Solving urban conservation issues through botanic garden functions

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Solving urban conservation issues through botanic garden functions. Integrated conservation through community education
Atlanta, GA.

A Thesis
Presented to
the Graduate School of
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In Partial Fulfillment
of the Requirements for the Degree
Masters in Landscape Architecture

by
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Accepted by:
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Abstract

Historically, botanical gardens have many contributing factors relating to their success. Attracting visitors to botanical sites all around the world and providing a unique set of resources are only a portion of what makes these types of gardens so successful. This paper will first analyze the effects botanical gardens, in their current state of operation; have on society from a cultural, economic, and environmental impact. This paper will then propose and discuss education, environmental and community awareness and urban potential. Through a past and present inventory, a proposed alternative future for botanical gardens will be revealed.

Botanical gardens have an abundant set of resources that can allow for more integration. These resources include record keeping, networks, maintenance staff, administration, and living collections. However, looking at botanical gardens through a large scope addresses three important topics that will be discussed in this paper: research, horticulture, education. Let’s not forget that aesthetic qualities play an important role as well in the collaboration of all the factors involved in making a botanical garden an important piece of the designed landscape.

Botanical gardens are generally high in maintenance. This paper will address possible urban conservation problems to be solved by botanical gardens through the built environment and focus on supporting the efforts of more nation-wide botanic use in implemented designs. Through understanding current research on botanical gardens involving climate change, botanical capacity, uses and interest and motives, the role of botanical gardens can then begin and better address conservation and restoration problems through engaging the community and finding solutions for current neglect.

The research methods will be conducted using telephone interviews, site visits, and self-administered questionnaires. The changing economy has proven to add to the
uncertainty of where future of botanical gardens are heading. This research will help clarify the uncertainty and provide solutions for the future of botanical parks of a variety of spaces. The green industry has allowed opportunities for botanical gardens to advance their resources and provide a high level of education. This study will open vast amounts of opportunities to bring botanical gardens from outside the city into the urban environment in a variety of new and exciting ways while addressing important urban environmental issues of restoration and conservation. Through understanding urban botanical gardens use of conservation and ecology, the conclusion has been made evident that urban spaces provide a great opportunity to educate the community.

This project has given light to the idea that botanical gardens should use collaborative space with public parks to provide an opportunity to educate, engage, and illuminate urban dwellers through the use of botanical garden functions and conservation education. This project is about exposure, illumination, and community engagement. Encouraging botanical gardens to become activists in the community through better partnerships and developing new ways to expose the natural environment as an education resource. This project connects with the community on a deeper level to illuminate the minds with conservation and gain support and activism in the community. The project takes the unsightly, run down, degraded site and fills it with life again to show people that mother nature is important not only for ecological purposes but to societies well being and public health.
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BACKGROUND

Too often plants are selected and placed to fulfill a development requirement with not enough importance given to the aesthetic environment they are in. However, with recent public and private efforts to become more sustainable, plants are finding new roles within the built environment in ways we have never seen before. Pocket parks, sustainable learning centers, and a variety of other applications in the urban environment of big cities have combined plants and design in new ways. Several of these new ways are explored using native plant materials to help solve urban conservation problems. Some of these issues have yet to be explored until recently with Atlanta, GA.

In this paper general botanical garden problems will be addressed focusing on botanical capacity, lack of space, invasive species, demographics, and funding as well as other limiting factors related to botanic garden operations. The problems will directly impact urban conservation issues; however, only three will be discussed in length: invasive species, stormwater management, and urban pollution. These key problems will help address a broader understanding of urban botanical gardens with emphasis focusing on research, horticulture, and education. This project will look specifically at a site located along the Beltline corridor in Atlanta, Georgia. Clear Creek provides opportunities to look further into conservation issues regarding stormwater, invasives, and pollution. These supporting documents will illustrate design solutions and address the three core principles of research, education, and horticulture in a way that promotes urban conservation and education through the use of a botanical setting within Atlanta, GA.

The site, located along the Atlanta Beltline corridor, is estimated at 1-2 acres of steep slopes just north of Atlanta Botanical Garden and Piedmont Park. Urban problems
will become apparent as further examination of the site is explored. Finally, these problems will then be analyzed in the case studies of three botanical gardens: Missouri, Brooklyn and the local garden of Atlanta.

