CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
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Project Number
J0312

Project Title
Wave vs. Barrier: Different Shapes of Barrier and Their Effects on a Tsunami

Abstract

Objectives/Goals
The purpose of this experiment was to determine how three different shaped blocks, acting as barriers,affect a tsunami. How do different barrier shapes on the shoreline affect a tsunami? If the wave hits the rectangular barrier with the half circle cut, then the barrier will stop the tsunami because this particular shaped barrier makes a focal point which compresses the wave. When the wave is compressed,its speed will be reduced drastically.

Methods/Materials
A rectangular plastic bin was filled with water and 2 pieces of plywood were placed at each end of the bin to act as drop zone and run-up ramps. A third plywood piece clipped with paper was supported horizontally to simulate the shore. Each barrier was placed at the beginning of the shoreline and the tsunami was created by dropping a medicine ball down the drop zone ramp. The brown paper absorbed the water that went over the barrier. The absorption limit on the brown paper represented the distance the wave traveled behind the barrier. The distance was measured from the back of the barrier.

Results
The triangular barrier was most effective. When the wave hit the tip of the triangle, it separated the water into two different paths. The wave did not flow over the barrier because was diverted to the sides. Only twice did water come over the barrier. The rectangular barrier with the half circle cut was the second most effective. Because of the concave shape of the barrier, the wave met at a focal point when it hit the barrier. When the wave met at the focal point,it traveled over the barrier with less energy. The rectangular barrier was the least effective having the highest average distance. When the water hit the flat surface on the face of the rectangular barrier,the energy was directed upwards and then over the barrier.

Conclusions/Discussion
The hypothesis was not supported through the experiment and the data gathered. It was learned that a triangular barrier can be effective in tsunami defense. The triangular barrier was most effective because when the wave hit the tip of the triangle, it separated the water into two different paths thus diverting it from flowing over the barrier.

Summary Statement
The purpose of this lab was to determine how three different shaped wood blocks, acting as barriers, affected a tsunami.

Help Received
Mom and Dad mentored throughout entire project development; Uncle provided tools and guidance for the construction of the wave simulator.