Students Lend Support for Regional Water Quality Improvement

By Paul Hlavinka, PMP, EIT

Members of WEF are familiar with the challenges faced in improving water quality in our watersheds. Storm water has been a particular challenge in the Anacostia watershed due the amount of runoff caused by the urbanization of the region and resulting sewer overflows. Funding and community awareness for implementing projects are the largest challenges faced today in addressing storm water treatment. To help address these issues, AWWA members welcome the efforts of students who are willing to take on the challenge and to make a difference.

In fact a large number of students are looking to make such a difference. The Engineers Without Borders (EWB) Chapter at University of Maryland – College Park (UMD-CP) already had ongoing student projects in Ethiopia, Burkina Faso and Peru. Why add a local project? Part of the thinking behind this evolved when student EWB president Phil Hannam, faculty advisor Dr. Deborah Gooding and others in the student EWB organization considered the immense number of student requests to get more involved. Meetings of the chapter exceeded 100 students and faculty. A local project seemed to be a good way to build on the student enthusiasm and to provide them with the skills needed for future projects.

Civil Engineering students Kristen Markham and Ethan Schaler volunteered to lead the local project and faculty member Kevin Calabro agreed to help provide guidance. The students are learning about the efforts to improve water quality by treating surface water runoff through best management practices as part of their curriculum. It was decided that a good fit for a local project would be a bioretention facility in the Anacostia watershed. The student chapter body was ready to serve.

UMD Students Having Fun at Selected Site

The Anacostia Watershed encompasses 176 square miles of land in Prince George's and Montgomery County, MD and part of Washington, DC. Its approximately 8 miles of tributaries make up one of 10 sub-watersheds that drain into the Chesapeake Bay in Maryland. Of the 10 sub-watersheds, the Anacostia Watershed is the

most densely populated and the most polluted. A combination of non-point source pollution from road, parking lot and other impervious surface runoff along with the combined sewer overflows during high volume rain events make this watershed unsafe for swimming and nearly uninhabitable for fish and other wildlife. Many organizations are working towards improving its health and restoring it to a healthy ecosystem, but much needs to be done before this can be achieved.

The newly formed local EWB team understood the need to develop partners that could help with the effort. They were supported by the Chesapeake EWB Professional Chapter which provided assistance from Beth Blair and Brian Houston, two professional engineers who work with wastewater management at Black & Veatch. The students also reached out to Anacostia Watershed Restoration Partnership and Prince George's County - Department of Environmental Resources (PGDER) for support.

FINDING THE RIGHT SITE.

The Anacostia Watershed Restoration Partnership provided EWB-UMCP with introductions to local officials. It was also instrumental in kicking off the project assessment process. They set up the initial meetings with mayors and their staff in Edmonston and Hyattsville, Maryland. With assistance from the partnership and local officials, the group identified 7 potential sites. These ranged from a proposed dog park, to playgrounds and soccer fields with drainage problems. PGDER promised to help the chapter with the design and implementation of the bioretention facility. The team took advantage of their help immediately by asking for assistance in choosing the best facility. The selection criteria involved locating a site with significant impervious surfaces, and area available for the facility. It was also important to identify a property which would be sized for the students estimated budget of approximately $10,000.

