The Arboretum Children's Garden Patio and Wet Meadow Demonstration Area

Final Report and Extension Submission

Summary

This project was developed to create a unique area near the entrance of the Kentucky Children's Garden (KCG) and the Arboretum's new facility. This area not only provides a sustainable way to clean and infiltrate stormwater runoff from the impervious surfaces of the parking lot and surrounding hardscape, it also acts as a nature play area for children waiting to enter the KCG or on their way home. This project also helps a previous Sustainability Challenge Grant by treating stormwater that the previous grant did not. Now, most of the runoff from the parking at the Arboretum is treated either through the wet meadow or one of three bioswales completed last year.

After much waiting to begin construction due to other projects that potentially effected this project, it finally went in the ground in the early fall. Due to the delay in this project, we will require one more summer (through August of 2017) of student help and to complete the project. The backstory is that a potential donor was planning a memorial garden and plaza space at the entrance to the KCG, which would have affected our planting area and most likely destroyed about half of what was eventually planted. We felt it unnecessary to compete with that project and felt it best to wait, as noted in previous reports.

Objectives

As stated in the application, the goal for this project was to create and monitor a successful wet meadow and permeable paving patio that cleans and infiltrates runoff prior to entering storm infrastructure. This meadow is to serve as proof-of-concept case study for the campus and Lexington. This area provides many populations of natural learners. Signage will guide children and adults in understanding stormwater and how these particular plants work in this system. Additionally, measurable reductions in stormwater runoff have been accomplished simply by removing the turf and adding mulch. Once plants become established (3-4 years), micro-channels in the soil developed by root systems will increase infiltration even more than we see today. Our hope is that after education, the aesthetic of native plants will become commonplace. We have received many complements on the bioswales, and expect the same once this area is established.

Methods

Students, staff and faculty worked through the design process to create, not one final design, but two. After creating the first design and then learning that a new project was being planned that directly affected our design, we reworked ours so that it would all flow together. After the other project fell through, our first design was then implemented on the site. Plant selection was key and was worked out between faculty and staff in horticulture, landscape architecture and the Arboretum. We worked quickly this past fall to get plants in the ground and established prior to the threat of frost. I truly believe that Jesse Dahl at the Arboretum can grow grass on concrete as he did an excellent job in establishing the wet meadow in short order.

To monitor the site, we established baseline conditions using modeling software and will adjust those models once we see how much runoff the wet meadow actually holds. Current estimates for the bioswales seemed high, but rarely does runoff occur from the bioswales. We will also watch root establishment in the wet meadow to compare root establishment and under soil drainage networks to that of amended soils. However, that takes time and will be monitored over the next five years. We currently have one problem area in the wet meadow and will address that erosion issue. Grab samples have shown high temperature water leaving the parking area, one of the predominant pollutants in the urban setting. We expect to see lower temperatures as the water moves through the wet meadow, as long as we can get enough of a sample to measure.

Outcomes

Student engagement was critical to the success of this project. In all, approximately 50 undergraduate students took part in growing, planting and care of the project. The Arboretum has a number of community participants that engage in many aspects of the Arboretum and its projects. Thus far, over 1000 elementary, middle, high school and college students have visited the bioswales. We fully expect that number to be much higher for the wet meadow.

The area is ready to be a living laboratory for campus. From the use of different plant species to the root systems that will develop, this area of campus can and will be studied. We (landscape architecture) will use the site as showing a systems approach to understanding and handling water runoff. We are excited at the prospect of the number of insects and birds this area will attract as well. Probably a publication or two are ripe for the picking.

Currently there are two scholarly publications in the works from my office. The first considers the cost difference between amending soils with sand to increase infiltration versus letting the plant roots do this work. It is about half written and I expect it to be out for review in late February. The second considers using the Coefficient of Conservatism (CoC) as a plant selection guideline. Often, plants are chosen in ecological restoration based on what the end stage should be, not how we might get there. And often those plants that are very specialized that are planted end up dead in quick order.

Reflections

Overall, I think we have accomplished some really good things regarding stormwater management on a small scale and bringing nature to children in the urban context. I am excited to see the area in three years and beyond as it grows and changes over time. I am also excited to watch children enjoy nature as they interact with the site in mostly unrestricted ways. Our next steps include analyzing how well this area infiltrates water, what kinds of insects visit the area, create the signage for certain areas, and continue to monitor when we can. So far, we have found the biggest difference in water is the overall temperature once the water moves from the parking lot through the meadow area.

Budget Analysis

~~Total budget requested: $21,000~~
~~Current expenditures: $10,536.16~~
~~Current transfers from SCG program: $10,209.76~~
~~Recent purchase rock for underpaving at $326.40~~

~~Extension request:~~
~~Mulch for late spring: $980.00~~
~~Bench seating: 4@ $1,000.00 = $4,000~~
~~Signage for education: 3@ $500.00 = $1,500.00~~
~~One student for summer maintenance: $2,500.00~~

~~Total for extension: $8,980.~~

See page 4.

Extension Request

We officially request an extension due to the late start and to have the ability of a seasonal hire to maintain the area so that is does not get overgrown and is maintained in an aesthetically pleasing way. If this area were to fail in looks, these types of gardens in the city will not happen promoting poor water quality in the city. Once we finalize our budget analysis, we will know how much we will require to finish the project.

Item	Grant total	Spent	Remaining	
	21,000	12,256.34	8,743.66	
Plants	8,000	7,380	620	
Survey	1,000	1,000	0	
Bench/Mulch	5,000	980	4,120	
Gravel	2,000	326.4	1,673.60	
Reagents	500	0	500	
Part-time Students	4,500	2,569.94	1,930.06	
Remaining items to secure				
Benches/mulch	5,000	980	4,120	
Part-time student	2,800	1,930.06	-869.94	Reagent cost should cover most of shortage
Signage	0	1,500		Gravel Excess to cover
Total w/expected expenses		20,656.10		
Amount transferred to date		17,959.76		
Total request of last transfer/extension		2,446.34		