

1) Abstract

- i) P3 Awards: A National Student Design Competition for Sustainability Focusing on People, Prosperity and the Planet. EPA-G200 8-P3-Z5 – Water
- ii) Title: Water Awareness, Research and Education in East Tampa (WARE East Tampa): A pilot collaboration involving USF, Young Magnet Middle School and the East Tampa Community.
- iii) Faculty Advisor: Maya Trotz (matrotz@eng.usf.edu; www.eng.usf.edu/~matrotz; www.eswusf.org). (co-advisors) Trent Green, Associate Professor, College of Architecture, University of South Florida (USF); Fenda Akiwumi, Assistant Professor, Department of Geography, USF, and Amy Stuart, Assistant Professor, College of Public Health, USF.
- iv) Institution: University of South Florida
- v) Student Represented Departments and Institutions: Civil and Environmental Engineering, Architecture, Chemical Engineering, Environmental Science and Policy.
- vi) Project Period: August 4, 2008 to April 1, 2009.
- vii) Project Amount: \$10,000.
- viii) Total Project Amount: \$10,000.
- ix) Project Summary: (1) Stormwater retention ponds play a vital role in flood and pollution control in communities throughout Florida and volunteer community programs have been successful at reducing local pollutant loads and maintaining pond health. Community funded revitalization programs in East Tampa, an economically disadvantaged urban area, include beautification efforts of stormwater ponds, but do not address water quality, maintenance or potential impacts on the pond and community members (from fish consumption) posed by increased accessibility and use of the ponds; (2) This P3 award will establish a collaborative mechanism involving the University of South Florida, Young Middle Magnet School and East Tampa community members that effectively raises environmental awareness in East Tampa using stormwater ponds as an initial focal point; (3) Through community education and awareness, local pollutant inputs to storm water will be reduced; an activity that not only impacts local pond water quality, but also water quality in the Tampa Bay; (4) Outputs from this project are: a) curriculum developed for students at Young Middle Magnet; b) stormwater retention pond demonstration modules and tour; c) baseline water quality data collection for three retention ponds in East Tampa and establishment of a sustainable water monitoring program; d) preliminary assessment of sediment heavy metal concentrations; e) a report with proposed activities needed to advance this project. Participant surveys will be conducted at various times over the course of the project to evaluate its effectiveness; and (5) P3 concepts are weaved into WARE's educational program for USF College of Engineering students, Young Magnet's middle school students and East Tampa community members.
- x) Supplemental Keywords: *ecosystem protection, environmental analysis, monitoring, sustainable environment, community based, surface water.*

Background and Problem Definition

East Tampa is a historic, majority African American (80.3%) community of 29,518 residents located in Tampa, Florida. Thirty three percent of the population lies below the poverty line and 48.8% have less than a high school education. The area is home to 25 illegal dump sites and other potentially contaminated sites (EPA, 2007). The community is undergoing tremendous community driven revitalization and was recently awarded EPA funded Brownfield assessment grants (EPA, 2007). The East Tampa Community Revitalization Partnership (ETCRP) is a coalition of neighborhood groups that advises the city on redevelopment projects within a 7.5-square-mile area designated as a Community Redevelopment Area (CRA) since May 2004 (Johnson, 2007). Many of these projects, like a new police station, are funded through a 2004 initiated Tax Increment Fund (TIF) which consists of a portion of the area's property taxes. One of the projects selected for funding is a retention pond redevelopment and beautification targeting three ponds in the community. This beautification project was designed under the guidance of co-advisor Prof. Trent Green in USF's College of Architecture to create community friendly open spaces with exercise paths and seating areas. Unfortunately, the already funded project did not address water quality issues or pond maintenance (managed by the City of Tampa's stormwater department) after the completion of the beautification.

Properly maintained storm water retention ponds play a vital role in flood and pollution control in communities throughout Florida (Livingston, E.H., 1995; Stoker, 1994). Community members also play a vital role in reducing pollution inputs to storm water through actions taken in their own yards (Aponte Clarke, D. M., et al., 1999; Bannerman, R. T., et al., 1993; Lehner, P. H., et al., 1999; Sarkar, S.K. and Bhattacharya, A.K., 2003; Serrano, L. and DeLorenzo, M.E., 2007). Community understanding and awareness of the water quality in these ponds and the health risks posed by consuming fish caught in them is also needed in places where fishing occurs; an activity that East Tampa residents have already suggested occurs (Campbell, K.R., 1994; Campbell, K.R., 1995; Casey, Ryan E., 2007; Cole, R.H., et al., 1984; Karouna-Renier, N. K. and Sparling, D. W., 2001; Marsalek, J. and Marsalek, P.M., 1997; Yousef, Y.A., et al., 1984). Programs like Hillsborough county's "Adopt A Pond" have been successful at ensuring ponds are well maintained to serve their greatest potential, however, require the active involvement of a volunteer community group (SFWMD, 2007)). "Adopt-A-Pond" does not serve communities within Tampa's city limits and there is currently no similar program serving these urban areas. Water Awareness, Research and Education in East Tampa (WARE East Tampa) was a pilot project proposed for this Phase I P3 award that focused on stormwater ponds in an economically disadvantaged urban area. It involved the University of South Florida (Engineers for a Sustainable World Chapter, Civil and Environmental Engineering Environmental Laboratory Class), Young Magnet Middle School and the Health, Education and Social Services Committee (HESS) of the ETCRP. USF is less than ten miles away from East Tampa, making it easily accessible for research and educational projects. Young Middle Magnet school for math, science and technology is one of nine public schools in East Tampa

