility of opening hours of public offices, etc.) with particular regards to scheduled events.
Making the tourist operators and storekeepers aware of the need for a transparency of prices and the exhibition of rates outside the business establishments.

5.6 Awareness
This topic is related to awareness of public education and promotion of the organization. This policy area included three subjects that were: (1) provide the citizens with information on the aims and procedures of what a Slow City is, preceded by information of the intentions of the Administration to become a Slow City, (2) programs to involve the citizens in acquiring the “slow” philosophy and the application of Slow City projects and in particular: educational gardens and parks, book facilities, (3) programs for the dissemination of the Slow City and Slow Food activities (Cittaslow International Charter, 1999). Seferihisar was found "very successful" in awareness (Table 2).

The successes of Seferihisar:
- A project was undertaken to write the oral history of Seferihisar in addition to other books and brochures published for representation of different aspects of the town and its surroundings (History of Seferihisar, 2012).
- A city council was formed by the local municipality that reflects a participatory process to visioning and promoting the implementation principles of the Cittaslow in Seferihisar and creating a public awareness in the process (Cittaslow, 2012).
- Seferihisar was rewarded as a child-friendly town after accreditation (Seferihisar Municipality, 2012).
- Tourist season was expanded from 3 months to almost a whole year (Seferihisar Municipality, 2012).
- “The Science Store” was opened in order to increase the interests of children and residents to science by collaboration with Yaşar University.
- “Cittaslow Science Committee” with 30 academics (from 16 universities) was created. It discussed the future of the Cittaslow movement in Turkey (Seferihisar Municipality, 2012).

There were no failure items for awareness for the Seferihisar Municipality.

5.7 Support to Slow Food Activities and Projects
This policy area related to support of Slow Food activities and projects. This topic included seven elements including: (1) establishment of a local convivium Slow Food, (2) education programs for tastes and nutrition for the compulsory and secondary schools in cooperation with Slow Food, (3) set-up of school vegetable gardens in cooperation with Slow Food, (4) implementation of one or more projects of Arca or Slow Food centres for species or products that are at risk of extinction, (5) use of local products safeguarded by Slow Food and maintenance of nutritional traditions in collective food services, schools and canteens with annexed food education programs, (6) support of the typical local area products through implementation of the “Mercati della Terra” in cooperation with Slow Food, (7) Support of the “Terra Madre” project and food communities through joint twinning (Cittaslow International Charter, 1999). Seferihisar was found “moderate” for support to slow food activities and projects (Table 2).

The successes of Seferihisar:
- Some projects based on the EU standards were executed to promote sustainable fishing in the region (Öztürk, 2012).
- A farmers’ market was opened.
- A restaurant that uses locally grown products was opened (Öztürk, 2012).
- Sustainable commercial fishing and production of tangerines and artichokes were encouraged by providing processing facilities (Öztürk, 2012).
- School vegetable gardens were established in some public schools (Seferihisar Municipality, 2012).

The failures of Seferihisar:
- Education programs for tastes and nutrition for the compulsory and secondary schools in cooperation with Slow Food
Implementing one or more projects of Arca or Slow Food Centres for species or product at risk of extinction

Support for the “Terra Madre” project and food communities through joint twinning

5.8 Finance
The Izmir development agency financed nearly $89,000 to support marketing tangerine and artichoke production and approximately 50% of the cost of landscape design projects, including a promenade and coastal park in Sığacık. The Government provided $167,000 for the Blue Flag Project, $139,000 for a street renovation project, $29,700 for an olive and olive oil factory in the Ulamış village and $192,000 for a project for SPA-thermal water and accommodation facilities in the Doğanbey neighborhood. The EU funded a sustainable fishing nets project with $198,000. For the Tangerine and Slow City festivals, it received $111,000 from the sponsors (Öztürk, 2012).

Although landscape design projects are financially supported by different government agencies, most of the green spaces were not systematically planned and designed after accreditation. Unfortunately, green spaces are mostly designated just to decorate leftover land. More importantly, in the designation process, public participation was generally ignored. Seferihisar was considered “moderate” for finance (Table 2).

5.9 Maintenance & Management
This topic covers the maintenance and management of the projects conducted by the Seferihisar Municipality. Seferihisar was considered “moderate” for maintenance & management (Table 2) because the maintenance and the management of the projects were not good enough.

6 DISCUSSION
Seferihisar, the very first example of the Cittaslow movement in Turkey, together with its location, present distinctive landscape features with its natural, historical and archeological sites. The town proposed alternative development strategies with the desire to protect its local values in a sustainable way. The local government of Seferihisar executed a number of projects for pursuing the goals and principals of the Cittaslow movement after accreditation. This study was designed to look at the successes and the failures of the major projects in Seferihisar and its surroundings using the case study methodology for landscape architecture (Francis, 1999; 2001).

Regarding the 9 main criteria listed in Table 2, it can be stated that Seferihisar had mostly moderate and successful scores except for two poors for “hospitality” and “technologies and facilities for urban quality”. In the criteria of “awareness”, the study area scored very successful. However, this scoring scheme needs to be supported with further elaborations and comparisons to get a better picture of the successes and the failures.

When the slow cities are evaluated in different countries, what is generally seen is the dominance of unique architectural character and/or a well-preserved traditional urban fabric such as Anghiari (Italy) (City of Anghiari, 2013). Seferihisar is generally lacking of these qualities except for some parts of the historical Sığacık neighborhood. In Seferihisar, particularly in the town center, urban development in the form of ordinary and identical concrete apartment blocks has been underway.

Urban squares are the backbones of the urban public spaces. Thus, no open space network is complete without properly and systematically designed urban squares. Seferihisar obviously needs an urban square(s) that would also reflect the town’s traditional values. This is necessary to enhance the image and legibility of the town (Hepcan et al., 2006).

Although the town encouraged the citizens and visitors to use the bicycle by providing bicycles and bike routes, a comprehensive transportation master plan that covers public transportation and bicycle use is needed for Seferihisar like that in Somona city (City of Sonoma, 2012). It should also be mentioned that a 3-wheel bicycle that is powered by solar energy is an excellent idea from a sustainability point of view (Seferihisar Municipality, 2012).

Most of the Cittaslow like Chiavenna (Italy) closed their downtowns to cars and designated large pedestrian zones (City of Chiavenna, 2013). Similarly, the speed limit for vehicles was decreased to 20 km/h in Enns (Austria) (City of Enns, 2013). In Seferihisar only a couple of streets were closed to
motorised vehicles. This should be a matter of further concern in the framework of the transportation master plan that was mentioned above.

Obviously, feasibility studies for light rail between Sığacık and the Seferihisar town center would be a very positive step in terms of establishing a sustainable public transportation (Keskin, 2010).

Sustainable energy consumption is one of the major goals of the Cittaslow movement. To accomplish this Sonoma city prepared an energy efficiency plan and sustainability programs (City of Sonoma, 2012). Similarly, the city of Sebastopol has the Solar Sebastopol plan that aims to encourage Sebastopol residences and businesses to switch to solar energy for generating electricity (City of Sebastopol, 2012). Although the climate of Seferihisar is quite suitable both for using solar energy and wind turbines, there was no implementation of any project based on using alternative energy sources except solar powered street lighting along the main artery in the town center.

Attracting more visitors to Seferihisar was one of the priorities and was accomplished by publicizing the town and its unique characteristics across the country. This was successfully done but the existing physical infrastructure is not capable of meeting the needs of the growing number of visitors. For instance, the narrow roadway between Sığacık and Seferihisar town center and the lack of enough parking lots are among the major problems, especially on weekends. These problems became more obvious during the festivals and celebrations where the number of visitors exceeded the city’s capability to handle the traffic.

The vegetable waste cycling program in Sonoma city, which handles over 800 tons a week, is recycled into compost (City of Sonoma, 2012). Seferihisar has a recycling program only for glass and plastics. This program definitely needs to be revised and enlarged to include organic waste as well.

The municipality encouraged the farmers to use local seeds instead of genetically modified ones. However, efforts against GMO were not completely successful in Seferihisar because it needed a nationwide policy and supportive legal provisions (Doğutürk, 2010).

What is easily visible is that most of the investments were made in the Sığacık neighborhood rather than other districts after accreditation. It is because Sığacık has been considered as a pilot area and showcase area with its natural and historical characteristics. But this became a matter of discussion and created dissatisfaction in the local community outside Sığacık (Öztürk, 2012).

Although some signboards that show archeological, natural and historical places were renewed after accreditation, the town still needs more signboards to show tourist attractions.

The e-municipality projects, such as the online problem solution department and municipal services that are accessible over the Internet, improved the quality of life for the local people in Seferihisar. Additionally, online shops of Seferihisar provided good opportunities for the local people to market their products.

Olive oil and goat cheese productions, for instance, became more important for town’s economy. However, there was no master plan for safeguarding the traditional methods of extracting olive oil and making goat cheese in Seferihisar.

Although Seferihisar is quite hospitable and a welcoming place due to the pleasant nature of the local people, there are no training courses or educational programs that teach the local people about the expectations of the tourists and the skills of quality hospitality.

The Seferihisar Municipality was very successful at creating awareness about Cittaslow and slow food activities. This has resulted in support and active participation by most of the local people in the activities and programs of the Cittaslow movement. It is very important to note that the women began to play an important role both in producing and selling locally grown and hand-made products. They became producers and participated more in the daily and economic life of Seferihisar.

However, besides creating awareness and getting support from the local people, more regular workshops and educational activities should be organized in Seferihisar. For example, in Katoomba Blue Mountain (Australia) the focus is on local production and preparation of various foods, e.g. cheese making and many other interesting items (Blue Mountains, 2013).

Social life is not vibrant for the young people in the town and is a frequent matter of complaint that needs to be addressed by the local government. It’s important that the young people enjoy their town and find activities and entertainment here.

Improving the quality of life of the residents lies in the center of the Cittaslow movement. It is equally important that projects should not be rushed to cause irreversible mistakes. Some of the projects
in the study area were rushed without enough research and consultation with the stakeholders (Doğutürk, 2010).

One of the major setbacks in implementing the Cittaslow principles is bureaucracy and the lack of a decentralized planning-management approach in some fields. For instance, since thermal facilities are run by the central government, local government has no authority over these facilities in terms of operational aspects (Doğutürk, 2010).

Maintenance and management of urban public spaces are held only by Seferihisar Municipality. In some Cittaslow some residents are part of maintenance & management of public spaces. Adopting a landscape program that allows individuals or groups to participate in maintenance or management of a public space, like a park area, as it is in Sebastopol would be a good example of public participation of maintenance (City of Sebastopol, 2012).

7 CONCLUSION
There is no doubt that Seferihisar becomes a center of attention after accreditation. Likewise, the recent statistics proved that Seferihisar is the most sought after place to live among the other districts in the Izmir metropolitan area (TurkStat, 2011b). Seferihisar was a pioneer in introducing the Cittaslow movement in Turkey. Seferihisar also encouraged other cities in Turkey to pursue the Cittaslow principles to develop an alternative way of living and an urbanization model. Therefore, it became a source of inspiration for eight other recently accredited towns in Turkey. Eventually, by learning from its successes and failures, it is hoped that Seferihisar may be able to increase the successes and eliminate the failures as well as present a valuable case for other Cittaslow in Turkey.

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9 REFERENCES


SUSTAINABLE DEVELOPMENT ALONG THE RED SEA COAST: STILL POSSIBLE?

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1 ABSTRACT
The Red Sea is a unique resource whose potential has not yet been realized. Since the 1980s development for mass tourism has destroyed large areas of the northern Red Sea coastal stretches as exemplified by the city of Hurghada. Innovative initiatives have taken place to protect the remaining parts of the Red Sea (From Marsa Alam city South), including several guidelines by the Red Sea Sustainable Tourism Initiative (RSSTI) in 2000-2004 that focused on developing ecotourism and coastal planning for the region, followed by another pilot programme named Livelihood and Income From Environment (LIFE) in 2005-2008 which supported implementing pilot projects in national parks to demonstrate examples of the appropriate process. Since 2008 there have been several initiatives to introduce sustainable practices (e.g., Solid Waste Management and Mooring Buoys) led by local NGOs such as HEPCA.

Despite these attempts, the development pattern has not changed much and the knowledge gained remains within a limited number of people. The main obstacles to improved planning and development are: (i) An institutional problem where the responsible authorities (both tourism and environment ministries) do not coordinate with each other nor with the many stakeholders, (ii) Practitioners typically borrow designs from the Nile Valley architecture rather than developing a local and appropriate one for the Red Sea, and (iii) The lack of understanding of the Red Sea system (i.e., drainage, soil, marine life, and natural habitat) resulted to several inappropriate land subdivisions and allocating development in vulnerable areas.

The solutions for such complex problems can be summarized as follows:
(i) Elevate land use planning above the ministry level, so that planning is not limited to one ministry (such as housing, tourism or environment) with a very specific mandate for one type of development, but rather an overarching exercise that is a product of a higher level proposed committee at the prime-minister level.
(ii) Architecture and planning education to incorporate appropriate planning tools and building technologies, and not limit this arena to the Nile Valley architecture. Learn from the local tribes’ knowledge about best site selections criteria and building styles and seeking guidance from relevant experiences in the region rather than copying western countries.
(iii) Land use suitability maps that can guide development in the region without harming the environment and while being locally implementable within the local market dynamics.

1.1 Keywords
sustainable tourism, land use planning, Red Sea.
2 INTRODUCTION

The Red Sea is a unique environment with deserts rich in history abutting a sea whose remarkable coral reefs are among the best in the world. With its striking environment and touristic potential, sunny climate, and short flight distance from major population centers in Europe, the Egyptian Red Sea coast has tremendous potential for economic development and benefits for the nation and region. Since this coast was opened to tourism after the Camp David Accords of 1978, the number of hotel rooms shot up from essentially a handful in 1980, to about 7000 in 1999, to over 40,000 in 2009 (Ministry of Tourism, 2009). This rapid development came with unfortunate impacts on the coast and coral reefs (Dewidar, 2002).

Most of the coast is flanked by a fringing coral reef, which blocks access to deep water. Exceptions are the mouths of dry streams (wadis), where there are breaks in the fringing reef and commonly embayments (marsas) that offer anchorage and access to deep water for boats, snorkelling opportunities along the reef edge of the embayment, and swimming beaches along the landward shore. Thus, the best places for tourist resorts are next to marsas, with their access to snorkelling and open water. However, development has been promoted (by the Tourism Development Authority) on parcels evenly distributed along the coast; most sites are along fringing reef, where it is impossible to swim in the sea. This motivated some developers near Hurghada to physically remove the reef in front of their hotels, or to fill over the reef in attempts to create direct access to deep water (Frihy et al., 1996). While such blatant destruction is no longer common, development patterns along the coast are still not informed by the underlying carrying capacity of the coastal geomorphology, coastal waters and thus their coral reefs) have been affected by chronic pollution and are at risk of extensive contamination from flash floods that will scour waste dumps in Wadis and carry chemicals, garbage, and other pollutants out to the coral reef (Ismail, 2003).

3 ENVIRONMENTAL PLANNING INITIATIVES

Since the late seventies there has been a recognition of the environmental significance of the Red Sea area, but attempts to do environmental planning started only in the 21st century. The importance of developing the Red Sea for economic reasons of was mainly promoted by the Government of Egypt to create jobs and increase national income. However, efforts to implement more sustainable, environmental and balanced development were initiated by external organizations seeking to protect the ecosystem specifically the coral reef, migratory birds and mangrove trees, as well as archeological sites. These organizations include USAID, UNEP, GEF, IUCN, Italian Cooperation, UNDP and WFP. (Table 1)

<table>
<thead>
<tr>
<th>Project</th>
<th>Year</th>
<th>Area Cover</th>
<th>Lead Agency</th>
<th>Local Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launch of Egyptian EIA</td>
<td>1994-Present</td>
<td>Egypt</td>
<td>EEAA</td>
<td>All other GoE organizations</td>
</tr>
<tr>
<td>Assessment and Management of Mangrove Forest in Egypt for Sustainable Utilization and Development</td>
<td>2003-2005</td>
<td>Egyptian Red Sea Coast</td>
<td>Ministry of Agriculture and Land Reclamation (MALR), Under Secretariat for Afforestation and Environment (UAE), MSEA and EEAA</td>
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<tr>
<td>Private Sector Tourism Infrastructure and</td>
<td>2002-2003</td>
<td>Egyptian Red Sea Coast</td>
<td>World Bank</td>
<td>EEAA</td>
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The earlier projects and initiatives played a role in bringing new concepts to the attention of local authorities and were the “wake-up” call for the importance of sustainable tourism. The most recent projects are the most significant ones that took place since the beginning of this century. However, none of these initiatives were extremely successful in changing the mind set and the pattern of operation of the local authorities. The most recent two projects RSSTI and LIFE had sufficient funding to implement pilot examples. The RSSTI project focused on the 5 km coastal strip of the Red Sea from Marsa Alam to Ras Banas, and despite all the land use planning efforts, the development continues (business as usual) after the project. The most recent project LIFE had some successful intervention with local communities development and supported some infrastructure in the park (e.g. vehicular trails, a ranger’s operation center facility, a visitor center and marine equipment).

However, none of the projects to date have achieved broad public education or developed land use suitability maps at appropriate scales to provide guidance for future ecotourism development for the area.

4 OBSTACLES FOR ENVIRONMENTAL PLANNING

Despite the thorough attempts of environmental planning agencies, and despite the fact that there is more awareness about environmental planning and ecotourism planning, the pattern of land subdivisions remains inappropriate for the environment. The reasons can be summarized as follows:

4.1 Current Structure of Government Agencies (Institutional)

The implementing agencies for tourism planning, in general, are subordinate agencies to Ministries and have specific mandate that often prevent planners from examining issues from a multidisciplinary perspective. A national or regional planning agency with a broader perspective could alleviate this problem. Alternatively, elevating the authority (or jurisdiction) of individual planning agencies would also encourage multidisciplinary planning perspectives. (Figure 1) shows a schematic simplified diagram for the existing ministries and some of their executing arms. The following are some examples:
The Tourism Development Authority (TDA) under the Ministry of Tourism has a very well-defined mandate, consisting of dividing the land and encouraging developers to invest in tourism facilities to increase the number of rooms and therefore attract more tourism. They have been successful in achieving the target. However, TDA has not fully considered its impact on environmental resources and fragile ecosystems, so achieving this development was at a very high environmental cost.

The mandate to develop has been manifested more in quantity than quality of tourism (i.e. number of rooms or nights versus revenue), resulting in densely developed coasts in the northern part of the Red Sea with a very low selling rate per room per night (goes as low as 12$/night in charter flights packages). This resulted in a mass tourism which created stress on environmental assets and significant environmental degradation such as developing on landfill, destruction of coral reef, pressure on fresh ground fresh water, development within flood zones and a reduction in quality of the destination.

4.2 Current Methods for Planning & Design (Technical)

Even within the available small window that international organizations promote to introduce some environmental planning for such a quality destination, the actual attempts have been lacking sufficient information about sustainability. The planning process did not recognize the weight of the environmental and cultural factors. Although some projects had high level of awareness about the appropriate planning, this was on the ideas and concept level and was not carried out forward to implementation. The typical planning techniques adopted further north (which is land subdivisions in linear row) has continued to be used in the southern region of the red sea as in (Figure 2)
4.3 Importing Planning & Design Models (Educational)

The local residents in the area are nomads who move across the Red Sea mountain range. Their numbers are small and their settling points within this migratory network tend to be fresh water wells where they practice grazing, and small villages near the shoreline where their main activity is fishing. Therefore, their physical traces are less impressive than the architecture dominating other parts of Egypt.

Most of the professional planning and design attempts to “go-green” have been imported from other climates. While perhaps environmentally friendly and useful for their original settings they may not be appropriate for the Red Sea coast of Egypt. The following are two examples of this practice:

- **Copying Nile Valley Development Style**

Architects and landscape architects in Egypt are heavily influenced by the architecture of the Nile Valley, and have drawn upon the vernacular architecture and building materials of the Nile for building along the Red Sea. However the Nilotic template is not necessarily the most appropriate for the Red Sea desert, climate, soil, available stone, economic activity and nature of residents. Patterns of life in the eastern desert of Egypt are very different and would suggest different patterns of planning and design for the coast. Figures 2 and 3 show some replication of domes and vaults using concrete. (Vaults and domes are originally structure forms that are suitable for areas like Nile valley where mud bricks and limestone exist).
Copying Other External Development Style

In attempts to replicate successful examples of world class ecotourism, such as South Africa “Ecolodges”, the tendency has been to replicate the facility rather than the planning and design process, which resulted in, ignoring differences in locally available material, climate and other aspects. Figure 4 shows an example of the building style of one of the camps using wood and concrete while the area is rich in other material that can be of more use such as granite and gravel. For example,

Figure 4. The government Housing (in Hamata Village) for local residents is not suitable for climate, locals' needs, design or internal zoning. It has remained unoccupied since it was built (Source, several interviews with local tribes – 2003-2007)

5 RECOMMENDATIONS

5.1 Institutional Restructure

We recommend that planning authorities be elevated above the single sector ministries to avoid the current conflicts between the Ministry of Tourism (aiming to increase tourism development) and the Ministry of Environment (aiming to preserve environmental resources). Figure 5 shows a proposal to elevate the planning authorities above the ministries as agencies that serve one sector through formulation of a cross-cutting higher commission for planning. This is a proposal developed by “Mithaq Group”, a group of professionals representing several organizations, and supported by several political parties and civil society organizations
Figure 5. Inspired by South African lodges, using (wood) in the construction of some coastal facilities, where wood is an extremely rare material and not local

- **Implementation agency mandate**

Like any other ministry in Egypt, the Ministry of Tourism is supported by many implementing arms such as: Tourism Development Authority, Tourism Promotion Agencies and others.

We recommend that the objective of Tourism Development authority to be changed from “Mass” tourism, where success is evaluated by the number of hotel rooms built, to low, moderate or “eco” tourism (achieving more number of rooms built) to “Moderate” or “eco” tourism (achieving same revenue or more with less number of rooms). Figure 7 shows the major difference between current planning approaches and alternative concepts:

(a) The current parcelization pattern (alternative A) tends to block natural flooding paths, reduce public view of the sea, minimize monitoring and limit control over the marine activities

(b) Laying out parcels in groups (alternative B) allows for floods to flow smoothly without damage, guarantees better management, more and beneficial environmental monitoring, exclusivity and better sustainability for the existing resources

(c) Alternative (C) proposes a more integrated and exclusive pattern that is economically feasible, safe from floods and provides better protection for the environment
Figure 6. Proposed schematic restructure for the government (proposed for the new constitution) as part of the current formulation of the government after the 25th of January revolution (developed be the “Mithaq Group”)

Figure 7. (a) Convention planning, (b) alternative concept with the same numbers of rooms, (c) low intensity development with focus on higher exclusive facility
5.2 Improve Environmental Planning & Design Capabilities

(a) Planning Level

The local authority (TDA) responsible for this planning will need to conduct a comprehensive research project to help identify vulnerability maps to inform other government agencies and developers of potential hazards in the region. It is also crucial to re-evaluate the planning process for the coastal area and incorporate a higher environmental planning component.

Informing the public and the investor of accurate potentials and hazards of sites is a key element to shaping the development pattern for the region and will help reduce risks that may occur to people and investments.

