

Rain Gardens to Improve Stormwater Treatment at the University of Texas at San Antonio Main Campus

Dr. Marcio H. Giacomoni, PI
Dr. Heather Shipley, CO-PI

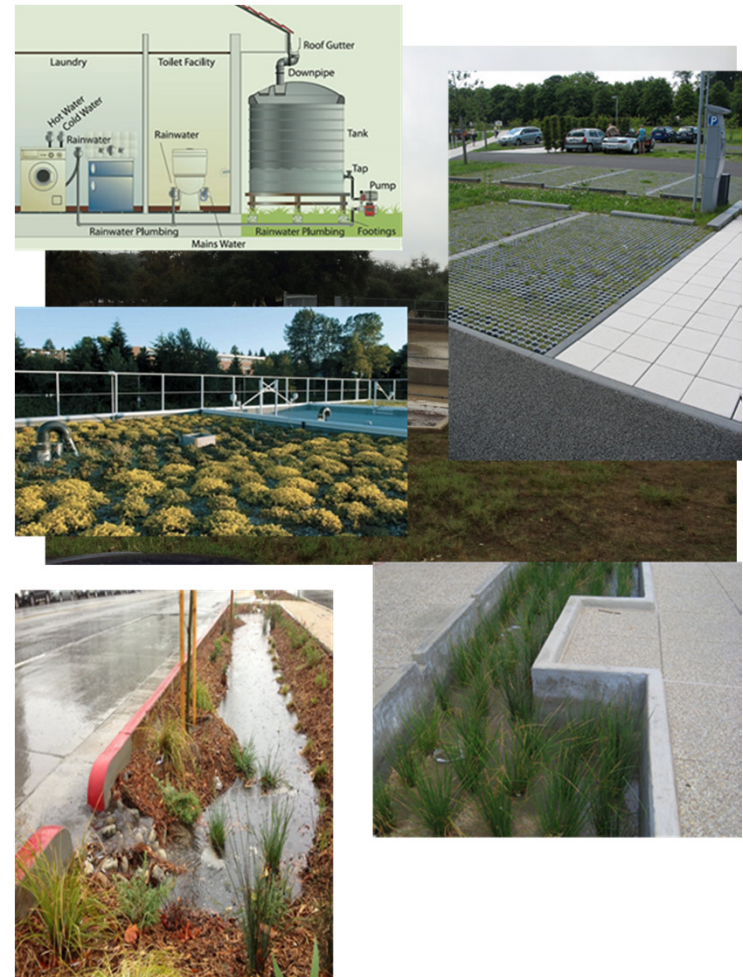
Department of Civil and Environmental Engineering

UTSA

The University of Texas at San Antonio™

Motivation

- Existing regulation require stormwater treatment on top of the recharge zone of the Edwards Aquifer¹
 - Sand Filter basins
 - 80% of Total Suspended Solids reduction
- Low Impact Development
 - Green Infrastructure
 - Enhanced treatment performance



¹ TCEQ- 30 Texas Administrative Code (TAC) 213.5

Current Work

- GEAA and SARA
- Monitoring 1 sand filter basin at UTSA Main Campus
- 1 year
- Inlet and outlet sampling:
 - Solids, Bacteria, Nutrients and Metals



Research Questions:

- How current treatment technology is performing?
- Is the impermeable liners necessary?
- If not, how much extra recharge can be generated into the Edwards Aquifer?
- How LID can perform in San Antonio?
 - What is the optimum design?

Sand Filter Basins x Bioretentions



Structural BMPs	Hydrologic controls			Removal processes					
	Storage/detention or flow attenuation	Infiltration	Evapotranspiration	Settling	Filtration	Sorption	Bioaccumulation	Biotransformation/phytoremediation	Other (e.g., photolysis; volatilization)
<i>Infiltration BMPs</i>									
Bioretention	●	(●)	◐	◐	●	◐	●	●	(◐)
Sand filter	◐	(◐)	○	○	●	(◐)	○	○	(◐)

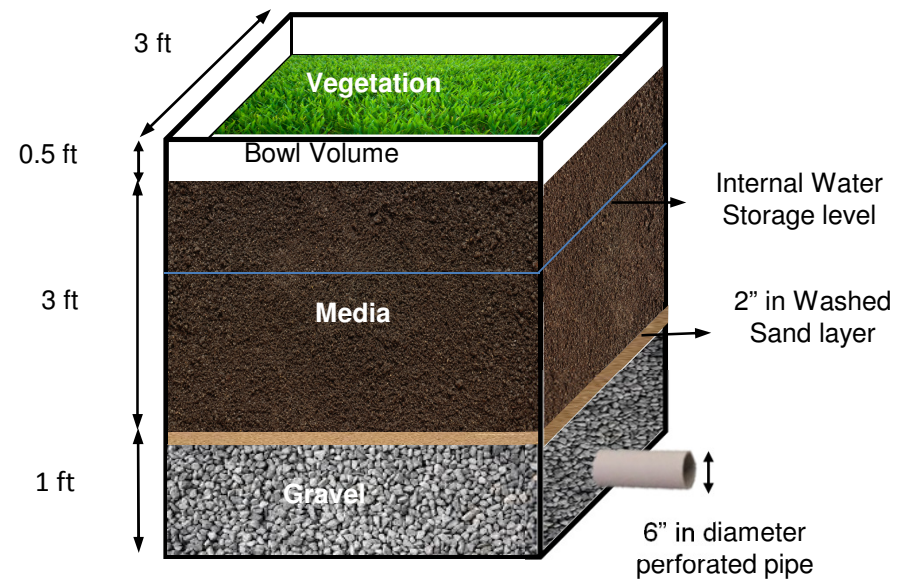
Symbols: ● major function; ◐ secondary function; ○ insignificant function; () optional function