Botanical gardens can play an important role in sustainability and the implementation of sustainable practices within urban environments. Currently, botanical gardens have a limited role outside the garden with specific partnerships. The urban environment lends many opportunities to explore uses of botanical functions in a way to connect to the public without being intrusive or costing urban dwellers to learn and educate themselves. Urban sites face many challenges when considering conservation. The lack of space for plants, pollution, and support can result in difficult decisions with regards to design. If these issues of conservation are not addressed through botanical functions a lack of community support for further park development and stewardship may suffer. Other areas may suffer as well, including maintenance. However, if these issues are addressed a variety of professions will benefit. Stronger partnerships may develop through the use of communal spaces. Botanical awareness and importance of research will be better understood to the community by providing education and spaces to learn about the environment. People need to see the benefit in preserving the environment and this comes with providing a space for people to relax and enjoy the outdoors but also have the opportunity to learn from their surroundings.

**Research Questions**

*How can urban spaces provide opportunities for botanical gardens and urban parks to collaborate to address conservation through education?*

*How can a botanical setting/urban conservation space reveal ecological issues to a diverse group of people?*
How can elements of botanical gardens be used to address urban conservation issues involving current park related problems?

How can strategies of urban conservation guide design, function, and information in a botanical setting?

How can a botanical garden in an urban setting address urban conservation?

How do conservation issues drive the framework of an urban botanical setting?

LITERATURE REVIEW

Botanical gardens do encompass a wide range of activities. Some of these activities date back 3000 years. Egyptians were among the first to cultivate plants and realize how beneficial growing gardens could be for a variety of reasons. Romans began to understand the medicinal qualities plants could have and ultimately this idea of medicinal gardens became the foundation for our modern day botanical gardens (BCGI 2010).

Many of the main activities involve education, and displays. However, to be defined as a botanical garden, the Botanical Gardens Conservation International (BGCI, 2010) lists several criteria, which influence botanic activities to help define what these types of gardens should allow for. Listed below is the list of criteria that helps define a botanical garden.

- A reasonable degree of permanence
- An underlying scientific basis for the collections
- Proper documentation of the collections, including wild origin
- Monitoring of the plants in the collections
- Adequate labeling of the plants
- Open to the public
• Communication of information to other gardens, institutions and the public
• Exchange of seed or other materials with other botanic gardens, arboreta or research institutions
• Undertaking of scientific or technical research on plants in the collections
• Maintenance of research programs in plant taxonomy in associated herbaria.
Source: (BGCI, 2010)

With over 2500 gardens around the world it may become obvious that the activities and uses of this type of garden may change from place to place (BCGI, 2010). Because activities change from place to place, it allows for the modification of activities in urban botanical gardens that may not have much usable space. Therefore, understanding how the space is used and the potential issues associated can be a daunting task for many botanical gardens.

Current Issues

Currently, botanical gardens are poised to do more than they already do. However, many would argue botanical gardens do plenty for the environment and the general public. Gardens become comfortable with their status as environmental stewards but are often confined to certain locations and ways of operation. This may imply the general perception of botanical gardens as completely separate from other green spaces.

To understand botanical gardens further and the challenges they face in the urban environment, we must look at the definition and purpose. The general definition of a botanical garden involves “institutions holding documented collections of living plants, for the purposes of scientific research, conservation, display and education (International Agenda, 2000).” To remain planetary stewards gardens must find new ways to reach out and help solve current environmental problems.

Excessive population has caused sewage and pollution problems contaminating groundwater and affecting many of our watersheds. Also the space is very limiting in the
urban environment and may not be conducive for the average botanical garden. Therefore a much needed look into the alternatives for implementing such aspects and activities that these gardens require is very important. New botanic gardens are being established throughout the world mainly to become botanical resource centers supporting native plant conservation (Wyse, 2000). Botanical garden in large cities however, can provide insights to ecological changes providing new opportunities for botanical gardens to rediscover new applications in conservation and preservation (Wyse, 2000). This can be accomplished by trying new ways to address conservation related issues such as stormwater management, invasive species, and urban pollution through the implementation of botanical garden functions in the common urban setting. While still focusing on the core framework, botanical gardens can still use research, education and horticulture through the use of new designs and solutions.