Increasing the technical capabilities for the planning team about Integrated Coastal Zone Management, (ICZM) will allow them to plan the coastal plain in conjunction and proper integration with the mountain deep range of the Red Sea, because the ecosystem is interlinked and the coast cannot be sub divided in isolation of what is going neither in the deep desert (west) nor on the marine side (east).

(b) Design Level

It is important to pay closer attention to the designs proposed by project developers and to re-evaluate the entire site layout to make sure it falls within the planning principles and ecological considerations on the macro scale. This can be achieved by revisiting the current Environmental Impact Assessment (E.I.A). process for such projects to include wider zones than the projects land lot.

One important consideration in tourism planning relate to adopting design solutions within the site boundaries, such as avoiding building in Wadi floor, using light structural development in potential runoff zones and avoiding locating facilities in parts of land where there is potential for flooding or soil replacement. This requires selecting competent landscape designers who are able to understand the site and respond to the developer needs without harmful designs that end up with environmental disasters.

The environmental regulations and current practices for shoreline setback are developed in isolation of risks that may occur from shoreline dynamics such as seal level change, realization of different habitat basic needs (e.g. turtle nesting sites and coastal mangrove zones ).

5.3 Improving Education & Learning From Local Knowledge

We recommend consulting local residents about their experience with ecological factors in the area. Such consultation will provide insights to numerous factors that might not otherwise be evident during the decision making time such as history of previous floods, types of winds in other seasons, project impact on local flora and network of movement for the fauna system (migratory birds and camel trail systems).

This consulting could include a wide range of public participation, engaging the nomads in the planning process and allowing for a communication channel between the developer and local residents in the Red Sea region.

6 REFERENCES


URBAN DESIGN

Edited by Madis Pihlak
ABSTRACT

The basic premise of this paper is that a designer’s creation of “meaning” takes place through an engagement with a network of relations, and that landscapes themselves are more than collections of objects and processes, but may be thought of as bundles of relations. Actor network theory (ANT), realized through post-structural analyses (i.e., Foucault) or non-representational theories (i.e., Thrift) provide ways of uncovering the agencies of actors in networks. The (somewhat ambitious) intention of the paper is to consider how ANT can affect landscape architecture, by presenting a variety of dispersive strategies that may evoke new landscape architectural thinking. For landscape architects, understanding dispersion begins with an examination of physical phenomena, of seeds, water, etc., that may evolve into useful metaphors for revealing imagined worlds and ideas. So, for example, the physical dispersion of natural elements may provide powerful metaphors regarding the dispersion of knowledge. Conversely, dispersion may be about a kind of sorting, the way that light disperses through a prism results in the separation of colours, to disperse may be about the separation of elements, things, ideas, processes, etc., followed by their coming together into the constitution of, for example, place.

Three strategies for examining dispersion are developed, by contrasting how elements are separated (disaggregated, disassembled, and deterritorialized) and then come together (aggregated, assembled and territorialized). Landscapes architecture is thus considered as dealing with flux, of anticipating, articulating and coping with shifting states of becoming and falling apart. Each of the dispersion strategies is discussed first as physical phenomena and then presented as metaphors about an aspect of design thinking: aggregation and disaggregation in place making, assemblage and disassemblage in design representation, territorialisation and deterritorialization in discourse networks.

Keywords

dispersion, assemblage, aggregation, territorialization, derritorialization
2 INTRODUCTION

“The great obsession of the nineteenth century was, as we know, history: with its themes of development and of suspension, of crisis, and cycle, themes of the ever-accumulating past, with its great preponderance of dead men and the menacing glaciation of the world... The present epoch will perhaps be above all the epoch of space. We are in the epoch of simultaneity: we are in the epoch of juxtaposition, the epoch of the near and far, of the side-by-side, of the dispersed…”

Michel Foucault

In Michel Foucault’s famous article ‘Of Other Spaces’ Foucault questions our past tendencies towards structuralism with the emphasis on giving order to events in synchronic time. He alternatively emphasizes an approach that makes room for a diachronic understanding of events (Crang, 2005, p.201). Foucault was careful to delineate a difference between internal space that he characterized by the phenomenology described by Bachelard and an external space, a space where “we live inside a set of relations that delineates sites which are irreducible to one another and absolutely not superimposable on one another”. This emphasis on relations has influenced a number of new approaches to critical theory such as actor network theory and post-structural geographies. Perhaps Foucault’s greatest contribution was in helping us understand space and place in terms of bundles or networks of relations, that to understand place means peeling through these bundles, to see the world not simply as a collection of objects understood through over-arching theories, but instead a world filled with the intersecting associations of agency (of things, animals/people, plants, memories, understandings...). Landscape architecture may thus be thought about as uncovering, recovering and evoking the agency of entities, and more specifically about the creation of “meaningful” relationships, where meaning is derived through unique associations of the agencies of entities.

In a sense the world by its very nature is dispersed, not simply into random isolated instances, but into disparate and unique collection of things, things (not limited to physical entities) that assemble into bundles of relationships. In this way landscape architecture may be thought about as the creation of sites which are irreducible to one another, sites that are unique not simply because the parts come together in interesting ways, but because the parts have agency and come together to create associations of agency. For example, landscape architects such as Cullen or Gehl would develop their own languages of the agencies of place where place making may be thought of as understanding things that have affect, and how to subtly bring things together to engage in the creation of affect. What then does actor network theory provide landscape architecture? The answer may have to do with language, that the “jargon” of actor network theory provides landscape architects new ways to think about the associations and relationships of things.

The example of the italicized word things is a case in point. Actor network theory considers “objects, tools, technologies, texts, formulae, institutions, and humans ... as mutually constituting one another” (Farias, 2010, p.3). Things thus become about how, for example, an object becomes differentiated through association (how for example a plant acts when part of a community, or how a seed disperses as part of an ecosystem). In actor network theory the social is not simply about human interaction, but just as much about the interactions between things when they form associations. It follows that design may be thought of as the creation of various kinds of associations and bringing about interactions between associated elements. Thus landscape architecture may be considered in terms of designing social associations for human and non-human actors, and designing for “other” clients such as plants, animals, ecosystems, geomorphologies..., or that the act of planting design may be about creating associations, of making things (with the agency that comes from association) from things. The art of design comes from the ability to predict the relationships that emerge through the creation of associations, of predicting how things become things.
3 LENSES OF DISPERSION

“... landscape implies more-than-human materiality; a constellation of natural forms that are independent of humans, yet part and parcel of the processes by which human beings make their living and understand their own placing in the world.”

(Lund and Benediktsson, 2010, p.1)

In “Starting a Conversation with Landscape” Lund and Benediktsson use the metaphor of conversation to engage in the concept of landscape. Following from Gadamer they understand that meaning is “entwined in the process in which the conversation takes place” (ibid.). Extending this into actor network theory implies that we are concerned with the “conversations” between things, or perhaps more plainly how things interact, and the outcomes on things that come from such interactions. Designers are concerned with the creation of environments for human and non-human entities circulating with the interactions between things. Meaning in this way is not about an external reading or interpretation of an association, but embedded in the association itself. Meaning is entwined in the process of interaction within an association. Landscapes “mean” not because they communicate outward in some form or another, but because of their inward affect upon themselves (of course humans may or may not be included as part of the association, thus meaning is not simply a human condition).

The notion the we are living in an epoch of the dispersed points to opportunities to engage in situated readings of the world, of understanding the world in terms of how things come together. But what does it mean to be dispersed and more specifically what does dispersion bring to landscape architecture? In what follows dispersion is considered through three lenses (prisms): physical agency the material realities of dispersion and how they can influence design and act as design metaphors; dispersion as a force within a creative process; and dispersion of thought in our current cultural condition and their effects on our built world. Examples are drawn from work conducted in design studio settings.

4 DISPERSION AND PHYSICAL AGENCY

Dispersion in a physical sense is about shifting or displacement of material. Although dispersion is continually going on around us at all times it is often subtle and not readably noticed as such. A vivid sunset is rarely appreciated as an accumulation of particulate matter in the atmosphere. The sand on the beach is normally not associated with the centuries of decomposition of parent material. Dispersion may be thought of as part of an association of human and non-human factors, of agriculture, forestry or other industrial practices combined with materials and their physical properties. Through such an association new agency of the materials are realized, as in the sublime beauty when light is diffracted, or through the subtle feeling of the shifting waves over the sandy beach.

Dispersion, as seen here involves both the coming apart and the reconfiguration of things into new forms of association. Perhaps a more tangible way of thinking about being dispersed is about a (random) scattering or a spreading, of simultaneously sending off in different directions. In ecological terms this would be found in the multi-directional spreading of landscape elements resulting, for example, from dramatic natural events such as windstorms or floods. This is dispersion as a manifestation of a sudden force. Landscape architects are concerned with the mitigation of such processes and as such work to develop an understanding of the assemblage of affects and the agencies of things that make up the flow, i.e., the energy of an event, the looseness of the landscape, the ability for the landscape to trap flowing material, the ability for the landscape to resist the flow, the ability of materials to go with the flow.

Figure 1. Water Flume Studies by Meaghan Hunter, advisor P. R. Perron, (by permission of the author)
Studio work at the University of Manitoba includes studies of flooding examining a range of mapping and modeling techniques that illustrate dispersion characteristics such as: video recording and identifying the materials carried by the flood waters, taking inventory of the destruction, developing predictive models (water flume studies) of the form and extent of material accretion and erosion, simulating water rise and force, and trying to predict impacts on landscape associations (often through event observation). This kind of modeling requires that we give some thought to the agency of the materials under inquiry and we then develop appropriate analogs for predictive experimentation.

Things themselves may intrinsically contain dispersive agency. Take for example the many ways that plants spread their seeds (see for example http://theseedsite.co.uk/dispersal.html). Seeds have evolved to be carried in the wind (such as dandelions) or water (yellow flag, willow, foxglove, water mint), attached and are carried on animals (plants with burs), or in animals (often berries), and projected or broken away from plants through a variety of mechanisms (geranium seeds are catapulted, lupins explode, Oxalis seeds are sprung out). Ultimately plants have evolved such that the dispersed seeds may reach a competitive network of relations including soil, water and sunlight and it may be relatively straightforward to anticipate the behaviour of plant materials in different associations within a garden setting. Landscape architects may design with the agency of seed dispersal in mind, and is so doing would develop models that describe the potential for the landscape to accept or inhibit the distribution of seeds.

Landscape architects often work in systems of complex relationships, like cities, and these designers may have ambitions of developing green networks. In the studio project “Capture and Disperse” (Figure 2) natural gas capture sites located throughout the city of Medicine Hat, Alberta (left), are developed with a variety of textured materials for capturing seeds upon their release (center), seed dispersal towers release the plant material (right) to coincide with periods of gas extraction.

Figure 2. Capture and Disperse studio project by Kristen Struthers, natural gas being captures and dispersal of seeds in response, Medicine Hat Alberta, studio critic P. R. Perron. (by permission of the designer).

Within an urban setting the spatial elements (the building, the boulevard, the front yard, etc.) may also be considered in terms of their specific agency for allowing or preventing dispersion. It should be possible to develop a flow typology (based upon characteristics such as porosity, size, materiality, etc.) related to the flow characteristics of the carriers and barriers. For example, seeds dispersed by the wind may be easily carried across a stream but wind patterns may be limited around a building. A dog might easily carry a bur around a building but would have more trouble crossing the stream. In this way, animals, people, plants, buildings, etc. may all serve as actors influencing the seed dispersion patterns. The dispersive agencies may vary greatly from plant to plant, based upon factors such as range and intensity of the distribution, and designers must begin to know their plants, as gardeners, not in terms of simply what they are or what they look like, but more specifically in terms of what they do and need to do, and the assemblages in which they play a part.
Related to the idea of dispersion are the concepts of aggregation (the grouping of distinct parts into a whole) and disaggregation (breaking up a whole into constituent parts; or empirically working towards finer details based upon observation). Aggregation and disaggregation are also natural processes. Consider for example how phase changes, such as ice formation (figure 3) and flow dynamics on a lake combine to aggregate through freezing and accretion and (dis)aggregates as the ice melts and the force of the shifting ice erodes (solid/liquid differentiation). The whole hydrological cycle may be considered in terms of phase changes and the aggregation and disaggregation of phased material. Flooding in Northern climates is often the result of shifting ice conditions and designers should be aware of the association of materials that aggregate and the resulting agencies, from the shifting occurrences of the ice damming, to the gentle luring song of a lake when the ice is candling).

Figure 3. Floating and Falling, temporal change study, artist Alex Poruchnyk (by permission of the artist.)

Dispersion of water has long been a strategy used by landscape architects. Probably one of the greatest current examples of this kind of dispersion is found in the Mirroir D’eau (figure 4) project by conceived by the landscape architect Michel Corajoud and developed by the fountain expert J. M. Lorca. In this project a thin layer of water is in a constant state of materialization and dematerialization, a shifting blend of appearance and disappearance; a random sequence of events where the water is in flux between gushing streams, gentle mists and … a planar emptiness. It is not simply that the water is scattered and dissipated but so too are the order of the events and the viewer is caught up in both the beauty and the unpredictability of the aqueous performance of the dispersion of experiences

Figure 4. Mirroir D’eau, photo by Marie Levesque (by permission of the photographer)
With aggregation and disaggregation comes agency; for example when water aggregates into ice new agencies emerge such as the agency to temporarily disrupt regimes of blending and mixing of the water with exterior materials (ice as barrier or filter), the agency that results from solidity (temporary firmness) allowing one to walk on water; and alternatively, the agency that serves as a determinant in fish behaviour (the warm surface layer, the shifting temperatures of the thermocline, or the cold lower layer). For example a deep thermocline may result in reduced fish stocks, in which case it becomes important to consider not only that water disaggregates, but also we have to understand the nature of the disaggregation. Designers need to think about external factors such as the nature of climate change or global warming by considering the changing nature of landscape aggregates and the factors and forces that change the patterns of disaggregation.

The studio project "Assemble and Disperse" (figure 5) brings together not only physical agency of dispersion but also the affects of human practice. In Winnipeg, Manitoba gravel and salt are dispersed throughout the winter on the icy streets. In this design the material is collected into a park like setting, and aggregated into salt and gravel using steam. In the design solution aggregated material is filtered through bio-remediation. Steam provides the basis for a new kind park ambience. Actor network theory is used to develop a park condition that is assembled from urban industrial practices, ecological processes and cultural desires. Material are dispersed first throughout the city as grit, collected, aggregated and then dispersed once again through bio-remediation.

Figure 5. Assemble and Disperse: Infrastructural Hybridity by Trent Workman, truckloads of sand, salt, and debris are assembled and aggregated using steam. Sorted material forms the basis the mounds in a park setting on a post-industrial site.

5 DISPERSION AND THE CREATIVE PROCESS

Design enquiry takes place through a number of approaches using a wide range of tactics that have the potential to be what James Corner succinctly describes as operational eidetics. As instructors of landscape architecture we must be engaged in the exploration of new tactics with a critical concern regarding their efficacies and potentials in design thinking. In this sense to “disperse” may be thought of as a tactic in design, to breakdown something into its component parts as ways of uncovering their design potential. How do we engage dispersion as part of the design process? Whereas aggregation/disaggregation, as considered above, is thought of as gathering and scattering of materials, an assemblage and conversely a dis-assemblage is a gathering and scattering of a broader collection of entities such as materials, ideas, human and non-humans, things and behaviors, etc. The landscapes that we create may be thought of as virtual assemblages of objects, ideas, living and non-living beings, relationships (all of which might be thought of as actors with agencies, hence the term actor network theory or ANT) that come together in a body of potential (Paris, 2012). Whereas sociologists may examine virtual
assemblages as ways of mapping the associations that occur in a culture, landscape architects unpack and re-build virtual assemblages.

The opposite to assemblage, what I am calling here dis-assemble, is the act of decomposing an established order, and in the design process this may be thought of as an approach to creation through dispersion; through tactics of removal, tactics about the creation of absence, and tactics that celebrate and explore the potentials of disappearance. This is often an exploratory process of teasing things apart to see what happens, or of uncovering the parts that constitute the whole. But it is also about placing the emphasis as much on what holds things together as on the things themselves. “Things, quasi-objects, and attachments are the real center of the social world, not the agent, person, member or participant – nor the society or its avatars…. its not the social that accounts for associations but rather associations that explain the social” (Latour, 2007, p.238). It is perhaps here that actor network theory becomes its most unwieldy and possibly its most powerful, for Latour is very interested in what constitutes the “social” (what I am calling assemblage) and he is very careful to point out a need to avoid the objectification of the social. The “social is not a place, a thing, a domain, or a kind of stuff, but a provisional movement of new associations” (Latour, 2007, p 239). Landscape architecture is fundamentally a practice of understanding and reconfiguring the “social”. Dis-assemble (dispersion of the social) may be thought of as tactics for understanding not only the composition of landscapes (in a very broad sense) but also about understanding what holds a landscape together, and of proposing new (provisional) associations.

Examples of dis-assemble in a design process include décollage, decalcomania (building up layers of paint then peeling them while still wet), éclaboussure (chemical/water splattering and paint removal), étécissments (cutting away to create an image), grattage (scrapping), outagraphy (cutting the subject out of an image), souflage (the blowing on paint to reveal an image), triptography (photo overlays, originally with film cameras) (see for example Shane, 2005). Landscape architects use their own techniques of dis-assemble acting directly of the land, for example borrowing from gardening (pruning/topiary) and from grading (earth works design). Studio work illustrated below result from explorations of design problems using techniques described above. From left to right: triptography is used to assemble social/spatial narratives presented on the female form celebrating the strength and power of feminist associations; decalcomania embedded into 3D plexiglass print model illustrates dispersion of species in an urban setting; décollage is used to break apart the primary functions of a GIS model of an urban setting; éclaboussure used as a metaphor of a predicted erosion/accretion process in the Mississippi Delta.

![Figure 6. Eidetic mapping studio work Thunder Bay/Prince Edward Island/New Orleans, from left to right triptography (Desiree Bunn), decalcomania (Kelly Wojnarski, Jocelyn Aquino-Javier, Daniel Neves, Shauna MacArthur), décollage (Cameron Bradshaw), éclaboussure (Alison Birkett)](image)

As things disperse they begin to disappear and it may be that disappearance itself is important in landscape architecture. It is not simply that landscapes grow and emerge, but equally there is great beauty and value in disappearance. Philosopher and architect Paul Virilio has been intrigued with concepts of time and space. From his early work of Bunker Archaeology to later works in Lost Dimension and The Aesthetic of Disappearance he has challenged conventional notions of time in our increasingly technological world. Rather than celebrating and recognizing loss (the disappeared), the emphasis is on the process disappearance itself. “[T]he tabula rasa is only a trick whose purpose is to deny particular absences any active value” (Virilio, 1991, p.31). Specifically this is about the agency of disappearance in our making of place and in our everyday lives. Disappearance is a natural process and we should consider how landscape architects celebrate and engage (speed up and slow down) social, cultural and
ecological processes of disappearance. I believe that this is what Weilacher meant when he wrote the following about the work of Peter Latz and Partners (figure 7).

"[Latz] still refuses to present nature exclusively in terms of long-forgotten Arcadian ideals, instead pointing out the value of everyday nature that has much to offer our lives than the cultural sterility that has to satisfy functional criteria all of the time and everywhere... Every openwork of art in Umberto Eco’s sense lives with the risk of the unforeseeable and is understood as a dynamic structure that does not fit in with any rigid ideals, but always signals freedom and the ability to change."

(Weilacher, 2008, p.100-101)

Figure 7. Duisberg Nord, images by the author

6 DISPERSION OF KNOWLEDGE

As educators we are engaged in a form of dispersion through the dissemination of knowledge, and as such we are beginning to understand that the dispersion of knowledge is directly associated with the currents of communication. Dispersion in not simply an artefact of tactics and technologies, instead it is an indicator of the nature of our interactions. We disperse into networks not on them. As such a landscape architecture creation is directly related to the nature of the discourse in which the design exploration is taking place.

When Foucault’s spoke about living in an epoch of the dispersed he was in a sense speaking about the simultaneity of different discourses, what might be thought of as discourse networks. Landscape architects engage in their own forms of discourse (what DeLanda would call linguistic coding) to find ways to modify a landscape, such as place making, landscape conservation, post-industrial rehabilitation, etc. We are living in an epoch of the dispersed because knowledge itself has become increasingly compartmentalized, or territorialized. Knowledge has become dispersed into so many independent specialized discourse networks that it is almost impossible to know what we are all simultaneously talking about. Designers must look for ways to traverse these discourse networks and experiment with our own forms of “deterritorialization”, i.e., we must look for ways to actualize the knowledge of others and decontextualize (or occupy) the knowledge relations. I believe that this is what Ian McHarg was trying to do when he envisioned landscape architecture as embedded in a complex set of interdisciplinary conversations. This may be better understood when we try to define what we mean by ecology.

Esbjörn-Hargens and Zimmerman identify close to 200 distinct discourse networks of ecological thought and environmental studies that they group into 25 overlapping categories from the religious to the linguistic, from complexity theory to somatic investigations. (The categories include scientific, economic, acoustic, medical, aesthetic, behavioral, representational, historical, social, technological, evolutionary, ecological, psychological, agricultural, geographical, complexity, cultural, philosophical, ethical, religious, esoteric, somatic, therapeutic, spiritual, and linguistic). These authors attempt to categorized the perspectives on ecology into four quadrants or terrains; experiences, behaviours, cultures, systems. They believe that these schools of thought are often speaking across purposes because they are interested in fundamentally different kinds of problems. The authors go on to advocate an integral ecological approach
that unifies objective approaches (inter-objective); while drawing upon artistic and psychological approaches (subjective) as well as ethical and religious approaches (intersubjective). "Integral Ecology is the study of the subjective and interobjective environments at all levels of depth and complexity." (Esbjörn-Hargens, S. and Zimmerman, M. E.). Landscape architects simultaneously draw from many of these networks to bring sense to a real world problem. But instead of trying to make sense of the whole, we attempt to bring together (assemble) different ways of thinking about space and place based upon the intersecting conditions of a lived world.

Figure 8. Landscape assemblages: train station in Europe, intersections of drilling platforms and hurricane paths in Mississippi Delta, changing seasons in Manitoba.

It is important to recognize, once again using actor network theory, that when we engage in a particular form of discourse (landscape ecology, or conservation ecology, or bioacoustics, or Deva-gardening, ...) that the knowledge becomes part of the assemblage of ones design, that knowledge is in a sense embedded in landscape, that the landscapes that we develop and the discourse networks that we adopt are bundles that together realize provisional movement of new associations. The power and potential of landscape architecture is in finding out how these dispersed areas of knowledge play out in a living world.

7 CONCLUSION

Actor network theory provides landscape architecture new tools for understanding and analysing the social (in terms of the interactions between entities when they form associations). Design may be thought of as the creation of various kinds of associations and bringing about interactions between the associated elements. Landscape architecture may be considered in terms of designing social associations for human and non-human actors.

