**Sustainability of the Prairie Garden at**

**The University of Illinois College of Veterinary Medicine**

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**Introduction:**

In 1820, Illinois contained 22 million acres of prairie, but due to modern intensive agricultural practices, only a few thousand remain today. Of high quality, remnant prairie, there are only 2,300 acres which mostly persist along railroads, in cemeteries, and in ground that is not fit for farming (DNR, 2014). Prairies are part of the history and culture of Illinois. The rich soils that grow so much food for people all over the country were formed under prairie landscapes. These grassland habitats have a lot of potential to continue providing ecosystem services for the citizens of Illinois, but first we have to recognize those ecosystem services and realize the value of the sustainability of prairie landscapes. Faculty at the University of Illinois Veterinary School and at the Illinois Natural History Survey have aimed to do just that through a prairie restoration project on the Veterinary Medicine campus.

The World Health Organization’s 2005 Millennium Ecosystem Assessment categorizes ecosystem services into four sections: provisioning, regulating, cultural, and supporting. Prairie ecosystems can provide all of these services to people (Millennium Ecosystem Assessment, 2005). They are regulating, because they help sequester carbon which offsets climate change. They have cultural value because of the history of our state, and many people find them aesthetically pleasing. Prairies are supporting because they assist soil formation, and have a healthier nutrient cycle than many other land use types. Lastly, prairie ecosystems are provisioning because they include edible species that can sustain humans, and they support pollinators, including native bees, butterflies, moths, birds, and non-native honey bees that support our agricultural systems, and provide food and material goods to us.

One of the greatest reasons that people get involved in habitat restoration projects is because of their aesthetic appeal. That was the case originally for Kerry Helms, the head of graphic design at the College of Veterinary Medicine at UIUC. In a 2009 meeting of “Orange, Blue and Green,” an environmental group at the veterinary school, Kerry expressed his desire to see “something other than a lawn” in front of the general science building on campus. He had native prairie plants in his own yard, and wanted to see something similar in front of the vet school. He called on his friend James Ellis, who is a botanist at the Illinois Natural History Survey in Champaign. James had a great understanding of the necessary steps to start and complete a prairie restoration project.

**The Student Sustainability Committee:**

In the beginning, it is possible that Kerry and James did not realize the full potential of their project. They applied to the UIUC Student Sustainability Committee (SSC) and received funding to go ahead with the prairie garden project. The SSC functions as a springboard for sustainability projects on campus. They collect two environmental fees from all UIUC students- the Sustainable Campus Environment Fee and the Cleaner Energy Technologies Fee. They also review applications to receive funding provided by these fees, and allot funding at each project’s request if it fulfills the necessary criteria (SSC website, 2014).

The original prairie garden plan fell under the category of “Land Projects” provided by the SSC, and fulfilled the criteria of no gain of impervious surfaces on campus, increased carbon sequestration, and lowering the resources used for upkeep and maintenance (ie compared to a sod lawn). The prairie garden was successful in all of these categories. James and Kerry might not have planned for all of the benefits that come from the prairie planting, but there are benefits to restoration projects that might not be as obvious or measurable in comparison to other sustainability efforts.

**The Plan:**

James and Kerry’s original goals were for aesthetics, the benefit of ecosystem services, environmental stewardship, and education of the community. The ecosystem services provided by this prairie include biodiversity, carbon sequestration, soil formation, water filtration, aesthetic values, and more. During my visit to the prairie site, Kerry and James both highlighted one of their favorite parts of the prairie- when the orange butterfly bush and blue downy gentian blooms appeared next each other on an island in the parking lot. Despite the 50 or so native plant species, and increased site visitation by animal species, environmental stewardship remains difficult to measure. This prairie garden was a restoration site, as restoration can include even small gardens that improve the state of the land for human use or ecological benefit. It is an example of meliorative restoration, which is described by the Centers for Humans & Nature as “any form of land or water remediation or restoration that focuses on improving the status or condition of a valued species or habitat.” On the other hand, ecocentric restoration is improving a site to a “pristine” state for the sake of nature (Van Horn, 2014). On this 10,000 square foot plot, there is too much outside interference and management for the prairie garden to be considered pristine. However, the goal of environmental stewardship is achieved through this restoration, and is clearly visible to the public as they walk around the Veterinary Medicine campus.

Another goal that Kerry Helms and James Ellis had for this prairie garden was education of the community and UIUC students. In the first few growing seasons, this plan came to fruition when Red Bison Club members came to the site to collect prairie plant seeds, which they planned to use in other prairie plantings on campus. Master Gardeners were also involved with the beginning stages of the project, and the planting itself turned out to be a large community event with over 100 participants. Kerry Helms designed flyers to spread the word, and there were postings on the UIUC Vet Med news page to attract volunteers (News Releases College of Veterinary Medicine). This level of public support was one of the plan’s original goals, and definitely something that was successful in the beginning stages of its development.

**Sustainability Metrics:**

Although the goals of the founders and the planting of the prairie garden were a success, delving into the specifics of sustainability metrics can prove to be very difficult when considering a project such as this. The goals to plant a prairie, educate and involve the public were all represented. However, the qualifications that the SSC upholds are not as arbitrary, and many people would require measurements to prove the success of this prairie garden. For example, besides aesthetic qualities, what makes this prairie garden any more efficient or valuable that a sod lawn? The planting of the prairie garden came with costs, namely the $21,700 donated by the SSC. Sustainability metrics can help to measure and compare the success of this project to others on campus.