Botanical gardens for a long time have become an attraction for the community by providing beautiful displays and events. Furthermore, botanical gardens have been facing issues with funding, making it difficult to expand operations. With many gardens’ government funding is being reallocated or completely stripped. Operational cost and funding directly impact maintaining the garden and the high quality of standards that botanical gardens are expected to have. The continued interest in providing adequate funding for botanical gardens helps address other issues such as invasive species, storm water management, clean up and educational programs. Botanical gardens now have to supplement activities and programs to make up for lack of funds.

Other problems botanical gardens are facing are issues of accessibility. Some gardens are off the main road and the community may not even be aware of the hidden treasure behind the gates. Botanical gardens may have to look at other options to position themselves to a wide audience (Matheson, 2011)
The need to appeal to a wider audience is becoming a bigger issue with botanical gardens than previously thought. Successful botanical gardens in current economic hardship have stood out to a wide variety of people, and this may be in large part due to location. Great examples of this are seen in the case studies, which will be examined later. These gardens are located within large cities that are adjacent to public parks. Public parks are under a different structure and funding that directly affect the botanical gardens success or lack of it. The problem with expanding partnerships is that though they often work together on education and marketing, other areas such as urban conservation are not approached in similar ways (Medbury, 2011). This would directly affect educational programs and funding. Without these issues addressed, botanical gardens may suffer even more as economic problems linger. Current research begins to shed more light on how botanical gardens are used and what impacts they have on the environment.

**Current Research**

Research has been conducted on a wide range of topics related to botanical gardens. Most recently, climate change and conservation techniques have been the forefront of most research. In an article published by Richard Primack and Abraham Rushing, climate change and botanical gardens were investigated on how botanical gardens can have a role in studying plant behavior in urban settings (Primack, 2009). In particular, the issue of urban heat island affect, which is when urban areas heat up more then the surround suburbs, could have great research potential if botanical gardens were implemented among our urban core.

Also with the effects of pollution and high concentration of gases the denser urban core may become a great venue for botanical gardens to study and educate on climate related research (Primack, 2009). Research on environmental awareness
relating to perception, motives, and interest has also been conducted to evaluate the public’s current use and perception of botanical gardens (Ballanytne, 2007, Ward, 2010). This research found that the public often takes the functions that botanical gardens provide, such as ecology, social, health, and aesthetics for granted. One issue that may affect this appreciation is the current location of a lot of botanical gardens. Gardens tend to be found away from city centers and the general population (Ward, 2010). The research found that there is only a small amount that visits botanical gardens, which are then being sampled. To get a more accurate representation of attitudes, conservation knowledge and behavior, more research must be administered. Ballantyne who found that the respondents to their survey frequented botanic gardens more often then those who did not. Research also found that commitment to conservation is moderate to low, which is opposite the awareness and interest among conservation (Ballantyne, 2007).

In today’s research environment specifically relating to botanical gardens as an institution for research, the lack of botanical capacity is a growing concern (BGCI, 2008). Botanical capacity is the ability to provide trained botanist to the industry of botanical gardens. In recent years the botanical field of study has suffered greatly due to the lack of botanists working for the government and other institutions, such as botanical gardens. Budgets are being tightened and some programs are being wiped out or reduced creating a more difficult environment for botanists to maintain a superior level of research. With the lack of botanists, botanical gardens could suffer as well as the potential research that is so vital to our future success as human beings. Much major advancement in science and technology has come from the understanding of plants. With less research official’s problems with invasives could damage the future success of our nation. Areas particularly in the southeast such as the long leaf pine savannah, which uses fire to maintain its existence, could be eliminated through hardwood intrusion
without the help of botanist to protect and research such areas to gain community support.

Community support and activism is a way our society has been able to help support the botanical industry by raising questions and problems to local governments. Issues such as post industrial waste in Atlanta, GA along the beltline has gained support from the local community to come up with a solution to not only fix these areas of disrepair but also use it as a catalyst for improving urban conditions through extended parkways and connectivity for the foreseeable future. Without botanical capacity the potential for the industry to suffer as a whole is enormous. Botanists are needed in many aspects of the botanical industry and it is not just research. They provide expertise for plants to designers and construction companies on proper installation and maintenance of plants. However, with lack of funding being a main concern of botanical gardens right now new sources of partnerships and community involvement are being sought out. The funding problem gardens face affects everything from research, hiring, designing, education, diversification and many more.