Dispersion is a filter through which one can begin to interpret landscape associations. Modes of dispersion of elements in the physical world provide insight into the assemblages of human and non-human worlds, and direct designers to new possibilities for design metaphors. A number of dispersive tactics may be developed to study landscapes that emphasize not simply the displacement of materials but also the nature of associations. Finally, landscape architects can realize the potential that emerges through the dispersion of knowledge, that, for example knowledge regarding natural systems is broad and varied, and that knowledge itself becomes embedded into design assemblages.

I would like to thank the editors for their valuable commentary.

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ABSTRACT

As a reflection of the evolving of the “Complete Streets” principles, the Safe and Complete Streets Act of 2011 (HR. 1780) addresses more on “safety” than its precedents. Based on the legal provisions, also as a response to the Complete Streets movement, this paper will discuss the legislation, safety, public demand, educational functions and sustainability aspects of the need for urban roadway systems to accommodate multimodal traffic on university campuses.

Through the review of the literature, this paper intends to document whether current roadway facilities of the University of Maryland College Park campus is adequate and efficient for daily behaviors of all user groups or whether facilities that ensure the order and safety on our streets are missing. According to a survey done by the Department of Transportation Services, University of Maryland, the important issues at the campus include cut-through traffic on main arterial (Campus Drive), lacking of bicycle facilities, and traffic congestion during rush hours. And further discussions the published results from a pilot trail of temporarily closure of Campus Drive. Therefore this paper will explore the improvement of campus roadways to accommodate some of travel means, especially cycling, currently used by the university community. Furthermore, the paper provides some suggestions on sustainability and education aspects and addresses how our campus roadway system could provide its user groups with more sustainable travel choices.

1.1 Keywords

complete streets principles, traffic conflicts, university campus roadway system
2 ISSUES STATEMENT

Acknowledged as a great industrialist, Henry Ford realized massive productivity in automobile industry by applying constantly-moving assembly lines, subdividing labor, and coordinating operations carefully. The popularization of automobile greatly expanded the range of human activities, in the meantime generated a demand for our urban roadway facility design to be oriented towards automobile travel. As our roads become more and more convenient for vehicles, many potential risks turns into great threaten to public well-being on a daily basis. From a microscopic point of view, traffic collision, right-of-way conflicts, and diseases directly/indirectly caused by automobile-dependency, are threatening individuals' safety and well-being. From a macro perspective, traffic congestion, stormwater drainage from roadway systems, and roadways cutting through habitats, are casting negative impacts on both our social economy and living environment.

2.1 Traffic Collision

Traffic collision (of which types include rear-end, side collisions, head-on, road departure, and rollovers), or "Motor Vehicle Accidents (MVA)" as used by the U.S. Census Bureau (US Census Bureau, 2009), was the sixth leading preventable cause of death in the United States as of 2000 (Mokdad et al., 2004). According to the report, nearly 36 thousand people died and 97 times more were injured in 2009 as results of motor vehicle accidents (National Safety Council, 2011).

There are basically 2 factors facilitating the occurrence of traffic collision: roadway related factors (human factors and road design) and vehicle related factors (vehicle design and maintenance). According to a 1985 study, which used British and American traffic collision reports as data, more than 90% collisions involved roadway related factors. (Lum and Reagan, 1995)

The two components of roadway related factors, roadway design and human factors (or driver factors), are closely related, especially in terms of motor vehicle speed. A 1998 research review on traffic speed done by U.S. Department of Transportation's Federal Highway Administration states that “there is limited evidence that suggests that lower speed limits result in lower speeds on a system wide basis”, meanwhile, more research needs to be done on the effectiveness of traffic calming measures (US DOT, 1998). As the 2008 International Transport Forum (ITF) elucidated, "it recognizes that prevention efforts notwithstanding, road users will remain fallible and crashes will occur" (ITF, 2008), inferences can be drawn that road designers have the potential and therefore the responsibility to contribute more to traffic safety by facilitating speed control on road systems other than traffic legislation and law enforcement agencies.

2.2 Right-of-way Conflicts

Right-of-Way conflicts (between automobile and bicyclists, as well as pedestrians, as referred in this article) become one of the obstacles repelling the campaign against urban sprawl as results of lacking adequate supporting facilities (sidewalks, bike lanes / tracks, etc.) for pedestrians and bicyclists' travelling in some roadway segments. Even on roads equipped with these facilities, conflicts still happen at critical segments, especially intersections.

The reasons for ameliorating urban roadway facilities to benefit pedestrians more than automobiles can be perceived from three facets: First, driving is a more advanced skill, which requires meeting minimum standards in several aspects that cannot be legally required of walking. Second, walking is a congenial human right while driving is more of a privilege. It is unreasonable to deprive an individual’s right to walk as a punishment in traffic disputes. Third, pedestrian is a group with more complex composition including people with less physical and cognitive skills than drivers, including children, youths, elderly people and people with physical challenges(Houten, 2011). On the basis of above reasons and analysis of traffic statistical data, pedestrians are vulnerable roadway users "much more exposed than others to injury or death in a traffic accident" (Tarko and Tracz, 1995). It should be noticed that the asymmetrical responsibility of pedestrians and drivers in a crash does not simply imply that drivers should take on full responsibilities in all cases. According to the data recording pedestrian crashes during 2000 – 2008 in Santiago, Chile, about 67.2% was caused by pedestrians' irregularities in traffic behavior, while 26.3% was drivers’ responsibility, and 6.6% was caused by undetermined factors (Blazquez and Celis, 2012). Avoiding irregular pedestrian behaviors, including imprudence, crossing roads surprisingly or carelessly, violating crosswalks, remaining on the road, disobeying red signal, and other
behaviors, should be taken into consideration in road improvement design as well as pedestrian safety protection measures. In the case of urban low-speed roads, an effective solution to reducing conflicts between pedestrians and automobiles from designing approaches is to apply signs and markings, signals and beacons, and traffic calming measures to roadway segments. Wider pedestrian cross marking, advance stop bars, yield to pedestrians signage, countdown pedestrians signals and various traffic calming techniques including speed humps, speed tables and roundabouts, all have the potential to effectually abate conflicts between pedestrians and automobiles when being applied together with education and enforcement.

Comparing with pedestrian behaviors in the streets, which could simply categorized as travelling “along the road” and “cross the road”, the conflict between bicyclists and automobiles is more of a communication problem (Walker, 2011). As pointed out in Chaurand and Delhomme’s research, even with a lower absolute number of bike crashes (i.e. NHTSA, 2009; SafetyNet, 2008), “bicyclists have higher exposure rate to injury and fatal crashes than car drivers, be it per time or distance (i.e. Broughton et al., 2010; PROMIZING, 2001)”. In addition, bicycle-car collisions are the riskiest situation for bicyclists (Bíl et al., 2010; Kim et al., 2007; Räsänen and Summala, 1998; Summala et al., 1996; Chaurand and Delhomme, 2012). The impairment of agility at start and considerable risk of losing balance in evading actions also contributes to bicyclists’ vulnerability. A 1997 study on 188 bicycle-car collisions in four cities reveals some regular pattern of these accidents. First, collisions frequently happen at road intersections, mostly on conflict points of motor vehicles and bicycle travel path. Second, in nearly 40% of collisions in this study, both parties didn’t realize the danger nor have time to evade. Third, bicyclists are less noticeable to drivers, and in most cases there’s an ambiguity on which party should yield to the other. (RäSänén and Summala, 1998; also in Kim et al., 2007) This study indicates roadway facility design plays a very important role in travelling bicycle-car interactions besides legislation and education on travelling behavior. Users’ right-of-way and yielding hierarchy (especially at intersections) should be clearly defined through signage and markings to reduce the accidents caused by ambiguity in these issues.

2.3 Public Health and Safety

Automobile-dependency threatens public health and safety both directly from traffic accidents and indirectly from impacting on living habits and traffic exhaust emissions. Except traffic collisions mentioned above result in injuries and mortalities, spillover effects, also known as “cut-through running” or “rat running”, also distributes vehicular traffic volume into adjacent neighborhoods where streets mainly accommodate communities’ daily activities, and therefore threatens amenity and safety of local residents especially children.

Different from walking and cycling, driving is more of a highly sedentary activity involves minimum body movements. Perennially lacking of exercises will usually weaken multiple body functions and results in sub-health symptoms and certain diseases. A study of 10,808 households in Atlanta found that every hour spent in the car raises the likelihood of being obese by 6% (ARHF, ARC, 2005). Meanwhile, the gaseous emission from automobile is one of the main causes of Asthma and many other respiratory diseases. A 2003 study by American Surface Transportation Policy Project indicates that the air quality in tens of cities in the U.S. has worsened over the last decade (Surface Transportation Policy Project, 2003), and transportation system is the major contributor to the current air situation (US EPA, 2000). In a 2005 United States Environmental Protection Agency study, except an annual average passenger car emission of 11,450 pounds carbon dioxide, on-road motor vehicles and non-road ancillary equipment (mainly gasoline and diesel stations) also emits mono-nitrogen oxides (NOx), carbon monoxide (CO), hazardous air pollutants (toxics), particulate matter (PM10 and PM2.5), and ground level ozone produced by the reaction of nitrogen oxides and volatile organic compounds (VOCs) (US EPA, 2008).

2.4 Traffic Congestion

Traffic congestion (or “traffic jam”) is a contemporarily common phenomenon closely related to urban sprawl and the growth of commuting. As described by Federal Highway Administration, traffic congestion is a condition that occurs as automobiles increasing on a particular section of road network within a certain time period, therefore increase vehicular queuing and decrease travel efficiency (FHA, 2008). The occurrence of traffic congestion is usually accidental. Under current traffic research, it is still hard to forecast which road conditions might lead to a congestion, but what is known is that individual incidents, from abruptly braking of a single car to traffic accidents obstruct a previously smooth flow, may
cause a cascading failure (or “ripple effects”) therefore create a sustained traffic congestion (Science Hobbyist: Traffic Waves, 1998). The negative effects casted by traffic congestion include decreasing in transportation efficiency, consequently impeding regional economic development, and encouraging road rage by stressing and frustrating motorists. In addition, traffic congestion also contributes to spill-over effect and exacerbates exhaust emission mentioned above.

2.5 Other Impacts

Asphalt and conventional concrete is the main pavement material of contemporary urban road infrastructure, and these impervious surfaces generate a large amount of stormwater runoff, which carries oil, brake dust, sediment, lawn chemicals and other toxins as byproducts from travelling of vehicular traffic, and send to nearby watersheds, resulting in degradation of aquatic ecosystem (ARHF, ARC, 2005).

As a conclusion to issues addressed above, which are more or less related to road facility design, there is an imminent call for better practice in road improvements which could benefit all roadway users by providing adequate equipment to maintain traffic order, and encouraging healthier travel modes. Furthermore, it is also expected to contribute in Low Impact Development (LID) by installing green infrastructure to road segments. In order to respond to these immediate challenges in university campus scale, several currently ongoing practices will be studied based on their different emphasis.

3 COMPLETE STREETS CONCEPTS

3.1 Legislation

Complete Streets campaign is more of a top-to-bottom action. In 1971, the State of Oregon passed a “bike bill”, which is considered as the first statewide prototypal Complete Streets policy enacted in the United States. The act required that new or rebuilt roads to accommodate pedestrians and bicycles since its effective date, and requested state and local governments to fund pedestrian and bicycle facilities in the public right-of-way (DOT, Oregon, 2011). In 1984, the state of Florida enacted State Statute 335.065, requiring that transportation planning and development give “full consideration” to bicycle and pedestrian facilities (Florida Senate, 2011). It was until the year 2003 when David Goldberg, the communications director for Smart Growth America, first use the term “Complete Streets” as a formal replacement for “routine accommodation” of walking and biking. Up to that time, the practices were concentrating only on bicyclists’ and pedestrians’ right-of-way from a more technical point of view. In 2005, the National Complete Streets Coalition (NCSC) was founded by a coalition of advocacy and trade groups including the American Society of Landscape Architects (ASLA) to keep developing and promoting the principles of Complete Streets (McCann, 2011).

Different from highways maintained by federal and state government, urban streets where Complete Streets principles targeted are usually maintained by private sectors, and upon which practices require legislation enforcement to benefit more communities. Federal Complete Streets legislation was proposed since 2005, but failed to become federal law (S. 794 IS, 2005, Library of Congress). Though the legalizing process faced repeated setbacks in federal level, major progress was achieved in state and lower-level jurisdictions. As of 2011, Complete Streets policies have been endorsed or adopted by 23 U.S. states and 201 lower-level jurisdictions, from legally effective entries and clauses to non-binding resolutions, executive regulations and transportation plans (NCSC, 2011).

In May, 2011, as a re-introduction of S. 794 (109th): Safe and Complete Streets Act of 2005 and H.R. 5951 (110th): Safe and Complete Streets Act of 2008, the bill H.R. 1780 and S. 1056(112th): “Safe and Complete Streets Act of 2011” was introduced and referred to Committee, which defines a “Complete Street” as “a roadway that safely accommodates all travelers, particularly public transit users, bicyclists, pedestrians (including individuals of all ages and individuals with mobility, sensory, neuro-logical, or hidden disabilities), motorists and freight vehicles, to enable all travelers to use the roadway safely and efficiently” (H.R. 1780, 2011, S. 1056, 2011).

Evolutions and improvements of the principles could be tracked by comparing the dead bill, “Complete Streets Act of 2009”, and its upgraded version, “Safe and Complete Streets Act of 2011”, in which major modifications were made. First, the 2011 bill emphasizes “safe” (“safety”) of all road users as a main goal to achieve, which shows a better comprehension in current urban roadway issues. Second, the later bill refined the category of roadway users. It separates freight vehicles from the category “motorists” into an independent one, to distinguish them from private vehicles and public transit in terms of
their service targets and functions. Generally, the amount of freight vehicles travel on a certain segment of urban roadway is not affected by the factors affecting that of private vehicles. The bill also specifies and clarifies that the term “pedestrians” covers “all ages and abilities”, which implies that ADA accessibility should be considered in roadway design. Third, the 2011 bill was revised to be more of a general guideline, in which many excessively detailed requirements have been trimmed off. It requires that an implementation plan to be created by agency staff under the directions of the Complete Streets policies to make sure the application of Complete Streets policies will be a well-planned and systematic process. Subsection “Promotion” was excluded from “Sec. 3: Complete Streets Policy Requirements”, which requires State DOT and Metropolitan Planning Organization to promote the development of complete streets policies in applicable local jurisdictions (H.R. 1443, 2011, S. 584, 2011), probably because similar requirements has been adopted by the U.S. Department of Transportation in 2010 to support the inclusion of cyclists and pedestrian accommodation in federal-aid projects (USDOT, 2010). The 2011 bill excludes “Sec. 4: User Access & Considerations” as a meticulous design guidance in order to improve adaptability of the bill as a potential act, as well as “Sec. 6: Safety Funding in Noncompliant States” in consideration of improved adaptability of the principles in all states. Last but not the least, some new contents were included in as the principles develops and the coalition grows. The 2011 bill takes “traffic volumes” into considerations in exemption requirements and procedures, and includes two affected communities including the American Society of Landscape Architects in “Research, Technical Guidance, and Implementation Assistance” section, indicating landscape architects’ responsibilities in promoting the Complete Streets principles.

3.2 Performance
The modifications imply that the Complete Streets principles mainly target on roadway users’ safety, and more concerns were put on promotion and broader adaptability of the concepts. Recent years have witnessed practices applying Context-Sensitive (CSS) approaches to follow the gradient of development patterns (i.e. practices in Caltrans, California), which enhanced flexibility and creativity of Complete Streets practices in areas with unconventional conditions. (AASHTO / FHWA, 2007)

Adaptability allows design elements vary to respond to the context changes. Design elements usually include improved pedestrian infrastructure (with ADA accessibilities), bicycle and mass transit accommodations, traffic calming measures and buffers. Concerning more on safety bring about better performances. A Federal Highway Administration (FHWA) safety review found that properly applying Complete Streets design elements can improve the safety of all roadway users (Campbell et al., 2004). Another study found that installing these elements reduced pedestrian risk by 28% (King et al., 2003). Several other reports and organizations including National Conference of State Legislators also indicated that Complete Streets policies effectively improve public health by encouraging healthier travel means, especially walking and biking (Robbins and Morandi, 2002). A study done by Powell et al. in 2003 found that the percentage of people meet recommended physical activity levels has a positive correlation with whether there are safe places to walk within certain range from their home (Powell et al., 2003). The Institute of Medicine recommendations for fighting childhood obesity revealed a direct link between Complete Street policies and public health (Koplan et al., 2004).

3.3 Practices Variances
The Complete Streets practices in Los Angeles, also known as “Living Streets”, focus more on designing to assert functions of streets as public spaces and their environmental issues. Landscape elements (furniture, swales and rain gardens, etc.) being introduced into streets help accommodating varieties of daily activities, facilitate communications both inside and among communities, and perform on-site stormwater process before discharging to drainage (Bain et al., 2012).

Unlike other forms of Complete Streets practices which articulate that transportation equity must be explicit, “Shared Space” ensures unobstructed traffic flow by integrating different users instead of segregating them. Shared Space practices powerfully reduce the dominance of motor vehicles by eliminating demarcation in different level and exceedingly promote degree of sharing. Substantially introduce more traffic conflicts into streets, these practices inevitably increases potential accidents. But from another perspective, this ambiguity of equity generates more vigilance and dramatically impairs the effect of human factors in provoking conflicts. Meanwhile, the conflicts in a Shared Space are engineered-
in and more predictable to some extent, and thus interact with the definition of “conflict” and boost the
development of new Pedestrian-Vehicle Conflicts Analysis (PVCA). (Kaparias et al., 2013)

4 UNIVERSITY CAMPUS ROADWAY SYSTEM
4.1 Introduction
In the past few decades, as transportation-related issues becoming more stringent, with
considerable impacts on institutional functions, the importance of transportation planning in university
Campuses attract increasing attention. Besides benefits of mitigating the negative impacts of heavy
vehicular traffic mentioned in the opening paragraph, better transportation facility also contributes to the
attractiveness of the university town and push forward research into university town branding, on which
few researches have been done (Brandt and Mortanges, 2010).
Transportation planning and facility design is more complicates in university campus context.
Though inevitably sharing similar regularities of spatial and temporal traffic patterns with city road network,
campus streets have some unique features need to be taken into consideration. Obviously as academic
institutions university campus requires stringent safety, legal and environmental restrictions on traffic
(especially vehicular traffic) travelling on their inner road networks. As will be revealed in the survey
report, in the case of University of Maryland, majority of roadway users adopt non-automobile
transportation modes on campus. Transportation problems and institutional problems are closely
connected in university campus environment. Kronlid argued that the intimate psychological and
physiological relationship between transportation facilities and their users discriminates the preferences
(Kronlid, 2008). Later in 2010, Ferreira and Batey’s study quoted this claim and further pointed out that
these preferences also influent the development and interaction between facilities and users in return
(Ferreira and Batey, 2010), which implies, transportation planning in university campuses is constrained
by institutional environment, and vice versa. With this inner connection, the problems cannot be effectively
solved unilaterally. Ferreira and Batey’s multi-layer transportation model reveals a connection links
transportation back to institutional design through three layers: Supply and demand, time, and
perceptions. Within this loop the problems develop and exacerbate themselves. This model was
developed upon the study on University of Coimbra (UC) campus in Coimbra, Portugal, which is located in
a university town comparable to College Park. These studies also imply that perceiving the problem from
appropriate direction is critical to the subsequent performance of improved road segments. (Ferreira and
Batey, 2007)

4.2 University of Maryland Campus Traffic Issue
As an urban university, the University of Maryland is embedded in the City of College Park, which
located in an increasingly urbanized metropolitan corridor (University of Maryland, 2011). Thus campus
streets more or less undertake functions of inner-connection of the city, which brought negative impacts
on campus operations. With major issues of traffic congestion and conflicts between vehicles and
pedestrians and bicyclists being addressed in campus’ Facilities Master Plan (FMP), detailed practice
suggestions will be proposed based upon a 2010 FMP subcommittees survey regarding transportation
and aspects of campus environment, to provide guidance for implementation of corresponding contents in
the FMP.

With about 40,000 students and 15,000 faculty/staff on campus in 2010, the designed sample
capacity was to cover random samples of ¼ the population of both students and faculty/staff. The survey
resulted in a responding rate of 14% from students and 29% from faculty/staff, in which students are
underrepresented (FMP Subcommittees, 2010).
Through analysis of the survey results, several conditions should be addressed. As living distance to campus increases to about 1 mile, percentage of people choosing driving to campus individually surge up 35%, and 64% of all respondents adopt driving as their most preferred travel mean for commuting to/from campus. Dramatically, 86% choose to travel as pedestrians (walking, skating, skateboarding, etc.) from place to place on campus. Comparing with living distance statistics and Shuttle-UM transit system catchment areas, it indicates that driving will possibly remain as dominant travel mean for commuting within current FMP scope, but could be gradually cut down by constructing ancillary facilities for alternative transportation. Meanwhile, the campus is relatively walkable with a high degree of pedestrian facility coverage. With 62% demands for somewhat to major improvements towards pedestrian-friendly, further questions on travel experiences reveal conflicts between motorists and pedestrians and cyclists: more than 35% considers conflict with vehicles deteriorates pedestrian experience on campus, while about 45% takes reducing conflict with pedestrians as first priority in improving driving experiences on campus. A few pedestrians and drivers also complaint that conflict with cyclists affects their travel experience. These complaints of conflicts reveal ambiguity in travel priority hierarchy of roadway users, which could be better illustrated and clarified by education and roadway facilities such as markings, crosswalk, signage, stop bars, etc. The reason for fewer complaints related to cyclists is due to their small population. Encouraging cycling faces obstruction from multiple aspects. Current requires cyclists to bike on vehicular lanes and follow the same laws and regulations as vehicular traffic. With no markings or signage indicating drivers should share lane with cyclists, and hilly geographic of the campus severely affecting cyclists' travel speed, cyclists and drivers are usually ending up in conflicts of their own right-of-way. Intimidated cyclists usually choose to ride on pedestrian sidewalks and therefore provoke conflicts with pedestrians. There is also a call for ancillary facilities including weather-protected bike parking facilities and showering facilities. All these obstacles contribute to the population of cyclists much less than expected, with 82% of respondents never bicycle on campus.
The survey also implies the demand of improving public transit systems to support on-campus travels, with the huge campus scale and carrying heavy items being revealed as top two factors impelling people from walking under certain conditions.

The existing road facility is one of the constraints for applying Complete Streets policies. With a width of 11 feet on almost all vehicle lanes, it’s nearly impossible to squeeze in bike lanes without widening the road or removing one or several vehicle lanes. The suggestion is to apply different principles on different segments of the road network. Bike commute routes info shows there are several routes most frequently used by cyclists on campus (Bike UMD, 2013). These routes are the first priority to equip with bike lanes adapt to their specific conditions. Shared lanes are needed for secondary routes and connectors between routes, but with qualified widths and clear markings and signage to declare equality of cyclists’ and drivers’ right-of-way. Current Shuttle-UM routes highly overlapped to each other in certain segments inside campus perimeter. The suggestions is to apply different principles on different segments of the road network. These routes are the first priority to equip with bike lanes adapt to their specific conditions. Shared lanes are needed for secondary routes and connectors between routes, but with qualified widths and clear markings and signage to declare equality of cyclists’ and drivers’ right-of-way. Current Shuttle-UM routes highly overlapped to each other in certain segments inside campus perimeter. The suggestions is to apply different principles on different segments of the road network. This will cooperate with strategic planning of pushing major parking lots out to the campus perimeters, and connect them to the core area with inner-campus transit and bike share system to reduce vehicular traffic volume on campus roads. Close campus main streets to outside vehicles might possibly lead to spoil effects affecting other part of the campus. Besides, a phased experiment of closing Campus Drive, one of the main streets on campus, was conducted in 2010, which indicates permanent closer of the road received negative comments from majority of the campus population (Baker, 2011). Shared Space and Living Streets principles are suggested to be applied to main streets of campus (i.e. Campus Drive) to assert pedestrians’ dominance and, discourage, but allow cut-through driving before any alternative routes being deployed. The proposed Purple Line light rail and subordinate bike route network is expected to encourage the use of alternative transportation and mitigate the heavy commuting traffic cutting through campus on East-West direction.

