Air Quality in Brownsville

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Abstract

Air pollution is a serious problem in Brooklyn. It causes many illnesses, including asthma, lung cancer, emphysema, etc. This project was aimed at measuring air pollution levels in Brownsville, Brooklyn. Experiments 1 and 2 were aimed to estimate the levels of PM10 and determine the local hotspots and critical time periods of PM10 elevation. Experiment 3 was aimed to study the acidity levels of rain in order to estimate the levels of sulfur dioxide in Brownsville. Experiment 4 was aimed to determine how air pollution affects general visibility. It was found that PM10 levels were higher near the train station than near the park (Experiment 1) and that they were higher on a weekday than on a weekend (Experiment 2), since traffic volume is higher at those times and in that location. In addition, two out of 3 samples showed evidence of acid rain suggesting the presence of sulfur dioxide in the air (experiment 3). Finally, it was found that air pollution greatly affected visibility levels (Experiment 4). Clearly air pollution is a problem in Brownsville and clean air reform is needed in order to prevent further air pollution.

Experiment 1

• Particulate Matter are tiny particles that are suspended in the air or liquid. PM10 are particles smaller than 10 micrometers. They are *particularly* dangerous since they can actually enter the lungs and cause asthma, lung cancer, heart disease and death. This experiment was set to determine the location of the highest PM10 particles in the air. It was predicted that more PM10 would be found near the train station than in the park since there is more traffic near the train station.

Methods

• 4 slides were placed in 2 different locations: 2 were placed in the park and 2 were placed near the train station
• Slides were subbed with Vaseline
• Slides were taken down after 2 weeks
• Pictures were taken of each slide with a Proscope (100 times magnification) and particles that were smaller than 10 micrometers were counted and averaged across the slides in the same location.
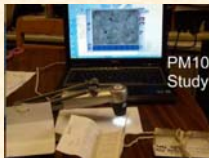
Results and Conclusions
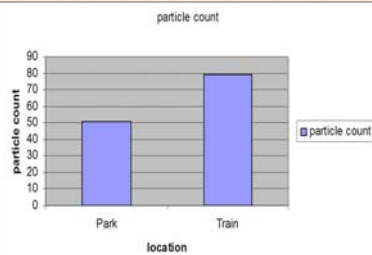
More PM10 particles were found near the train station than near the park, suggesting that there is more dangerous air pollution near the train station. This is not surprising since there is more traffic near the train station than in the park.
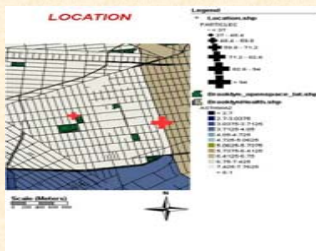
The map on the left shows the locations where the samples were taken. The big cross indicates more air pollution and smaller cross indicates less air pollution.
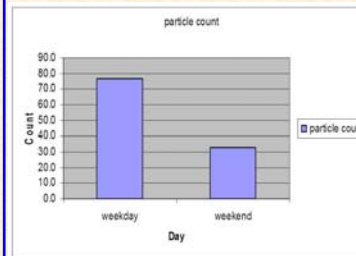
Experiment 2

• Results from Experiment 1 indicate that there is more pollution in high trafficked areas as compared to the park, where there is less traffic. This experiment was aimed to determine when there is more PM10 in the air, the weekday or the weekend. It was predicted that more air pollution would be found on a weekday than on a weekend since there is more traffic on a weekday.

Methods

• The methods were identical to those of Experiment 1 with the following exceptions:

• The slides were placed for only three days at a time (in order to equate the duration on weekend and weekday)

• The weekday slides were placed on a Tuesday and removed on a Friday morning

• The weekend slides were placed on a Friday and removed on a Monday morning

Results

• The results on the left indicate that there was more PM10 on a weekday than on a weekend. This is most likely due to higher amount of traffic on weekday than on a weekend.
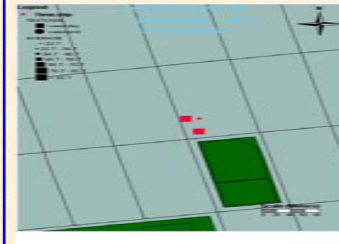
• The map on the left shows the location where the data from this experiment were collected. The large red squares indicate more pollution on a weekday than on a weekend (small red dot).
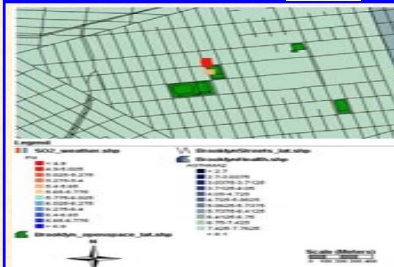
Experiment 3

This experiment was aimed to determine whether there is acid rain in Brownsville. Acid rain typically occurs as a result of high Sulfur Dioxide amounts in the air. Acid rain is dangerous because it kills trees, animals and fish. The predicted hypothesis was that there is no acid rain in Brownsville.

Methods

• Rain samples were collected on the rooftop of the school and local buildings. A pH meter was used to measure the acidity of water. A pH lower than 7 is acidic, a pH level higher than 7 is basic (or alkaline).

Results

• The results demonstrated that the samples were acidic, suggesting that there is acid rain in Brownsville. The red color indicates samples that were more acidic, less red samples were less acidic.

Experiment 4

- This study aimed to study how air pollution affects visibility. It is known air pollution can affect visibility on otherwise clear days, making the streets look foggy. For example, air pollution was very bad in China prior to the Olympics because of factories, cars, coal plants and weather. However, when China lowered sulfur dioxide and other emissions prior to the Olympics, the visibility in Beijing became much better.
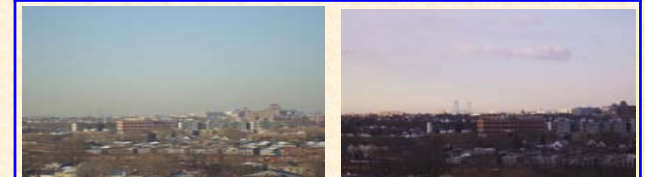

-Before the Olympics

-During the Olympics

Methods

• Pictures were taken from the Teachers Preparatory School roof top on different days. Weather (air pressure, humidity, temperature was recorded). The pictures with similar weather were compared on different days.

Results

• The pictures above show the visibility on two different days when the air pressure and humidity were roughly the same. However, on one of the days the Verrazano bridge was visible (right) and on the other day it was not visible (left). These results suggest that air pollution can alter visibility.

• The map on the left represents the visibility landmarks observed from Teachers Preparatory School

General Conclusions

• The results of these experiments suggest that there is an air pollution problem in Brownsville. Experiment 1 found that there was a lot more PM10 near the train station than near the park. Experiment 2 found that there was a lot more PM10 on the weekdays than during the weekend. Both of these experiments show that traffic affects the PM10 levels and can potentially be hazardous to our health. Experiment 3 found evidence of acid rain in Brownsville, which is alarming because it means that our plants and animals may be affected. Experiment 4 showed that air pollution can affect visibility on otherwise clear day. All of these studies show that clean air reform is needed in order to fix the air pollution problem in Brownsville.