Team Number: SSMA48
School Name: Saturday Science and Math Academy
Area of Science: Environmental Science
Project Title: Hurricane Effect on Disease Transfer

DEFINITION OF PROBLEM

Hurricane Maria was the strongest storm to make landfall in Puerto Rico in 85 years, and it has left thousands in need of water supplies, sanitation, food supply, electricity, transportation, shelter, communications, security, medical care, and mosquito control. The health of many Puerto Ricans have been put in jeopardy due to the catastrophic flooding. The flooding has led to an increase in floodwater related illnesses. In spite of the recent outbreaks officials say running water has been restored to 72 percent of the island's people. Internal and external contact with floodwaters can lead to cases of cryptosporidiosis (parasite), E. coli (bacteria) or giardiasis (parasite), which result in diarrhea, gas, nausea, and vomiting.

COMPUTATIONAL PLAN

With our project, we plan to model the places where people are more at risk for diseases carried in sewage water. Puerto Rico has its sewage system split up into 10 zones with a treatment plant in each zone. The unclean water from each plant would be taken up in the wind and water of the hurricane, and any diseases in the water would be dropped along the path of the hurricane as it travels through.

In Netlogo, we will have a map of Puerto Rico with each sewage plant indicated by a special symbol. A hurricane will start on the eastern side of the map (not yet directly on the continent) and move randomly over the map toward the northwestern quadrant. If the hurricane hits a plant, that region becomes at risk for the spread of the bacterium. If the hurricane moves to another region, it carries that infected water with it, and the population of that region will be at risk of infection. We will be monitoring the increasing percentage of the population that is at risk for, and possibly infected with these bacterias.

PROGRESS

We have looked at several models that display where hurricanes originate, and the likelihoods of their pathway. This model will be altered to suit our purpose of targeting the sewage plant and keeping track of the casualties.
To date, we have completed the hurricane portion of the project based off of other online models, with intentions to finish the disease modeling portion during winter break. The hurricane moves according to its energy level, which is determined from its category.

EXPECTED RESULTS

After considering the hurricane factors (initial location, probability of pathway, hitting the sewage plant and carrying the disease or not) have been taken into consideration the data should project the casualties as a result of the hurricane. This model will show the importance of

monitoring the sewage plants during hurricane season. Safety precautions should put in place as a means of protecting the plants and the thousands of people at risk.

CITATIONS

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