Figure 3. Cyclists on campus are encouraged to share the road with vehicles, but frequently they are intimidated and use pedestrian sidewalk, bringing potential collision risks to pedestrians

4.3 Sustainability and institutional functions

Besides targeting on transportation issues, corresponding green infrastructures such as planters, swales and rain gardens should also be configured to install on certain parts of campus roads to reach Best Management Performances (BMPs) on stormwater runoff, in respond to the FMP on designating of the campus as an Arboretum and Botanical Garden, and the prompting in sustainability. The existing campus road facilities cannot meet the needs on sustainability due to the absence of stormwater management facilities. Suggestions include installation of bioswales on main streets, especially Campus Drive, Stadium Drive and Regents Drive, which have significant elevation changes along their reaches. On one hand the topography can contribute to dispersal of processed stormwater, as well as opportunities of designing unique streetscape. On the other hand, these facilities are exposed to road users’ daily activity, thus will clearly display how green infrastructures work and efficiently popularize sustainable concepts.
Figure 4. Campus storm drainage network map shows that campus roads are lacking on-site stormwater management facilities (2012) Facilities Management, University of Maryland.

Finally, getting students involved in the detailed design part, such as bus stop shelters and some of the green infrastructures, will also boost the mutual promotion of education and road facility, and form a virtuous circle in Ferreira and Batey’s multi-layer transportation model.

5 REFERENCES


ABSTRACT

Urban fragmentation reflects the lack of synergy between the built and unbuilt environments, between culture and nature, and between people and people. Greenways present themselves as a reasonable resolution to fragmentation. Then why are greenways not a prevalent practice in city design? This article examines the causes of urban fragmentation and examines contemporary landscape design responses, looking at their positions on addressing urban fragmentation and synergy. The article begins with a review of synergy and greenways before moving on to explore responses to urban form. The ability of legacy cities to offer insight into how urban spaces and infrastructures are viewed is also discussed. The article closes with the potential examination of urban greenways as a strategy to integrate Baltimore City by acting on existing vacant land, public infrastructure, open space, and cultural amenities. The underlying intent is to project synergism through productive relationships between human and ecological systems at every scale of landscape design and public decision making. The research is the groundwork for a design solution for which the built environment between greenways can be adapted to create a meaningful sense of place and synergy to an emerging greenway network. Can landscape architecture provide new relationships for the city and its inhabitants to experience distance, time, and place?

1.1 Keywords

greenways, urban fragmentation, landscape, Baltimore, synergy, city planning
2 GREENWAYS AND SYNERGY

Synergy, broadly defined, is the interaction of multiple entities to produce a combined greater entity. It can be the combination of a number of phenomena working in unison to create improved or enhanced condition. It can also be viewed as a series of systems functioning at their maximum potential working to increase efficiency and making each system stronger in the process. This paper in the format of a literature review, outlines current trends in landscape architecture when interfaced with contemporary urban form, and with an intention on framing a view on the role of greenway networks in addressing urban fragmentation. Greenways in American cities are either ecologically significant corridors and natural systems, recreational Greenways, often near water, trails, and scenery, or, greenways with Historic Heritage and cultural values (Fabos, 2003).

Randal Arendt notes that greenways broadly conceived “can encompass extensive areas comprising natural and cultural landscapes such as prime farmland and upland habitat, in addition to linear elements such as stream valleys or environmentally sensitive lands which are unfit for development due to wetness floodability or steepness” (Arendt, 2004, p.241). This macro scale definition seems to concern itself with primarily non urban areas, and rural or peripheral zones. Multiple returns on investment such as job creation and retention, improved value of adjacent land uses, improved quality of life and health of citizens and the opportunity of revenue generation-improving the tax base and providing a growing source of income for communities are noted by Flink (2012). This argument when tied with socio-economic anthropological status starts getting attention of community groups, local governments, and even the federal government. Cities struggling with a decreasing tax base, an increasingly fragmented population, and an abundance of underused land are in positions to take a look at historical greenway approaches and merge them with emerging landscape architecture theories to redefine greenways, urban form, and urban ecology.

Critical writing with explicit focus on urban greenway is still quite thin. While examples of urban greenways exist, there is little research or documentation on the strategies involved in planning an urban greenway or in literature talking about using new greenways to retrofit urban areas. While Arendt’s discussion primarily deals with how to develop new greenways outside of the city, he discusses the pertinent reality of community-wide participation. Arendt suggests the re-zoning of land which proposed routes will transect, density incentives for developers, land trusts to acquire and maintain land, and incentives to grant public access in subdivisions and other private developments (Arendt 2004, 247). As we continue to investigate urban form and potential greenway solutions Arendt’s zoning and land use suggestions might prove relevant to any design considerations we arrive at.

In one of the few texts dedicated to urban greenways- Greenways and the Making of Urban Form, Anthony Walmsley lists five categories of greenways: Urban Riversides, Recreational Paths and Trails, Ecologically Significant Corridors, Scenic and Historic Routes Comprehensive regional ‘green’ infrastructure plans (often encompassing aspects of 1-4).

These categories are not entirely independent of Arendt’s and Fabos’ classifications, but Walmsley approaches the subject from a distinctly urban point of view, articulating that there is no ‘kit of parts’ for green infrastructure, and that urban theorists often overlook streets as available public space to be incorporated into green infrastructure (Walmsley,1995, p.81). It could be argued that contemporary green infrastructure advocates have taken the public street into consideration with the growing prominence of complete streets, walkable communities, and New Urbanism, but his concern holds true today in that we don’t see much in the systems wide theory of the street grid becoming part of green infrastructure on a large scale. Walmsley refers to the premise that “a better understanding and application of natural processes (climate, water, plants, soils, wildlife, and food growing) could shape a more productive and sustainable design form for the modern city (1995, p.82). Walmsley goes on to talk about how the majority of greenways come from “residual leftovers after development, natural corridors, abandoned railroads, canals, and other rights of way and how these neglected lands could prove ecologically rich due to their not being overlaid with “biologically sterile manmade landscapes” (Walmsley,1995, p.82).

These ideals and strategies are further articulated through various design phases, mainly ecological urbanism, and sustainability movements nearly 20 years later. They are resurgent indeed, but there are still gaps in contemporary practice as urban greenways are few and far between, and are not often used in the same discussions of synergy.
3 URBAN FRAGMENTATION

Many urban greenway networks were built around left over “green” in certain environmental corridors or stream valleys, and as the environmental movement gained influence these greenways were programmed into multi-functioning transportation paths, recreational parks, and environmental buffers. Is this sufficient to address urban fragmentation - to green the left-over spaces in between building blocks? Also, such an approach does not address the spaces in between the greenways?

In “City Sense and City Design” Kevin Lynch talks about the four major general models for urban form. In order they are: The Linear System, the Linkage System, the Radial System, and the Grid System (Lynch, 1991, p.76-81). Most U.S. cities followed some sort of sequencing through these four stages or were built on top of a grid system with various adaptations for local interest and importantly topography. All most all of these forms were designed in response to transpiration technologies of the day, be it boat, horse, streetcar, or automobile. Lynch talks about the hybridization of these forms, but there is room for current designers to discuss further the role that existing greenways play and proposed adaptive open space networks on reimagining what a future urban form can look like. The popular grid form seen in most cites has its value, but might be ready to progress into the next stages of being more responsive to existing urban conditions of underused space, social and environmental fragmentation, topography, organic clusters of open space and the very real prospect that the personal automobile might not be the dominate mode of transport as cities evolve into the 21st century.

While Lynch highlights the patterns of urban form, Marco Venturi talks about the paradigm transformations of theorists and landscape architects having been successful using metaphors of networks. He says, “...network language manages to take into account not only the layout of the individual ‘links’ but also old urban centers, including both in a schema which in some ways transcends them. What emerges as a result is not a new type of city or non-city, but rather many types of coexistent cities. The great phases of technological innovation also upset the time-space relations within the city. The speed of movement of goods, people and information, once similar in the various sectors, is gradually being differentiated: people are relatively stable compared to the information transmitted. This raises new problems in renewing infrastructures and of the perception and appropriation of spaces, as well as the bonds in communities or social and political groupings (Venturi, 2012, p.264). Venturi articulates the fact that urban form is based on antiquated land uses and systems and for purposes of modernity may be more of barriers than of connectors. His discussion of networks opens the door for the logical question: what type of networks do cities need and why? Landscape architects are required to look at two phenomenon for the answer; the physical conditions of a site (the city), and the wants and needs as inputted by the local community. Doing so will take landscape architects from being the theorists to the design practitioners introducing sustainable, responsive, and adaptable networks to our urban public realms. To Reinforce the idea, planner and architect Ali Madanipour notes “the modern city has gone through spatial and temporal dispersion of its functions and a de-spatialization of some of its activities which have created multiple, non converging networks against the cohesive, nodal role which the urban public space could play in the past” (Madanipour, 2003, p.214). The role of the public sphere is being diminished as transportation and communication technologies have undermined public spaces. Sociability has been diminished and barriers have been set up along these physical and cultural divides.

Venturi goes on to argue that “the city is socially and physically fragmented…. people identify more with a social group than a place.” And “the city has become an obstacle to the various interests of individual social groupings as well as a hindrance to the most important form of freedom recognized today – freedom of movement” (Venturi ibid). So what can be done about it? In the same essay Venturi suggests that attention be paid to the quality, rather than the quantity of new urban expansions, with particular thought paid to the site (the existing physical conditions) rather than a market driven approach to what can be built. This very thinking and acknowledgment of fragmentation lends itself to my approach to looking at undeveloped land (vacant, abandoned, brownfield etc.) to see how it can be repurposed to act as a connector as part of a broader network incorporating ecological significance, historical value, and contemporary circulation and livability issues. Systems can be made more fluid by persevering with old stretches of continuity. Can these greenways counter the increasing fragmentation of our cities?

The contemporary form of our cities has given us the post industrial or even post modern city in which cities are becoming increasingly chaotic in their structure. The term “fragmentation” comes into the conversation. Carmona and others describe the arrival at the post industrial city as a “complex patchwork of growth and decline, concentration and decentralization, poverty and extreme wealth are juxtaposed.
Whilst downtowns may maintain their dominance of some high-level service functions, back offices, and corporate plazas, research and development and university campuses, malls, airports, and logistics zones, and retail, leisure, and residential spaces spread further and further around the metropolitan core” (Carmona et al., 2003, p.29). Much of this city form has to with the growing popularity and perceived practicality of the car, as various features can be located at any automobile navigable distance. And as a result the physical geography of our cities has been developed around the car. Leading to what Soja calls “carceral architecture” in which city form becomes based on protection, surveillance and exclusion as a result of the car dominating the direction of form, but also as a result of the combination of deindustrialization, internationalization of production modes and markets, and the development of new spatial trends in segregation and polarization (Soja, 1996, p.125-37). As much of the modern city has been built and formed around transportation structures which most recently have been the car, we are seeing that the public spaces of legacy cities of today are becoming increasingly fragmented as a direct result of a reliance on and designed response to the prevalence of the car.

Walter Hood offers a tangible idea of fragmentation in his history of Oakland, California. Like other cities, Oakland’s physical form evolved out of a growing railroad industry in the mid 1800s, but was drastically reshaped in the middle of the 1900s as highways and other forms of transit became popular. “Competition for land, particularly freeways and housing was greater than ever before” (Hood, 1997, 10). He discusses land use re-zoning tactics used to evict disenfranchised residents, wealthier residents fleeing to the suburbs (bankrupting the wealth and diversity needed to sustain a thriving community), home ownership declining – and public housing increasing. As disparate communities became less empowered and decreasingly economically relevant, the city became socially and physically fragmented. He speaks of the how systematic introduction of transportation infrastructure to community’s edges has led to further isolation. “Neighborhoods are dramatically isolated from Oakland’s CBD by the elevated eight-lane freeway and the elevated tracks of the Bay Area Rapid Transit,”(Hood,1997, p.9). As arterial roads morphed into ‘fortress wall’ isolating neighborhoods from downtown and the greater community, the city began to experience a fragmentation that was not always the case. This phenomenon is similar in many cities emerging from the post industrial age. As transportation infrastructure gained significance in planning strategies, marginalized populations and the space they used became increasingly less relevant to the systems theories guiding transportation planning. U.S. cities formed on the heels of transportation evolution, and that continued evolution had led to their fragmentation.

In their discussions of urban form Carmona, et al talk about the social dimension of fragmentation, and how spatial morphology can change the character of space and lead to social fragmentation as a response to the form of a city. In these instances various form of segregation take shape responding to demographic changes, or more importantly lack of access (Carmona, 2003, p.127-129). This lack of access is often the direct result of cities becoming fragmented due to de-industrialization, declining economic activity, or unequal access to the public and private transportation. This type of urban fragmentation is seen in legacy cities across the northeast as rustbelt towns become smaller in population yet retain their geographical size. Outdated and overworked infrastructure systems are subsequently insufficient to serve the needs of an increasingly segregated, fragmented, and marginalized population.

Let us approach fragmentation as a growth stage in which certain post industrial cities go through as their economies transition from production to service, their population declines, and the amount of underutilized space increases. As a result of the increasing amount of underutilized, vacant, or unproductive land, gaps are formed in the landscape which creates physical and social fragmentation in which there are breaks in the synergy of cities. Essentially cities were built on modes of transportation and human interaction based on trade. As those modes of transportation have evolved, and the markets have declined over time, our contemporary cities are situated atop a system of networks from a previous era. This has resulted in the situation in which land areas of cities are spread out, with outdated infrastructure, disconnected populations, and deteriorating public service.

3.1 Urban Fragmentation and Counter-strategies

In “Recovering Landscape” Marc Treib talks about in Nature Recalled how the designed landscape has changed over time, from public green spaces relying almost entirely on a vocabulary of naturalism(Treib, 1999, p.29), of a sort of bringing nature into the city. The argument can be made now that the passage of time has shifted the role of landscape architect from large park designer to recognizing that a new form of nature exists in cities. This nature has grown up in between the build form
of the grid, and as a result of human care, or neglect. Contemporary landscape architects are therefore now responsible for responding to time by designing for the temporal urban surface and ourselves learning how to articulate the relationship between urban nature, natural nature, the built city, and our designers’ desire for networks and green infrastructures. In his discussion of what nature is, he concludes with “While nature may be an inspiration to some, it is a burden to others, as our regard for nature is essentially a product of our culture” (Trieb ibid p.39). This is a very relevant thought for the landscape architect looking to create a network with ecology in mind which will transect diverse communities with different perspectives on how humans are to interrelate with “nature.” Christophe Girot offers Four Trace Concepts in Landscape Architecture to help guide a landscape architect in their search for recovering landscapes to become active places again. They are: Landing, Grounding, Finding, and Founding (Girot, 1999, p.60-65).

For anyone entertaining the idea of repurposing land for a modern network, but wanting to react favorable to locality, history, and place, the above mentioned concepts can help lay the framework for an extended legacy of place, and in turn a well functioning asset which has real meaning, is adaptive, and yet responsive to real phenomena. Walter Hood offers a similar set of criteria for the designer to consider when working in transformed urban areas or cities that have morphed from one point of reference and identity to another. He notes that “change and transposition are guided by individual expression, combined with social environmental and political multidisciplinary analysis, traditional design strategies, and an understanding of common, everyday objects and practices” (Hood, 1997, p.6). He calls this process ‘improvisation’, which generates a new series of goals for the designer:

In Effects of habitat and landscape fragmentation on human and biodiversity in densely populated landscapes Manuela Di Giulio et al. discuss the social impacts of fragmentation on society and how people’s relationship with their landscapes relates to their sense of identity and place (Di Giulio et al. 2009). Their article notes that people prefer to have a relationship with outdoor places and prefer their public spaces to have natural features which can result in restorative experiences. The authors also talk of how historical significance is important in creating that sense of place with well planned natural features. They mention the combination of historical buildings, local culture and a few well placed trees or water features as a more effective means of creating a sense of place and therefore identity in the urban realm rather than an urban forest. This nod to preferences is key to understanding how creating while retrofitting urban areas can include ecological design, but must be responsive to community concerns about the built environment. Personal mobility and social activity across roads and other new barriers must be addressed (Di Giulio ibid). In fragmented cities these condition exist, with strong senses of identity from neighborhood to neighborhood, but landscapes and land uses acting as barriers to mobility and access across the city. Their conclusion asserts that densely populated areas require planning and management to provide access to semi-natural areas for recreation, providing populations with the benefits of access to nature, but also address how the quality of these places is more important than the quantity (Di Giulio et al., 2009). They argue that future research should be directed at how to design these places that meet the needs local human population. I would argue that a systemic network of these places as productive landscapes will address the needs of local communities while simultaneously improving the connectivity issues of fragmented cities.

In the essay Landscape Architecture and the Changing City Michael Laurie talks of the need to restore our cities’ degraded landscapes and to conserve or ecological and economic resources through healing the dichotomy between art, science, research, and intuition. He says “only then will landscape architecture and planning be capable of contributing to new, sustainable, regionally and culturally appropriate forms and to ecologically and socially sound land-use policies and plans. The result will be a new aesthetic with popular appeal (Laurie, 1997, p.159). The popular appeal he talks about is the notion that locality will resound in these new places so that they have meaning within the local community. The notion gives a nod to Richard Florida who notes that “place is becoming the central organizing unit of our economy and society” (2000). In terms of urban greenways though Laurie goes on to say that sustainable landscape design and planning seek to reduce the impacts of energy and natural resource consumption through techniques such as urban forestry, creating micro climates, and “planning communities that facilitate and encourage walking and bicycling rather than the use of automobiles” continuing on to note, “Ecological expressionism emphasizes the importance of a sense of place and it reveals the natural process of a site “(Laurie, 1997). This thinking supports the idea that retrofitting urban areas to expose some of the natural processes will help to create one layer of identity to an area, and can be done in
Laurie is aware that retrofitting urban areas this way will be more difficult than planning new suburbs, but he writes that these natural processes do exist no matter how altered, and they can help define the place.

As Laurie continues on about livability, sense of place, and urban ecology, he talks about the livable city which he defines as “a city of distinct neighborhoods that possess a sense of pride, place, history, safety, good housing, friendly playgrounds, parks, and open spaces.” (Laurie, 1997). He goes on to describe a hierarchy of public spaces in which many do not contribute to livability because they were designed for one use, which brings us to the design challenge of looking at these in between urban spaces in the voids of disparate greenway networks of how to design an open space network which is able to be used by multiple diverse users, at different times, at the same time, and is economically viable. While acknowledging that pastoral parks do not make sense for many large urban cities today he suggests that urban ecology and open space will serve new environmental roles such as urban forestry, community gardens, microclimate modification, and contemporary forms of recreation (Laurie, 1997, p.165). I believe that in today’s terms of a legacy city and their abundance of spaces that these very community and ecological services can be the backbone of open space networks which can expand upon existing and future greenway networks, breaking down barriers to access, and increasing the synergy of systems in our urban fabric.

In Planning and Design of Ecological Networks in Urban Areas, Ignatieva et al talk of the ecological significance of providing greenway systems in urban areas for biodiversity and habitat conservation, as well as the historical idea that cities were built around green networks of transportation from rivers and valleys, but how that has largely disappeared today in our urban form. They spend an equal amount of time talking about the essential social benefits and services provided by green areas including “improved climate, hygiene, aesthetics, recreational opportunities…while meeting the social and psychological needs of the urban population”(2011, p.18). They mention that landscape architecture language refers to urban open space as an integral part of urban frameworks and networks, while also mentioning affiliated research which addresses the “potential ecological, cultural, and social benefits of open space networks and their contribution to a democratic society” (Ignatieva, 2011, p.18).

Ignatieva et al argue that, “A new multidisciplinary approach to planning and designing ecological networks in contemporary cities requires the integration between ecologists, landscape architects, urban planners, politicians, ethnic or cultural- especially indigenous representatives. They will improve biodiversity, aesthetics, cultural identity, and be an important part of the framework for creating sustainable cities” (Ignatieva, 2011, p.23). This again reinforces ideas of landscape architects being leaders who will emerge to synthesis the ecological and cultural data to and organize the relevant stakeholders and actors to bring about new types of networks or productive, and appropriate landscapes to urban areas in need or responsible, pragmatic, and forward thinking scenarios of the new public realm.

Modern greenways theories are all encompassing cross-disciplines with an increased attention to ecological services and infrastructure, thus acknowledging the city as set of inter-dependent physical, cultural and ecological systems. There have been a number of theories related to planning and landscape architecture discussing the dilemma of urban areas’ ecological and social impact. While they don’t all address the questions of ‘How can greenways be used to retrofit underused space in cities and provide new aspects of synergy?’ They have brought relevant topics to the table about city form, systems, land ethos, and landscape planning techniques. It could be argued that the modern progression of these theories stem from Ian McHarg’s publication of his book “Design With Nature” (1969) in which he was critical of the previous design movements as ‘subjugations of nature,’ and began to promote his environmental determinism in which designers responded more soundly to what the ecology of a site is telling us. McHarg was writing at a seminal time in American history. The environmental and civil rights movements were gaining significance in national dialogue, and there was awareness that there needed to be more scrutiny placed on how land was developed and space was planned. McHarg hoped that landscape architects would take the helm on these initiatives. Most recently, Transportation Oriented Development and New Urbanism emerged as and acknowledgment of increasingly automotive society. Landscape Urbanism came to fore almost simultaneously. This may be a result of the re-emergence of a different kind of landscape architecture redefining professional responsibility to overlap the realm of urban design and planning. Chris Reed defined this evolution as, “Contemporary landscape practices are
witnessing a revival of sorts, a recovery of the broader social, cultural, and ecological agendas. No longer a product of pure art history and horticulture, landscape is re-engaging issues of site and ecological succession and is playing a part in the formative roles of projects, rather than simply giving form to already defined projects” (Reed, 2006, p.269). Frederick Steiner credits the relatively new concept to integration of Ian McHarg’s ecological advocacy with James Corner’s urban design vision. He writes, “The basic premise of landscape urbanism holds that landscape should be the fundamental building block for city design. In traditional urbanism, some structure; - a wall, roads, or buildings-led development. Green spaces were relegated to left over areas, unsuited for building, or were just used for ornament. Through landscape urbanism, cultural and natural processes help the designer to organize form” (Steiner, 2011, p.333). The approach is to understand large scale systems and to have meaningful design responses to them. However critics of landscape urbanism suggest that few projects have been built within this school of thought, and that it remains largely a theory. James Corner and Chris Reed are advancing the prospects through projects such as the High Line, Fresh Kills, and the Lower Don Lands, but critics suggest there is not enough research into the ecological realm for these projects to provide any real environmental services.