Goal and Objectives

- Main goal:
 - implement and assess the water quality of bioretentions on the University of Texas at San Antonio main campus
- Four specific objectives:
 - Research Objective 1) Identify an optimal bioretention design for San Antonio using bioretention box experiments.
 - Research Objective 2) Implement a series of parallel bioretention and sand filter cells
 - Research Objective 3) Monitor the bioretention cells
 - Educational Objective 1) Enhance education of the public about stormwater sustainability

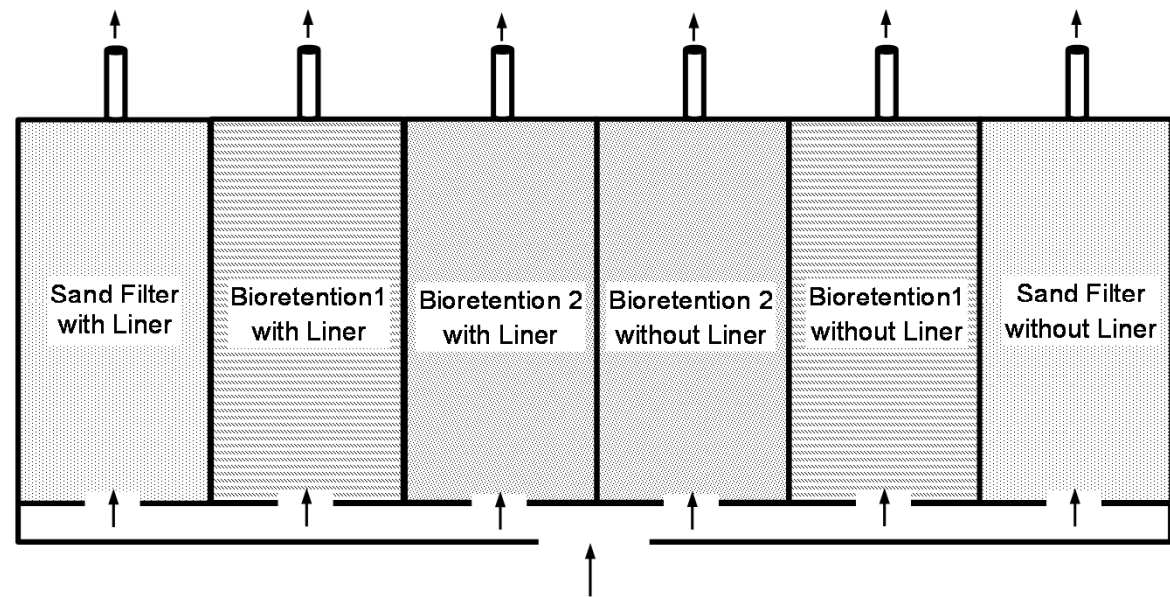
Objective 1) Identify an optimal bioretention design for San Antonio using bioretention box experiments.

- Most of LID design guidelines come from East Coast
- What is the proper combination of soil media and plants for San Antonio region?
- Build and monitor several combination of plants and soil composition in a controlled environment.



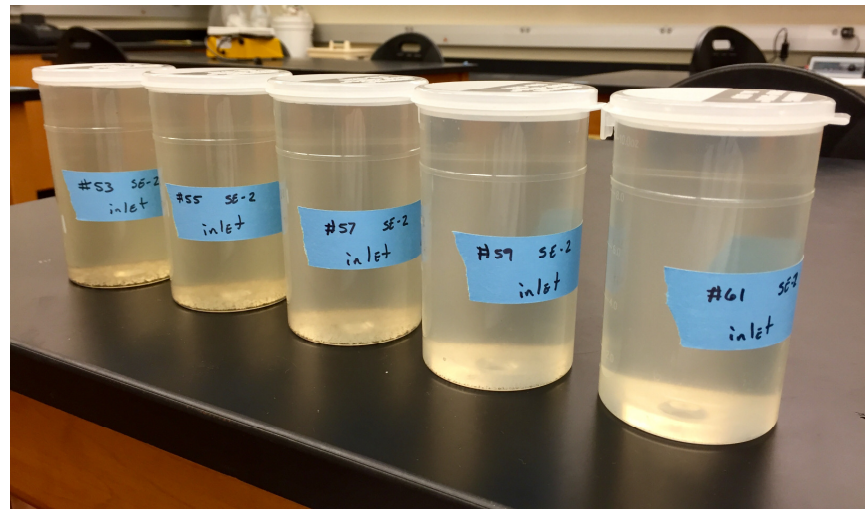
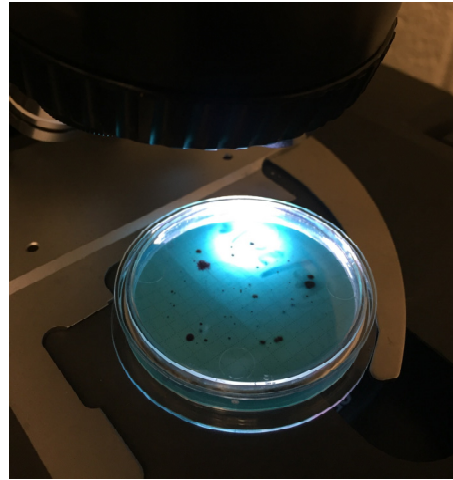
Objective 2) Implement a series of parallel bioretention and sand filter cells