and is conveniently located directly opposite one of the targeted retention pond beautification projects which will be completed by June 2009.

Purpose, Objectives, Scope

The goal of Phase I was to establish a sustainable, collaborative mechanism that raises environmental awareness and understanding amongst East Tampa residents (Figure 1). By using a storm water retention pond as a focal point, the three groups involved (USF, Young Middle Magnet and HESS) are building a framework to educate and communicate with each other and to the broader community about environmental issues related to water in Florida.

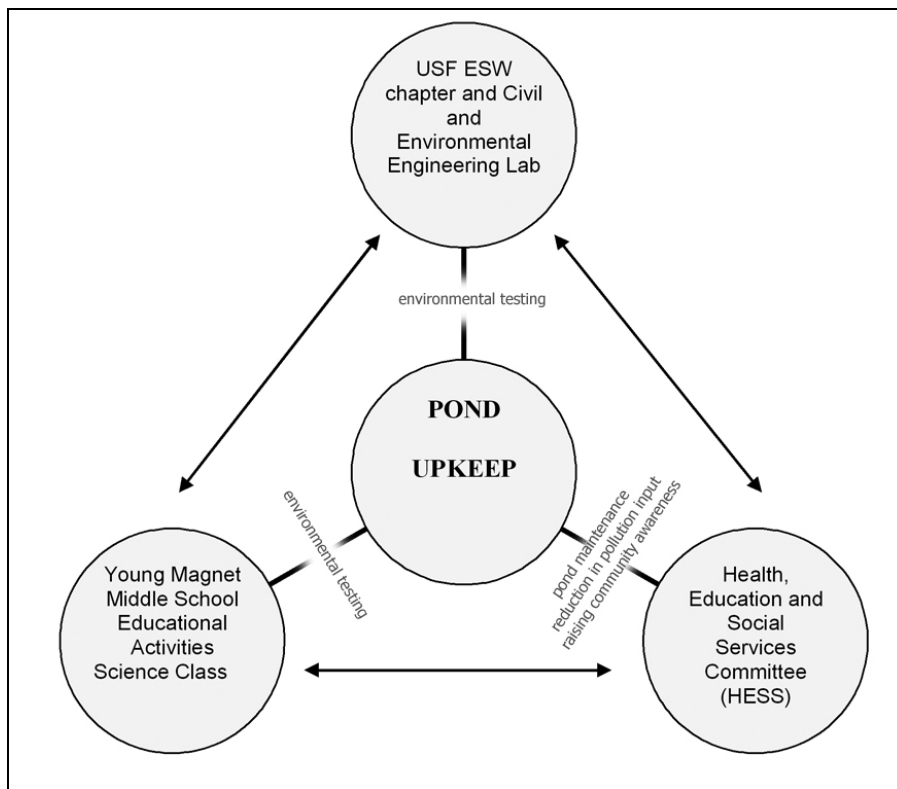


Figure 1. Initial Model to Sustainably Manage Stormwater Ponds in East Tampa

The objectives for this initial P3 award were:

- 1) Develop curriculum for K6-8 that integrates testing of water quality in local retention ponds.
 - a. The science teacher from Young Middle magnet will work with USF faculty and students to develop curriculum that can be approved and integrated into the school's educational program. They will conduct background research on stormwater ponds in East Tampa and their management, successful community driven management strategies used elsewhere, and relevant K6-8 curriculum.

