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Cassidy Drasser

*University at Albany, State University of New York*

Bryan King

*University at Albany, State University of New York*

Aidan McGovern

*University at Albany, State University of New York*

Ahren Von Schnell

*University at Albany, State University of New York*

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# **Integrating Naturalized Areas onto the University at Albany Campus**

Cassidy Drasser, Bryan King, Aidan McGovern, Ahren Von Schnell

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## I. Abstract

The purpose of this management plan is to provide recommendations to create naturalized areas and increase biodiversity on the University at Albany campus. The University currently follows a number of environmental policies in an effort to promote uniformity. There are many benefits to increasing biodiversity on campus such as providing ecosystem services, increasing education and awareness, aiding in stormwater management, and support institutional advancement. There are already several areas on the campus that would serve as prime locations for projects of this nature including the front lawn and the Dutch and State parking lots. Future directions that the campus can take includes a biodiversity sanctuary and a habitat corridor along a proposed rapid transit bus route. If we implement these policies, the University at Albany can become more appealing and a model for enhancing biodiversity on other urban campuses

## II. Background Information

### A. Existing Biodiversity on Campus

Much of the biodiversity that exists on the campus today consists of numerous plant species. Some of these species include *Pinus nigra* (Austrian Pine), *Quercus palustris* (Pin Oak), *Acer rubrum* (Red Maple), and *Acer saccharum* (Sugar Maple), among others. These trees are considered to be the University's most dominant species and are often placed in large clusters, making them highly susceptible to diseases such as the fungal disease called *Diplodia pinea*.

Some of the species on campus, such as *Acer platanoides* (Norway Maple), are exotic species not native to the New York State or even the United States. In addition to being considered an exotic species, it is also invasive. Other species found on campus include *Fraxinus spp.* (Ash) which require high maintenance due to their susceptibility to insect attack (University at Albany, 2010).

Besides plants, the campus host a number of small mammals and bird species. Some of these species include *Sylvilagus* (Cottontail Rabbit), *Tamias* (Chipmunk), *Cardinalis cardinalis* (Northern Cardinal), *Buteo Jamaicensis* (Red Tailed Hawk), and the exotic-invasive *Passer domesticus* (European House Sparrow).

### B. Uniformity on Campus

The campus has a very symmetrical shape to it, full of geometric shapes and aesthetically pleasing views. This uniformity is key when considering what and where plant species are to be included on the campus landscape. The ultimate goal of uniformity is to keep things aesthetically pleasing and to uphold the long-standing tradition of order and neatness (Kersch, 2015).

Planting orderly lines of identical plant species can bring visitors and students a sense of calm and ease. Herein lies one of the many problems of a monoculture; having large groupings of the same or similar species make it easier for disease to pass through the plant community. This can lead to large costs on the University when it comes time to remove the plants and soil, and replant new species.

Despite the fact that having greater biodiversity can lead to greater stability and faster recovery from diseases; pests; and other hazards, it is often seen as unattractive and visually unpleasing. To circumvent this problem, the campus now groups species in accordance to their

size, shape, branching density, and foliage texture. For example, plant species that are small, have a round shape to them, have open branching patterns, and have fine foliage texture (small leaves) will be placed together (University at Albany, 2010).

### **C. Landscape Practices and Maintenance Restrictions**

In order to maintain the uniformity seen on campus, there have been a number of maintenance practices and restrictions put in place. For example, areas such as the athletic fields and the green space at Collins Circle are completely off limits to modification. These areas are maintained through mowing, and planting or construction of any kind would be almost impossible to achieve on these sites. These areas are considered to be easier to maintain because they generally don't contain trees and are not fragmented. The inner podium is another place where uniformity is maintained and change is generally off limits.

Currently, the edge of the campus is slowly being eroded away as more infrastructure is built. Places that were once heavily wooded are being cut away to build new facilities such as academic buildings and student apartments. The space where Empire Commons now stands was once considered to be a corridor to the Albany Pine Bush. This activity is cutting the campus off from its connections with the Pine Bush and thus its natural habitat (Kersch, 2015).

Though there is existing green infrastructure, its prominence on campus is relatively minor. One example of green infrastructure that is starting to spread across campus is the use of porous pavement. Porous pavement helps to reduce the need for sewage and underground infrastructure, and allows water to infiltrate the ground rather than pool in certain portions of the campus (Fazio, 2015).