The ecological urbanism approach “has the capacity to incorporate the inherent conflictual conditions between ecology and urbanism” is the later addition to urbanism (Mostafavi, 2010, p.17). Steiner is critical of these early approaches to ecological urbanism in that he feels there is value in the theorists’ foundation in landscape urbanism, but room for significant expansion in terms of ecological research. He believes these urbanist projects can be improved by enhancing ecosystem services which he defines as “the benefits we receive from nature: resource services such as food, water, and energy; regulatory services such as purification of water, carbon sequestration and climate regulation, waste detoxification, crop pollination, and pest and disease control; support services such as nutrient dispersal and cycling, and seed dispersal; and cultural services including cultural, intellectual, and spiritual inspiration, recreational experiences, ecotourism, and scientific discovery” (Steiner, 2011, p.336). Steiner therefore argues in favor of a more in-depth understanding of urban ecological systems will yield a more responsible practice based field of landscape architecture and urbanism and advocates for landscape ecological urbanism.

In a nod to Ecological Urbanism, Derya Oktay promotes Human Sustainable Urbanism as the culmination of previous schools of thought stretching back to McHarg. He strengthens the bridge between physical and cultural by noting that “we live in environments that have been very damaged, in ecological, social, and cultural terms, there is an urgent need for a radical shift towards a holistic approach to sustainable urban planning/design combining ecological and social-cultural sustainability. This calls for sensitivity to traditional urbanism and impact of global ideas, practices and technologies on local social and cultural practices” (Oktay, 2012, p.25). This is essentially a reinforcing summary of the evolution of thought pertaining to the city as an ecosystem. In terms of the social side, the notion of sustainability comes into play, as the human component of synergy, but in affirms the growing trend of designers looking at cities as more than a collection of buildings, but as a multifaceted system which requires in depth analysis to provide rational and responsive design solutions.

The division in thought comes from landscape urbanists wanting to create a sense of place with a response and acknowledgment of natural systems and the landscape ecological urbanist camp wanting to doubly create place but also serve a productive ecological function in the process. This presents an interesting scene when we talk about new types of greenways in retrofitting fragmented cities. If we assume that these cities have an abundance of land, we are afforded the opportunity to create regenerative landscapes or productive land uses through in fill and design along our greenway networks. Ecological urbanism requires more astute research but offers the designer a chance to become proactive in building sustainable landscapes and planning cities which are adaptable to future challenges.

In concluding our discussion I would like to note that city forms seem to have been predominantly imposed on the land, engineered or planned on top of ecological and cultural phenomena rather than as a response. Therefore today, we are left with cities in which physical form and the resulting responses of culture are leftover remnants of land planning which lacked acknowledgement of (a) underlying geographical and ecological systems; (b) the value of an activated public realm as an actor in a systems wide approach to urban synergy and connectivity; and (c) the relationship between humans and nature. This project looks to acknowledge these three prospects and will seek to identify landscape architecture theories which address the fact that there is a need to use landscape design to use a variety of urban and
ecological systems to create a more cohesive and productive urban realm responsive and adaptive to ecology, economics, culture, and place.

4 UNIFIED CITIES AND SYNERGISM

In many urban areas there may be an acknowledgement of the natural world, but there is often little recognition of the valuable interdependency that human systems, urban systems, and the natural world have in shaping a synergistic realm. The above review of theory and practice offers sporadic strategies and promises to address fragmentation and stitch the surface of the city through green network. The emergent urban construct is possibly synergistic, “a hybrid that is not entirely one or the other” (Beardsley, 2007, p.202). Meyer’s articulation expresses our intentions “replacing this binary way of thinking with other conceptual strategies, landscape architecture can foster a land ethic and an aesthetic predicated upon a continuum between human nature and nonhuman nature, upon a recognition that the land is a cultural and physical product and that people are living organisms” (Meyer, 1997, p.51). Green networks purposely designed as part of a larger green infrastructure can begin to effect synergism and dismantle the disconnect between nature and culture.

In Programming the Urban Surface Alex Wall talks about the contemporary metropolis and how peripheral sites are often overlooked by designers as the core downtown areas are heavily programmed for tourists, or visitors, or day time workers, he observes that “The grafting of new instruments and equipment onto strategically staged surfaces allows for a transformation of the ground-plane into a living connective tissue between increasingly disparate and unforeseen programs” (Wall, 1999, p.234).

New greenways or adaptive networks can act as infrastructure – as the basis for future growth or current connection, and that previously built on sites can be reactivated both as places of their own and as parts of a larger network as instruments unfolding the new urban realities. This also enables the landscape architect to become more intrinsically engaged in “programming the urban surface.” The physical connections which will activate peripheral zones by infilling blighted cities through realizing new greenway networks based on a recognition of the interaction between the public and private realms, and the built and natural environments as all interconnected parts of one larger system of urban synergy.

5 CONCLUSIONS: ONGOING PROCESS

While many of the contemporary theories hold significant value and perhaps bring very relevant topics to the dialogue of urban planning and landscape architecture, we have yet to see the culmination of a cohesive theory which is more than just a theory, that is, which can be applied to U.S. cities, to bring a sense of synergy to the post industrial city. Additionally we have not seen the synthesis of urban greenways theories with regenerative urban design theories. We have seen theories which propose parks, and which propose ecological planning, and which propose greenways, urban farms, regenerative landscapes but there is little which has combined these programs as part of a city-wide, or even regional network, or system of synergy. Whether synergism should be approached as an attitude or ethic, or a designed effect is the question that will be further researched in continuum.

Baltimore city is noted as one of the former industrial urban centers that is losing population either to other cities or to suburbs. Such exodus, leaves behind fragmented urban surface and a deprived serveg the local population. Baltimore offers us the opportunity to re-evaluate our practices on spatial design and the role of greenway networks in unifying the urban grid at multiple levels and generate synergy.

6 REFERENCES


SCULPTING IN TIME: TRANSIENT LANDSCAPES AND TIME FOCUSED URBAN DESIGN

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1 ABSTRACT
This paper explores the idea of temporality in landscape, and proposes its role as an active and formative design element in shaping contemporary Landscape Architecture discourse as well as physical design. This time-focused design inquiry is based on research into precedent projects around the world as well as studio-course design investigations and proposals.

The paper is divided into four main parts. The first examines historical and contemporary landscape precedents to identify the significance of transient landscapes in the conceptualization of landscape architecture and urban design. The second part focuses on case studies of the “farmer’s market” typology to assess the mechanics of temporary event based public space and how different locales, demographics and networks of produce and product are brought together to reveal and evoke different social and agricultural landscapes of a region. This is followed by a study of “Shikinen Sengu” - an extraordinary example of the “permanent” transient landscape of the Ise shrine and how its cyclical rebuilding engages the fabric of time to manifest the culture and nature of its landscape, both through history and in the present moment. The last part of the paper reviews time-focused, urban design proposals by students that offer potential for transient programming, activation and mobilization within the urban public sphere.

Each of the projects described in this paper is a place that engages time, especially of cyclical nature within its site. Their cyclical time organization allows these projects to renew themselves and thus makes them pertinent to current human experience, in order to bring the sense of being here and now into the public sphere. Together, these investigations suggest adaptable, community initiated, resilient ways to approach ever changing urban conditions in the realm of our current landscape of urbanism.

1.1 Keywords
temporality, transient landscape, farmer’s market, urban design, time-focused design
2 INTRODUCTION

This paper explores the idea of temporality in landscape, its role as an active and formative design element in shaping contemporary Landscape Architecture and further, its potential impact on the realm of Urban Design. Through a study of precedent projects as well as studio based design proposals, this paper considers time as an essential part of landscape and urban design praxis. By accepting time as an operational tool within these fields, perhaps designers can conceive of new methods and design processes that address the multiplicity of interests in urban spaces where varied communities and systems overlap and that connect these contemporary urban site to nature and their cultural heritage. The premise stems from an investigation into contemporary attitudes towards the design of public urban landscape manifested in temporary, small-scale urban design projects. These recent transient projects seem to be successful in bringing the sense of being here and now into the public sphere. Moreover, they provide more adaptable and flexible scenarios that address ever-evolving and increasingly complex and diverse social, cultural, economic and ecological issues of the contemporary urban condition. Contemporary society is changing rapidly and faces the multifaceted challenges of globalization, virtual social networks, technological advances, an internet-dictated lifestyle and global ecological crises to name a few. Yet, Landscape Architecture and its governing disciplines, including governmental policies and zoning laws to city planning guidelines, seem to be based on a different clock where most design projects go through a painfully long permit process and may take decades before they are built. Sometimes by the time a project sees its completion, the public view or the social, economic or political situation surrounding the project has shifted and the project’s original designed intent seems to have lost its context. This is especially true in the realm of fast moving urban design where politics, bankruptcy, or a real estate development can change a neighborhood overnight. It is in this context that a proposal for a time-focused design of space is called for, as an attempt to reconcile these different time schedules.

In recent years, we have witnessed increasing numbers of so called “transient projects” from farmer’s markets and “parklets” to “popup” stores, spring up in North American cities everywhere. This trend is in part a direct response to a dire economic situation, a stop-gap measure in the effort of urban revitalization where bigger and more “permanent” projects have been stalled. It may also be due to rising public awareness of grass-roots community activism that proposes urban revitalization through small-scale and affordable interventions, or even as a critique of a car-oriented society. The New York Times art critic, Michael Kimmelman notes that this new temporary D.I.Y. trend in creating public space has been “developed from a democratic mix of top-down and bottom-up governance” and that the traditionally authoritative approach to public spaces is backward in addressing public needs. (Kimmelman, 2013) The transient quality of these projects by its nature suggests less applicability and thus less conformity to city planning regulations and their usual long permit process. In return, these transient urban projects are granted both immediacy and flexibility to creatively reflect on current public interests and needs from diverse demographics, especially the younger population. Moreover, these small scaled projects might hold potential keys for making a long-term impact on urban revitalization in the larger public realm of the city through a bottom up, community based approach, by building up a resume of successful, quick, cheap and often times non-traditional precedents, in order to affect and accelerate the more traditional top down, slower, planning policies. Therefore, the research goal of this paper is not only to examine how temporary programs, time-share uses, and occupations structure and transform their physical spaces as they take place but also to propose a time-focused urban design methodology as a way to address larger systems of nature and the city. How can we connect the design of our everyday environment to the larger cycles and rhythms in our contemporary world? Indeed, the role of time and temporality in landscape and urbanism is in need of close examination.

This paper is divided into four main parts. The first examines the embodiment of time in landscape in landscape design projects in order to identify the significance of transient landscapes in design. Particularly, it will look at the concept of “preservation” and “decay” in historical landscape design and some defining qualities of contemporary transient landscape projects, such as time-shared programming, event, seasonality and community involvement. The second part focuses on case study research conducted during a design studio at UC Davis in the Fall 2012, comparing three different farmer’s markets in the Bay Area. This comparison assessed the mechanics of how different locales, demographics, networks of product, and even ideologies are brought together temporarily, to reveal and evoke the different social and agricultural landscapes of the region. Additionally, it examines the mechanics of how to design time in space as it happens in a farmer’s market, where various and often
conflicting scales of time and space converge to create a contextual urban landscape – one of the most ubiquitous public space typologies of our time. The market is where the idea of locality (of being in a specific place) cannot be distinguished from a regional scale agricultural condition and where a temporary market-day simultaneously connotes a cyclical urban event and the cycles of seasonal growth on the calendar of agricultural production. This is followed by a brief study of the unique Shintoist ritual of “Shikinen Sengu” (directly translated as the ceremonial year shrine transfer) as an extraordinary example of how a cyclical rebuilding of the Ise shrine, once every 20 year for the last 1300 years, manifests an enduring history, culture and nature of the place in the present by managing different cycles, tempos and durations of time in the landscape of the community. Shikinen Sengu is instructive in showing how an entire community, the communal memory, and the growth cycles of plant materials come together in a specific time and space creating a transient landscape that embodies a level of permanence. This enduring transient landscape highlights the permanence of the process of landscape-in-the-making. The last part of the paper focuses on proposals for time-focused urban design projects that offer potential for transient programming, activation and mobilization of the urban public sphere through unique revelations of landscape brought into the contemporary city. Together, these investigations demonstrate adaptable and resilient ways to approach ever changing urban conditions in the realm of our current landscape of urbanism.

3 QUESTIONS OF TEMPORALITY IN LANDSCAPE ARCHITECTURE: PRESERVATION AND DECAY OF TIME AND HUMAN INTERVENTION

As the 2013 CELA conference theme, “Space, Time, Place, Duration” suggests, Landscape Architecture is a profession of designing with time. In other words, the profession operates through the coordination of ever-changing living and natural systems as design praxis. Unlike other spatial design professions such as architecture, ours is often without a clear and well-defined sense of a finished design “product.” As James Corner states, “(l)andscape and image are inseparable” and that there is a long landscape design tradition stemming from landscape painting in Europe that is to reshape land “according to prior imaging.” (Corner, 1999) To put it plainly, Landscape Architecture trades in the currency of imaging. In lieu of a completed design “product” on the day of a project opening, a promised land(scape) image is given to the client or users as a token, so that they can anticipate that one day the landscape will become the very “picture” where trees are fully mature and wildlife thrives. Therefore, designing landscape inherently involves setting up and organizing time – be it, expected plant growth, growth patterns, scheduled maintenance or the future projection and programming of what is to happen in the designed space. This projection and manipulation of time(s) is perhaps as determining in the success of a design as the formal layout and materiality of physical space.

Meto J. Vroom in Lexicon of Garden and Landscape Architecture defines this notion of time in landscape architecture in the entry, Dynamic. Sequence. Rhythm” as follows:

Natural and cultural landscapes develop and change over time. Landscapes are dynamic. An observer witnesses a momentary ‘glimpse’ of an ever-moving and changing environment. Natural dynamics are the result of physical processes (such as erosion and sedimentation) and of biological processes (involving growth, blossoming and decay). ... Society also changes, and shifting views on realities influence our perception of the real world. (Vroom, 2006)

In this sense, what we design as “landscape” is not a product/object, but we design the “landscape of becoming.” The notion of changeability is so fundamental in thinking about landscape and yet, it seems that the question of time in landscape hasn’t been sufficiently, nor explicitly studied. This suggests a brief examination of historical and contemporary designed landscapes that evidence “time on terms with space.” An understanding of time as it has been embedded in landscape can be instructive as a way to think about a new time-based design strategy that can be deployed in the urban sphere.

Perhaps one of the most familiar examples of time-related concerns in landscape architecture may be the issue of “preservation.” Be it historic preservation or the preservation of nature, the term preservation intrinsically implies keeping things in the present tense and freezing time so as to avoid decay, decomposition, or disappearance. Unlike the historical preservation of a building, however, the ever shifting and evolving nature of landscape conjures complicated and conflicting questions related to
preserving historical gardens. For example, how do you preserve the gardens of Versailles, originally designed by André Le Nôtre in the 17th century? These gardens have already gone through centuries of addition, renovation, restoration and replanting and have been subject to different governing bodies responsible for their maintenance. In this context, historical preservation presupposes a “picture” of the gardens at certain crucial historical moments to be frozen in time as a point of reference in order to ensure that the gardens stay the same as the picture. Preservation efforts are implemented with cyclical replanting of the original species; it is believed that no tree in Versailles from the time of Le Nôtre still survives, due to their natural life expectancy. (Thompson, 2006) Here, time is manifested and materialized through a series of pictures of the past. In the case of Versailles, Corner’s idea of prior imaging, initiates the preservation effort and leads to human intervention toward reconfiguring times past. The image is manifested in space and reinforced by innumerous reproductions and representations in postcards and guidebooks that become re-imaging tools to shape and reinforce the communal memory of the historical place and time past. In short, a natural evolution or ecosystem of the gardens of Versailles is subjugated to the picture of a time past and preserved.

The preservation of historic gardens can also be achieved from a totally different angle. The famous moss garden at Saiho-ji Japan (1339 -), occupies a significant place when thinking about the time revealed in landscape. Unlike the meticulously maintained and preserved geometric gardens of Versailles, at first glance, Saiho-ji moss garden refutes the concept of human intervention in that the material, moss itself, becomes the manifestation of the duration of time past, as if to present a perfect picture of untouched nature. Moss preservation does not allow people to stroll freely around in the garden. One of the main moss species in the garden is Leucobryum juniperoides. It is a native species from the mountains of Japan that grows at the foot of trees, on roots, stumps and fallen trunks. Together, with the poetic display of the moss’s native habitat in close association with the life cycle of trees - their birth, decay and rebirth in the garden - it is as if the moss itself functions as a preserver like snow falling on top of the forest floor. Saiho-ji moss garden gives the illusion to the visitor that it embraces the passing of time in landscape in a preserved and pure form. Yet, the fact is that it is a carefully orchestrated display of time that requires constant human intervention and prevention to keep up appearances. Moss is one of the most fragile and hardest plants to maintain. In fact Zen gardeners go to great lengths in Japan to carefully and meticulously remove leaves that have fallen on top of moss by hand.

Thus, it can be said that preservation of time in landscape - whether naturalistic or artificial in its expression- shows how we, the humans, reveal and organize time in space and that time, almost as a material, is shaped by human interventions in natural and designed systems and environments. The question of time is inherent in preserving design. The problem of landscape preservation, however, is that the “preserved picture/image” or “preserved material” wins out over engagement in the moment and the evolution of society, people, culture or ecosystems. In other words, the distance between the preserved past and the present where our “preservationist efforts are made never grows closer - indeed it grows more distant, as the present keeps moving on to future. This conundrum brings up a question - has there been a different approach to time in terms of space/ landscape that is not about preserving a moment in time?

At first glance, the idea of decay seems to be the opposite of preservation. A prolific writer and artist, Robert Smithson, was one of the first influential land artists who took interest in the concept of time without obvious human interventions. His concept of entropy proposed a new attitude towards landscape with which to embrace the temporal aspect of the natural environment including the decay and impermanency of his own work as an artist. He saw landscape as “carriers of the unexpected and of contradiction of all levels of human activity, be it social, political or natural.” (Smithson, 1973) Similarly, centuries prior to Smithson, Japanese cultural embrace of the aesthetics of “Sabi”, literally meaning, “rust”, shows appreciation for the evidence of old age and decay. (Tarkovsky, 1986) More specifically, this citation points out the particular phenomenon in Japanese history when revealing time’s passing in old materials became a particular national aesthetic. Japanese Buddhist temples originally came in bright colors when first imported from China, but stopped being repainted sometime around the 9 -12th centuries during the process of naturalization of Buddhism in Japan. This allowed the original natural wood materials to be exposed to reveal its age; the fragility of human life is thus implied as contrast. In this case, the visualization and materialization of old age where time is revealed in materials and in space becomes a way of mastering time in a narrative format. However respectful to the time’s passing and process of change, both examples of “decay” still fail to engage with the “now.” In contrast to the
preservationist relationship of the past and the now, where the now keeps moving away from the permanently frozen past, in these examples it seems that the only clock that is ticking is the decaying time that forever keeps moving away from the somewhat irrelevant now. In both cases, the problem seems to be that the idea of time is conceived as the linear passage of time. In linear time organization, now is always one step ahead of the past and the past and the present never meet nor interact with each other. This fundamentally creates a distant view, a cold gaze that makes these landscapes, regardless of aesthetics, an object or a picture, rather than a place of engagement with continuity to the present day.

From the historical examination of time in landscape so far, it seems that neither the preservation of the past nor the cultivation of decay harnesses time as an element that engages the immediacy of the now in dynamic social, ecological and special systems. Therefore, it seems a different time organizing model other than a linear system may be required in thinking about the immediacy of here and now as an essential part of a time-focused design approach. In understanding a different system of time it is indicative that an ecological planner, Nina-Marie Lister states that “ecosystems don’t follow a linear path of development toward a particular biologically diverse and stable “climax” state.” (Lister, 2007) How this ecosystem analogy plays a role in understanding a time-focused design strategy will be elaborated in the next section.

4 TEMPORALITY AND URBAN CONDITIONS IN CONTEMPORARY URBAN DESIGN: A RECENT TREND

“If there is to be a “new urbanism, it will not be based on the twin fantasies of order and omnipotence; it will be the staging of uncertainty; it will not long be concerned with the arrangement of more or less permanent objects….“ (Koolhaas, 1995)

Travelling centuries back to the future of our contemporary urban landscape, the question of how this concept of designing with time in landscape can be applied to contemporary urbanism amidst everyday life in a decidedly democratic society will be considered. As mentioned, in recent years, there has been a surge of transient projects in North American cities that make an interesting statement about the potential impact of a new kind of urban design. While temporary urban landscapes of the past might have merely suggested a few planters in temporary parking lots, this new trend attempts to take advantage of its very temporary quality and taps into social, cultural and commercial resources for revitalization and activation in the making of temporary public spaces. Additionally it suggests that these new types of transient urban projects are more than urban spectacles, mere art installations or special event promotion, but are instead rooted in everyday quotidian life, as commentary on social, political and cultural issues surrounding cities. They have the potential to have long lasting influence as well. For example, “Proxy project” by Envelope A+D, which is part of the Octavia Boulevard urban revitalization in San Francisco, California has been instrumental in creating a new destination in itself, bustling with social life and amenities including a café, a specialty ice cream shop, a beer garden and a bike shop among others. Initially started as an RFP from the SF Mayor’s office that requested design proposals for temporary uses of lots resulting from the removal of a freeway structure, these narrow strips of land by a busy traffic thoroughfare have a few specialty shipping container lots, each one with a parking lot/backyard of its own. The layout successfully breaks down the scale of a traffic throughway/highway off-ramp and creates the illusion of a small cozy neighborhood.

“Proxy is a temporary two-block project located in San Francisco which seeks to mobilize a flexible environment of food, art, culture, and retail within renovated shipping containers. Envisioned as transitioning into a more permanent housing plan in roughly four years, proxy is both a response and solution to the ever changing urban lifecycle, existing as a temporary placeholder and an instigator of evolving cultural curiosities in art, food, retail and events. Our design embraces the vast diversity of a city and encourages the rotation of new ideas and businesses as well as innovative public art installations which come and go like new visitors at the site.” (http://proxysf.net/)

This manifesto suggests that the success of Proxy project is partially owed to acceptance of its transient nature and because it embraces changeability and revolving cultural attractions. Similarly, in San
Francisco there is a series of Parklet projects, which temporarily occupy parking spots to create pocket parks to encourage social gathering. Street Food Park (http://somastreetfoodpark.com/) utilizes an empty parking lot through short term lease from the city and is filled with a rotating roster of food trucks - each truck’s whereabouts and scheduled appearances at the site are tracked by tweets- in order to provide diverse food options at lunch hour. The rotating schedule and changing food options create excitement that is in touch with the pulse of urban public life. The same is true for the Proxy project’s rotating art gallery, food and retail events. The projects are successful in creating a public social space that is filled with program, events and activities in leftover and underutilized nooks and crannies of a space in the city and are also remarkable in finding a way to steer public interests by hosting revolving events and attractions. Due to the temporary nature and its small scale, the site that each of these transient projects occupies has little significance and is often interchangeable. The interchangeability and placelessness is a good thing in this case for working on the public’s desire for urban spectacle. On the other hand, it is also observed that a lot of these events, programs and people gathering tactics depend on commercial activities, suggesting that commercially driven programs are necessary ingredients in successful transient urban design projects. Are commercial driven programs the only answer to engage people in activating urban public space today?