- b. They will also develop storm water demonstration modules. These will be shared as a part of the ESW exhibit for the USF Engineering EXPO (February 2009) that attracts students and teachers from throughout the Tampa Bay region, at community meetings (August 2008 and March 2009), in the classroom and at the national P3 EXPO.
- 2) Establish a sustainable, water quality monitoring program for the redeveloped retention ponds in East Tampa.
 - a. ESW students and the PI will identify the most sustainable mechanism for monitoring and sharing data for the three ponds. This will include sampling and analysis as a part of the USF Environmental Engineering Laboratory course taught by the PI. It will also incorporate the input from Young Middle School students for the pond opposite their school.
- 3) Collect baseline data on heavy metal (Hg, Pb, As, Cu) sediment concentrations in the three ponds targeted for redevelopment.
- 4) Engage East Tampa community members in WARE activities.
 - a. ESW students will introduce the project to the community through a booth exhibit at the 2008 East Tampa Community Survival Day fair.
 - b. They will also work with HESS to deliver a workshop on the importance of the stormwater ponds and develop a bus tour of East Tampa's stormwater ponds. They will also identify the most appropriate ways to deliver the demonstration modules developed for Objective 1 to the community.
- 5) Prepare a report on potential project expansion activities.
 - a. Based on the newly remodeled pond environments, the ESW students will determine if there are any other interventions needed to maintain pond water quality and identify the most sustainable solutions (e.g. use of certain types of vegetation, solar powered fountains).
 - b. The three groups involved in this project will examine the feasibility of expanding the project model to cover more retention ponds in East Tampa and include more K-12 schools. They will also identify the most appropriate methods for informal science education within the community based on the project (e.g. a multimedia learning kiosk at the pond site).

Data, Findings, Outputs/Outcomes



The findings and outputs for the project objectives list above are summarized below.

- 1) Develop curriculum for K6-8 that integrates testing of water quality in local retention ponds.

- a. Ms. McAllister, a science teacher from Young Middle

Magnet worked with the USF team to develop curriculum that was integrated into her 7th grade science class. One class was chosen for the initial phase of the project as a test case and also because the late start of the P3 grant limited the time for curriculum development over summer 2008 as initially proposed.

Over the Fall 2008 semester, ESW students and Mrs. McAllister worked on the curriculum for the class to use in Spring 2009. The document prepared addressed the issues listed in Table 1 with a large emphasis placed on section VI and field and laboratory exercises.

Figure 2. ESW students visiting with Young Middle Magnet Science teachers to work on curriculum in September 2008.



During Phase I, curriculum was developed, entitled “Water Matters”, which helped to educate the students on water issues, stormwater retention ponds, various analytical procedures, and on ways that they can conserve water at home. The curriculum was taught on a weekly basis by student members of the ESW-USF chapter.

Figure 3. Young middle magnet 7th graders and ESW students Erlande Omisca, Joniqua Howard and Ken Thomas (back row L-R) along with Young Middle Magnet’s teacher, Mrs. McAllister, Dr. Trotz (PI) and Young Middle Magnet’s Principal Dr. Cheneille, and Assistant Principal, Dr. McDermott (front row, L-R).

Students from a 7th grade Environmental Science class at Young Middle Magnet School were given the opportunity to apply knowledge and field analysis skills to address the environmental and social issues associated with the stormwater retention pond located directly across from the school. The students learned how to utilize the Quanta Hydrolab probe to assess water samples for various parameters (temperature, pH, conductivity, dissolved oxygen, turbidity, etc.). Using these skills, the students were able to regularly monitor the status and progress/decline of the stormwater pond. In addition to the field activities, the students had an opportunity to create and design a website to post their research findings and conclusions, along with the chance to build a small-scale model of the stormwater pond following completion of the beautification.

Table 1. Curriculum Outline for Young Middle Magnet Students**Overview**

The curriculum is designed to be correlated with Sunshine State Standards that have been stated in Holt Science and Technology Level Red Chapter 16: Rivers and Groundwater.

The following sections will be discussed in the curriculum are as follows:

1. Section I: Water Matters (A brief introduction of global and local perspectives)
 - a. Define water
 - b. Water and society
 - c. Conservation and Sustainability
2. Section II: The Chemistry of Water
 - a. Phases of water
 - b. Water as a universal solvent
3. Section III: Water Quality, Quantity, and Public Health
 - a. Point source vs. non point source contamination
 - b. pH, DO, turbidity, biological indicators, temperature, nitrates, phosphates
 - c. Typical usage values and crisis in the world
 - d. Water related illnesses
4. Section IV: Water Cycle (natural system)
 - a. Emphasis placed on aquifer and surface water storage
5. Section V: Water Treatment (engineered systems - student makes connection to water cycle)
 - a. Drinking water
 - b. Wastewater (i.e. stormwater and reclaim water concepts introduced)
6. Section VI: Water Monitoring
 - a. Retention pond emphasis
 - b. Rotation schedule development for the following subgroups:
 - i. Lead engineer, field assessor, field sampler, lab analyst, and data analyst

- b. The students also developed storm water demonstration modules. These were shared as a part of the ESW exhibit for the USF Engineering EXPO (February 2009) that attracted over 4,000 students and teachers from throughout the Tampa Bay region, and will also be shared at an upcoming community meeting (August April 2009), and at the national P3 EXPO. The stormwater pond display module informed Expo visitors on the plans for the pond beautification project along with various other water quality issues that had been discussed and learnt throughout the duration of the modules.