Visitors

One important aspect of botanical gardens that helps keep them secure is visitors. Visitors are attracted to the gardens for relaxation, ideas, events, displays, and education. Without the proper professionals these reasons for visitation could suffer ultimately impact funding for research and other programs within gardens. This is why there are three facets to botanical gardens. Each area of research, education, and aesthetics play an important part in the overall success of the industry as a whole. With growing concerns about botanical capacity one solution may be to look at alternatives for botanical gardens that may allow for a change in the way programs are currently implemented. For example, one solution may be to look at smaller spaces such as
pocket parks that can provide a variety of functions but take the ease of maintenance allowing for funding to be distributed more evenly (Blake, 2011). Though smaller pocket parks can pose some of the same problems as large gardens, they do have the one thing that is different - the size. With less space there is less to maintain.

Maintenance is a major cost for botanical gardens and sustainable sites are becoming more popular each year. This is why finding alternatives by using sustainable methods and appropriate functions can allow for reduction in time and maintenance. This idea of finding alternative locations for botanical garden could ultimately affect botanical capacity through community engagement and allow for future interest in the field of botany for young professionals. Brooklyn botanical gardens in New York, is already doing this as they have also seen the decline in botanical capacity and have devised a solution. Brooklyn is using community education engagement as a source to almost “recruit” new professionals. Teaming up with a local high school right next door to the gardens has allowed Brooklyn to engage young adults at an early age to get them interesting in conservation and botany (Medbury, 2011). People within the city are looking for a way of recreation and relaxation that can also engage the visitor on an educational level that could potentially provide support of local community programs of conservation and maintenance for botanical garden alternatives.

Likewise, botanical gardens can offer more to the public than they currently do. Some botanical gardens offer a great deal to the public like Brooklyn Botanic garden in New York. Scott Medbury, president of Brooklyn Botanic Garden mentioned that educational programs have become a major part of what they can offer to the public. However, with many botanical gardens thinking about how they can grow in the current economy, alternatives to the way of doing every day business becomes crucial. Medbury feels that the success of botanical gardens’ future comes not only from education but monetary investment and endowments. Municipal subsidies could allow botanical
garden operations such as control invasive species or conservation can suffer.

**Urban Invasive Species**

Research and observation have shown that horticulture has played an important role in the dissemination, naturalization, and invasion of plants species throughout the world (Dawson et al, 2008). Many gardens are starting to tackle these issues through implementation of an invasive collections policy (Medbury, 2011). There are several ways to address invasive species on site. These focus on manual and mechanical removal, controlled burning, and herbicides removal. Urban botanical gardens use these methods. However, a proactive approach is often taken from further invasion. Most gardens and urban locations deal with invasive species in one way or another. Depending on the climate, location, and resources, the type of species may differ. However, with lack of urban green space among large cities, along streams urban conditions can provide great habitats for invasive species and in Atlanta many species along the study site have been identified. Most gardens can’t eradicate these species completely but through maintenance they are under control.

This research will use conservation techniques and methods to find solutions for the Clear Creek Project site in Atlanta. Proposing new ways of tackling existing ecological issues. A combination of aesthetic invasive control may be used as an education tool in order to promote education outreach. This will teach the Atlanta population about the importance both positive and negative invasive plant species has on the urban ecosystem.
Urban Stormwater in Botanical Gardens

More than 75% of the U.S. lives in urban areas (Paul, 2001). With so many of American citizens living in urban areas, it has become very important to regulate and understand stormwater processes. After Hurricane Irene hit the Northeast coast in 2001, botanical gardens such as Brooklyn are taking proactive measures to help control and regulate stormwater. Brooklyn Botanical gardens is partnering with the City of New York to create stormwater diversion channels that use garden ponds as a way to ease the excess stormwater that has caused countless problems in erosion and degradation of infrastructure (Medbury, 2011). However, many cities still have stormwater problems with pollution and chemicals leaching into local water tables causing habitat loss among urban streams (Nelson, 2011). New programs are being constructed to deal with urban stormwater issues. This approach can be applied to Atlanta, GA to help fix stormwater issues through a botanical setting that can both teach and help mitigate stormwater. “Urban streams also offer ecologists an opportunity to test concepts of system organization through restoration projects (Paul, 2001 pg. 356). “

