

Sustainable design has always been important to the progress of our cities and it is only now slowly becoming more of the motivation behind design here in the United States. Many times buildings and projects are designed with other things in mind such as the look, feel, cost, use, and ease of building a structure and while all of these things are important, it is becoming more apparent that environmental aspects should also be considered and probably be a catalyst as to why a certain project is chosen. Here in Philadelphia, the Water Department (PWD) is embarking on one of the most ambitious projects seen in this country. If the project is approved by the Environmental Protection Agency (EPA), this effort along with many other initiatives, will act as a model for other cities to follow. It is imperative that the public is educated on what the interests of this project and the efforts of the water department are in order to reach their goals and continue to bring safe, clean water into our homes and businesses, as well as keep local waterways clean.

The mayor of Philadelphia, Michael Nutter, has issued the challenge of making Philadelphia "the greenest city in America". The Mayor's Office of Sustainability was created to "help the city leverage its existing assets and mitigate its exposure to the effects of global warming" ("Mayor's office of," 2009). This attention to the environment is helpful in getting projects off the ground and funded and also brings the topic of the environment into the limelight. While the Office of Sustainability does not seem to interact directly with the water department, some of its initiatives directly effect Philadelphia's watersheds. For example, "Philadelphia now has the second highest amount of square footage of green roofs in the country, behind only Chicago" ("Mayor's office of," 2009). Green roofs can positively effect the environment in a few ways, one would be to help conserve energy by reducing heating and cooling costs and another is to retain water and slow the storm run off to our sewers, streams and rivers. Green roofs are also low maintenance, reduce the urban heat island effect, and can have positive affects

on occupants who have a view of that roof (Beatley, 2000). It is important that our politicians start to see the benefits of such projects and start to implement them. It is often found that sustainability projects while good for the environment also save money in the long run. Once people start to see this, hopefully it will be a snowball effect and that is why public education is so important.

Many people simply do not realize what their seemingly small actions have on the environment and what they can do to stop destruction and change attitudes. It is simple to think that tossing one piece of trash into the sewer will not be a big deal or the few drops of oil that leak from a car would cause significant pollution. The truth is that both of these actions can contaminate gallons of water. Governments must fund initiatives that educate the public and show them not only what they are doing wrong, but how to do it right. The PWD is aided by different groups and organizations that try to do just that, these groups include the watersheds department, the Fairmount Water Works Interpretive Center, and Penn Future to name a few. The PWD relies on the help of these other organizations to help bring awareness to the city's residents.

The water department's "primary mission is to plan for, operate, and maintain both the infrastructure and the organization necessary to purvey high quality drinking water, to provide an adequate and reliable water supply for all household, commercial, and community needs, and to sustain and enhance the region's watersheds and quality of life by managing wastewater and stormwater effectively" (<http://www.phila.gov/water/Mission.html>). This mission cannot be achieved without the active participation of the city's citizens. The PWD has a Public Education Manager whose role is to create programs, presentations, and public awareness in order to engage residents. My attempts to contact this person went unanswered which is unfortunate because I was told he could provide educational information from the last 20 years!

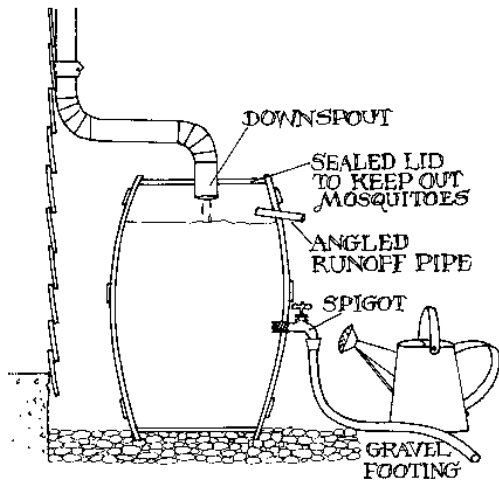
The Office of Watersheds (OOW) is a unit of the PWD's Planning and Engineering Division. OOW was formed in January 1999 through reorganization of the PWD, by integrating three historically separated programs: Combined Sewer Overflow,