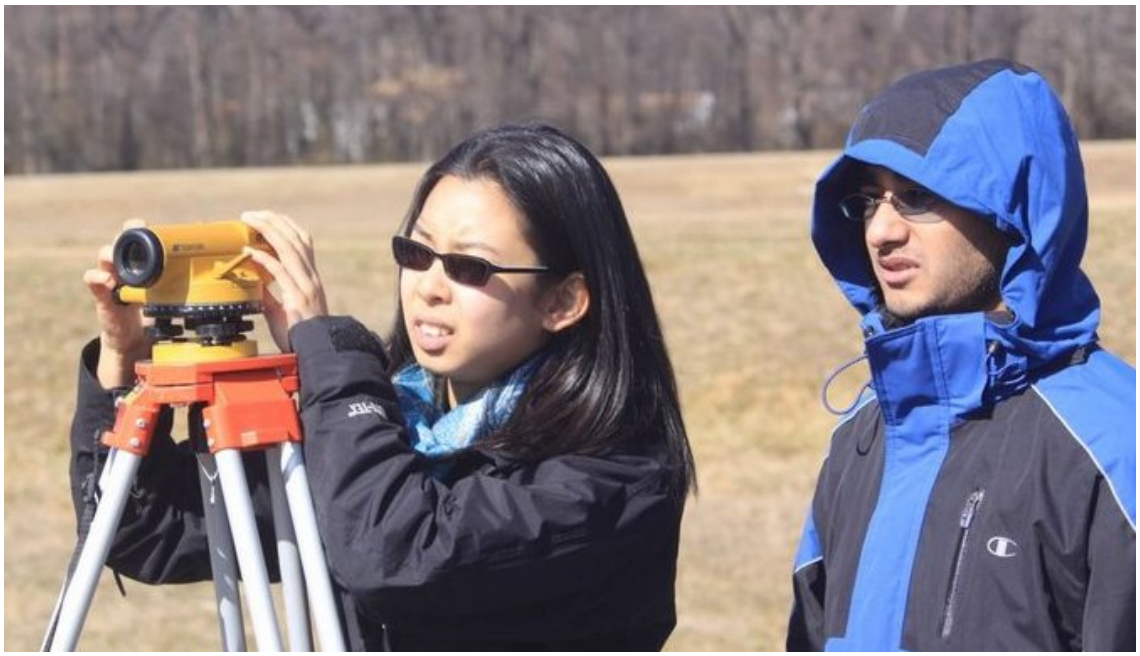
Visit to Local Site in Edmonston

The final selection was located in the city of Edmonston. The selected site would require construction of a bioretention facility that would receive the storm water runoff from a Community Center and the adjacent parking lot in Tanglewood Park in Edmonston, Maryland. Mr. Schaler and Ms. Markham had met with the city's mayor and received a very positive promise to help coordinate community involvement when they constructed the bioretention facility. Edmonston promised to maintain the new bioretention facility according to a manual of maintenance the chapter would provide to them.

DESIGNING THE BIORETENTION FACILITY

At one of the first meetings, the group of approximately 25 volunteers was broken down into subgroups: Site Design, Construction, Landscaping, Logistics and Fundraising. The students ranged from freshman to those taking their masters, and from various disciplines. Each group was dependent on a good flow of communications and coordination from the leaders.

The design of the facility became a very interactive learning process for the students. The site design team dove into the Prince George's County Bioretention manual and began formalizing the design. The project was broken up into phases, and the initial 30% design deadline was critical in meeting the aggressive end date. The team struggled with several potential locations of the facility and whether to use an infiltration to groundwater model, or a filtration model to filter the runoff and return it to the surface water. The filtration model was ultimately chosen based on the site having standing water and significant amounts of clay with poor infiltration.