Urban Conservation

As botanic gardens enter a new world of economic struggle a much needed look into how urban environments can adapt to growing demands on space. Efforts in urban conservation are being implemented in many botanical gardens and public parks to help strengthen local diversity within the city. In Atlanta, Piedmont Park Conservancy has been implementing a wetland restoration project through planting native species and restoring local watersheds through filtration (Nelson, 2011). Urban conservation today is using stakeholders throughout the community to develop tools and techniques to protect the integrity of the urban fabric (UNESCO, 2011). Urban conservation relating to
botanical gardens often focuses on identifying an area that in need of repair and restoration. Therefore, Clear Creek has been chosen in part due to its brownfield potential, erosion, and pollution problems. The use of ecological techniques such as wetland restoration allows to not only increase biodiversity in the dense urban fabric but also to improve water quality for habitat restoration for fish.

Urban conservation often leads into different techniques use to become more sustainable. A great example of how this could be implemented in an urban setting is through rainwater harvesting. Rainwater harvesting is the practice of capturing and storing rain to provide water for human use (Melby and Cathcart, 2002). Water problems in Atlanta have existed for years and new ways of retention are needed to help support life throughout parks and garden (Nelson, 2011). Through implementing a designed rainwater harvest system, the community has the opportunity to learn the problems Atlanta has been facing but also learn the solutions to help mitigate use and help support their own gardens. These benefits to the community can be used to provide new functions or urban botanic settings in areas where space is an issue and reaches out to a wider general public base. The Beltline project in Atlanta provides a great opportunity to connect the rest of the city to urban conservation issues.

**Benefits and Functions of Urban Conservation**

As discussed earlier, botanical gardens in urban environments provide opportunities for a variety of functions everywhere from providing an area for recreation to urban renewal of soils, stormwater, and mitigating invasives. The benefit urban conservation provides doesn’t lie within just botanical gardens, but the urban environment as a whole. Urban conservation offers the community a sense of nature within the built environment and promotes well-being and a higher quality of life. A lot of urban conservation functions improve ecological processes and support the balance of
urban ecosystems. Furthermore, urban conservation also benefits education programs and engages communities to help support new programs implemented by institutions. Through this idea of community engagement through urban conservation, a rise in public awareness supports research and promotes the horticulture industry to help solve problems of botanical capacity. Urban conservation efforts help encourage networking with other botanical gardens through training, trading, and general knowledge of operations and new efforts to the advancement of the green industry (Wyse, 2000).

**Current Issues in Urban Conservation**

The urban environment is ever changing and requiring a deeper look into current systems of development. As cities become bigger every year, a need to understand urban conservation issues becomes more important. Though there are many issues affecting urban conservation, this section will focus on two in particular that have a great effect on an urban botanical setting. These two issues that urban environments are focusing on; knowledge and mitigation are erosion and plant conservation. Each of these issues has the potential to directly affect each other. For example, plant conservation of native species within the urban environment may help control erosion problems caused by excessive stormwater,

**Urban Erosion and the Botanic Approach**

Soil erosion occurs as the surface of the land is impacted by water, ice, gravity, buildings’ weight, weathering, and many other urban factors (MAACD, 1998). As erosion takes place, environmental conditions are compromised. Nutrient levels are disrupted due to fertilizers, pet waste, and other pollution that leak into watersheds ultimately affecting ecosystems in its path. Natural ground cover improves runoff conditions and helps filter out harmful contaminants (MAACD, 1998). As mentioned earlier, Brooklyn
Botanical Gardens has taken measures to help control runoff as well as Atlanta Botanical garden with wetland restoration. So the issue here is not that erosion happens but what is the best way urban environments can help control its effects. As we have already seen, vegetation provides some of the answer to these problems.

Many institutions are using these urban conservation issues to educate and promote community engagement through active programs. Botanical gardens use many of these programs to educate the community about urban problems. Some of these programs focus specifically on habitat restoration as seen in the wetland restoration of Atlanta. However, the opportunity to impact more people through botanical elements can have a greater effect then just fixing the problem. Botanical gardens through an urban conservation setting can not only address these issues, but have the ability to impact more people through outreach as well. A look at Atlanta botanical garden will better explain this point. In Atlanta, the Botanic Garden sits on top of a hill nearly cut off from the active park goers and general public. Adjacent to the gardens is Piedmont Park, which surrounds the gardens on most of its sides. Below is a creek that has seen major problems with contamination and dumping. Over the past several years, Piedmont Park has been addressing these problems with restoration and soil repair. This program has been proven effective as wildlife has started to comeback and the support of native species has helped filter ground water and prevent further erosion. However, Botanic gardens could do more to address these issues by implementing design ideas that could help educate and energize the community to proactively support urban conservation. This idea could be accomplished through signage, aesthetics, and outreach programs just to name a few. Currently, there is very little signage in the current restoration area of Piedmont Park and aesthetics are at a very basic level. This suggests that further investigation of design is needed. To further understand this, the next issue focuses on habitat restoration and the visual aesthetic relating specifically to plant conservation.
Urban plant conservation