### **D. Current Policies**

The University currently follows a number of policies in its effort to practice environmentally sound practices. The University advocates the use of the LEED Green Building Rating System, which is based on accepted energy and environmental practices. The system helps to ensure that the University considers the most environmentally sustainable practices. LEED helps to reduce light pollution, minimize site disturbance, and improve access to public transport, among other things (University at Albany, 2010).

In an effort to maintain the integrity of the campus water supply, the University also follows the Clean Water Act. The Clean Water Act dictates that water be of a certain quality, improving water treatment, and preventing point and nonpoint source pollution (EPA, 2014). In accordance with the United States Environmental Protection Agency (EPA), the University follows the Municipal Separate Storm Sewer System (MS4) plan. The MS4 allows for the transport of polluted water in urban areas (DEC, 2015); (University at Albany, 2015).

The University is subject to a number of policies that have been created by the New York State Department of Environmental Conservation (NYSDEC). One of these policies is the State Pollutant Discharge Elimination System (SPDES). To prevent the loss of soil during construction, sedimentation of storm sewers and receiving streams, and excessive air pollution, SPDES requires permits for any construction project on campus (DEC, SPDES, 2015). Should the project concern an area greater than one acre of disturbance and 30% or more impervious surface planned, the NYSDEC requires that a full Stormwater Pollution Prevention Plan (SWPPP) be written (University at Albany, 2010).

The University also complies with the Endangered Species Act which aims to protect and recover imperiled species and the ecosystems upon which they depend (FWS, 2013). In 2008, the NYSDEC reviewed the NY Natural Heritage Program database for the Albany area (AASHE STARS, 2012). They provided a list of rare and state-listed animals and plants, significant natural communities and other significant habitats. The database is continually being updated due to ongoing monitoring. Although the University at Albany does not own or manage legally protected or internationally recognized areas, the campus sits adjacent to the Albany Pine Bush Reserve and Six-Mile Waterworks. The Albany Pine Bush Reserve is a globally-unique ecosystem and is important for biodiversity conservation, wetlands protection, stormwater management.

## **II. Value of projects to the benefit of the campus community**

As urbanization increases and the natural landscape becomes more fragmented, the value of green spaces and biodiversity conservation becomes even more pertinent. The University at Albany and broader community, will greatly benefit from integrating Albany's natural environment and wildlife back into the campus. Wildlife-friendly campuses can increase biodiversity conservation, education and the use of living-learning laboratories, increase campus and public engagement, aid in stormwater management and promote institutional advancement.

### **A. Biodiversity Conservation**

Biodiversity has both direct and indirect economic benefits for humans and wildlife (Edwards, 1998). Biodiversity provides recreational and aesthetic opportunities for humans, but also assists in flood control, climate regulation, pollution and waste assimilation and nutrient cycling. It also attracts and helps maintain species that may be endangered or threatened, such as pollinators. Pollinators have experienced major declines in populations due to human encroachment and development and pesticide use. Urbanization has fragmented natural landscapes and caused a decline in biodiversity around the world. Wildlife-friendly practices should be integrated in urban environments, especially at the University at Albany, where there is a lot of green spaces that can support plants and wildlife native to the Albany area.

Albany is home to the globally unique and intact ecosystem, the Albany Pine Bush Reserve, which was created by the last glacial period (Pine Bush). Although the Pine Bush is quite small in area, it is home to 45 of the 538 wildlife "Species of Greatest Conservation Need" in New York State. It also provides for more than 20 federally- or state-listed at risk species, including the Karner Blue Butterfly. The Pine Bush is fragmented in various areas around the county and it is extremely important that it is maintained. Since the University at Albany lays adjacent to the Pine Bush and Six-Mile Waterworks, it should include landscape management practices that support these species, especially migratory species that utilize the campus for stopovers, rest and feeding. Unfortunately, the campus' edges are slowly eroding away to built infrastructure and the University at Albany is separating from the Pine Bush and its natural ecosystem. Creating additional areas for biodiversity conservation on the University at Albany campus can also create a habitat corridor to connect species from the Pine Bush, Six-Mile Waterworks and Indian Pond. Intact and contiguous habitats increase biodiversity, resilience and ecosystem functionality (Goddard, 2010).

## **B. Education, Living-Learning Laboratory, and Campus and Public Engagement**

Increasing naturalized areas on campus can create opportunities to incorporate educational opportunities. Living and learning labs link campus operations, academics and research and provides hands-on experience for students (creating a campus sustainability living lab). They increase resources for facilities managers, which includes awareness campaigns and planning, skill development and knowledge of sustainability issues that the younger generations are facing. They provide resources for students to research and participate in conservation practices. This can also create mechanisms to monitor and evaluate progress. Designing and implementing natural systems, such as rain gardens, can increase biodiversity, but also aid stormwater management, filter run-off of pollutants and fertilizers and decrease the need for expensive drainage sub-infrastructure.

