

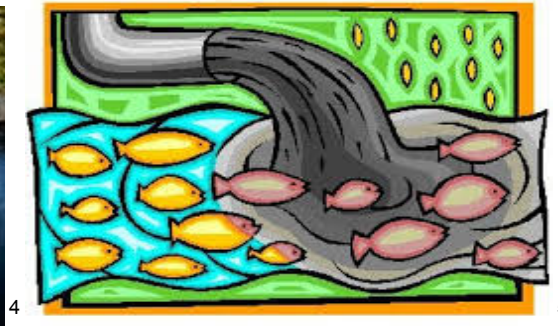
The Urban Watershed

A Learning Experience for the Youth

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Introduction:

The purpose of our capstone project is to provide a better understanding of watersheds and their effect on the natural environment for children who live in urban areas. A 2008 report by the [United States National Research Council](#) identified urban runoff as a leading source of water quality problems in the country.¹ Impervious surfaces (roads, parking lots and sidewalks) are constructed during land development. During rainstorms and other precipitation events, these surfaces (built from materials such as asphalt and concrete), along with rooftops, carry polluted stormwater to storm drains, instead of allowing the water to percolate through soil.² Water running off these impervious surfaces tends to pick up gasoline, motor oil, heavy metals, trash and other pollutants from roadways and parking lots, as well as fertilizers and pesticides from lawns.³ Water flowing through storm drains is untreated and therefore carries these pollutants into streams, rivers, and bays.



¹ United States. National Research Council. Washington, DC. "Urban Stormwater Management in the United States." October 15, 2008. pp. 18-20.

² Water Environment Federation, Alexandria, VA; and American Society of Civil Engineers, Reston, VA. "Urban Runoff Quality Management." WEF Manual of Practice No. 23; ASCE Manual and Report on Engineering Practice No. 87. 1998. ISBN 1-57278-039-8. Chapter 1.

³ G. Allen Burton, Jr., Robert Pitt (2001). *Stormwater Effects Handbook: A Toolbox for Watershed Managers, Scientists, and Engineers*. New York: CRC/Lewis Publishers. ISBN 0-87371-924-7. Chapter 2.

⁴Image source:

<http://www.conteches.com/stormwater-blog/details/articleid/48/can-lid-techniques-alone-restore-urban-predev-elopment-hydrology.aspx>

⁵ Image source: <http://www.ci.patterson.ca.us/Default.aspx?pi=89&ni=110>

Urban runoff pollution can have negative effects on fish, people, and plants. Some pollutants can concentrate in fish and cause health concerns in people who eat them. Excessive nutrients used for lawns and landscaping can also become pollution when they wash down into the storm drains and cause increased plant growth, including algae. As plants die and decay, oxygen is removed from the water. Lowered oxygen levels can lead to the death of aquatic organisms and fish. Pet waste left on the ground can harbor E. coli bacteria, as well as roundworm, tapeworm, and toxoplasma gondii. Not only are these parasites transmittable to humans, toxoplasmosis can cause serious health concerns in immune-compromised individuals and pregnant women.⁶ Litter from urban runoff can harm wildlife. For example, wildlife that ingests plastic can suffer internal injuries and death. Discarded fishing line and plastic six-pack holders can entrap birds, fish, and mammals. Trash and litter can be harmful to humans when it clogs storm drains to the extent that it impacts surrounding properties. Storm drains clogged with trash cannot function properly and often result in local flooding.

While completing our capstone project we worked with a local organization called [Return of the Natives](#) (RON). Their mission statement is “Bringing nature closer to people and people closer to nature through hands-on participation in restoring habitats”. RON also collaborates with local schools to educate children ranging from about 10-14 years of age about the importance of restoration and native species. While working closely with RON we discussed different ways to educate the youth about the issue of pollution in their urban watershed. RON was specifically interested in having a watershed model that highlighted the urban areas along the coast of the Monterey Bay.

Approaches:

There are two approaches we considered when teaching youth about urban watersheds. The first approach is to take the kids out into their watershed and physically show them how water moves across streets, through storm drains, and out into streams, rivers, and the ocean. The second approach is to bring an example of a watershed into their classroom. This is the approach that we chose. We had the assumption that the young children would want a hands-on, exciting learning experience in order for them to take notice. We assumed that kids of this age are more enthusiastic about hands on learning activities and providing an interactive watershed model would help the concepts to permeate deeper into their beliefs on the subject. Also, we assumed that it would be much easier to bring a watershed model into a classroom full of children rather than having them come out individually to observe how their watershed works in the natural environment.

⁶ Environmental Protection Agency Nonpoint Source Control Branch (2010). USEPA Nonpoint Source Fact Sheets. Washington, DC: Government Printing Office. Retrieved from Environmental Protection Agency website: http://www.epa.gov/npdes/pubs/nps_urban-facts_final.pdf

Another assumption we had is that kids would be unaware of the problems and potential environmental threats that their watershed faces from human building activities.

Project Goals:

The goal of our project was to provide RON with a model of an urban watershed that they can then use in presentations for 5th and 6th graders in the cities of Marina and Seaside, in efforts to teach them about the impact of the built environment on their local watershed. In addition, we wanted to develop a lesson plan about the hazards of urban runoff to go along with our watershed model.

Project description:

For our project we built a watershed model that focused on the urban landscape found in the coastal cities of Monterey Bay. We also created a [lesson plan](#) that teaches children about the importance of open areas, such as parks and green spaces, that help to filter out pollutants and increases the amount of water retained in the ground. We did this by collaborating with Emily Howard of RON on the best path we should go with the lesson plan. We also based our lesson off of existing plans and our watershed model in order for them both to be used side by side in the classroom.

Results:

Our supervisor is extremely happy to have a model and lesson plan for use in the future. She believes that it will have a long lasting impact on the children because it is more relatable to where they live in comparison to the generic watershed model RON usually uses. In doing this, RON will now have another lesson to bring to the children they work with. In the future we hope to receive feedback from the curriculum we have created.



Project evaluation:

During the construction of the project, we came across numerous obstacles. During the semester of the project we both had extremely full schedules, along with the teachers we were speaking with, and were not able to present our lesson plan in a classroom setting. Also, we were limited by the size of the model and what materials we could use to construct it. The model had to be mobile, able to be lifted by one person, and needed to fit in the trunk of a car. This required us to be creative in our construction because, as college students, do not have a lot of disposable income. Even with these drawbacks, we were still able to create a lesson plan along with an urban watershed model to be used in the future by RON.

Recommendations:

To take this project to the next level we would like to have been able to come up with a more interactive and fun ways for students to use our model and learn about their urban watershed. We thought about coming up with a Jeopardy-like game with fun small prizes or a word search activity to increase students vocabulary and understanding of watersheds. In the future, we recommend that RON uses our urban watershed model in presentations directed towards students, teachers, and parents in the cities of Seaside and Marina. We hope this will be used to educate them about the importance of the local watershed and how to reduce negative human influences that are directed toward it.

Conclusion:

In order for our society to reduce the amount of pollutants from urban landscapes entering our waterways and oceans, we must educate our youth. It is imperative that we educate these kids as soon as possible so that environmental conservation becomes a simple part of their everyday lives. This is an effective way we can ensure that our natural environment remains for future generations.