Stormwater Management, and Source Water Protection ("Watershed information center"). Watershed management is important because when it rains, the water in that surrounding area sheds the runoff into that waterway. Most people do not realize that everything they do impacts their watershed. "Runoff from garden fertilizers, hazardous substances like used motor oil, and trash dumped into one area of a river bank can pollute water many miles downstream" ("The Monoshone watershed," 2009). City residents need to be more aware of the choices they make about products and what could potentially end up in the rivers that provide their drinking water. The OOW encourages residents to be active in their local watershed participant programs. These programs organize stream and park clean ups and work to restore local habitats. The OOW has also created A Homeowner's Guide to Stormwater Management. The guide provides residents with guidelines on proper vehicle maintenance and washing, lawn and garden care, pet waste, tree planting, planters, rain barrels, rain gardens, etc. This program works to a certain level because it provides all the right information and gets people involved in their communities. I think that there is still more that can be done, it seems as though if you want to learn about these things you have to go out and seek it for yourself. This program could benefit from a little more advertising to let the public know they are there and providing opportunities to get involved. There needs to be a sort of interest or excitement created in order to get people thinking.

The Fairmount Water Works Interpretive Center (FWWIC) serves as the Delaware River Basin's Watershed Education Center. This interactive learning center is housed in the Fairmount Water Works which stopped pumping water in 1909. The use of this historic building, once one of the most visited sites in Philadelphia, creates a perfect atmosphere for water education. The building now contains many exhibits, a theater and admission is free. It is a great place for children and students to learn how their daily activities connect to the natural environment, especially at a young age, so they can hopefully develop good habits for the future. I had the chance to visit the facility myself a couple of years ago. Truthfully, I did not know it existed until I was wandering by and since it was free, I figured why not check it out. I was pleasantly surprised to find such fun, well put together exhibits while learning something about my own water practices

and my everyday impact on the water supply. I think the best thing about the facility is how you are able to interact and see how the products you use and how you dispose of them directly effect the environment. In one exhibit there is a series of questions about the products you have used so far that day, such as shampoo, soap, detergents, cleaners, etc. and it really opens your eyes to how much we dump down our drains. The point of this particular test was to let you know how many gallons of water a single person can contaminate without even realizing it. It was also interesting to see the fish ladders and the live video feeds in the Schuylkill River. I was there with my father and he was telling me how far the area has come in cleaning up the rivers and that at one point there were virtually no fish in the rivers. The decline in fish came from pollution in the river as well as the placement of dams as migrating fish were not able to return to spawning grounds because of the blocked passageways. This made it all the more exciting to see the fish back in the river. It is educational interactions like this that had the most effect on changing my daily habits, but it is difficult to get people interested and excited to come in and learn. Even in my case, it was just by chance that I was walking by, was curious and had the time. The FWWIC is effective in their educational programs, but it also relies on their visitors going out and spreading the word as well. The FWWIC would be great for school or summer camps to visit. I think in order to really start making changes we have to get the younger generations excited, informed and involved so that as they grow they will begin to make better sustainable decisions in the future.

Another goal of the PWD is to come as close as possible to a natural water cycle as opposed to an urban water cycle. In an urban area an average of 50% of surfaces are paved or built on as opposed to about 20% in the suburbs (Christopherson, 2009). This can cause flash flooding and fast moving water that carries pollutants such as motor oil and fertilizers into the waterways. Storm water run off is now the main cause of pollution in our waterways, this has shifted from the industrial pollution of years ago when companies would just dump their waste into the water. If that can be slowed down or diverted, combined sewer systems would not overflow and less pollutants would end up in the water. One way to accomplish this is to collect rainwater from rooftops in rain barrels. In Philadelphia the watersheds department makes it fairly easy to obtain a free



rain barrel through the Rain Barrel Program. You simply need to attend a rain barrel workshop that will educate you on the installation and use of the barrels and then you will be issued one barrel. The watersheds department holds these workshops periodically and you must be sure to attend the workshop that is associated with your watershed. Rain barrels can also help decrease one's water bill since the water

collected can be used to water lawns, gardens, and deck planters as well as wash cars. This program is slowly getting off the ground, but it is their hope that rain barrels become as common as recycling bins.

The Partnership for the Delaware Estuary has programs that encourage community participation in keeping water clean. One such program is the Storm Drain Marking Project. This project educates groups and their communities that only rainwater should go down the drain. This happens when volunteers go out and affix medallions on the street in front of storm drains with a "Yo! No Dumping! Drains to the River" message. Volunteers are also provided with tip cards that can be handed to the



community that explains the program and the benefits of keeping drains clean. I think this can be useful, but the signs are not very big. I think the city could do a better job of bringing this to people's attentions. Philadelphia has an incredible mural arts program and I think this concept could be used in painting storm drains. I found some examples in Brazil of their use of art on something as unconventional as a storm drain. This could definitely provide an opportunity to be informative in an artistic, eye-catching way.