- Parallel cells
- Monitor and sample the inlet and 6 outlets



Objective 3) Monitor the bioretention cells

- 2 years
- Measure flow and infiltration
- Test inlet and outlet:
 - Solids,
 - Bacteria,
 - Metals,
 - Nutrients



Educational Objective 1) Enhance education of the public about stormwater sustainability

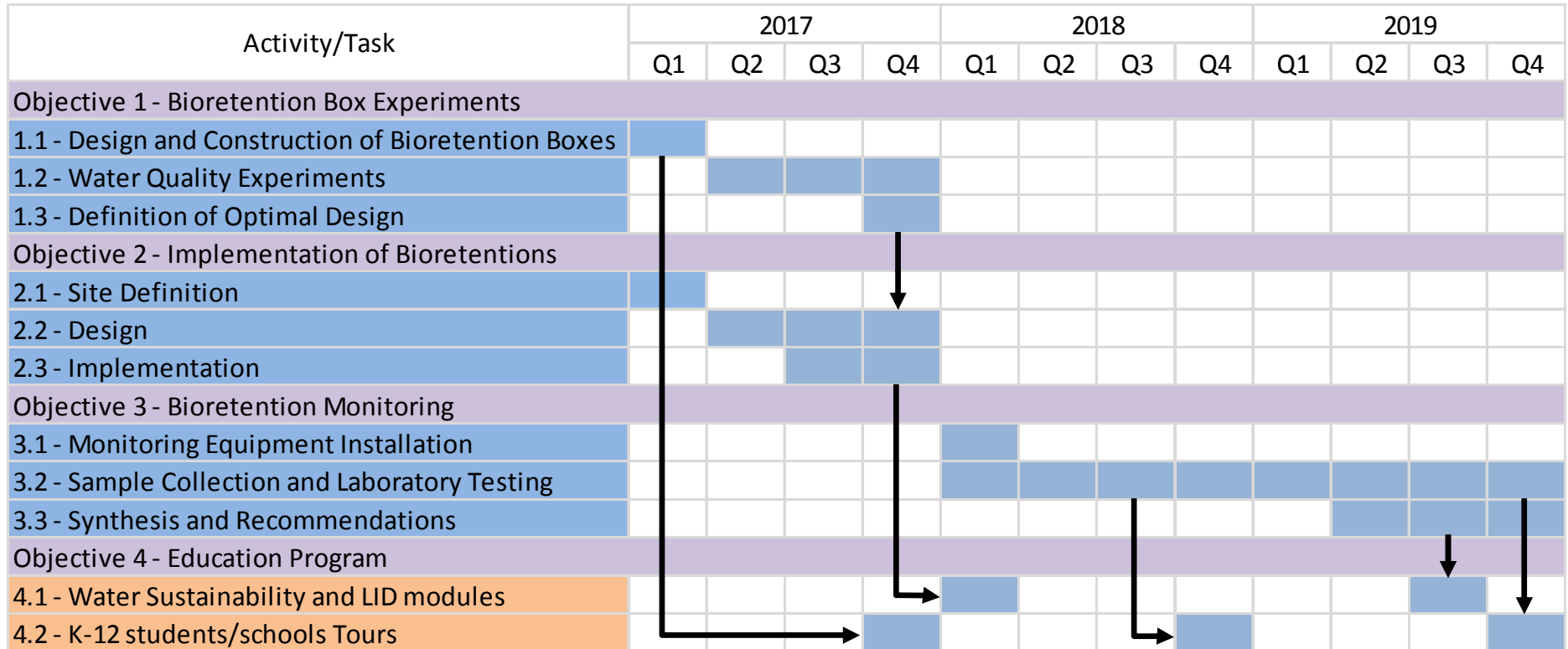
- Bring students from high schools to UTSA campus to visit the bioretention cells and the lab
- Incorporate LID/ Green Infrastructure at UTSA curriculum



Potential Monitoring Sites



Timeline





QUESTIONS?



marcio.giacomoni@utsa.edu