Creating naturalized areas on campus can increase education and awareness of the plants and wildlife native to the Albany area. Students are not the only group that can benefit from naturalized areas on campus. The administration, the broader community and the grounds and maintenance crews on campus can learn landscape and biodiversity conservation techniques. Signage can be developed and placed in these areas to let passerby's and visitors become aware that they are entering "Naturalized Areas". For example, Indian Pond's trails consist of signs and informational pieces about the vegetation and wildlife that inhabit the area. This can increase ones pride for the University at Albany. The University in the High School Program can utilize naturalized areas on campus. This program provides students in the Capital Region with advanced study. They can supplement their learning by gaining hands-on experience in biological, ecological and conservation sciences.

Urbanization can create a disconnect between the community and its heritage. The University at Albany is home to a rich cultural heritage and it has the opportunity to educate the campus and surrounding community on the natural, cultural and historical background of Albany, while demonstrating environmentally favorable landscaping practices. It can serve to unite a diversity of students, faculty, staff, as well as groups and organizations in the broader community under a common purpose to promote cooperation and understanding.

Living and learning labs fits President Robert Jones' visions on sustainability and public engagement. It can facilitate collaborations between faculty, staff, students and the local community to plan for and design innovative and sustainable infrastructure and landscaping methods. It echoes the University at Albany's commitment to enhancing the campus' and broader community's ecology, equity and economy.

## **C. Stormwater Management**

In accordance with the Federal Clean Water Act, the University at Albany follows strict stormwater practices to maintain the highest water quality possible. Managed by the New York State Department of Environmental Conservation, the University at Albany adheres to the State Pollutant Discharge Elimination System (SPDES) and Municipal Separate Storm Sewer Systems (MS4) permit (stormwater management policy).

The University at Albany has a severe flooding problem due to its large areas of impermeable surfaces and outdated stormwater sub-infrastructure. As more hard infrastructure and impermeable surfaces replace the campus' natural landscape, increases in water volume and flow are observed. The out-of-date underground drainage systems on campus cannot manage

current storm water discharge levels. This creates increased non-point and untreated runoff of pollutants, fertilizers and other contaminants off the campus and onto Western and Washington Avenue, and also into New York's water bodies. This not only degrades drinking water quality, but also adversely affects public health, fisheries and habitat health and recreational uses of these freshwater systems.

The University at Albany actively works to increase stormwater management practices above the NYSDEC minimum threshold, and there are many opportunities to go above and beyond (F. Fazio, personal communication, April, 13, 2015). For example, by improving biodiversity and green spaces on campus, the accompanying ecosystem services such as flood management, water filtration and increased surface permeability can improve stormwater management. It can also help alleviate the current outdated drainage systems by creating spaces for water to flow into and be absorbed. It costs a lot of money to drill into pavements and replace entire underground drainage systems. Increasing biodiversity can be valuable in the long run because it can perhaps prevent future replacement of expensive new infrastructure.

Innovative projects such as designing and creating rain gardens and green roofs can also ease flooding occurrences. There are already three rain gardens and one green roof on campus, with an additional green roof to be added to the new Campus Center Extension project. Besides an educational opportunity, rain gardens filter runoff pollution, recharge and conserve local groundwater, and enhance sidewalk appeal (rain garden). They are inexpensive and low maintenance projects that can be an environmentally sound solution to urban stormwater runoff and flooding. Green roofs not only mitigate stormwater impacts, but it improves air quality, enhances biodiversity and wildlife, public health, and reduces urban heat island effect (greenroof).

#### **D. Institutional Advancement**

Over the last several years, the University at Albany has experienced enrollment and retention issues at the undergraduate and graduate levels. In order to become a publicly engaged university, the value of sustainability needs to be taken very seriously because it is not just a core value held by the University at Albany students, but by this new generation of youths. It could be argued that aesthetically-pleasing campuses attract higher caliber students. It is contended that increasing green and neutralized spaces will increase enrollment, retention, and graduation of students. Due to its aesthetic and recreational benefits, green spaces contribute to health and wellbeing (Goddard, 2010). Implementing living and learning labs can expand the University at Albany's academic footprint.