Another program encourages pet owners to clean up after their pets. "In fact, scientists from the U.S. Geological Survey estimate that pet waste contributes between 20 to 30 percent of the water pollution in America. Excessive nutrients from animal waste

contributes harmful bacteria, promotes excessive plant growth and causes algae blooms, all of which rob the water of vital oxygen when plant materials decay" ("Partnership for the," 2009). This program provides interested participants with "supplier information, signage and tip-card templates, along with technical support" ("Partnership for the," 2009). There are often even fines for not picking up after your dog, but they are not very useful if they are not enforced. Again, I think if you want people to make changes, they have to make the connection between what they are doing to how it effects them and the community. This is an image that I found that, in my opinion, that does exactly that.



The Water Department will also encourage smarter storm water management by adding a storm water tax. "In 2010, the agency will charge its nonresidential customers for the runoff their sites generate. The tax will be based on the amount of impervious surface, using GIS satellite technology to determine what is paved and what is green. So, for instance, the owner of a fully paved, one-acre parking lot could see monthly storm-water charges rise from almost nothing today to as much as \$400. Schools will be taxed like everyone else." (<http://www.philly.com/inquirer/magazine/47906407.html>). This will hopefully give owners a push to repave with porous material or better yet install some greenery. Along with this tax the city has put together a plan that, over the next 20 years, should help to reduce it's storm water run off, improve the overall quality of the water and air, create jobs, and higher property values. If the EPA approves it, it could have national implications and serve as a model for other cities. Sandy Bauer of the Philadelphia Inquire explains that 60% of Philadelphia's sewers are a combined system meaning that both runoff from street and waste-water from households flow through the same pipes. Most days this is not a problem, but when it rains, the system overflows and everything from raw sewage to litter "gushes from 164 pipes directly into the Delaware, the Schuylkill, the Tacony, the Pennypack, and Cobbs Creek" (Bauers, 2009). This is obviously a big problem, so the city decided to look for ways to help alleviate this

problem that did not require a lot of disruption to residents and would also hopefully give the city a new look and feel as well as be cost effective. The answer seems so simple and as Howard Neukrug, director of the Office of Watersheds states, "Instead of figuring out how to manage pollution, maybe we should be looking at how to prevent it in the first place." The plan calls for the reduction of the city's "sealed" surfaces and replacing them with things such as rain gardens and green roofs. Playgrounds and basketball courts will also be replaced with porous material that allows rainwater to sink into the ground instead of running down drains and overwhelming sewers. There is also hope that every time a street is dug up for work, it will be replaced with porous asphalt. As with any big plan there is always draw backs. The changes could potentially raise water bills for residents and "the EPA wants to see overflows reduced by 85 percent; this plan gets the city to just 80 percent" (Bauers, 2009). Overall, I think the plan is exciting and echos some of the efforts already being made in Europe. In my lifetime I could potentially see a completely different city from the one we live in today.

While all of these projects are worthwhile, they cannot be successful without the active participation of Philadelphia's residents, business owners and policy makers. It is important the lawmakers get involved and start enforcing some of the environmental laws, but education is the key to setting these plans in motion. It is important to be creative and catch people's attention. I feel that Philadelphia's recycling program has done a good job of being present in our everyday lives, you see commercials on television, informational advertisements on public transportation and in the subway stations, and new recycling trash bins on the street, it is everywhere! I think the PWD could also benefit from this sort of campaign. The goal is to get more people to think twice about what they pour down the drain and paving over green space and how it directly effects them by polluting drinking water and adding costs to monthly bill. It is important for people to make the connection between their household outputs and the rivers that we get our drinking water from. Once these programs begin to make that connection I think we will start see a big change in our communities towards sustainable design that enhances our water department.

Works Cited:

Bauers, S. (2009, September 27). Breaking ground with a \$1.6 billion plan to tame water. *The Philadelphia Inquirer*, A01.

Beatley, T. (2000). *Green urbanism*. Washington, DC: Island Press.

Christopherson, R.W. (2009). *Geosystems*. Upper Saddle River, NJ: Pearson Prentice Hall.

(2009). *Mayor's office of sustainability*. Retrieved from <http://www.phila.gov/green/mos.html>

(2009). *Partnership for the delaware estuary*. Retrieved from http://www.delawareestuary.org/acivities_community_dog_waste.asp

(2009, September). *The Monoshone watershed*. Retrieved from http://www.phillyriverinfo.org/WICLibrary/PWD_Monoshone_Quarterly_Report_Sept2009.pdf

(n.d.). *Watershed information center*. Retrieved from http://www.phillyriverinfo.org/nav_VisionMission.aspx