So far this paper has largely discussed contemporary transient projects from the aspect of program and events at all levels of human activity, including politics, commerce and lifestyle. In contrast, the following section explores a different aspect of designed time in urban transient projects that focuses on the sense of time embedded in the physical aspects of landscape itself, such as ecological cycles, biological evolution and expression of season. One such project is the Paris Plages project. According to its website (http://www.paris.fr/english/visit/highlights/parisplages/rub_8208_stand_34146_port_18969), the city of Paris transforms the riverside thoroughfares by the river Seine into a pedestrian only beach resort, complete with real sandy beaches, a swimming pool, cafes, sun-bathing decks, showers, music concerts and all sorts of beach side sports for four weeks in the summer since 2002. Besides its massive popularity among the native citizens and tourists and its evocative power due to the physical transformation of the familiar riverside landscape of the Seine, the Paris Plages is appealing in its subtle social message. It provides a summer beach holiday in a city where everyone is obsessed with going away on holiday, to those who cannot afford to do so. Similarly engaging in the local river landscape, "Badeschiff", translated as spa barge project in Berlin, Germany is also a place of seasonal social, cultural and leisure activities that is open to the public. In the summer it becomes a floating swimming pool and in the very cold winter in Berlin it is a floating hot tub. In fact, the seasonal transformation of natural landscapes has been celebrated as a social event all over the world. Especially notable is the cherry blossom season in Japan. Each year, complete with a blossom forecast on national TV, millions of Japanese make it an excuse to have parties under cherry blossom trees in the park, on the streets, or even in the cemeteries for a few nights, temporarily transforming the urban cityscape into that of the country. These examples set up a transformative mis-en-scene in the midst of a busy cityscape. These transient and cyclical projects punctuate the city and slow down its pace by revealing a slower but dramatic cycle of seasons that is usually hidden from the quick cycle of city life. Therefore, these more landscape based, seasonal temporary projects show another potential for time-driven landscape design criteria that takes advantage of landscape’s seasonal transformative potential. These transient designs are social, cultural and natural at the same time and none is solely dependent on commercial activities for success.

Castro Commons is a peculiar transient urban project. This example is not commercial, physical, nor seasonal, but is the most transient in nature. It shows the transformational power of the regular and repetitive occupation of space by a particular group of people. “Castro Commons” started out as a non-descript parklet, in the form of a mini plaza/ median, at a busy intersection in the Castro neighborhood of San Francisco. Its physical configuration is minimal, with planters and a few chairs defining the space. The space became prominent when a group of nudists started to gather regularly and the plaza got named as the first US urban clothing optional nudist plaza (“Social nudity” entry, in Wikipedia) in the middle of a public thoroughfare. It is generally observed that Castro Commons’ peculiar success came from its contextual location in the city, that is to say, the Castro being known as one of the most prominent gay capitals in the US. Somehow, the particular physical intersection known for its progressiveness and acceptance of transgressive social behaviors became the social intersection for nudists of all types and origins such as nude beach denizens, out of town visitors and Castro gay nudists, to meet and to make a
visual statement in the city. It is also notable that the particular intersection provides one of the few dependably sunny spots in foggy San Francisco and the nudists’ temporary occupation largely depends on the emergence of the sun.

In his groundbreaking work in the 90s, architect Bernard Tschumi proposed a new urban typology often referred to as “event architecture”, stating that, “… there is no space without event, no architecture without program.” (Tschumi, 1994) His proposal was partly a critique on the historicism, modernist formalism and subsequent Postmodernist formalism that dictated architectural discourse in the 70s until the late 80s and partly a suggestion for a new methodology of architectural representation and drawing that reflected his take on the city. He felt that cities provide a stage where a complicated web of narratives and bodily movement unfolds. In short, he brought in the concepts of program and notation to urban design through a series of notative graphics, diagrams and sequential photos. His idea of event architecture is suggestive in thinking about a time-based landscape/urban design strategy, since program, event and bodily movement are the very essence of time-based urban projects. This paper expands his notion of event architecture to include the specifics of urban contexts, including social, cultural, economic and political conditions.

From what has been discussed so far about time-based urban transient projects, each imports its own rhythms and pace to intervene and bring energy to the existing cadence of public life, whether it is a lunch schedule, a social and cultural calendar, or a slower change of a season, or even the ephemeral and localized occupation of a sunny spot in a plaza by urban nudists. Time-focused design interventions are successful for being attuned to individual and diversified needs and pulses of local urban life, in contrast to a traditionally planned pocket park, for example. Moreover, the transient project’s inherent quality of interchangeability, repetitiveness and revolving programs, occupations and occurrences, proves to be more resilient and adaptive in ever shifting urban conditions. It is catered to individual needs and its small scale makes it easy to quickly address changing public needs. In contrast to a linear understanding of time displayed in the historical examples in the previous section, the quality of contemporary transient projects can be said to offer “alternative scenarios that take place temporally as well as spatially.” (Lister, 2007). That is to say, recent urban transient projects seem to possess a quality that is analogous to what Lister describes as an essential component of resilient and adaptable ecosystems. Indeed public urban landscape can be said to act as one big ecosystem within which each cycle of time of different agents and systems, such as individual, community, plants, climate for example strives to survive and thrive in the immediate moment and place. At the same time, the ecosystem of a transient landscape seems to sustain and function as a dynamic whole as a successful public space typology mainly because of its ability to constantly change shape and the space in which it takes place. Lister points out that living systems go through phases of stability to instability cyclically and that “(c)hange in an ecosystem as a result of natural catastrophe, ..., is a normal and usually cyclic event, although it is considered catastrophic, even tragic.” (Lister, 2007) Urban life too can be understood as a cycle that goes through different phases as a loop, from decay to rebirth. Ephemerality is always paired with permanence and vice versa. This idea offers a methodology and strategy for a time-focused urban design. The farmer’s market is an event that orchestrates several overlapping cyclical times and makes an excellent case study that embodies such a transient spatial typology.

5 FARMER’S MARKET STUDY

“When you make a note in your Filofax you are taking an (the only) opportunity to organize evasive time. You can make the idea of time visible. Perhaps this suggests an answer to the tough question of how to understand that landscape means capturing the abstract idea of space in elements and layout patterns.” (Latz, 1999)

In the Fall of 2012, UC Davis Landscape Architecture students engaged in a farmer’s market study as part of their design studio in order to dissect the mechanisms of a transient urban project. The farmer’s market was also chosen because it is one of the most well-known transient typologies that have been around for a long time. In the article ‘The Meaning and Design of Farmers’ Markets as Public Space,” Mark Francis and Lucas Griffith describe an increasing popularity of farmer’s markets in recent years – in fact, the number has jumped three times more in the 15 years between 1994 -2009 – the authors go on to posit the importance of the farmer’s market as an integral part of the diverse public realm.
of cities and stress its role in economic revitalization (Frances and Griffith, 2011). Their article is informative in three ways. First is the fact that the farmer's market is now considered part of the new types and forms of “public space”, alongside which they list community gardens, skate parks and ecological parks as other examples. Secondly, the farmer's market's economic vitality plays an important role in revitalizing contemporary civic life, as market activity historically has been the center of social life since the beginning of civilization. Lastly, the market is an increasingly popular and successful program for public space invigorated with social and cultural engagement of the civic life that takes place.

In Frances and Griffith's example of new types and forms of urban public space, the farmer's market stands out since it is the only example in the midst of sustainable parks and community gardens that is: non-site specific, program-oriented and temporary urban “space” (ibid.). In fact, this temporal characteristic seems to sit uncomfortably with the authors in their definition of new urban public space. They go on to declare that their goal is to provide a permanent home to farmer's markets in “the planning of official public open-space systems.” so that they are no longer “temporary events in leftover spaces” and the farmer's market program cannot be displaced by development pressures (ibid.). The dilemma here is that the farmer's market is by definition nothing but a communal and commercial activity that cannot be reduced to a spatial typology. In contrast, our studio's farmer's market research started from the hypothesis that the temporal character of the market is an active “place maker” in itself and is a prime catalyst for bringing civic space to life by stimulating vital social, economic and cultural communal activities. Furthermore, this research attempted to test out the idea that the flexibility and changeability allowed by this time-based urban design typology, which does not always conform to more rigid official urban planning norms or policies, might hold a key to engage in more grass roots, community and activity oriented place making strategies as an alternative to traditional master planning.

The first task in the studio was to conduct a spatial comparison of a market day and a non-market day at the Davis farmer's market in Davis, California. Davis farmer's market, designed by none other than Mark Frances, was the first farmer's market in the US that had a permanent market structure in place as a part of a larger central park. This exercise aimed to reveal how the space is used differently and transformed by temporary events/programs. Visualization and representation of the time organization, as well as remarks and analysis that students gathered on the site, were carefully studied in the process. Students set up a datum point, to record the rhythm, meter and intervals of engagement and finally analyzed the raw data as a visual sequence. This allowed students to draw conclusions about dealing with time and temporality in space.

![Figures 1 & 2. (Works by Javan Bowsher and Amie Patel from LDA 191, Fall 2012)](image)

With the techniques of juxtaposed diagrams and sequential photos, Figure 1 successfully depicts both spatially and temporally how the park space is used differently, or sometimes not used at all, on a market day and non-market days. Figure 2 on the other hand, notates the park users' movements in the park and overlays the information with a sun and shade study. Overlaying information is effective in situating the raw data in context, of the city, climate, culture, demographics, etc. Despite the desire expressed by Frances and Griffith, students found that the park is underutilized throughout the day on non-market days and that the physical specifics of the park and a permanent structure for the market have little to do with the success of the market as a social event. If the success of a farmer's market cannot
necessarily be measured by the physical setup of the space, then what are the other key elements beyond the spatial in determining the success of a farmer’s market?

The next exercise was to compare three different farmer’s markets in the Bay Area, namely Davis, Alemany and Ferry Terminal Plaza. It is noted that each farmer’s market is one of the most popular and successful in the area and each has distinctive physical features and very different audiences that create distinctive cultures of their own. Students looked into how the physical space in each specific location affects the success of each market’s temporary programs as well as how time-shared uses and programs are organized. A comparative study made it possible to illuminate each market’s specificity through our site visits, overlaying, and juxtaposing the data to draw conclusions in the studio, as well as on-site interviews with the users. Students were divided into 4 groups, to research four categories of specific investigations. Those groups were: “physical space” (size, plan layout, circulation, vegetation, etc.) “product and produce” (price, where they are from, season, marketing, etc.), “regional/local scale” (Accessibility, locations of farms, the site’s connection to a larger context of the city in which it is located. etc.) and lastly, “people” (demographics, # of visitors, where they are from, what are they buying, activities etc.).

Figure 3. Physical spaces. (works by Javan Bowsher, Johan Holvick-Thomas and Brooks Taylor from LDA 191, Fall 2012)

Each farmer’s market has distinct physical features that are totally different from each other and each is situated in a totally different urban context. Davis farmer’s market has been in the very pastoral central park since 1975 in the college town of Davis, an agricultural research center in Northern California. The Ferry Terminal is in downtown San Francisco with spectacular views of the bay, the Bay Bridge and the Golden Gate Bridge and is at the termination spot of many modes of public transportation in the city. Even without a market, the ferry terminal building is a host to daily operating gourmet stores and thus is a major tourist attraction, trying to cast itself as the symbol of the slow food capital of America. Alemany Farmer’s market on the other hand, is in a parking lot framed by intersecting highway overpasses adjacent to low income housing in the Southern part of San Francisco. It does not have the physical/spatial appeal of Davis nor the financial support system of the Ferry Terminal, nevertheless it is a long standing market, operating since 1943, started as a part of the victory garden movement during the world war II (http://sfgsa.org/index.aspx?page=1058), and beloved by the local community. Spatially, these markets could not differ more from each other. Is the key to each of their success in the commercial activity itself?

Figure 4. Produce and product. (works by Anthony Parker, Iqra Anwar and Tyler Erickson from LDA 191, Fall 2012)
One group researched where merchants for each location came from, what kind of products they sold, how produce was related to seasonality, market price comparison with each other and with local supermarkets and the marketing strategy of each market. Some of the most interesting research outcomes were: 1. Each market has specialized produce and products that cater to specific clientele. For example, Ferry Terminal caters to visitors desiring gourmet, organic and restaurant branded food whereas Alemany market is decidedly ethnic and sells rare Asian vegetables that can’t be found elsewhere. 2. Due to its specialization, Ferry Terminal sells the highest priced produce and products on average. However, generally speaking the prices are not so different between farmer’s markets and supermarkets. The year round produce is the most consistent in price. 3. The governing body of each market makes each market totally unique. For instance, Ferry terminal is run by CUESA, Center for Urban Education about Sustainable Agriculture, which is an active advocator for local sustainable food and advertises its value; complete with a comprehensive website and signage as to the location of each farm at all the produce booths. In contrast, Alemany market is run by a city agency and the managing office at the site was very reluctant to release any information on the merchants, not even the numbers of merchants nor kinds of produce. 4. The locations where the farmers and merchants are from are nearly identical in all three locations. However, farmers’ choice of where to sell their produce depends on the specialty of each market. One Davis farmer doesn’t go to the Davis market but instead drives all the way down to the Ferry Terminal to sell his lavender flowers and herbal salts. The locality of farmers also depends on the seasonal availability of certain produce. For example out of season strawberries have to travel much further from the south. The locality map thus is seasonal and temporal as well.

![Regional Analysis](image)

**Figure 5. Regional. (works by Micheline Chagniot, Peter Chang and Chris Norgaad from LDA 191, Fall 2012)**

In fact, the issue of locality brings up an interesting question, when the intrinsic value of a farmer’s market is to get locally produced food. The regional group began by assessing how “local” produce is defined. Davis farmer’s market contains the most locally produced produce of all the markets by far. Surprisingly, the CUESA run Ferry Terminal has the longest driven merchant, from 533 miles away, that even surpasses the Whole Foods market chain’s definition of “local” as a 400 mile radius.

**People:**

Perhaps, the most interesting and varied research outcome came from the “People” group. They conducted on-site interviews and data collection on demographics at each location and the results are compiled in graphic boards and a video. In summary, in the interviews, the Davis market was revealed to be about socialization and social events, suitable to a family-oriented wholesome lifestyle where locally grown food is an additional bonus. On the other hand, people, many of them tourists, come to the Ferry Terminal market for fresh produce in support of the slow, organic food, sustainability and the farm-to-table movements, while enjoying the view of the amazing San Francisco Bay. People don’t come to the Ferry Terminal in search of a good price but instead for the “scene”. In contrast, Alemany stood out as the venue for local people to get their week’s worth of groceries quickly so there is not much emphasis on socialization nor on events. The clientele is decidedly Asian in search of rare ethnic vegetables that are only sold there. Organic produce is minimal and is not particularly well advertised, as if the value of organic produce doesn’t have much relevance in this particular market. In this way, it is an everyday people’s market without an external promotional campaign.

Overall, the comparative study revealed that a farmer’s market is made up of the complex web of social, cultural, political, economic and ecological networks that overlap at a specific time and place over
specific intervals, schedules and seasons. Moreover, those time-organized occurrences, such as a
market-day event itself and the comings and goings of seasonal produce from different locales, happen in
a cyclical manner as in Lister’s revolving and shifting model of successful ecosystems. The farmer’s
market is a place to connect people to the cyclical loops of both urban and agricultural landscapes. In this
way, *transient landscapes*, as seen from the case study of farmers’ markets, can be called dynamic,
adaptive and always a work in progress. Additionally, it is apparent that a community of people who
supports and comes to a market not only plays a role in setting the mood of the place, but also adds
value. The community is an active part of making this landscape in both time and space. The rhythm and
repetition of a market day and market day activity connects people to their cultural, seasonal, regional,
urban and agricultural landscapes in ways that are not the same in other parts of their everyday life. Time,
intrinsic to these landscapes, becomes pertinent to their lives through produce, people, programs and
events. Farmer’s markets revealed another aspect of time in landscape. That is the making of a
“communal” time in public space, by sharing and experiencing the time and space together by the
participants. The communal time here needs to be distinguished from a communal time that is derived
from a one time only event or a spectacle. By the nature of various cyclical times in a farmer’s market, the
cyclical communal time has both the freshness of the shared present moment as a community, as well as
the enduring experience of such shared public space and its supportive community in-the-making. The
next section attempts to explore such a cyclical and communal transient landscape in-the-making through
a treatment of “Shikinen sengu” in Japan. It will focus on how an entire community creates a permanent
communal memory of the place in history, culture and nature, that is refreshed and renewed every 20
years by a large, elaborate and cyclical temporary landscape process. The cycle involves the supporting
community in the rebuilding of the main shrine with timber from nearby forests and ritual celebrations of
each step in the process.

6 SHIKINEN SENGU: A DESIGN OF SHARED COMMUNAL CYCLICAL TIMES

The ritual of “Shikinen Sengu” literally means ‘ceremonial year shrine transfer’. Ise shrine in
Japan, the largest and central home shrine for the Japanese native religion, Shintoism, can be seen as a
very unique transient landscape project. It is an extreme case of age-defying “preservation” landscape
tactics that takes the form of ritual. Its recurring ritual has had an enduring history for hundreds of years,
and is observed even to the present day. As stated on Ise Shrine’s website (Isejingu.or.jp), Naiku the inner
sanctuary of the main building gets reconstructed in exactly the same form and materials once every
twenty years at an identically sized site adjacent to its former site. This has gone on since late in the 7th
century A.D. for 1300 years. Shikinen Sengu takes about 2 years of preparation involving the local
community of faithful followers processing the holy timber from a holy forest and washing holy white
stones in a local river for the new entry courtyard. Even the source of timber used for rebuilding has been
managed through forestry and cyclical replanting. The sizes of the timber required means that the trees
for harvest must be on average 200 to 900 years olds. Planting and replanting hinoki cypress
(*Chamaecyparis obtusa*) and preparing for the next cycles of Shikinen Sengu are crucial parts of this
landscape’s image as well as its making. The repetition of the ritual over 1300 years makes the
preservation of the historical landscape pertinent to an evolving present time and space. The sense of
time is carefully managed. It manifests itself in the continuation and repetition of the ritual itself carried out
by a community of people, rather than through building materials or the physical site that the building
occupies.

![Figure 6. Different time lines of Shikinen Sengu by the author, Spring 2013.](image-url)
The idea of “Shikinen Sengu” is particularly intriguing, since it combines a repetition or reenactment, the community participation and involvement thus maintaining the landscape’s relevance to the present on one hand and acknowledges the duration of time through which the act is continued and renewed, on the other. Time manifested in space here is not just a preservation of image like in the Versailles gardens nor is it a preservation of material appearances, as in the idea of decay and rebirth in the moss garden. Shikinen Sengu is an active cultural movement rather than an aesthetic end in itself. At Ise Shrine, the design concept does not let nature take its course so as to diminish traces of the human interventions nor the designer’s intentions. Rather, the program is an active and conscious agent of time/space-making that simultaneously creates a physical space such that the Naiku, inner sanctuary, stands here and now at the moment of creation and is as well a historically enduring space through time in its sameness. This combined form and action suggests a creative agency in which there is a great potential for time/space-making as a new way of designing landscape. Landscape can then be understood in terms of time revealed through community activity and use, or even through more transient groups of people, society or cultures.

7 URBAN DESIGN PROPOSALS

In the last section of the paper, some of the key ideas of transient landscape, such as cyclical times, immediacy of being here and now, time-organized programs, adaptable and revolving events and making of communal and shared time in space, are reviewed through ideas tested out as design proposals in the studio. The question that students were asked to consider for their proposals was how to mobilize time, schedule and people in order to create a successful and lively public space that can directly connect with the present urban conditions. The site chosen was a parking lot, adjacent to a steam plant in a derelict part of downtown San Francisco. Students were first asked to define a series of design parameters, such as who the targeted users are, how to socially and spatially activate the space through their proposed temporary programs, how to set up and organize their temporal rhythms, how to use affordable, reusable and easily (re)movable materials, to name a few. It was also stated that the space-activating program should not simply rely on commercial activity to compel students to propose alternative ways of attracting people. The project, needed to consider different aspects of program and spatial and temporal organization, through key words such as “people”, “regional, economic and social impacts”, “products”, “materials” and “physical space” along the same line as the farmers’ market study was conducted.

The physical site and its location in downtown offered a couple of questions for the students to think about. It is in a transitional leftover space sandwiched between the Tenderloin area with its persistent and transient homeless populations and derelict open land in close proximity to the popular tourist destination, Union Square. The space needed to be flexible, multi-purposeful and was asked to be an active force in the development of new forms of civic life and social exchange addressing the complex neighborhood context and the seemingly conflicting interest groups.

Two projects stood out in their effective use of time to orchestrate and structure program and space, as a way to engage and integrate different social groups and urban contexts. One is called “The Stacks.” This project took advantage of the secluded nature of the parking lot, proposed to close off vehicular access on both alleys that frame the lot and to transform it into an exclusive spot that hosts a range of time specific activities and events, from music concerts to food trucks that are scheduled and promoted through social media such as facebook and twitter. The name came from the site’s existing steam stacks as well as their use of stacked gabions filled with reclaimed asphalt from the parking lot to arrange temporary and changing boundaries of the proposed activities on site. There is a unique juxtaposition of two different kinds of time in this proposal. One is a regular rhythm of the lunch time schedule with rotating food trucks, strengthened by the presence of more permanent food and cultural activities such as sidewalk cafes in a new alleys-turned-into-pedestrian-plaza space. The regular daily programming creates a sense of security and activates the formally derelict space. This regularity is punctuated with an irregular set of cultural and music events for a much larger audience, promoted only through social media to make it very exclusive, immediate and to build up a sense of excitement for an anticipating crowd. The active use of social media makes it appealing to the younger generation and also keeps the element of surprise as a part of this urban experience. In some ways, the use of social media as a part of time-focused design proposal shows some potential for being an effective method of creating a new kind of urban community that could in turn make a temporary space as in the case of “Shikinen
Sengu.” It is the community that physically transforms and affects the process of public space making. The social network’s virtual community has a tremendous power to mobilize people. When “designed” well, it might become the powerful tool in engaging in the contemporary public space.

Another notable proposal made use of steam from the steam plant as a way to reconnect the divided neighborhood. Tapping into the ephemeral quality of steam, the project proposed different uses for steam, a heating pad for warming people, inclusive of the existing homeless population, an outdoor hothouse, steam lighting art and a green house. All of these uses creatively adapt to designated programs, and visually and poetically express and address temporality and place activating programs, using the inherent urban landscape and phenomenon. This project makes use of the transient quality of steam, an essential part of industrial urban landscape and successfully transforms it into programmatic attractions that are pragmatic as well as poetic. The proposed programs pulsate and change with a dynamic stream of steam available to the site at specific times of the day. The changing volume of steam was a deciding factor in changing programs on site. The Steam Work is also successful in addressing the diverse population that uses the space, whether it is a tourist or a homeless person and shows the potential for the power of landscape’s ability to transform physical space through transient interventions.