Plant conservation in urban environments has generally involved the effort of the removal of invasive species in replacement of native plant communities. Urban habitat restoration is a movement in the US that involves the almost exclusive use of plants native to a particular region (Dunnett and Hitchmough, 2004). However, through this movement an issue of urban aesthetics and lack of an “artistic element” can be a characteristic of the urban conservation issue. This idea that urban areas need an artistic element is directly associated with ecological design. “The public are most appreciative of habitats that are visually pleasing (Dunnett and Hitchmough, 2004).” To engage community activism urban plant conservation and the project in Atlanta must take on an aesthetically pleasing form to gain support. So the real issue in urban conservation related to plants can often be seen in the design and functions of a site. With these functions education is one way many botanic gardens and urban parks are promoting community engagement through knowledge and understanding of ecological processes.

Education Outreach

As examined earlier botanical gardens provide and education component as one of the primary functions of a botanical garden. Along with research and horticulture, education in botanical gardens focuses on the method of providing the public with issues of concern and importance (Zender Group, 2001). Though there are many ways to approach public outreach this section will focus on methods, education approaches, partnerships, and resources.

Because of the many challenges that face urban botanic settings, a need to
effectively communicate to the public must be included in a plan for design. Most botanic gardens today have a department dedicated to education. These education departments focus on everything from signage to programs including workshops to help raise awareness of conservation goals and objectives (BGCI, 2011). Relating specifically to Atlanta these goals may include urban stream restoration as well as to help gain support from the community to help fund projects. One of the main challenges in education for botanical gardens is the visitation focused on meaningful interaction and retention of knowledge when they visit (BGCI, 2011). This challenge becomes an opportunity for Atlanta Beltline and the restoration project. As discussed previously, the project site located along the Beltline corridor is great for interaction. Since the area being developed is a 22 mile loop around downtown Atlanta, the site allows for plenty of interaction with the public on commute and recreation.

**Techniques and Methods of Sustainable Education Practices**

Methods involved in education practices with botanical gardens often focuses on signage and group activities. Botanical gardens throughout the world document plants in the garden and express this information to the public through interpretive signs explaining importance of the species. Signage allows for self-directed learning so that people do not have to commit to a class if they just want to learn a little bit about what is affecting their community. In order to develop this method, identifying goals, a clear message, and incentives are often used to support the program whether it is through signage or a workshop. Some people may think incentives would involve money but often they could be an improvement in the city to help clean the air or return native plants (Zender Group, 2011).
Benefits of Urban Conservation Education

It may be obvious to many how education can have benefits. However, urban conservation may still need clarification to some. This section focuses on benefits of urban conservation through the practice of education.

One of the most clear and easily understood benefits centers around quality of life. Quality of life can be improved through urban practices simply by providing more green spaces for the community (International Agenda BGC, 2000, BGCI, 2011, Gobster, 2007).

Right now the site in Atlanta is not currently used to its full potential, as it occasionally gets visitors through the beltline trail. Therefore, enhancing the site with aesthetic displays that are both ecologically responsible and provide an educational component is ideal for growing the knowledge about conservation and restoration. “Through aesthetic experience ties our feelings of pleasure to the perceived world (Gobster, 2007). This idea of aesthetic experience plays an important role in quality of life and community knowledge. One way aesthetics, through ecology, can improve is through education. Often ecological arguments are supplanting aesthetics ones as justification for protection of these urban landscapes (Gobster, 2007). Benefits of education can directly affect pollution, stormwater, and invasives through a better understanding of how to manage and design urban botanic settings.

