

Comparison of Water Pollutant Discharge from Three Parking Lots in Nacogdoches

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Introduction

Storm water runoff can have harmful effects on a community. Runoff water picks up chemicals and pollutants from surfaces that do not absorb water like concrete areas (ex. roads, parking lots, and others) The same water will then eventually be drained into local lakes, rivers, and surrounding environment. Our experiment measured the pollutant discharge of parking lots after a storm. The main water quality indicators are temperature, pH, dissolved oxygen, and turbidity/alkalinity. For the parking lot runoff measurements, the parameters we measured included copper and lead. Our hypothesis was that there are more metal pollutants and poorer quality in a Wal-Mart parking lot and car wash parking lot than in a recreational park parking lot.

Materials and Methods

To conduct our experiment, we had three sampling days that took place after a rainstorm. Before leaving to take our samples we made a field blank using distilled water, and took the blank with us and stored it with the other sample bottles. We took the pH and dissolved oxygen reading on site using the HQd portable meter, at each of the three parking lot locations. We also took a bottle of sample water at each site and brought them back to the lab for testing. In the lab, using the spectrophotometer and Hach reagents, we tested for total alkalinity, lead, and copper.



Collecting water samples

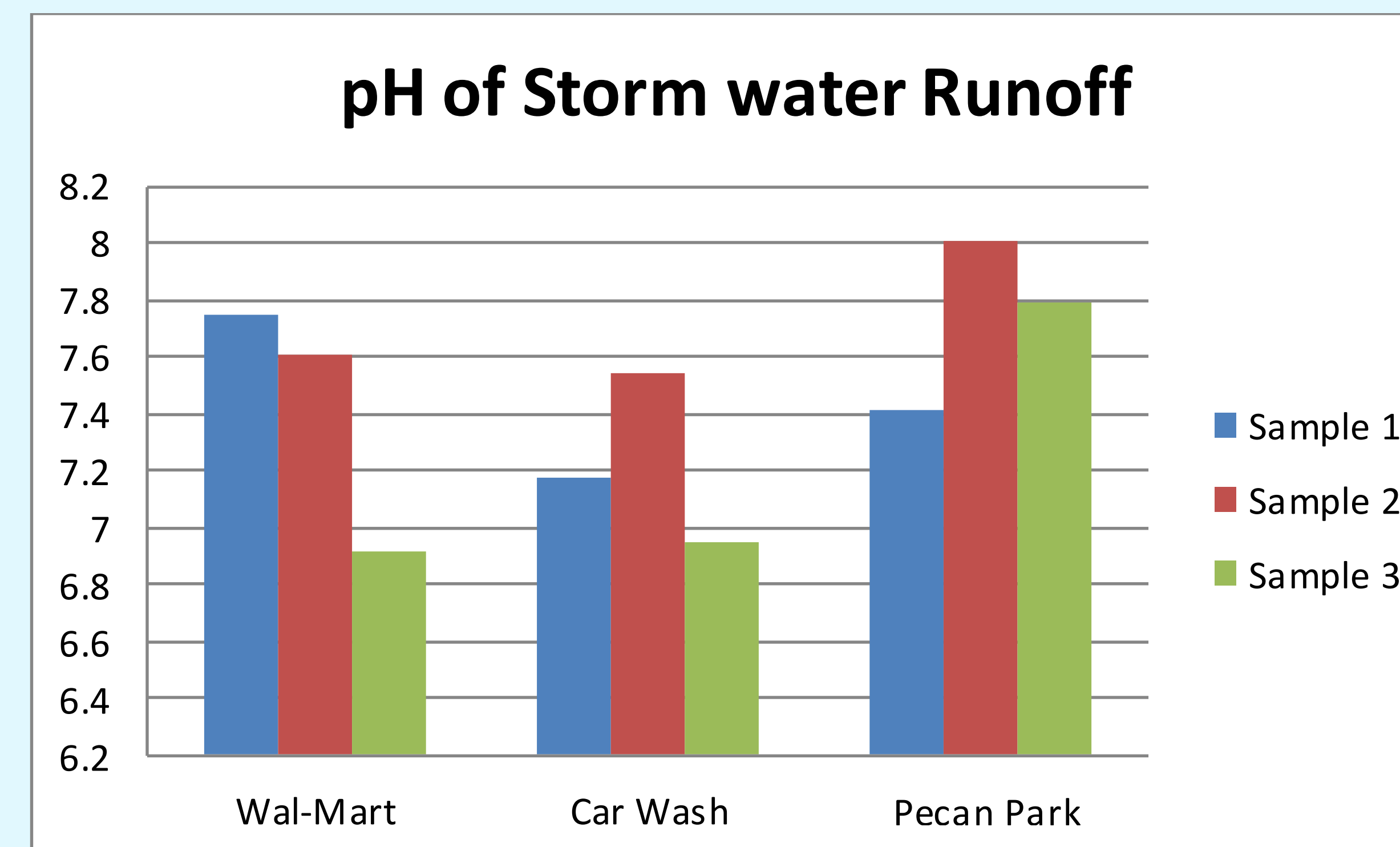


Figure 1. Comparison of pH for three sampling days at three locations.