The University at Albany is already nationally recognized for its sustainable and innovative projects. In 2010, it was listed on the Sierra Club's Cool Schools List, and in 2012, earned a STARS Silver rating from AASHE (Office of Environmental Sustainability, 2015). Continuing environmentally-savvy projects can boost the university reputation even more. Green infrastructure provides ecosystem services and enhances the social reputation of the city (Goddard, 2010). Besides attracting students, it can promote environmentally-friendly and sustainable urban planning, development and even employment. These spaces can not only advance the University at Albany, but its broader community. The University at Albany has the opportunity to become a living prototype for integrating the natural environment with urban landscapes and become a national model for urban campuses.



### III. Existing Opportunities to enhance biodiversity on the campus

There currently exist many areas on campus where projects designed to increase biodiversity could be implemented. We have highlighted some of these areas as particularly good candidates for project implementation: The front lawn by Washington Avenue, the 4 way intersection at University Drive & Tri-centennial Avenue, the Dutch quad volleyball court rocks, Dutch & State quad parking lots, and the Western Avenue campus entrance. These areas are key locations for projects to enhance biodiversity on campus, as well as provide other benefits such as storm water management and aesthetic appeal.

#### A. The Front Lawn (On Washington Avenue)

This area is a pair of large patches of grass and trees right along Washington Avenue in front of the campus, and would be a great place for naturalization via low or no mowing techniques and planting of more diverse plant species. Making the area more natural would greatly increase the amount of biodiversity on the patches, and would provide a small wildlife refuge on campus for students to enjoy. There is of course the issue that the University may not want the front lawn, and therefore the entrance to the campus, to look like it is not being maintained. This issue can be mitigated however by putting up signs and other notifications to tell people about the purpose of the area in terms of biodiversity protection, and the more natural look may appeal to people more than the landscaped appearance.

#### B. 4-Way Intersection of University Drive and Tri-centennial Avenue

This particular intersection on campus is very prone to flooding during sudden rain storms. Prior to the construction of Empire Commons, there was dense forest that included the ecosystem that is characteristic of the Albany Pine Bush Reserve (J. Kersch, personal communication, April 20, 2015). This site aided in stormwater management due to its deep roots and absorbent, permeable land. This area completely transformed into an urbanized space, with an entirely impermeable surface. Since then, major flooding in the form of run-off has been observed at the 4-Way intersection of the University Drive and Tri-Centennial Avenue. Projects here could include roadside bioswales, rain gardens, and tree boxes. All of these ideas would have the dual benefits of both promoting biodiversity and urban greening as well as managing storm water. Managing storm water from pavement is important due to the costs of towing cars of students and faculty who get stuck during storms as well as the fact runoff from pavement contains a large amount of chemicals and pollutants.

#### C. Dutch Quad Volleyball Court Rocks

The area in front of Dutch quad where the volleyball court is located is ringed on all sides by decorative gravel, which serves no purpose and takes up valuable real estate on campus. The considerable amount of area the gravel takes up could be better used as locations for urban greening projects, such as gardens or bioswales. The gravel creates a barren and desert like feel that may be unwelcoming to current and prospective students. These areas can be lined with vegetation and serve a dual purpose: attract pollinators and enhance aesthetic appeal.

## D. Dutch and State Quad Parking Lots

Despite data supporting the idea that university does not in fact have enough parking, it has been found that both Dutch and State parking lots are underutilized even during peak hours. Aerial photos show that the furthest reaches of State quad parking lot and about half of Dutch quad parking lot are usually vacant. These areas would be great spots for urban greening projects, particularly Dutch quad parking lot as it is also in an area prone to storm water problems. Further, both parking lots have large dividers between rows of spaces that would be perfect for bioswales and other urban gardens that would increase biodiversity, aesthetic appeal and storm water collection capabilities. Many students argue that the University at Albany resembles “concrete jungle”, particularly due to the overwhelming roads and parking lots. Transforming these relatively empty parking lots can increase aesthetic appeal, transform the culture on campus and create a more inviting feel.

## E. Western Avenue Campus Entrance

This area is particularly vulnerable to flooding during sudden rain storms, as it lies downhill from the rest of campus. It would be an ideal place for many of the same projects as the University Drive and Tri-centennial Avenue intersection such as rain garden, tree boxes, and bioswales.