METHODOLOGY

Atlanta, Georgia with over 540,000 people within city limits and over 4 million in the surrounding counties is an ideal place to study urban botanical gardens for the amount of population density Atlanta provides (Atlanta Convention, 2011). Atlanta leads the nation in LEED certified buildings with 53 buildings (City of Atlanta, 2011). Along
with the green initiative plan including projects such as the Atlanta Beltline, Atlanta is an up and coming city that recognizes the value and importance of green initiatives. The green initiative plan involves programs such as ParkRide, Trees Atlanta, PEDS, Beltline, and many more that aim to make Atlanta a more green friendly city. For these reasons Atlanta has been chosen for this study. Throughout this study various methods of research will be used. The city is also currently engaging on a design endeavor to link the entire city through a beltline corridor with the use of parks and urban green spaces.

**Case Studies**

This research will use a case study method focusing on urban botanical gardens from Brooklyn Botanical Gardens, Atlanta Botanical Gardens, and Missouri Botanical Gardens. These case studies will be broken down into a comparative analysis study looking at how each garden addresses key topics or activities specifically relating to conservation and/or restoration. The botanical gardens selected have been chosen on several parameters, the access to annual reports, within or close to a large city, and that provides all of the essential functions of a defined botanical garden. This study will work closely with Atlanta Beltline and Trees Atlanta to address issues of programming, functions, problems, as well as issues that will need to be looked at before an appropriate alternative and plan can be selected.

**Interviews and Questionnaires**

This study will use interviews with top botanical officials to gage appropriate need of implementing alternatives and other uses through the urban environment. Mary Pat Matheson of Atlanta Botanical Gardens feels the Beltline is a great area for possible alternatives to focus on conservation. This area provides a great potential for investment
and development. The study will coincide with Trees Atlanta project to create an arboretum throughout the corridor. Key areas within the Beltline corridor will be selected to examine further for potential use in the design phase of the research. The Beltline currently uses a tax allocation district that allows the city to propose park plans over the next 20 years. Along with selling bonds the city is able to provide funding for this extensive project that encompasses a 22 mile corridor along a former railway. Data will be gathered through interviews and questionnaires to gage public perception and uses for the potential site. This will involve visiting the site and speaking with local community leaders through organizations involved with the Atlanta Beltline Project. This research will use an induction method to arrive at generalizations to be made about urban botanical gardens and how they can help with conservation and education. Open and close-ended questions will be used to gain a general understanding of not only the specific site but also current issues involved with botanical gardens today.

The objectives for this research are to create a setting that allows all members of the public to participate in the functions of a site that provides botanical garden elements through addressing urban conservation issues. Personal interviews will be used to interact with the public and gain knowledge, experience, and memories of public parks/botanical gardens. This will require site visits to the potential site, which is north of Piedmont Park known as the Ansley park area. Using a pilot survey will gage the public’s perception and current uses of botanical gardens. The results of the survey will be used to gage interview questions with the public and botanical officials. The information gathered from case studies, pilot surveys, and interviews with local community members and botanical officials will be analyzed through similarities in responses.
INTERVIEW QUESTIONS

• Does the garden currently have stormwater problems, if so how are you dealing with the issue?

• What would you say would be an appropriate example of a plant collection?

• What invasive are you currently having trouble with and how are you fixing the situation?

• How is the garden currently connected to the adjacent park? Are there issues with the connection?

• Since the garden is currently in a very urban environment what challenges and/or benefits do you see to being in such an area?

These questions were designed to focus mainly on issues that are currently in place at the Clear Creek site. Since the site faces stormwater problems, degradation, invasive species, and lack of space, these questions were used to find out how botanical gardens deal with similar issues and solutions they have used to fix them.

RESULTS

Throughout this study an intense examination of botanical garden functions, sustainability, and public outreach has been conducted. Through the use of telephone interviews and case studies this project resulted in developing a series of analysis and design boards that suggest appropriate actions for botanical gardens and the city of Atlanta, GA in regards to further public involvement and education. This further involvement should result in a better understanding of ecological functions and promote
the importance of botanical garden functions through out the urban setting, not just in a confined space.

Throughout this project different techniques both within botanical gardens and best practices from urban planners have been used in the overall plan for development. The Clear Creek site was designed in order to effectively address conservation issues through botanical garden functions. Opportunities throughout this project have resulted in ways to connect the community, expand partnerships, and practice sustainable urban design. A great example of this is the implementation of a wetland site that serves many purposes. The constructed wetland will provide an opportunity to include native plants while filtering out harmful pollutants. This implementation in the design also allows the opportunity for local citizens to learn about the importance of wetland restoration and potential provide further support and interest to help restore urban environments.

