CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)
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Project Number
34721

Project Title
Is It Raining Trash? The Effect of Storm Drains on Ocean Pollution

Abstract

Objectives/Goals
The purpose of my project was to determine how the design of storm drain grates affects the amount of flooding and the amount of trash flowing into the ocean.

Methods/Materials
The storm drains in my surrounding cities were tested to determine how effective they are at preventing ocean pollution. Pictures and measurements were taken of the storm drains for Los Angeles, Glendale and Eagle Rock. Replicas of all three drains were built using polymer-based clay. In addition, I created and built my own storm drain design. The drains were then tested by building a water chute from plastic sheeting and attaching the drains to a hole cut out in the middle. The chute was placed at an angle and 4.75 gallons of water were dumped down the chute. A baseline was first obtained for each drain and then 73 pieces of litter were added to the water similar to the litter I observed had accumulated at the actual city drains. Testing was done for both heavy and light rainfall by adjusting how fast the water was dumped down the chute.

Results
The best drain at preventing flooding was Eagle Rock during both heavy and light rainfall. However, it was the most inefficient at preventing ocean pollution as it allowed 52-56 pieces of trash to enter the storm water. Los Angeles, Glendale and my storm drain were similar in preventing flooding, which were not much less effective than Eagle Rock. However, my storm drain performed significantly better than all of the drains at keeping litter out of storm water. My storm drain only allowed 1.4-4.2 pieces of litter to enter the storm water. My storm drain design surpassed all of the city designs as it was both efficient at preventing flooding and vastly superior at keeping litter out of the storm water.

Conclusions/Discussion
Proper storm drains are essential for preventing ocean pollution. Much of the trash that has accumulated in the Pacific Ocean is due to litter that enters storm drains. Water that enters storm drains is not filtered for pollutants. It flows directly into streams and lakes, eventually ending up in the ocean. Unfortunately, storm water drains in many of our cities are not designed to effectively prevent flooding and ocean pollution. My storm drain, with both slanted, vertical openings and circular openings, was most effective at preventing flooding and ocean pollution because the size, spacing and angle of the grate openings directly affect its efficiency.

Summary Statement
My projected tested storm drains, including my own design, to determine which grate model performs best at both preventing flooding and ocean pollution.

Help Received
My mother helped me bake my clay replicas. She also helped me lift the bucket of water during testing.