## F. Science Library, Rear. Biodiversity Sanctuary

Immediately behind the Science Library is an expanse of lawn that is a prime candidate for the location of the Biodiversity Sanctuary. Immediately adjacent to this area can be found a stone, open-air terrace. Oversized, and elevated above the ground level, this common area will provide an excellent viewing platform of the proposed Sanctuary. Immediately behind can be found the Barnes and Noble Reading Room, from which students will also have excellent visual access, thanks to the large observation windows comprising its outer wall.

One of the primary purposes of the Biodiversity Sanctuary is to provide on-campus habitat for local pollinators. It is recommended that special attention be given to developing conditions which favor Bumblebees. Reasons are enumerated below:

1. Bumblebees are, in general, very gentle animals. Aggression is uncommon in most species, often to the point where it is possible to inspect their nests without smoking or protective gear. Due to its proximity to campus facilities, safety considerations of the Biodiversity Sanctuary will likely be a prominent concern of University policy makers. A focus on this docile and well-loved species should help to alleviate those concerns.
2. Similarly, the non-threatening nature of bumblebees will allow for intimate and meaningful interaction with students for educational purposes, with minimal safety concerns.
3. Bumblebees are often the initial bees to become active in the spring and the last bees to which are active in the fall. Provided with the appropriate flora, they will provide pollination services throughout the growing season.
4. Bumblebees are capable of regulating their body temperature. This allows them to be active in conditions which are moister and cooler than honeybees.

5. Bumblebees have the ability to “sonicate.” This is method of buzz-pollination, which results from the bee vibrating its body at a frequency close to a middle C musical note. In addition to being aurally pleasing, it has the advantage of significantly increasing the release of pollen from certain species of plant.
6. Bumblebee nests are simple to create and require little maintenance.
7. Bumblebees forage up to a mile from their nests. This will allow for them to provide pollination services to the entire campus, and beyond.

Development of the Sanctuary will include incorporating white clover into the overall ground cover. This will provide a “bee pasture” that specifically attracts the bumblebee and that will be aesthetically appealing to human senses. Lavender, another favorite of this species will serve a similar purpose.

As the bee is active during the entire growing season, it is essential to provide it with a source of food for that entire span. This will involve planting species of plant that are in bloom during various points in the season. Recommended natives include wild lupine, purple giant hyssop, and New York aster. These flower during spring, summer, and autumn, respectively. Shrub and tree coverage will be provided by common serviceberry and highbush blueberry. Fruits from these plants can offered to Campus Dining Services in order to promote locally grown produce.

## **V. Future Projects and Directions**

### **A. Enhancing and Expanding the Heritage Garden**

As the Heritage Garden’s mission is to showcase plants which have contributed to the agricultural and botanical history of New York, further development should be done with this in mind. One recommended avenue of exploration would be to begin cultivation of plants which have medicinal value and a tradition of use in treating ailments. This can provide a valuable conservation service as well; the popularity of natural medicine in recent years has led to many plant species becoming threatened in the wild. An example is goldenseal, an herb with antimicrobial and anti-inflammatory properties long used by Native Americans. Due to practices such as wildcrafting (harvesting plants from their native habitat), its population has become much diminished across its range. Cultivation of botanicals such as this should be a top priority for the Garden in its goals of promoting plants with a unique historical value to the State of New York – by necessity this objective implies preservation of such species.

### **B. SEFCU Parking Lot Lawn**

It is recommended that the existing grass lawn be replaced with white clover. As previously mentioned, this species can be used to create a “bee pasture,” encouraging pollination services on campus. By created multiple such pastures, it will be possible to created biodiversity corridors throughout the grounds. Additionally, clover offers the following benefits over grass:

1. It grows rapidly and deters weeds.
2. Deep root system lessens soil compaction.

3. It is a nitrogen-fixing plant, thus eliminating the need for artificial fertilizer.
4. It requires little to no watering or mowing.
5. It remains verdant even during periods.
6. Clover is inexpensive, costing approximately \$ 4.00 to cover 4,000 sq. ft. of turf.
7. It is soft and comfortable even on bare feet.

### **C. Interfaith Center**

It is recommended that due to its shaded location, the Interfaith Center grounds be selected to host bat houses. These will provide valuable roosting sites for native species such as the little brown bat, which in turn will aid in pest control on campus through consumption of insects. As some insects are vectors for disease causing organisms, bats offer an attractive health and wellness service to our community.

Finally, it is recommended that the Interfaith Center's perimeter be lined with high hedges due to its proximity to the road. This will reduce noise pollution penetration, providing a more attractive site for bat habitation, as well one which is more conducive to quiet, spiritual contemplation.

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