

# TSUNAMI HAZARD ZONE

IN CASE OF EARTHQUAKE, GO

TO HIGH GROUND OR INLAND

# Survive That Tsunami! Testing Model Villages in Big Waves

Groups of 10. Estimated materials cost is \$1 per group.

**Grade Level** 5 (3-5)

Subject Areas Physical Science, Problem Solving

Time Required 50 minutes

**Contributed by** Integrated Teaching and Learning Program, College of Engineering, University of Colorado Boulder

# Summary

Students use a table-top-sized tsunami generator to observe the formation and devastation of a tsunami. They see how a tsunami moves across the ocean and what happens when it reaches the continental shelf. Students make villages of model houses and buildings to test how different material types are impacted by the huge waves. They further discuss how engineers design buildings to survive tsunamis. Much of this activity setup is the same as for the Mini-Landscape activity in Lesson 4 of the Natural Disasters unit.

This engineering curriculum meets Next Generation Science Standards (NGSS).

#### **Engineering Connection**

No one can stop tsunamis from forming since we cannot prevent earthquakes, volcanoes and landslides, but we can devise ways to minimize the impact of these killer waves on human communities. Engineers design and install seismographs, tide gauges, ocean floor pressure sensors and loud sirens. Engineers also design buildings using materials and shapes that are more likely to survive a tsunami. Between high-tech detection systems and smart structures, the impact of a tsunami strike can be

lessened dramatically. But, in many areas, dense populations, unreliable

local communication, and poor or nonexistent roads remain

the biggest obstacles to quick evacuation to safety.

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#### Learning Objectives

After this activity, students should be able to:

- (i) Explain what causes tsunamis, including movement under the surface of the ocean.
- **Communicate** that buildings constructed with materials that are heavier are more likely to survive a tsunami, but may be too expensive or not available.
- **Output** Understand how engineers cannot prevent tsunamis, but they can design and build buildings so that they are more resistant to tsunamis.

#### Introduction/Motivation

What is a **tsunami**? Well, it is a really large wave — much larger than the waves you see when you splash in a pool or surf at the beach. The difference between a regular wave and a tsunami is that a regular wave is just a surface disturbance of the water, and a **tsunami is a disturbance that** reaches all the way to the *ocean floor*!

What do you think causes a tsunami? Well, tsunamis can be caused by anything that moves the ocean or **sea floor**, like earthquakes, volcanoes and landslides. Think about an underwater earthquake that is caused by the moving of **tectonic plates**. Do you think that this could move the sea floor and create a tsunami? Yes, it could! Do you think engineers can prevent tsunamis? Engineers cannot **prevent** natural events like earthquakes or volcanoes, or the tsunamis that can result from them. So, what can engineers do about tsunamis? One thing engineers can do is build **structures** that can **survive** a tsunami.

In December 2004 a huge tsunami hit the beach in Indonesia. Do you know from what material most of the destroyed houses were made? Most were made of wood, and some were actually made of paper. What do you think are the advantages and disadvantages of wooden or paper houses? How might houses made of these materials be a disadvantage when it comes to a tsunami? Well, a house made out of weak material, such as wood or paper, probably will not survive the great forces of a tsunami. So, what can engineers do so that a building or structure is able to survive a tsunami? (*Possible ideas:* Build it out of stronger material; build it on stilts.) What might be some disadvantages of these types of the new houses? (*Possible ideas:* More costly and difficult to construct, look different than usual buildings.)

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## Survive That Tsunami! Testing Model Villages in Big Waves

#### Introduction/Motivation Continued

Today, we are going to explore some of the choices that engineers have when designing buildings with tsunamis in mind and make some conclusions as to what shapes and materials make the most tsunamiresistant buildings. **Today you are going to make a model building and see if it will survive a tsunami.** Are you ready?

#### Aligned Educational Standards

NGSS Next Generation Science Standards (4)
ITEEA International Technology and Engineering Educators Association (1)
CO Science (2)

The full activity includes the materials list, procedures, specific aligned standards, attachments and assessments.

SEE THE FULL ACTIVITY

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