8 CONCLUSION

“…we must accept and embrace change as a normal part of life and through our designs and plans, adapt to it in a more flexible and responsive manner.” (Lister, 2007)

Studying time and its power to shape and organize space, one can say that time is landscape as much as space, place or activity is landscape. Throughout the research, transient landscape projects have proven to be effective in connecting the often abstract ideas of landscape, place, time and people to very immediate urban conditions. Small scale, temporary landscape/urban design projects work as portals into the contemporary interests and activities of their milieu and thus, these projects have the potential to affect change in the structures and policies that govern, define, manage and structure the development of public space on a broader scale in the city. The dominant methods of planning disciplines towards the design of public space are often distanced and rigid, which is evidenced by the ubiquitous use of plan-
view zoning maps, or from the distant perspective of the aerial view. These methods are challenged by the actual use and bottom up development of transient projects.

The planning discipline often seems to be based on a very linear understanding of time, where the past is always prior to the present and those two instances only converge in a fairly contrived way as often is the case in historical preservation. Transient projects on the other hand come from a D.I.Y., experiential, experimental and bottom up sensibility that transforms small leftover spaces of the city one by one. As these transient projects get realized, each has the potential to engage its site and community in an active process that becomes a living part of the urban landscape.

The notion of time in transient projects leads to a notion of “locality of time”. This concept is analogous to the notion of genius loci – or spirit of the place, but focuses on a spirit of the time, or perhaps, more specifically, the spirit of the moment. Thus a “locality of time” refers to the amalgamation of a number of “times” as experienced and lived by people, as opposed to a more universal and scientific time organization as measured by a clock, a calendar or a time zone. The locality of time cannot be described by a linear calendrical system, but can instead be understood by the mapping and overlay of the different rhythms and systems that apply to a particular location/population. Through design that responds to and cultivates this “locality of time” the people, the agents in these spaces, can be brought back into the design of public space. This is urgent at this point in history, as people aggregate in cities and spend more and more time in virtual space, many of us are becoming disassociated from real time and physical places. Instead of placing and organizing people, programs and events in a universal calendrical and linear time, understanding “locality of time” is based on the idea that Landscape Architecture is made up of individual times, communal times, biological times, evolutionary times of the natural world, geological times, etc. When we design landscape, we actually create a specific time comprised of all these different times that is now lived in the designed space.

This inquiry into time focused design can be called “sculpting in time” in Landscape Architecture. The phrase “sculpting in time” was coined by the Russian film director, Andrei Tarkovsky as a way to describe the act of collecting, editing and thus mastering individual and factual times, in order to create the designed time of film – the time that is lived in the duration of a film.

In what form does cinema print time? Let us define it as factual. And fact can consist of an event, or a person moving, or any material object. ...But the virtue of cinema is that it appropriates time, complete with that material reality to which it is indissolubly bound, and which surrounds us day by day and hour by hour.” (Tarkovsky, 1986)

Similarly, the sculpted time of landscape architecture, created in space, needs to be firmly grounded in both the material and experiential realities of a site’s life cycles.

When proposing a new kind of “operational” landscape design tactic, Corner reminds us of the Old German word landschaft “referring not to scenery but to environment of a working community” which is in contrast to the idea of landskip, which was a traditional landscape design method, focused on creating beautiful “scenes”. (Corner, 1999) Landshaft is “more than an organization of space; it connoted too the inhabitants of the place and their obligations to one another and to the land.” (Stilgoe cited by Corner, 1999). Along these lines, transient landscape design can be a way of engaging a working community that supports, shares and operates the cycles of lives and various time schedules of the environment surrounding inhabitation as seen in the example of Shikinen Sengu. Through repetition and adaptation, a transient landscape firmly grounded in a working community can endure, evolve with its changing environment and last as long as, or longer than, more “permanent” projects. Each of the projects described in this paper is a place that engages time within its site, however, each also evokes rhythms and landscapes beyond its boundaries through overlapping systems and communities. Their cyclical time organization allows these projects to renew themselves and thus makes them pertinent to current human experience.

9 REFERENCES


SPACE, TIME, PLACE, DURATION; THE EVALUATION OF DESIGNED URBAN LANDSCAPE THROUGH PUBLIC SOCIAL MEDIA ACTIVITY

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1 ABSTRACT

Advances in smartphone GPS and the increased use of location-based social media have enabled a shift in analytics from global to large-scale urban trends to the local instances and their immediate spatial context. This paper advances previous methods of using location-based social media to characterize urban space by extracting location based Twitter use within the London Olympic Park and Village Complex during periods surrounding the 2012 Olympic Games from July 21st until August 11th. The analytical scope of the survey encompasses a range of site specific textual, temporal and geo-location data generated from 63,897 instances of Twitter communication by 13,844 unique persons over the period in question. Specific areas of analysis addressed in the paper include geospatial densities, textual sentiment and temporal movement patterns associated with active and passive space, Olympic venue site context, pedestrian circulation and transportation routes, parkways and surrounding urban fabric.

The findings offer exemplary big data analysis methods grounded in current scholarly literature for GIS that correlate life cycle processes with intended use of a large scale designed landscapes. The findings also provide worthwhile methods relevant to landscape architects and landscape architecture education for evaluation of socially mediated urban space defined by place and mobility patterns associated with “momentary life-loging via Twitter.”

1.1 Keywords
urban design, social media, geo-location, lexicographic analysis, sentiment analysis
2 INTRODUCTION
An essential part of any design process entails an understanding of the context within which one is working, particularly the social context. Eventually when proposals are made, these too, must be measured to determine their likely impact on the people who will use and live with them. The general objective of this paper is to support these accepted caveats, through a case study of methodologies for the extraction and analysis of intensive social media activity and user transient spatial location. There are many terms given to this type of data collection, for example; “data-mining”, “pervasive computing”, “semantic analysis of online crowd activity,” all of which describe techniques of gathering publicly available digital social interactions in order to form an interpretive narrative.

The majority of current research to date on this subject has been conducted in two key areas of related work: the use of new technologies and data sources for urban studies, and studies of social media to extract “real world” insights, or temporal dynamics. This work suggests that digital social interaction through Twitter often mirrors “real world” experiences and can be used to sense and track large physical events (Fujisaka, 2010). Methods for using data in this regard have been developed in the work of Sakaki et al, demonstrating how social networks can be used as sensors to detect natural disasters (Sakaki, 2010). For example, in “Earthquake Shakes Twitter Users: Real-time Event Detection by Social Sensors” the University of Tokyo data have indicated that when an earthquake occurs, people generate Twitter posts (tweets) relating to the earthquake, which enables a prompt detection of earthquake occurrence simply by observing the tweets (Sakaki, 2010).

As such, as general principles underlying our methodology we assume two principles: (1) each Twitter user can be regarded as a sensor and (2) each tweet can be associated with a time and location in latitude and longitude. As a corollary to these principles, the paper proposes that sensory information such as tweets can be utilized successively as ongoing narratives of specific locations and times within a larger context of the city. Moreover, we suggest that these narratives can then be analyzed for a much greater understanding of human relationship within the urban environment.

3 METHODOLOGY
3.1 Geo-location Analysis
Data was mined through a spatial extraction radius using a Twitter search API over the duration of the 2012 Olympic Games in London from 6:00 on 7/21 to 21:00 on 8/11. The spatial extraction radius was set for 2 kilometers from a center point at latitude 51.542291 and longitude -0.01604. The total number of tweets collected during the study was 688,137 with 63,897 or 9.28% containing latitude and longitude GPS coordinates. These geo-located tweets were then analyzed using ArcGIS and network graphing software, and then displayed to compare spatial trends of the 13,844 unique individuals. Tweets used in the study were from retrieved from mobile phones and are not always located based on the GPS tracking of the phone. The single locations within the Olympic Park with the most frequency of sampled tweets were the main stadium and surrounding venues, which were geocoded by Twitter based on the “@” symbol in the message text.

Figure 1 depicts the location of those places with greater than 500 geo-referenced tweets. For example if an individual writes “Eating some great fish and chips @Olympic Stadium” the message subsequently geo-codes at the center of the Olympic Stadium. While this greatly increases the total number of geo-located tweets relative to those without a spatial location, it decreases the overall accuracy. Tweets that do not rely on the “@” for their location are given a geo-location that reflects the GPS accuracy of their mobile device. The majority of mobile devices were deemed accurate to four decimal degree decimal points (ex. 0.0001) which corresponds to the proximity of 10 meters. Locations with greater than 500 tweets represent 22% of the total geo-located sample. The referenced locations are similar to those used within popular online searches and represent a key feature’s general location rather than the more detailed location in or around this feature. Within our sample, the majority of these feature locations are associated with stadiums and larger regional names, while the remaining are found to be individual accounts.
While the primary use of this data is to reveal to the observer the location of individuals within the landscape, to successfully depict this information, a frequency count was performed to mitigate overlapping instances of Twitter use. Figure 2 above illustrates the highest frequencies with the most spatial regularity within the surveyed data.
3.2 Sentiment Analysis

Qiu et al. of the Division of Psychology, Nanyang Technological University, Singapore, demonstrated in their in-depth study: *You are what you tweet: Personality expression and perception on Twitter*, that personality traits are associated with linguistic cues in microblogs and can be accurately judged by unknown others. In particular, extraversion was found to be positively correlated with positive emotion words and social process words, agreeableness was found to be negatively correlated with negation words, and openness was found to be negatively correlated with second-person pronouns, assent words, and positive emotion words.

McCullough observes that “Language abounds with bodily metaphors that recall the experience of environment” (McCullough 2004). As such, if one considers digital social interaction related to an individual’s mental and subsequent physical environment, one can perform quality evaluations of their context based on their calculated sentiment and location. A subsequent analysis of keywords in the surveyed Twitter message text provided relative sentiment of each message (see Figure 3). Subsequent following maps below illustrate spatiotemporal data points at the Olympic Venue statistically weighted by the number of keywords, with a positive weight (+1) for each positively scored keyword (see Figure 4) and a negative weight (-1) for each negatively scored keyword (see Figure 5).

![Figure 3. Olympic Venue statistically weighted by the number of keywords](image)

While the graphics for negative and positive maps are similar, they feature unique characteristics bound to the individual locations. The node points are varied in size effectively representing the weight of the sentiment, with a stronger sentiment theoretically having a much larger social radius of influence. As these spheres of influence cross the color deepens and allows the observer to view the clustered sentiment. In the field of landscape architecture, this data can help better understand the unique social sentiment of a certain place at a certain time. (Please see Figure 8 for a word cloud illustration of these positive and negative relationships)

Sentiment analysis on keywords left 70% of the data set with a neutral sentiment (that included words in foreign languages) and these were not used in the above mapping examples (see Figures 5 and 6a). For the duration of the Olympic Games using the 30% of our sample that was weighted, sentiment was found to be 74% positive in nature which corresponds to about 22% of the total sample. In contrast,
26% was negative in nature which corresponds to only 8% of the total sample. For graphs illustrating these percentages see Figures 6b and 7 below.

Figure 4. Olympic Venue statistically weighted by the number of keywords, with a positive weight

Figure 5. Olympic Venue statistically weighted by the number of keywords, with a negative weight
While sentiment analysis suggests that places within the Olympic park were significantly more positive, those places associated with positive sentiment also exhibited negative sentiment. And while we can assume that the venue activities contributed to the majority of positive and negative reactions to the sporting events, it is important that future work attempt qualitative study of how tweets, positive and negative, reference the context from which they are sent.

Figure 7. Sentiment ‘Word Clouds’ with a larger word size representing higher frequency use within our sample

3.3 Temporal Analysis

Recently, Golder and Macy (2011) have examined temporal variation related to Twitter posts reflecting mood, across different locations, and indicating diurnal (as well as seasonal) mood patterns...
consistent within many cultures. Naaman, Zhang, Brody, Lotan (2012) further elaborated diurnal urban routines using Twitter, focusing more on city-scale rather than time-zone and country. While Naaman et al concluded that when compared to overall online activity, low number of tweets from GPS-enabled mobile devices are too small and too biased for adequate data-sets, we successfully managed much smaller yet more accurate data sets consisting of only the tweets from GPS-enabled devices. For example, within the two week sample the study combined consecutive days with temporal patterns by hour. Figure 8 illustrates a sample 24 hour period indicating the diurnal pattern of the event.

Figure 8

Figure 9. Cumulative georeferenced tweets for the sample duration of the 2012 Olympics depicted by hour

Figure 9 represents the spatial location of tweets during the Olympics by hour. The findings clearly show the entering and exiting of the Olympic stadium as it related to the morning and afternoon schedule.
with a break in the mid-day for lunch. The consistent use of Park Live and surrounding hardscape throughout the day also stood out.

4 DISCUSSION

The issue of using such data in a real planning situation raises several significant questions: 1) how to determine the extent of limited demographic information, data frequency, and the privacy concerns of Twitter users, 2) accessing and processing increasingly larger data, and 3) assuring a sample's diversity. In response, we believe that the three analysis techniques described above suggests that: 1) Big Data can become a robust tool, 2) Density can be coupled with temporal patterns to reveal dynamic sentiment monitored city wide offering detailed views of social trends.

For issues related to better informed decision making, characterizing urban areas is essential. Through the union of data and location as exemplified in this study, multiple layers of real-time information can be displayed geographically, providing enhanced situational contexts and the deciphering of evolving social narratives. Odendaal (2006) acknowledges this premise, suggesting a growing movement in urban planning to utilize city narratives in the process of understanding place. The paper suggests that public life within digital social networks can tell an exceptionally well documented story.

5 CONCLUSION

The paper points to a number of directions for future work. The advantages of data generated by social media networks in comparison to more traditional data sources such as government data, are found in the areas where the data is currently completely missing or where up-to-date human spatial patterns are an integral part of a project. The theoretical base from which landscape architects, urban planners, and architects operate and the ability to analyze big data within conventional GIS platforms will enable a position of oversight to those trained in computer science now attempting to make sense of urban social theory. The practical application for big data from social media outlets cannot be summarized at this stage in its development by a few keywords namely: public health, emergency response, community safety, resource planning; the true value of applied big data will increasingly reveal itself with more directed research into this new field of urban informatics.

6 REFERENCES

THE “PEDESTRIAN REALM” AS A GENESIS OF COMMERCE:
BAZAARS OF THE EAST AND MIXED-USE CENTERS OF THE WEST

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1 ABSTRACT

Commerce is an ancient economical framework that enables establishment of social ties, improving cultural relationships, and trading values (Edgu et al., 2012). The products typically has reached its destinations (customers) through pedestrian spaces such as Bazaars in the East and commercial centers in the West. The presence of people has been a key to successful urban public space (Marcus and Francis, 1998; Gehl, 1987) and commerce has been the primary activity of such spaces for over centuries. Yet increasing vehicular and transportation activity and changing commercial dynamics of contemporary cities have been adding more pressure to pedestrian spaces (Morgan, 1996), requiring further examination.

This research is to document and assess the physical make up of the pedestrian realm in mixed-use settings in both the Eastern and Western cultures. The paper aims to gain greater understanding of the role and characteristics of pedestrian environments by drawing lessons from case studies to inform future commerce oriented mixed-use settings. The paper utilizes qualitative methods and case study analysis techniques to investigate the relationship between pedestrian realm and commerce. Interviews are conducted with three stakeholder groups in each setting: pedestrian, designer and developer/planner from (Taylor and Bogdan, 1998). The research also utilizes evaluation and observation techniques (Francis, 2001; Marcus and Francis, 1998) as well as map analysis techniques (Wheeler and Koo, 2011) in order to further examine the spatial configurations and characteristics of these settings.

Research illustrates that commerce oriented centers of the East and West may illustrate changing visual characteristics, serve varying transportation modes but carry similarities in the way how pedestrian realm and street networks are designed to create as a central organizing element to activate commerce. Whether the “pedestrian realm” is the genesis of commerce or not still remains somewhat as an ambiguous question but the interviewees points out diversity of land uses, utilization of human scale, the presence of pedestrian spaces and amenities, and presence and the diversity of people as the noticeable positive characteristics of such settings contributing to their vitality. Research also highlights various physical qualities that are unique to each setting reminding that design and planning of such environments require critical understanding of regional parameters while exploring cross-cultural references.

1.1 Keywords
pedestrian realm, commerce, mixed-use centers, bazaars, urban design, public spaces, urban landscape
2 BACKGROUND

Commerce is an ancient economical framework that enables formation of social ties, improving cultural relationships while exchanging values and trading commodities (Edgu et al., 2012). Although commercial activities are mainly driven by the strategic placement of greater transportation networks among production and economic centers in macro scale the products typically reaches their destinations (customers) through pedestrian spaces and networks and districts such as Bazaars in the East and malls and mixed-use centers in the West. The presence of people has been a key to successful urban public space (PPS, 2005; Marcus and Francis, 1998; Gehl, 1987) and commerce has been the primary activity of such spaces for over centuries.

Commercial nodes, specifically bazaars or mixed-use centers, in many instances are typically being planned as live, work, entertainment centers to attract more users to maximize their use. Varying strategies such as service improvements, invitation of famous brands into the facilities or holding various events are being used for the same reasons (Young Min et al., 2012). These centers are also planned as tourist destinations, complete with tour guides and souvenirs, and some include hotels so that vacationers and conference do not need to leave the premises during their stay (Goss, 1993). Retail land uses are shown to effect movement patterns by acting as a multiplier by transforming a linear relation between spatial integration and pedestrian flow into an exponential relation in mixed-use areas (Hillier et al., 1993).

Mixed-use centers and bazaars’ increasing role and evolving presence in both Eastern and Western cultures as part of changing city form, and their dependency for pedestrians activity with their complexities as commercial environments it make them critical setting to investigate their physical make up for their pedestrian realm. Since such settings needs to activate pedestrian presence and flow, this raises a research opportunity to have a greater understanding of the physical make up of the pedestrian realm as well as how these settings are influenced by their commercial element. This research illustrates that only limited number of studies scrutinizes the relationship between the pedestrian realm and the commercial activity with cross-cultural inquires. Thus, changing commercial and transportations activities in contemporary cities adds more pressure to such pedestrian spaces and networks (Morgan, 1996), requiring further examination.

This paper focuses the physical make up of the pedestrian realm in selected mixed-use commercial settings of the East and the West in order to document the desired characteristics of such pedestrian environments and to inform the design and planning of future urban centers with cross-cultural references. The study focuses on three acclaimed sites in each setting; Southlake Town Square, Legacy Town Center in Plano, and West 7th Urban Village in Fort Worth in Texas, USA, and bazaars of Tabriz, Isfahan and Kerman in Iran. This research primarily answers the following three questions: 1. What is the role of the pedestrian realm in bazaars and mixed-use centers? 2. What are the physical attributes of the pedestrian realm in each setting? 3. What are the characteristics of bazaar and mixed-use centers that contributes to the pedestrian realm?

3 LITERATURE REVIEW

Both researchers and designers must be concerned with raising the standard of the designed environment from the present level, to one which successfully meets the complex levels of human demand (Smith et. Al., 1997). Reaching to these design standards are the real challenge for the designer and researchers, looking for the best examples and precedents that responds to the desired quality and learning from the features is the first step to take. Whereas the importance of considering historic precedents has been established in the study and theory of urban form, much less attention has been paid to the historic precedents of urban function (Marcus, 1998). The medieval town square or Italian piazza cannot provide models of function to emulate, although they may offer important lessons in form, such as height to width ratio, sense of enclosure, and furnishing to enhance uses (Marcus, 1998) reaching the quality that is desired for the pedestrian realms of today’s cities. Commerce and retail centers have played a significant role throughout history and despite the new vehicle oriented trends they tend to attract pedestrian activities and people (Goss, 1993). Therefore the public life has a great influence on commerce, as well as, commerce influencing the public life (Young min et al., 2012).
3.1 Pedestrian Realm

A ‘pedestrian’ is defined in the dictionary as “one traveling on foot.” Yet the fact that walking has been the predominant mode of transportation through most of human history, makes it more valuable than just any mode of transportation (Owens, 1993). A body of literature deals with the growing concern for the automobile on urban life and its implications for pedestrians. This concern can generally be traced back to planning concepts reacting to the negative impacts of the industrial city (Has-Klau, 1990). Not surprisingly, traffic appears to be an important influence on pedestrian behavior (Owens, 1993, p.117). For at least several decades the overwhelming criteria used in street design has been to maximize its utility to the automobile (Untermann, 1987). This has resulted in streets that are wider, smoother, and more uniform in the name of safety. While this may improve driver visibility it also encourages faster driving, thereby making a less inviting street to walk along (Bosselmann, 1987). Some general discussion can be found in the urban design literature, “with the exception of Jacobs (1961) and Jacobs (1985). There is a few studies that are focusing on detailed analysis of the pedestrian realm” (Owens, 1993, p.118).

Rapoport (1987) divides pedestrian activity into two principle types: dynamic and static. Dynamic activities are principally comprised of walking, strolling, and running. Static activities include standing, sitting, squatting, leaning, working, playing, talking, and pottering. These correspond well with the distinction made by Gehl (1986) between coming and going activities and staying activities. Significantly, staying activities last longer. He found that although activity frequency was evenly split between the two types, staying activities accounted for 90% of the total time spent on streets, discussing that the influence of environmental quality on pedestrian activity varies with type.

Optional activities such as strolling or sitting are highly sensitive to the character of space. Pedestrian street life is affected by the physical variables of the environment, but perceptual and cultural variables as well (Rapoport, 1987). Likewise, issues such as safety, climate, noise, fumes, congestion, topography, distance, proximity to services (benches, cafes, shops), and other human activities all affect the attractiveness of a street for pedestrian use. “Rapoport (1987) claims that the single most important characteristic of pedestrian-supporting spaces is complexity. Gehl (1986) has a notion of ‘soft edges’ that states the same thing in a much less abstract way” (Owens, 1993, p.118). Gehl particularly emphasizes the need to make strong links, both physically and psychologically, between indoors and outdoors. This can be influenced by the arrangement of interior activities, distance, and the quality and comfort of intervening spaces. Little or no setback leaves no occupiable space. According to Gehl, too much distance (more than 18 ft) discourages the connection between building and pedestrian realm. A monotonous edge can also discourage walking by increasing perceived distance, and “the quality of the route is just as important as its actual length” (Gehl, 1986). Alexander (1977) reinforces the need for good edges in his book ‘A Pattern Language’, “If the edge fails, then the space never becomes lively.”

Lynch (1960) distinguishes five elements which facilitate the linkages of a community (pedestrian) to a city being, paths (channels where people move), edges (linear elements such as railway lines), districts (sections of the city having some identifiable characteristics), nodes (strategic spots where people can enter), and landmarks (points of reference such as a monumental building).

Although pedestrian presence and activity is in the heart of the most design research and literature, as exemplified with a few overview above, there are only limited number of studies scrutinizes pedestrian’s relationship to commerce oriented space and activity in relatively contrasting settings. Specifically the relationship between the pedestrian realm and the commercial activity is not fully explored in bazaars and mixed-use centers with cross-cultural inquires within the same research framework to drive lessons to benefits both.

