

Stormwater Ecological Enhancement Project (SEEP)



Overview

The Stormwater Ecological Enhancement Project (SEEP) began in 1995 as a take-home final exam in the course Ecosystems of Florida. The exam objective was to develop a management plan to enhance a stormwater retention basin located within the University of Florida Natural Area Teaching Lab (NATL) for species diversity. Since that time, the Wetlands Club at UF has taken this project forward and developed a full-scale created wetland that achieves not only the original objectives, but also improves wildlife habitat, water quality, and aesthetics.

What is a Stormwater Retention Basin?

Water that runs off the land during and after a rainstorm is called stormwater runoff. This runoff and any pollutants it carries flows into streams, rivers, lakes, oceans and depressions throughout the landscape. In an urbanized landscape, natural physical, chemical and biological processes are disrupted and leaves, litter, animal waste, oil, grease, heavy metals, fertilizers and pesticides are often added and transported downstream. A stormewater retention basin provides temporary storage for the runoff generated by development in the watershed releasing it slowly and reducing the potential for flooding. The basin also provides some treatment of pollution carried by the stormwater runoff.

Wetland Values

While wetlands have historically been considered of little importance, our increasing understanding of these systems is changing this misconception. Wetlands are now recognized for providing many vital benefits. Some of these benefits include

- Unique plant and wildlife habitat
- Groundwater recharge
 Recreational opportunities
- Aesthetics
- · Improved water quality

Although we have lost more then 50 percent of the historic wetlands in the lower 48 states, protection of wetlands has increased considerably over the past 20 years due to recognition of these values.

Wetlands and Stormwater Basins

Wetlands can be found alongside rivers and lake shores, and as low areas in the landscape that often become flooded during storms. These wetlands are the natural stormwater basins of the landscape. As humans create stormwater basins to reduce the effects of development, it seems only logical to integrate wetlands into these basins. This provides benefits beyond that of water storage as the basin becomes a multipurpose area serving our needs to reduce flooding while adding wetland functions that have been lost over the past 200 years. The water treatment component of the retention basin would also be substantially enhanced by the diversity of vegetation and complexity of the integrated wetland community. integration of these "free" services provided by a natural system within the needs of our growing world has been termed Ecological Engineering. This new approach to urban and regional planning is not only a more environmentally sensitive approach, but one that uses processes that have been working naturally for millions of years.

The Pre-Enhanced Retention Pond at NATL

The 3-acre retention pond at NATL is the low point of a 40 acre watershed. The majority of the basin was constructed in 1989 with additional storage added in 1990. Structures within this watershed contributing significant runoff to the basin include the Center for Performing Arts, Entomology and Nematology buildings, the Park & Ride commuter lot and roadways and sidewalks between and around these buildings. The total storage of the basin to offset the increased runoff generated by these impervious surfaces is 478,000 cubic feet. Prior to enhancement, the bottom of the basin was essentially flat, with uniform slopes of the north, south and east sides. To the west of the basin, the slope is low and quickly grades into a pre-existing depression of the area. Because the bottom of the basin was uniform in elevation the established vegetation prior to enhancement was dominated by Cattail and to a lesser extent by 31 other species.



Ecologically Enhanced Design

The primary goal of the project was to increase the diversity of flooding depths and frequency of flooding that occurs within the basin since this is the primary factor regulating presence or absence of vegetation in a wetland. To do this, two depressions were dug at the southeastern end of the pond providing a deep, openwater habitat. At the north end, a low berm was constructed that temporarily impounds 80% of the entering stormwater. This forebay provides the first phase of treatment and has been planted with species known to take up heavy metals and remove nutrients. Water from the forebay will be slowly released to the rest of the basin, first flowing through an area planted to resemble a bottom land hardwood swamp, and then move into a shallow marsh before entering the deep-water ponds.

At the southeastern end of the pond, another small berm was built to divert stormwater away from the deepwater pond, increasing treatment time. At the end of this berm a knoll was constructed and planted with trees to provide nesting or roosting habitat for birds. The basin was planted with species that resemble those found in wetlands communities of North Central Florida



Benefits of SEEP

The SEEP project already has provided an unparalleled learning experience for Wetlands Club members through project design and organization, regulatory agency interaction and team work. Other benefits of the project include:

· Species Diversity. The variety of plantings and topographic diversity on the sight provide new genetic material as well as suitable establishment sites for long-term increases in vegetative species diversity within the basin. Since 1995 the number of species found within SEEP has increased from 32 to over 120.

· Wildlife Habitat. Vegetative diversity as well as diversity of aquatic habitat provide a multitude of new biotic niches not previously available in the basin. The value of this habitat will become increasingly important as other areas on campus and in the Gainesville community are encroached upon. Numerous wading birds, reptiles, amphibians, and mammals use the basin along with a multitude of diverse and fascinating range of insect species

· Aesthetics. Many retention basins are notoriously unattractive, often fenced in, littered with trash, and square. Although the original retention basin at NATL was pleasant compared to some, its appeal has been significantly improved by increasing its resemblance to a diverse wetland. The present diversity of vegetation includes many flowering species and provides many different textures and colors throughout the ear making this a nice spot to visit regularly to see what things are changing and what is in bloom.

· Water Quality. Construction of the forebay, planting of species known to assimilate contaminants and diversion of stormwater to maximize treatment all improve the water treatment potential of the basin. Several studies conducted on the basin indicate that most contaminants entering the basin are being retained in the forebay area and near the points where stormwater enters the basin. This improves the water quality in the rest of the basin and the quality of water that leaves the basin and infiltrates into the ground.

· Research. Since the concept of integrating wetlands into stormwater basins is still a relatively new concept, little is known about optimization and performance of these systems. Creation of SEEP provides a unique opportunity to test the principals of this concept, pushing the University of Florida to the forefront of this technology. The location of this site on campus as well as the location of the site within NATL allows for easy access and control over activities wit the site. Faculty, staff and state agencies interested in this topic are able to use this as a long-term study site.

· Education. Educational opportunities for both students and the public are enormous for this site. The University of Florida has one of only three wetland centers in the country with some of the founding faculty in principals of Ecological Engineering. Many courses throughout the campus use the area for various components of their curriculum. Public education opportunities abound with the proximity of the Florida Museum of Natural History within a stones throw of the basin.

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