 Some of the metrics that came up while looking into this project more deeply included herbicide, water, and fertilizer use, labor resources, mowing, and the potential for carbon sequestration. Data provided in an analysis comparing different lawn types concluded that native plantings had the lowest impacts with regard to carcinogen pollution levels, climate change, and land use (Smetana and Crittenden, 2014). These measures all indicate that such plantings would be more sustainable in the long run with regards to human, social, and ecological health. From my interviews with the founders of the prairie garden, I learned more about the sustainable measures at this specific site.

 With regards to water use, the native prairie garden is successful and more sustainable than a conventional sod lawn. In the first growing season, the prairie garden had to be watered the same amount as the regular lawn, once per week. Now it does not have to be watered at all, whereas the rest of the lawn on the Vet Med campus, and all other lawn areas on the UIUC campus have to be maintained. Native prairie plants are more drought resistant, and typically need less management in all aspects of their care. This is emphasized in the SSC plan, which includes native plants as a priority in all land based projects.

 One topic where this planting was lacking with regards to sustainability was in herbicide use. In the beginning, the site was sprayed with Roundup herbicide to kill the grass in order to plant the prairie. In comparison with other grassy/lawn areas, the prairie definitely used more chemical herbicide. Since the first growing season in 2009, the garden has used a similar amount of a pre-emergent herbicide as the rest of the lawn areas on the campus. In general, the prairie has used a larger amount of glyphosate herbicide than the remainder of the campus.

 On the other hand, the prairie garden uses less labor resources and mowing, which includes the use of diesel fuel. According to the EPA, gas mowers account for 5% of US air pollution every year, adding up to 26,212,514 tons of CO2 per year (EPA, 2014). In my calculations, I assumed that the average riding mower like the type that is used to mow the Vet Med campus uses one gallon of diesel gasoline per acre. This 7200 square foot plot is equal to .16 acre, so when the prairie is mowed once per season, it uses .16 gallons of gas. If this garden was mowed the average 12 times per summer that the rest of the lawn has to be mowed to keep it in acceptable condition, it would use 1.92 gallons of gasoline. In the end, it saves 38.4 pounds of CO2 per season from being released into the atmosphere (EPA, 2014). This does not include all of the other chemical pollutants which come out of the lawnmower’s exhaust, including carbon monoxide and nitrous oxides. The habit of the prairie garden and its maintenance schedule make it much more sustainable in the long run than the grass lawns surrounding it, and those that we see all over our UIUC campus.

 One of the main positive points that I discovered while looking into the sustainability of this project was the potential of the prairie for carbon sequestration. One study published in the journal of “Aspects of Applied Biology, Biomass and Energy Crops” indicated that a native prairie, not treated with fertilizer or water could accrue 120 g/m2 of biomass yield. This indicates that in the 7200 ft2 plot of the prairie (668.9 m2) could accrue 162.2 pounds of biomass. This study explained that half of the dry biomass would be carbon, so 81.1 pounds of carbon would be sequestered in every growing season (Jungers et al). While these numbers are not based off of this particular study, it is a good baseline to start from, and we can see that even a garden prairie can make a substantial difference over the years.

**Critique:**

The success of any project based on measures of sustainability depends on the collection of data. For a project to be labeled as sustainable, the metrics need to be put into place. While a project can be labeled as “green” in the beginning, it can sometimes turn out in the end that it took more resources than originally planned. In the case of the prairie garden, there are many factors that are hard to measure. The prairie sustains native plant populations, as well as insects, birds, and potentially other types of animals. A starting point for measuring the success of this project would be a species count, including the number and types of plant species that have been successful and persisted over the years. This would let the SSC and other groups planning prairie gardens know what is successful in the area. When I visited the site, James Ellis explained to me that some species such as blue joint grass grow a lot taller than the shorter species of grasses and forbs. In the future, this information could serve other groups like Red Bison, and inform as to which species would be most helpful to the success of the prairie.
 Now that the prairie has been established for five years, it would be a good time to undertake such a study. James Ellis and Kerry Helms both have their own busy careers, and this kind of monitoring does not necessarily fit into their current plans. As a botanist, James Ellis knows what plants are successful and could explain to anyone how this site is succeeding and what its shortcomings are, but having a hard set of data would be the most helpful. As a continuation of the original goal for education, a native Illinois plant identification class could visit the site, and in the process learn some rare native plants, while taking inventory for this project. This could also be true for entomology, ornithology, horticulture, and many other disciplines at UIUC.

 Having these measures would indicate the ecological success of this project and encourage more education on its behalf. More measures, such as the exact amount of fertilizer, herbicide, and water used on the site would provide information on the long term sustainability. As James Ellis said, doing a test on soil organic carbon might be too expensive, but measuring the inputs of the system would definitely be within their means. The follow up that the SSC provides on the success of sustainability projects should definitely contain a section on sustainability metrics. Many programs, including the sustainability program at the University of Maryland, require that all participants monitor the projects and report on their success. The resources put into each projects should be measured, as well as the outcomes.

**Conclusion:**

 NRES students, SSC members, and students in many other disciplines at UIUC regard sustainability as a high priority. The Chancellor of our school, facilities and services, and the Illinois Climate Change Action Plan have all committed to sustainability on many different levels. A discussion on the metrics of sustainability efforts on our campus is essential. We should be proud of every effort toward sustainability on our campus, and strive toward our goals of making each project more successful, and to have a great impact on our campus’ future.

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