3.2 Bazaars

Bazaar defined as a marketplace or assemblage of shops where miscellaneous goods and services are displayed to buy and sell (Gharipoor, 2003). Bazaar started establishing centuries before the automobile era which can provide an example to focus on a non-motorized urban area. Located on the edge of the Silk Road, the first establishment of commerce started shaping the urban social centers of the East. It was also used as a main pathway and a place for meeting people. This has shaped a greater role for this setting as a pedestrian realm and the activities rolling in between trade and business. “Bazaar consists of a number of smaller bazaars that makeup a multi-functional, multi-layered construction. When the bazaar was expanded over time” (Soltani-Tirani,1982, p.111) It is a complex of street and lane, of courtyards, of public amenities, a complex which is repeated tens of times in the immense area the market
covers, providing the essential elements in commercial and cultural life and extended to the houses of many of the citizens who reside in the bazaar district (Bakhtiar, 1974).

3.3 Mixed-Use Centers and Developments

Mixed-use, defined as developments that have three or more significant revenue generating uses that possess significant functional and physical integration of project components. It is a relatively close-knit and intensive use of land with, uninterrupted pedestrian connections, and development in conformance with a coherent plan that frequently require the type and scale of uses, permitted densities, and related items (Schwanke, 2003; Ozdil et. al in Regional Choices for North Texas, 2008). Most of these developments serve to the immediate neighborhood and the community around them and in some instances they are destinations within the larger city or in the region.

Mixed-used centers and bazaars are typically retail oriented settings which benefit from an improved physical environment to generate pedestrian activity. They typically react to their target service area based on the demand created for whether regional, district level or metropolitan. Although mixed-use centers and bazaars might seem different in the first glance the literature review as well as the research illustrates varying complimentary physical characteristics among them. They both seem to benefit from street pattern or networks of paths as well as hierarchy of open spaces. Buildings and stores are mostly formed aligned with these pedestrian networks and public spaces, and they are dependent of the quality of pedestrian realm. Stuying existing conditions and searching for attributes that improve pedestrian realm in commerce oriented environment in cross-cultural settings can help to better understand the role of the pedestrian realm and the attributes that can generate the future success of such settings.

4 RESEARCH METHODS

The research utilizes qualitative methods and case study analysis techniques to investigate the relationship between pedestrian realm and commerce (Guba et al., 1985; Taylor and Bogdan, 1998). The study primarily benefits from the data collected from person-to person interviews. Research also follows case study techniques to document and study each setting (Francis, 2001; Francis and Marcus, 1998). Map analysis techniques are also utilized to further examine the spatial configurations and characteristics of these settings (Wheeler and Koo, 2011). The spatial analysis grounds its basics with the aerial photos obtained from Google Earth to get a basic general idea of how pedestrian spaces are located according to the general pattern of the setting.

Total of six acclaimed sites to represent bazaar and mixed-use centers are selected for this research; Southlake Town Square, Legacy Town Center in Plano, and West 7th Urban Village in Fort Worth in Texas, USA, and bazaars of Tabriz, Isfahan and Kerman in Iran. While bazaars in this research are selected based on familiarity of the author and data availability three matching mixed-use case studies were selected based upon their relative comparibility informed by the ongoing mixed-use study at University of Texas at Arlington (Ozdil et al., 2009). These setting were chosen because of their exemplary qualities in two distinct environments and relevant significance in diversity of culture, time and place.

The study intends to assess the role of the pedestrian realm with the help of interviews conducted with three stakeholder groups: pedestrian, designer and developer/planners for each case study. Designers and developer/planners are identified for interviews based on their involvement in the design, planning/developing of these settings while shop owners or shop keepers are utilized as users. Stakeholder for bazaars are reached through phone calls while most mixed-use stakeholder interviews conducted in-person. In the case of bazaars, the pedestrian users identified through random phone calls by the area code matching that particular setting and asking the interviewee whether they are pedestrian users of the setting.

5 ANALYSIS AND FINDINGS

As it is stated earlier in this paper the objective is to document and assess the physical make up of the pedestrian realm in mixed-use settings in both the Eastern and Western cultures. This research primarily answers the following three questions: (1) the role of the pedestrian realm in bazaars and mixed-use centers, (2) the physical attributes of the pedestrian realm in each setting, and (3) the characteristics of bazaar and mixed-use centers that contribute to the pedestrian realm.
5.1 Case Study Findings

Each case study is organized to start with an introduction containing basic site history, site description, and location and context information. Following the introduction detailed information regarding the site’s physical characteristics, site surrounding and relations, accessibility as well as interview results are documented and analyzed.

5.2 Southlake Town Square, United States

Southlake Town Square is a 125 acre master planned mixed-use development, located within the corporate limits of the city of Southlake, Tarrant County in North Texas. The primary mixes of uses are commercial, retail, office, residential and institutional. Like many town squares in Texas, Southlake Town Square is home to Southlake City Hall (City of Southlake website, 2012).

The Southlake design allows individual blocks to accommodate their parking load without sacrificing any prominent public street facade to a garage or parking lot. While the 460x480-foot blocks for the two-story buildings at Southlake are large. At Southlake, efforts to limit the perceived length of streets have included mid-block vehicular breaks that read as streets and notched corners of the larger blocks to accommodate squares and plazas (O’Looney et al., 2006).

Southlake Town Center was built around a combined city hall and sub county courthouse facing a block-square garden. The buildings around this city hall have three stories, tapering a block away to two stories. The attention to façade detailing is intense, but the developers allowed a mix of modern buildings amid the traditional ones (Wallace, 2009).

The interviews findings illustrated that almost all of the respondents agrees on the success of the project, and the fact that it is attracting pedestrian activity. They commented on a combination of factors that has assisted to establish pedestrian realm in this setting. Qualities considered by the informants positively in this setting can be summarized as: Sense of comfort, Human scale, Architecture, Atmosphere, Public Space, Variety of uses Pedestrian access, Design details.

5.3 Legacy Town Center, United States

Legacy is a well-established, mixed-use development located in Plano, Texas. Legacy Town Center is a compact, mixed use, walkable neighborhood built on a greenfield site in the middle of the Legacy Business Park, to the east of the Dallas North Toll way in Plano. The 150-acre development contains apartments, townhouses retail office space, hotel rooms, and a Theater (NCTCOG, 2012).
Legacy Town Center is a master plan community which is envisioned, designed and built as the core of a 2,665-acre suburban business park. Design is primarily shaped by walkable block sizes, pedestrian friendly building frontages and accessible open space infrastructure for a diverse set of residential, commercial, entertainment and service uses. Some of the key design features include but are not limited to: Pedestrian friendly streetscapes, 5-acre parks, 4-acre lake within the development, enhanced infrastructure, luxury apartments, hotels, boutique retail, 120-foot-wide fountain, and 24 live-work-play environment (North Texas 2050, 2010).

Interviewee results for the Legacy Town Center illustrated that the restaurants play an important role in attracting the pedestrian traffic and the intentional situation of the parking garages systematically bring people to the sidewalk and create more pedestrian movement to attract more pedestrian activity. Qualities considered positively by the informants in this setting can be summarized as: Edges, Details, Variety of uses, Variety of shopping options, Parking, Safety and Security, Merchandising, Relation to the city, Pedestrian access - Organization of uses.

5.4 West 7th, Fort Worth, United States

The West 7th Urban Village is one of 16 different small geographic areas zoned for dense, multiple-use development that is mass-transit and pedestrian friendly. It serves as a gateway to the Cultural District and Downtown. People are already drawn to cultural venues in the district, and the introduction of a lively, mixed-use urban neighborhood with a greater variety of retail and entertainment attractions should help increase activity (City of Fort Worth, 2012).

Mid-rise and high-rise housing, retail, and offices overlook the Trinity River corridor, which provides scenic and recreational opportunities for the residents and businesses within the urban village. Other land uses include boutique retail, restaurants, urban-scale apartments, and professional offices (City of Fort Worth, 2012).

Urban design elements that have been used and established in West 7th can be identified as (City of Fort Worth, 2012): Neighborhood-scale mixed-use development, an attractive boulevard with a comfortable pedestrian environment with buildings fronts, a neighborhood is further integrated with land uses along West 7th Street through improved pedestrian connections, a modern roundabout creates a unifying gateway landmark and a boutique hotel adds to the urban ambiance.
There are still some challenges that need to be considered in order to make a better environment. Vacant lots and auto-oriented development along West 7th create an environment in which walking is impractical and uncomfortable. Some vacant lots are not maintained, and others are used for parking. Pedestrian connections to surrounding streets are limited. Strategies to address this issue include policies that encourage more intense use of developable land, rezoning to apply more appropriate urban development standards, and urban design strategies such as pedestrian improvements and landscaping (City of Fort Worth, 2012).

In West 7th the common theme that has been collected from the responses was the need for reconnection with the city and downtown but at the same time it is considered utilitarian space for the pedestrian. Qualities considered positively by the informants concerning pedestrian realm in this setting can be summarized as: Atmosphere, Architecture, Mixed-use activity, Human scale, Pedestrian access, Activity watching, Design details, Clarity-Merchandising, Public space, Relation to the city fabric.

5.5 Kerman Bazaar, Iran

Located along the Silk Road, the oldest and most important trading route in eastern civilization, Kerman, which was once a trading metropolis of international renown has one of the most historical bazaars in Iran. Kerman was chosen for its location and the role its bazaar once played in the formation of the city itself. Commercial trading with adjacent cities was easy as Kerman lies on a vast plain, and is classified as dry and warm climate (Aletaha, 1999).

Neighborhood centers play an important role in the social and cultural life of a city, which made the district dynamic and lively for local residents. Apart from its role in the district itself, the neighborhood centers were shaped around a Bazaar, a branch of the main bazaar and it connected nearby districts to the main bazaar (ArjomandKermani, 2009).

These pathways are of secondary importance to the main bazaar, and render residential quarters accessible through a system of paths peripheral to each walled quarter. Normally four to five meters wide, these pathways lead through the encircling walls through gateways. Constantly kept in the shade by the surrounding high walls, these paths are today cool channels for pedestrian circulation even in the hottest of summers. The Kerman bazaar has been and still is the liveliest location in the city, and it continues to exert considerable influence on the cultural, economic and social life of the town (ArjomandKermani, 2009). In some parts open public spaces were created along the covered bazaar. This open space was generally located where the main bazaar and the minor pathways meet. There are also other public spaces where the main bazaar intersects with a secondary pathway.
In Kerman bazaar the common theme emerged from the interviews was the “variety” as being the most important factor of the pedestrian realm. In this particular case variety refers to not only diversity of people, but also variety of functions and spaces offered in this setting including in the architecture. All the participants implied the covered part of the main pathways to be very successful and the fact that it is restricted to cars is a positive point. Qualities considered positively by the informants in this setting can be summarized as: Variety of uses, Variety of spaces, Diversity of people, Activity watching, Sequential qualities, Relation to the city fabric, Pedestrian access, Sense of comfort, Security, Gender preferences, History, Design details.

5.6 Tabriz Bazaar, Iran
Tabriz city, with an altitude of about 4400 ft above sea level, is considered a mountainous city. The Mehran Rood River goes through the middle of it. The bazaar of Tabriz dates back to the early periods of Iranian urbanism of 6th century. The bazaar faced many recession and growth periods and was destroyed several times, is most likely that the main passages in the bazaar are reconstructed exactly as the past after a destructive and violent earthquake in 1780 (Mansouri, 2011).
The central core is divided into two parts named as upper and lower bazaars, lower bazaar is being the part from the core to the River and upper bazaar is being the northern banks of the Mehran River. Tabriz bazaar is generally occupied by jewellers, gold and silversmiths on south, leather and shoe sellers at east, religious and educational facilities at west, carpets and textiles in center and iron, copper and metal works at north (Edgu et al., 2012).

In Tabriz bazaar the most common theme retrieved from the responses was the variety of spaces and the diversity of uses being the most important factor of the pedestrian realm. Also the importance of the pedestrian access connection to the city has been emphasized in many different ways. Qualities considered positively by the informants concerning pedestrian realm in this setting can be summarized as: Pedestrian access, Variety of spaces, Diversity of uses, Unity, Human scale, Activity watching, Relation to the city, Design details, Merchandizing, Sense of comfort, Gender preference, Security and safety.

5.7 Isfahan Bazaar, Iran

Isfahan city is located in 32° 38’ 30” N latitude and 51° 38’ 40” E longitude. Isfahan bazaar core consisted of two parts, the old section, which started from the old square, and the new section, which started from Naghsh-e-Jahansquare, with its measurements of 1680x523 ft. and connected to the old section.Old square had a castle, and mosque and residential. There were some peripheral markets along the main streets radiating from the old square from at least that time (Arjomand, 2010).

The 1.5 km (1,650 yard) shopping street is still the main street in the bazaar. Creation of Naghshe-e-Jahan square played an important role in Isfahan’s town planning. The important point is the best design for connecting of this new square with the old structure of the city core. The purpose of design was linking it with the main chain of the grand bazaar, which extends from the Old Square (Karimi et. al, 2003). The buildings surrounding the Naghsh-e-Jahan square (originally including a large number of coffee houses), to the south east and the large bazaar to the north, where the old core was located (Walcher, 1997).

“The volumes of the various sections of the bazaar, the width and the height of the bazaar lanes were determined to a large extent by the trades and crafts that were sustained in the different sections. Some areas required simple cells with low ceilings and circular openings in the roof to admit light and air. Others required higher ceilings and more ventilation, but these, too, had circular openings in the roof, often at the apex of a vault. These admitted a pale yellow light and kept the interiors warm and dry in winter, in summer they were cool, shaded and airy. Many of the old covered streets have lost their roofs through time. Beyond the plain and undecorated walls may often lie cool and tranquil gardens, shaded courtyards and arcaded walks, but none of this is evident from outside” (Bakhtiar,1974, p.18).

Figure 11. Isfahan Bazaar and surrounding environment (adapted from Google Earth, 2012)

Figure 12. Isfahan Bazaar street pattern (adapted from Google Earth, 2012)
In Isfahan bazaar the common theme retrieved from the responses was the variety of spaces and the diversity of uses as the most important factor of the pedestrian realm. Also the importance of the city fabric and its connection with the bazaar was one the important facts. Qualities considered positively by the informants concerning pedesrian realm in this setting can be summarized as: Pedestrian access, Diversity of uses, Relation to the city, Sequential quality, Security and safety, Activity watching, Sense of comfort, Variety of shopping options.

5.8 Synthesis of Findings from Case Studies:
The case study review illustrated that in spite of many differences that pedestrian setting of East and West have there are many common features. The table below reveals the overall look of the case studies combined with the attributes collected from the interviews. There are several common features in pedestrian spaces and pedestrian realm, in both bazaars and mixed-use centers. Among them activity watching, pedestrian connection, diversity of uses and design details are most common. Histories, variety of spaces and sequential qualities have only been identified as contributors to the pedestrian realm in bazaars. Parking, clarity and atmosphere have only been mentioned in mixed-use centers.

Table 1. Overview of the themes in each case study

<table>
<thead>
<tr>
<th>Themes</th>
<th>Isfahan bazaar</th>
<th>Tabriz bazaar</th>
<th>Kerman bazaar</th>
<th>West7th</th>
<th>Legacy Town Center</th>
<th>Southlake Town Square</th>
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<tbody>
<tr>
<td>Activity watching</td>
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<td>Clarity</td>
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<td>Sense of comfort</td>
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<td>Diversity of people</td>
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<td>Diversity of uses</td>
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<td>Sequential quality</td>
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<td>Unity</td>
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<td>Variety of shopping options</td>
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<td>Variety of spaces</td>
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6 CONCLUSION
This paper document and assess the physical make up of the pedestrian realm in higher density mixed-use commercial settings of the East and the West in order to better understand pedestrian environments’ role, and to inform future design challenges with cross-cultural references in similar urban settings. Three settings in mixed-use centers, Southlake Town Square- Southlake, Legacy Town Center- Plano and West 7 Urban village - Fort Worth as well as three bazaars, Kerman Bazaar, Tabriz Bazaar, and Isfahan Bazaar were selected to explore pedestrian realm in public settings. This research primarily focused on the following three questions: (1) the role of the pedestrian realm in bazaars and mixed-use centers, (2) the physical attributes of the pedestrian realm in each setting, and (3) the characteristics of bazaar and mixed-use centers that contribute to the pedestrian realm.

6.1 Pedestrian Realm and Commerce
The study reveals that the relationship of pedestrian realm and commerce is symbiotic, and complementary to one other. As it is illustrated in Table 1 research identified various physical attributes
and characteristics that contribute to the quality of pedestrian realm in these settings. For example sense of comfort, which can be provided by the right temperature and right amount of exposure to the natural environment is suggested to be one of those qualities. Activity watching is the most important activity that occurs in these settings, therefore every physical characteristic that provides a potential for this option is considered as essential. Diversity of people is one of the contributing factors to activity watching potential, as well as variety of uses. Additionally, a well-defined mix of uses provides variety of options and a potential to satisfy all demands in one stop. One of the most mentioned of these uses would be restaurants, coffee house or cafes, which in turn leads to repeat business. So as one of the participants mentioned, the world is changing from utilitarian only and recreation only uses to a mix of those where you get to enjoy and at the same time get your needs fulfilled. The edges are the most important feature of the pedestrian environment as they stimulate activities, define the human scale and sense of enclosure for the pedestrian to be comfortable and motive. It is desirable, to be activated by commerce or at least transparent edges which provide an opportunity for activity watching. Providing a safe and secure environment without automobiles harassing the pedestrian activity are among the most essential physical characters as mentioned by the informants. For the places that has a distinguished history, it is important for them to represent it, whether it is through different architectural styles or through decent representation of the past. It can offer a sense of place and identity for the pedestrian environment. All of which provide a good atmosphere for pedestrian to relax and enjoy their time while they are meeting their timeframe.

People enjoy watching other people interact, watching diversity of people and diversity of spaces. So the most important factor here as also supported by literature is diversity, variety and complexity (Rappaport, 1987) of people, uses, and spaces. It was stated several times pedestrian activity encourages more pedestrian activity. Architecture at the same time is a unifying elements or character. Also Providing a sequential qualities is important, so the place would be cohesive and readable for the pedestrians. Details are what people on foot pay most attention to. Creating a good pedestrian realm needs careful attention to the details in design. However without having provided a general sense of comfort for the pedestrians, the details are not that significant of the fact. As one of the participants mentioned: “you go to a place to watch activities, it does not matter if it is poorly designed with details”. Research illustrated that public spaces are another element that help pedestrian spaces to thrive. People should feel they belong to the place or they should be provided with a sense of ownership of the place which can be achieved through public spaces.

Research reveal also some key findings concerning the nature of commerce in such settings. The types of commerce influence the pedestrian activity and should be scale dependening on the customers volume it is responding. It is desirable for commerce to be related to everyday life essentials. The study illustrated that the most compelling and attractive types of commerce are the food places such as restaurants, café and such, because people tend to return more often to such places and they provide a gathering place and activity watching potential. Both bazaars and mixed-use centers findings suggested that commerce and pedestrian realm as inseparable elements and they should be addressed well through design and planning.

### 6.2 Mixed-use centers and Bazaars

Both bazaars and mixed-use centers play major roles as destinations for their community, city and the region surrounding them. They draw people from around to come and enjoy their time. In mixed used centers it was mentioned that they are responding to the bigger regional scale, as well as in bazaar, the setting is serving as a destination for it surrounding and the city in general. In bazaars reviewed in this study the pedestrian realm has not been designed for pedestrians only but after the introduction of the automobiles, it has been restricted to automobile movement, so it became pedestrian only space in time. In mixed use centers reviewed in this research, it is designed for the automobiles mainly. While making a comparison between bazaars and mixed-use centers, one of the informants mentioned that, if there is no automobile traffic it is hard to introduce the space to the pedestrians, but once it is established and became known to the community, it is actually a good suggestion to make it pedestrian-only environment. On the other hand the designer in one of the settings concludes that “bazaars are formed as pedestrian access because it has enough potential”. “This potential comes from the integrity of the network between districts and the urban fabric”, he mentioned.

The parking in mixed use setting are located in the setting and adjacent to the pedestrian realm while in bazaars they are mostly located outside of the settings. Parking should be provided and
positioned sensibly. The mid-block location of the parking is a strategy to bring people to the sidewalks and from there to the other activates provided as it was mentioned by the designers in the mixed use setting. Safety and security is another important characteristic of the pedestrian realms, and it mostly deals with vehicular movement and the location of the parking to provide that safe environment for the pedestrians either in bazaars or mixed-use centers. As it was mentioned by the interviewees, accident causing problems discourage pedestrian activity. Pedestrian-only environment such as bazaars due to the comfort and safety level they are providing and by the fact that people are not disturbed by cars as much, seem to be prone to more pedestrian activity.

The other surprising finding of this study is that architecture is not mentioned strongly by the respondents as a physical attribute that impact the relationship between pedestrian ream and commerce. The human scale and the right geometry of the environment, that provides an enclosed area for the pedestrians to feel safe and secure, seem to be a very important factor that emerged more than the architecture itself. Human scale has had an important role in the success of these places, they support the idea of enclosure and being protected with walls and certain height to width relationship.

In conclusion, this research covered important grounds addressing a void in literature by highlighting the relationship between the pedestrian realm and the commercial activity in bazaars and mixed-use centers with cross-cultural inquiry. That being said, it is suggested here that empirical studies with large number of cases must be undertaken as future research in order learn more about the symbiotic relationship between commerce and pedestrian realm and promote long term viability.

7 REFERENCES


The Landscape Research Record publishes top quality articles selected from manuscripts submitted to the Council of Educators in Landscape Architecture (CELA) annual conference each year. The Record serves the mission of the CELA, that is, to encourage, support and further education in the field of landscape architecture specifically related to teaching, research, scholarship, and public service. The Record contains recent research and scholarship in all aspects of landscape architecture, distributed in the following tracks:

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The steps and typical timeline of the peer review are described below.

**Abstract Submittal: September**
Peer-reviewed article publication on the Record starts from the abstract submittal to the CELA annual conference. The CELA executive office sends out Call for Abstracts around August each year.

**Abstract Review: September-October**
The Vice President for Research leads the track chairs in the abstract review. Double blind review is used. Each abstract is reviewed by at least two reviewers.

**Paper Submittal: January 20-25**
Authors of accepted abstracts receive the invitation to submit a full paper in November. The deadline is in January of the following year. The papers submitted at this time are not peer reviewed but only edited to satisfy the conference standard. Papers that do not follow the template of the conference are rejected.

**The CELA Annual Conference: March-April**

**Paper Review: May-June**
Papers that are submitted in time in January and stratify the conference standard become eligible to enter the peer review for the publication in the Record. The track chairs manage the review for their tracks and select high quality papers based on the score of abstract review, grammar, completion of study, contribution of new knowledge, format quality, etc. The track chairs then send out selected papers to at least two reviewers.

**Review Result and Revision: July**
Track chairs collect review results and make recommendations on the manuscripts. Papers that are accepted with revision requirement will be sent back to the authors in July.

**Final Manuscript Submittal: August**
Authors submit final manuscripts by August 31st. All papers are published by December 31st.

**The Outstanding Paper Award: December-March**
The CELA Executive Committee has authorized The Outstanding Paper Award for published papers in the Record. The Vice President for Research and track chairs collectively select the winning paper. CELA notifies the winner(s) of the award, which is presented at the following CELA Annual Conference.