Furthermore, to become more sustainable certain suggestions for site adaptation have been made. For example, the site currently has unwanted businesses, no true connection with the surrounding environment, and lacks facilities for functions that currently take place within other gardens. Therefore, this site has proposed the adaptation of the current buildings for community use to create spaces for workshops, meetings, and other events. Since botanical gardens often use events to gain support this idea will also be adapted to this location. The drawback for this idea is the relocation of the current businesses. However, the benefits to the community far out weigh the negative effects.

The main idea is to use botanical garden elements such as signage, biodiversity, and conservation to connect more urban dwellers to the importance of conservation. The site provides unseen benefits to the environment through proposed underground cisterns and soil remediation. With the use of erosion control products and plants the new site can help control runoff do to the large amounts of impervious surfaces close by
that drain directly into the site. These proposed ideas will coincide with the efforts made by the Atlanta Beltline and Trees Atlanta. Therefore, with conducting important interviews, case studies, and analyzing current literature on botanical gardens this solution remains a best fit for further development within the city.

**CONCLUSIONS**

This study has opened light to very important issues. Issues that have been addressed are sustainability, education, conservation, and community engagement. Though the actual construction of the site will take several more years, Atlanta Beltline now has a plan of action that is appropriate for the city. The Atlanta Beltline has many sites to develop and the purpose of this study was to find a way to design a park that uses the theme of conservation and connect the entire city. One way this city can connect to conservation is through education. Therefore, this study focused on the design and proposal of ideas that will suggest using education and the implementation of conservation techniques.

A full understanding of the benefits of implementing botanical functions through conservations methods will not be fully understood until after the site is developed and a post environmental and psychological study is conducted on the local ecosystem and visitors. Since botanical gardens provide a wide variety of functions this site will be a mixed use area.

The uses of the site based on interviews, case studies, and literature review will consist of onsite signage for education, paths for recreation, pervious materials to promote proper drainage, native plants to support biodiversity, and a community center to help provide funds and community activism.
Throughout this document we have discussed two sets of challenges from urban to garden. Using functions from botanical gardens to help solve current problems for both botanical gardens and the urban setting can solve both challenges, which include everything from stormwater to funding. Some challenges apply to both such as invasive species or funding. These issues are not uncommon and with the right application and design botanical gardens can have a great presence in the urban environment to help solve some of today's most challenging issues of conservation.
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APPENDICES
Appendix A

Analysis Boards

1.1 FIGURE A-1: Case Study Matrix
The Clear Creek site sits within Fulton County, Georgia. The area has been used for centuries as a main mode of transportation, located just south of the Atlanta Botanical Garden (ABG) and Piedmont Park. The site has many opportunities to explore conservation methods and techniques to address stormwater, pollution, and invasive species. The site is right behind the Atlanta Mall shopping center where a pub and over 20 shops and businesses are located. The site has only one official entrance at this point but others are used informally and man-made. The area is also a location for homeless camping, bird sanctuaries within the invasive plants, and many old and new trees with the help of the Atlanta Botanical Garden.

2.1 Figure A-2: Context Map Clear Creek
3.1 Figure A-3: Soils, Watershed, and Slopes
4.1 Figure A-4: Vegetation, Natural Communities

Invasive species

Japanese Knotweed  Japanese Hops  Kudzu  Irenbit

Invasive plant species on this site are a problem. However many of these issues have been initially addressed by the organization Trees Atlanta. Using herbicides, and hand removal, Kudzu on the other hand creates a big problem, but the deciduous plant allows for birds to nest and be protected during the winter months.

Birds

Carolina Wren  Mockingbird  Gold Finch  Pine Warbler

Atlanta birds often find places of shelter among small urban spaces filled with plenty of seeds and shelter from the weather. The species above are the most commonly seen at the Clear Creek site. Some water fowl can occasionally be observed, but not in significant amounts.
Figure A-5: Site Analysis Map
6.1 Figure A-6: Larger Context Map
7.1 Figure A-7: Stormwater Analysis
Appendix B

Design Boards

8.1 Figure B-1: Concept Development
9.1 Figure B-2: Illustrations and Signage
10.1 Figure B-3: Master Plan
11.1 Figure B-4: Materials