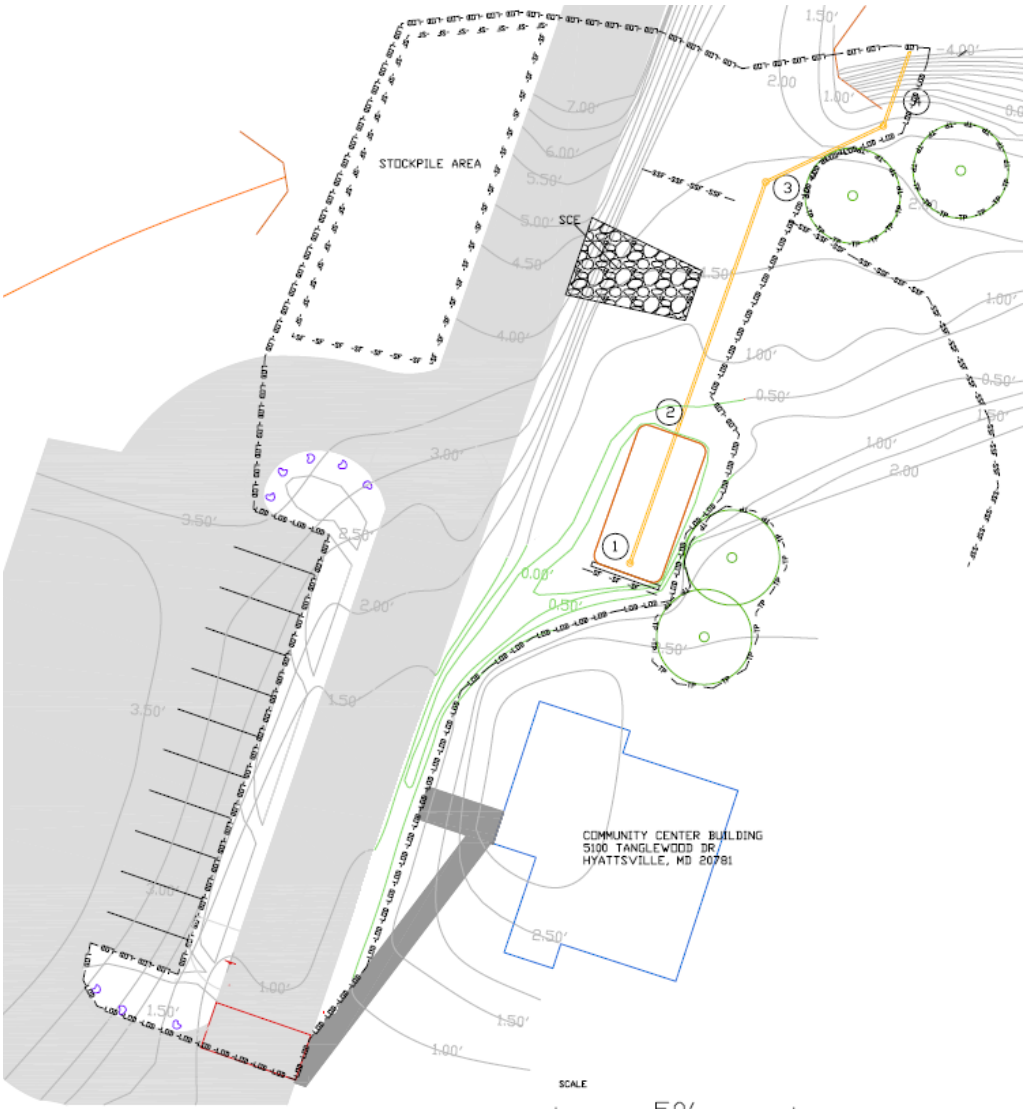
Students Learning Surveying Skills

The design team initially sized the facility based on very conservative standards. The design team took advantage of their relationship with the PGDER by meeting with the county's engineers to go through their design assumptions. The outcome was a streamlined approach, accounting for the first inch of anticipated runoff from a storm event. This first inch would carry a majority of the pollutants of concern. They also met with Dr. Allen Davis of UMD to tap into his extensive background in bioretention.

During this phase the students learned how to use surveying equipment and AutoCAD to create the documents required for county approval. Although PGDER had promised to help expedite this process if necessary in order for EWB-UMCP to meets its current projected project deadlines and implementation, significant work was still required by the team to create the drawings for submission. There were many days, nights, and weekends spent creating the documents. The group made extensive use of the collaboration tools available through Google for storing and sharing these documents. Ultimately the 30% design was submitted on time, and the final 100% design was approved by the county.

PLANNING FOR CONSTRUCTION

The construction and logistics teams were working on parallel efforts to move this project to the construction phase. The construction team worked on identifying the materials required and finding sources for them. They also setup a time line for getting materials and manpower to site. These teams would finally oversee the actual construction of the project. PGDER was willing to provide support of heavy equipment if needed and/or contractor support to complete activities that the chapter was not qualified to do without OSHA training. Contractors would be used with oversight from the students.



Location for Materials for Construction Phase

FUNDING THE PROJECT

Even the best ideas cannot get underway without funding. The chapter was successful in receiving a grant from the Student Government Association; however, it was not enough to start the project. The team leaders applied for additional grants through organizations such as the Chesapeake Bay Trust and the EPA. Just weeks before construction, they received a grant from the Chesapeake Bay Trust. The remaining necessary funds would come through EWB-UMCP or donations from suppliers. The group requested donations of tools and were able to take advantage of the university engineering department's tool stock as well. With funding in order, the team was ready to begin the final phase.

CONSTRUCTION and COMMUNITY INVOLVEMENT

During the design phase, there were many curious neighbors stopping by to talk to the students. This was an excellent informal way to involve community members in the project. The group also sent students to a community event where rain barrels were being given away where they were allowed to make a presentation on the planned project. The chapter also sent team members to local schools to present the concepts of water treatment to students. Edmonston already had several projects underway to make it a green community, and so the community was very receptive to the project.

Since students provided the manpower and oversight to finish the job, the construction was timed to start right after finals. The construction was accomplished with the assistance of Environmental Quality Resources, LLC. They provided the heavy gear and operators that the students needed to complete the project. This phase involved the site excavation, placing an underdrain, addition of the layered bioretention materials and grading of the property to provide for the proper drainage to the facility.

Getting Ready for Community Event

During the final days of the project, the group held a community event. It was important for EWB to bring the community together for a common cause. At this event interested citizens were invited to set out plants in the bioretention facility and learn about how the technology works and can be replicated elsewhere. As a result of the community event, more community members are now aware of this technology and what it is doing to help improve their environment and decrease likelihood of floods.

SUMMARY

The positive impacts of this project are numerous. First, the storm water coming from the parking lot and community center will no longer be sending pollutant-filled water directly into the Anacostia River. The water will instead be filtered, eliminating many of the pollutants and improving water quality. Secondly, the flash

flood effect that result from rain storms on land with a high percentage of impervious surfaces would be lessened. Some of the storm water in Edmonston would be directed to the bioretention facility first, which effectively absorbs the water and decreases its velocity, resulting in a positive and sustainable effect on the health of the river. And lastly, the community awareness of the benefits of bioretention would benefit future efforts by this group and others interested in lessoning the impact of our urban environment.

This story is more than a story of students trying to make a difference. It is about students becoming the teachers, and giving us all a challenge to do more with the resources we have. It is a challenge for us all to consider projects that benefit our communities and make a difference in our world. As Ms. Markham said to her volunteers "Thanks a million to all who have been so dedicated to making this project happen." Ms. Markham & Mr. Schaler, thank you for laying down the gauntlet and challenging us to do more.

Markham, Shaler and Calabro at Project Site

You can learn more about the EWB projects on their website www.eng.umd.edu/ewb.

Paul Hlavinka is a Masters of Engineering student at UMD, and is also AWWA Engineering Modeling Applications Committee (EMAC) member and AWWA Chesapeake Section (CSAWWA) Government Affairs Committee member.