Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Lesson 1: Does the Coastline Affect Storm Surge Damage?**

The United States has over 9,000,000 square kilometers of land area next to coasts. Hurricanes and other storms affect these areas often with lots of damage and even many deaths. The main killer of these storms is due to storm surge. Can you find out how the shape of the coastline and the depth of the ocean water affect storm damage? Put on your storm gear and get started.

Here are some definitions to help you in your investigation.

Depth - the distance from the top or surface of something to the bottom of something

Meters - a unit of measure of depth. One meter is about 3 feet.

Shelf Width - the part of the continental plate that extends into the ocean and is below the surface to a relatively shallow depth. The shelf varies in width from a few meters to over 1,500 kilometers wide.

Continental Plate - a large part of Earth’s crust

Storm Surge - a rise in the ocean level due to storms pushing water in towards the coastline

Constant - keeping a variable from changing

Manipulated Variable - the variable that the researcher changes. This is called the “cause.”

Response Variable - the variable that the researcher measures. This is called the “effect.”

**Doing the Science**

1. Start the Storm Surge Simulation by clicking on the “Simulation” tab.

2. Select “Basic Factors.”

3. Select “Shelf Width.”

4. Choose one of the three different shelf widths.

5. Make sure to keep all other factors constant, that is, do not change water depth, tides, or location.

6. Click on the “Run” icon.

7. Record the Cost and Damage values displayed in the Damage Assessment portion of the screen in Table 1 below.

8. Select the “Reset” button. Again, click on “Shelf Width.” Select a different shelf width from step 3. Repeat steps 5 – 7.

9. Repeat step 8 for the remaining shelf width.

**Table 1.**

|  |  |  |
| --- | --- | --- |
| **Shelf Width** | **Cost of Damage ($)** | **Damage Factor** |
| Wide |  |  |
| Medium |  |  |
| Narrow |  |  |

10. Select “Basic Factors.”

11. Select “Water Depth.”

12. Choose one of the three different water depths.

13. Make sure to keep all other factors constant, that is, do not change shelf width, tides, or location.

14. Click on the “Run” icon.

15. Record the Cost and Damage values displayed in the Damage Assessment portion of the screen in Table 2 below.

16. Select the “Reset” button. Again, click on “Water Depth.” Select a different water depth from step 11. Repeat steps 12-15.

17. Repeat step 16 for the remaining water depth.

**Table 2.**

|  |  |  |
| --- | --- | --- |
| **Water Depth** | **Cost of Damage ($)** | **Damage Factor** |
| Deep |  |  |
| Medium |  |  |
| Shallow |  |  |

**Do You Understand?**

1. When conducting the shelf width part of this investigation, name one factor you held constant.

2. Why did you keep the factor listed in question #1 and all other factors than shelf width constant?

3. What was the manipulated variable in the part of the investigation that you studied for the data input in Table 2?

4. What was the response variable in the part of the investigation that you studied for the data input in Table 2?

5. How does shelf width impact the damage done by a storm surge?

6. How does water depth impact the damage done by a storm surge?

7. Which factor, shelf width or water depth, had the larger effect on storm damage? Support your answer with a reason or two.