

## The Effects of Urbanization on the Surface Waters of Memphis

Tatiyanna A. McChriston ; Student

Memphis Stormwater

This paper has been very slightly altered from the original submission. Two portions added are in red. One term that is not accurate is blocked out in grey. The end portion is not included until resubmitted due to accuracy issues. Blank formatting headers and portions have been removed.

Conclusion and data are the students own.

## Abstract

Urbanization is one of the most innovative ways of creating a new era of well-being, resource efficiency, and economic growth. This is especially so to places that need this economic boost. However, it is also safe to say that urbanization can have very negative effects on the area itself, such as the amount of pollution being pumped into it. This paper will include data and other findings of the participants of the Memphis Stormwater **Green Camp** program of 2017. It will include the information we have gathered, the methods and materials used to obtain additional information and data, our findings during our experiments, and the results of everything found within the three weeks of research.

## The Effects of Urbanization on the Surface Waters of Memphis

In the beginning of our first session, the participants of the Memphis Stormwater **Green Camp** program (myself included) were asked told the urbanization of Memphis had an effect on its surface water. The answer was a unanimous “yes”. We were then asked to explain the many ways the surroundings of the water can have an effect on water itself. After stating the basics such as the health of the water changing to the animals being affected by said change, we were told of the surrounding water sources’ history and ways to prevent most of the pollutants from getting into our **drinking** water. For the next three weeks, we were to study the quality of the water, the life sources surrounding it, and record everything we’ve seen as we go, including the amount of trash or waste scattered around the area.

### Progress

As I have stated before, this program was meant to be observed in the three weeks given by the conductors of the program. The following will be a brief cover of what went on through these weeks.

**Materials:** We were provided with many tools and devices to properly conduct our lab research. We were given a portable scale to weigh the amount of trash we collected, a portable photometer to measure the amount of material is found in the water sources we tested, gloves and trash bags to collect said trash, personal protective equipment (PPE), binoculars, magnifying glasses, dichotomous quotes and dip nets to capture and identify the certain species of plants and animals in the surroundings, and of course the sampling bucket to collect our samples from the sources.

**Week 1.** We start our research by going to McKeller lake to collect and separate the trash and recyclables found there in the span of two hours. In total, we collected 180 pieces of trash with half being identified as trash and the other half containing recyclables. The total weight of it all added up to about 7.79 kg (17.17 lbs) with the recyclables taking up more than half that weight at 4.11 kg (9.05 lbs), 52.76 % of all the trash collected. 53.75% of it all being plastic, which takes the longest time to break down out of all the other materials found in the trash. No source of life found for obvious reason.

**Week 2.** The week after consisted of our group collecting data at the Cypress Creek connected to Gayoso. From this creek we collected water samples to measure the amounts of phenol, chlorine, dissolved oxygen, and copper found from our samples. Collected at 10:00 a.m., the water was 25.8° C and had a pH level 7.8. Using the photometer, we gathered that this source contained an average measure of 5.14 mg/L of dissolved oxygen, 0.003 mg/L of chlorine, 0.12 mg/L of copper, and 0.16 mg/L of phenols. Despite all of this, this source is surprisingly healthy enough to sustain tadpoles, crustacean, minnows, and the algae found in that area.

**Week 3.** During the third week, we experienced a bit of a precipitation event, an unexpected rain period that was going on during our studies. We did our test regardless of the disturbance.

Collecting our samples from the Bateman Bridge, we conduct our same experiment procedure as we did at Cypress Creek. We collected this sample at 9:42 a.m. having a temperature of 24.6° C and a pH level of 6.2. It contained averaged amounts of 0.41 mg/L of copper, 0.23 mg/L of phenols, 0.13 mg/L of chlorine, and 6.63 mg/L of dissolved oxygen. We went as far as to collect even more samples with dip nets to capture and identify the life dwelling in it. We've found a total of 2 baby shrimp, 5 minnows, 1 catus fly, and 4 mussels. This source was clearly healthy enough to sustain these types of species. Going further into another region in Moscow, Tennessee known as Mineral Slough Boardwalk, where we identified dwelling species in the area such as the purple martous, cayote, bobcat, raccoon, finches, and even a great blue heron which all we sighted using our binoculars.

With all the data collected, it is safe to say that for the most part, our surface water is relatively healthy, despite the amount of trash still finding its way into our drinking water because of the urbanization that took place around our source.