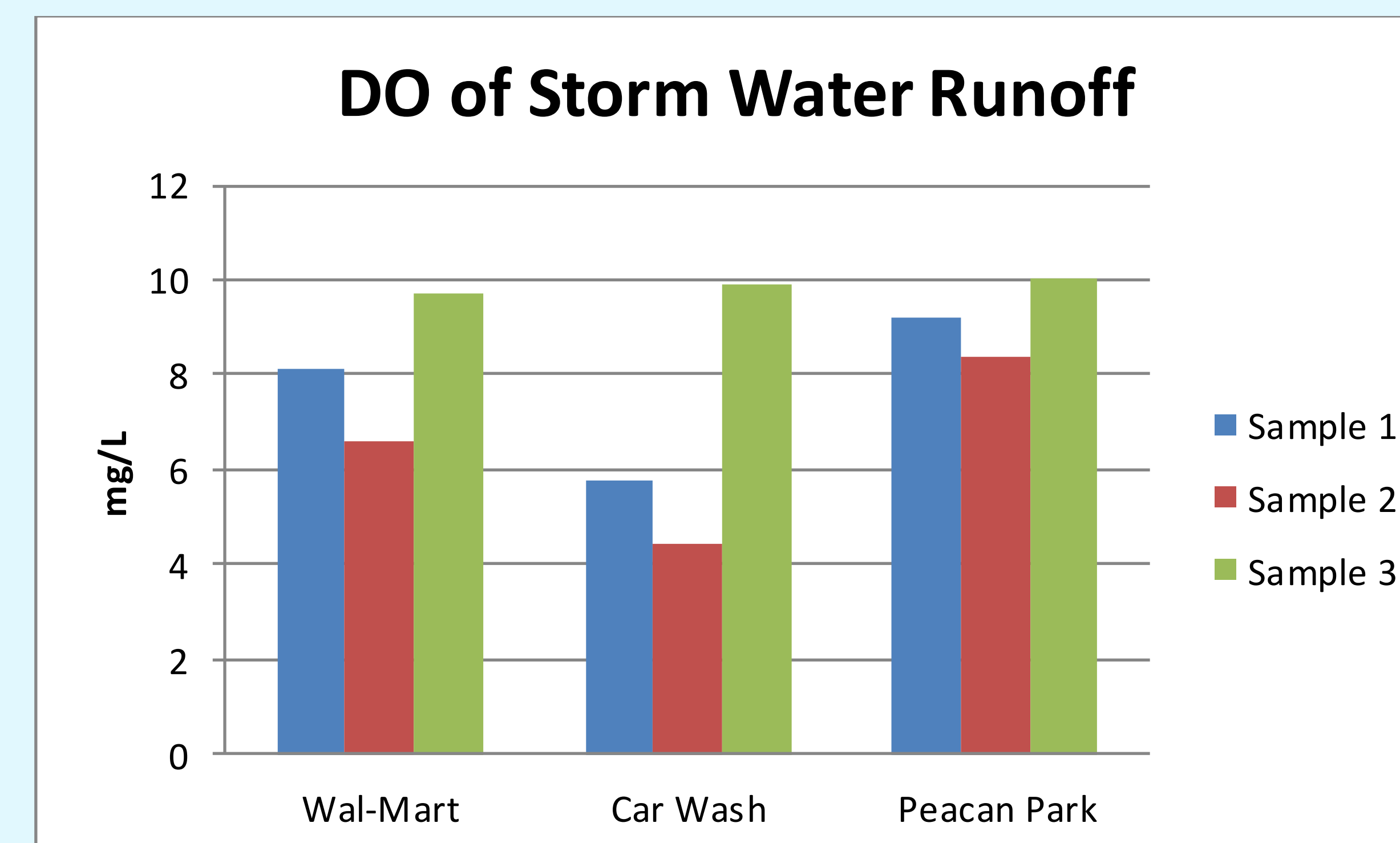


Figure 2. DO comparison at three locations for three sampling days

Results

The most reliable results came from our on-site testing of pH and DO taken with the HQd portable meter. Pecan Park had an average pH of 7.74 and a DO reading of 9.20 mg/L. Wal-Mart had an average pH of 7.43 and a DO reading of 8.15 mg/L. The Car Wash had an average pH of 7.22 and a DO reading of 6.69 mg/L. The data collected using the spectrophotometer was suspect due to several possible reasons. On the first and second water collection days, we froze the samples because the environmental assessment lab was not open on the weekends when it happened to rain. We also did not put any preservatives in the samples before freezing them because of our limited budget and access. Other errors occurred because of particles in the water were not filtered out which then interfered with the spectrophotometer readings.

Discussion & Conclusion

Our results concluded that Pecan Park had a higher DO and higher pH which is a result because of the large amount of organic materials found near the park parking lot. Our results concluded that Pecan Park had the best water quality which coincided with our hypothesis. Although our total research results were inconclusive, the prevention of hazardous pollutants into storm water runoff is still an important issue. To keep Nacogdoches beautiful and have good water quality, the three possible solutions are as follows: Permeable Pavements, Rain Gardens, and a Water Quality Awareness Day.

- **Permeable Pavements:** A large amount of contaminants entered into the ecosystem when new development or construction is occurring in the community. "They provide a special type of pavement surface which allows water to infiltrate through the surface as an alternative to the traditional impermeable surfaces." (Tota- Maharaj, 2010).
- **Rain Gardens:** Rain gardens are community gardens strategically placed in depressed areas to help naturally infiltrate the rainwater. The benefits of a rain garden include the reduction of pollutants spread through runoff, improves the community aesthetics, and reduces erosion.
- **Water Quality Awareness Day:** To get people aware and concerned about a problem is to have them be involved. Stephen F. Austin State University environmental science and water quality students could work with Nacogdoches Parks and Recreation Department to teach the community about their environmental water quality.



Example of Permeable Pavement

<http://watershedfriendlysurfacealternatives.files.wordpress.com/2013/04/082109-permeable-pavers.jpg>



Example of a Rain Garden

<http://www.cuyahogawcd.org/grantfunded-raingardens.htm>

Literature Sources

Tota-Maharaj, Kiran, and Miklas Scholz. "Efficiency of Permeable Pavement Systems for the Removal of Urban Runoff Pollutants under Varying Environmental Conditions." *Environmental Progress & Sustainable Energy* 29.3 (2010): 358-69. Print.