

Surviving the Surge

Problem

In Michigan's history the Great Lakes water levels are at the highest they have ever been. Meaning that more homes are getting destroyed due to flooding and beach erosion.

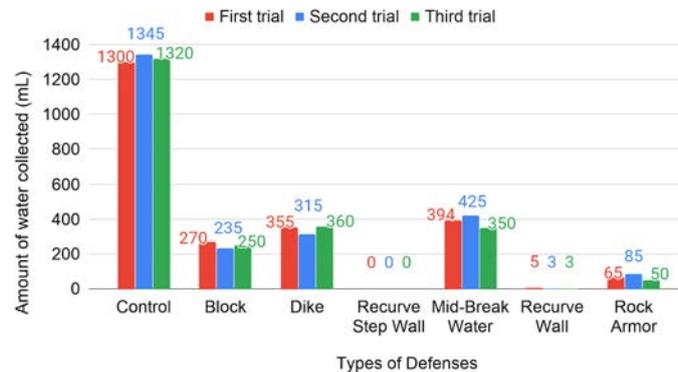
Hypothesis

My hypothesis is that if the area uses a defense with a curve it would redirect the water away. Keeping it out of the collection area.

Procedure

1. Glue all 5 plexiglass sheets together
2. Glue 10x5 2 inches from a back wall and 1, 10x5, 2 inches from the first
3. Using the cement make the defenses
4. Make rock armor by closing rocks in wire
5. Cut cardboard 2 inches wide and 10 inches tall then form this into a triangle
6. Pour cement into the triangle, this will be your beach
7. Pour water into the tank
8. Place defenses on the wall
9. Cut a charging cable so that the wires are exposed
10. Splice the wires into the parts of the motor and speed controller
11. Attach the wheel to the motor
12. Use pliers to curve both ends of the rod, drill a screw through the curve into the wheel
13. With the opposite end of the rod drill a screw through the curve and into glass that is 10x14 to make the paddle.
14. Put the wave maker in a box, make a rectangle hole for the rod
15. Place box on the opposite side of your defense
16. Plug in the wave maker, turn it on
17. Set the speed to 75%
18. After 20 seconds turn off the wave maker
19. Measure the water in the tank, use a syphon pump to measure the water back into a beaker
20. For a control repeat steps 1-20, no defenses

A Comparison of 7 Defenses Repeated 3 Times



Abstract

This year the Great Lakes water levels were the highest in recorded history. Meaning that more homes are getting damaged due to flooding and beach erosion. I had a hypothesis that if you use curved defenses it will reduce the amount of flooding. To test this I had made a mechanical wave tank and tested 7 defenses. My results were that the recurve step wall had an average 0 mL of water, the recurve with 3.60 mL, the rock armor had 66.66 mL, the block with 251.66 mL, the dike with 343.33 mL, then the mid-break water with 389.66 mL and finally the worst was the control with 1321.66 mL of water. In the end the curved defenses had proven superior to those that did not have a curve.



Types of Defenses	Trial 1	Trial 2	Trial 3
Recurve Step Wall	0	0	0
Recurve Wall	5	3	3
Rock Armor	65	85	50
Block	270	235	250
Dike	355	315	360
Mid-Break Water	394	425	350
Control	1300	1345	1320



Conclusion

From my experiment I had concluded that the recurve step wall and the recurve wall were the two superior defenses. I had found that the most successful defenses are built with a curve. The reason why they had outperformed the others was because they could redirect the water away from the collection area. Meanwhile, the worst defense was the farthest underwater. Meaning that it had less success of breaking up or moving the waves away.