



Coastal Floods
2024 NHERI Lehigh Real Time Multi-Directional Experimental Facility REU
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Summary

This hands-on activity is designed to teach students about coastal floods and allow them to analyze, evaluate, and create a cost-effective flood barrier to protect a structure. This activity will enhance students' critical thinking and introduce how engineers can mitigate property damage during floods.

Engineering Connection

Students will learn about the effects of natural hazards on structures. Specifically, they will learn about coastal floods and their impact on communities.

Audience

High School Students (9th -12th Grade)

Lesson Objectives

- The objective of this activity is for students to learn about coastal floods by designing and creating flood barriers to protect a structure.
- Students will understand the importance of natural hazard mitigation.
- Students will practice problem solving and critical thinking to create a cost-effective flood barrier.

Educational Standard: Earth and Human Activity

Link: <https://www.nextgenscience.org/pe/hs-ess3-1-earth-and-human-activity>

Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific knowledge, principles, and theories. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

Material List

Building Materials	Structure Materials	Other
Masking Tape	Paper	Tray
Craft Sticks	Paper Clips	Water
Foam Cups		Paper Towels
Cotton Balls		
Straws		
*etc.		

*Any other material that could be used for a barrier.

Introduction

The main goal of this activity is for students to create a cost-effective flood barrier. Each student will work together to create a flood barrier that is 3"x3" in size to keep an already made paper box structure (1"x1"x2") dry during the "flood". The barrier will consist of different types of materials and is also associated with costs. This activity should take only 90 minutes to finish. Students will be encouraged to critically think and understand the effectiveness of a flood barrier. The motivation for this activity is to introduce how engineers can mitigate property damage during floods.

Procedure

Background knowledge

- Discuss the impact of coastal floods on communities
- Provide a video of a natural hazard event (e.g., Surfside condominium collapse)

Before the activity

- The activity leader will explain the project goal and the materials available.
- Students will be randomly divided into groups of 4-5.
- Students will brainstorm ideas to develop their flood barrier. They will assess the materials they need based on the allotted budget.

During the activity

- Groups will have 1 hour to build a flood barrier. Students will assign one member to keep track of their building materials and how much they are spending. That student can also participate in the building.

After the activity

- Ask students to write their reasoning for choosing the materials for their barrier.
- Activity leader will test the student's barriers by simulating a coastal flood.
- Flood barriers will be evaluated on performance and cost effectiveness.

Assessment

Once the activity is complete, students will discuss and write what they would have changed or done to improve their flood barrier. This requires students to think critically about what went well or what didn't. Students will be required to fill out a

worksheet, writing what they learned and their design process. They will be turned in at the end of the activity.

Wrap-up

- Give students an opportunity to ask questions and discuss how this activity relates to real world applications.
- Encourage students to take a photo of their build to initiate a conversation between the students and other people about their activity.

Example Photo