Figure 4. Display module at the Engineering Expo in February 2009.

2) Establish a sustainable, water quality monitoring program for the redeveloped retention ponds in East Tampa.

ESW students and the PI had to identify the most sustainable mechanism for monitoring and sharing data for the three ponds. This included sampling and analysis as a part of the USF Environmental Engineering Laboratory course taught by the PI. This class is taught each semester and includes a class project which looks at stormwater ponds on campus and in East Tampa. It also incorporated the input from Young Middle School students for the pond opposite their school. The pond revitalization was to be completed by December 2008, however, it is only now undergoing work and will be done instead by June 2009.

3) Collect baseline data on heavy metal (Hg, Pb, As, Cu) sediment concentrations in the three ponds targeted for redevelopment.

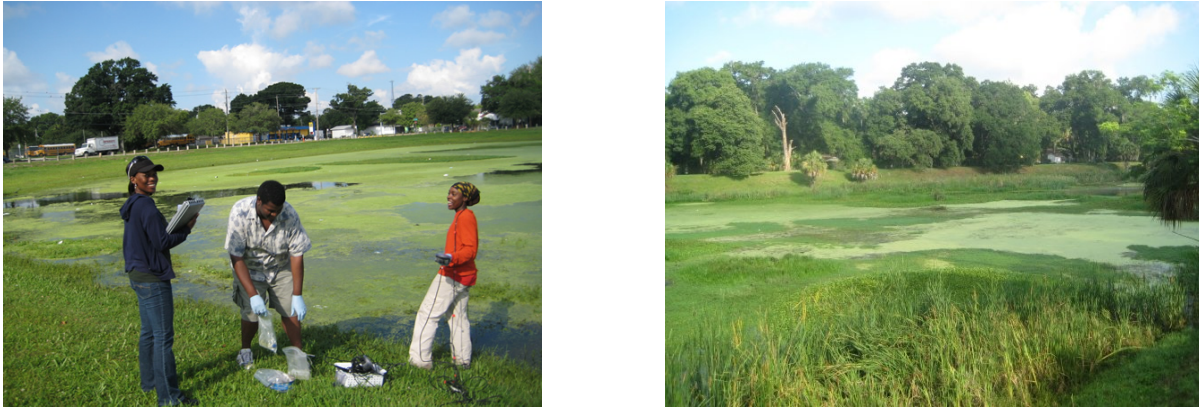


Figure 5. ESW students conducting field analyses at the stormwater ponds opposite Young Middle Magnet (left) and opposite Middleton High (right).

4) Engage East Tampa community members in WARE activities.

- a. ESW students introduced the project to the community through a booth exhibit at the 2008 East Tampa Community Survival Day fair held on Saturday August 16th from 9 am to 2 pm. This was the only environmental awareness booth and delivered on a promise to HESS that the project would help to raise awareness on environmental issues in the community. The booth contained handouts from local environmental agencies, hands on activities and was visited by ~ 600 community members. Pastor Johnson, visited the booth and later contacted the group because his private school received a grant from the South West Florida Water Management District (SWFMD) to study stormwater ponds. The ESW group made a presentation to his class in October 2008 and plans to create modules for elementary students that will be shared through the website and at the ecology night.



Figure 6. Interaction with organizers (left hand side) and residents during the 2008 East Tampa Community Survival Day fair. Pastor Johnson (right hand side) teaches at a local elementary school and the ESW group visited his class in October 2008 to give a presentation on water.

c. The group is currently working with HESS to deliver a workshop on the importance of the stormwater ponds in April 2009 and on April 3rd, 2009, the group (Young Middle Magnet students, USF students, and Young and Lockhart Elementary teachers) will take a bus tour of East Tampa’s stormwater ponds. Ms. Evangeline Best, chair of the East Tampa Community Revitalization Partnership will give the tour, building on her memory and history of the area. Mr. Roderick Colbert, President of the USF video club will accompany the group and make a 5 minute video presentation for the project. This will be placed on youtube, linked to the ware webpage (ewsusf.com/ware) and be presented at the EXPO in DC.

d. **Night of Ecology:** In February 2009 Lockhart elementary held a “night of ecology” that was open to the local community and parents. ESW students Joniqua Howard and Erlande Omisca worked closely with Jane Kemp, the science resource teacher, to prepare activities for the evening which was attended by all of the students in the school.



Figure: ESW students with stormwater displays at the Lockhart Night of Ecology, February, 2009.

e. WMNF 88.5 is a community radio station located in East Tampa, two blocks from Young Middle Magnet and Lockhart Elementary. On March 8th, there was a women’s day special with Dr. Trotz who discussed water and the P3 project. In the future, this type of publicity and use of local resources will be tapped to include students and other participants from the project. (http://www.wmnf.org/programs/play_archive/3993306?program_id=215&type=long-term – from minute 38).

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