Warnings Signs: Nature and Technology

Overview:

In this lesson, students classify tsunami warning signs as either natural warnings or official warnings communicated through technology by playing an active and fun game.

Targeted Alaska Grade Level Expectations:

Science

[3] SA2.1 The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by answering "how do you know?" questions with reasonable answers.

[3] SE2.1 The student demonstrates an understanding that solving problems involves different ways of thinking, perspectives, and curiosity by identifying local tools and materials used in everyday life.

[4] SD2.2 The student demonstrates an understanding of the forces that shape Earth by identifying causes (i.e., earthquakes, tsunamis, volcanoes, landslides, and avalanches) of rapid changes on the surface.

Writing

[2] 1.1.2 The student writes about a topic by writing and organizing thoughts into a topic sentence and two supporting sentences.

[3] 1.1.2 The student writes about a topic by writing a paragraph on a single topic with two or more supporting details.

[4] 2.1.1 The student writes about a topic by writing a paragraph that maintains a focused idea and includes details that support the main idea.

Objectives:

The student will:

- identify technology used to send tsunami warnings;
- classify warnings as natural or technology-based; and
- explain the appropriate action of going uphill and inland in the case of a tsunami warning.

Materials:

- Two fly swatters
- Two sheets of blank paper
- Tape
- Marker
- VIDEO FILE: "Warning Signs"
- TEACHER INFORMATION SHEET: "Warning Cards"
- STUDENT WORKSHEET: "Tsunami Warnings" (Grades K-2) or STUDENT WORKSHEET: "Tsunami Warnings" (Grades 2-4)

Whole Picture:

The quantity of observable tsunami warning signs, including warnings communicated through technology and warnings noted by observant coastal residents, depends on the type of tsunami. Tsunamis are categorized as transoceanic (teletsunamis) and local. Because of the great distances they travel, teletsunamis offer the greatest likelihood of being detected and evaluated by tsunami warning centers before issuing official warnings. Natural warning signs, described below, also can alert coastal inhabitants of an incoming teletsunami. Local tsunamis do not affect areas outside the bay of their origin, but education about natural warning signs may be the most effective means of mitigation due to the short time before the waves arrive. A single earthquake may generate a teletsunami in addition to multiple local landslide tsunamis, as in the 1964 event, which caused at least 20 separate tsunamis.

Tsunami warning centers use the following technology to communicate official warnings: sirens, telephones, televisions, Internet warning messages from tsunami warning centers, NOAA weather radio, and CB radio.

There are several ways nature gives warnings of a possible approaching tsunami. Awareness of your surroundings is key. Pay attention to what you feel, see, and hear. Earthquakes are one of nature's tsunami warning signals, but remember that all earthquakes do not generate tsunamis. Do not stay in low-lying coastal areas after a strong earthquake that lasts more than 20 to 30 seconds or knocks you down.

Some natural tsunami warnings may be visually observed, such as unusual, frothy bubbles in the water, or an unusually low, receding waterline. Sometimes the seafloor may be exposed for hundreds of feet, revealing seaweed, sunken ships, floundering sea life and debris. Olga Bay Narrows and Akhiok resident Nick Alokli was in Old Harbor at the time of the 1964 earthquake and tsunami. He remarked, "Sitkalidak Strait dried up completely. We could see the rocks in the middle of the strait."

Sucking, hissing, bubbling and boiling may be heard as rocks, pebbles and water are drawn out to sea. There may be an eerie silence along a coast that usually pounds with the sound of surf. Elena Suleimani, a Tsunami Modeler/Research Analyst at the Geophysical Institute, describes that the sound is like distant thunder at first, then a low-flying helicopter or a loud roar from the ocean. Interviewed after the 1964 earthquake and tsunami, Victor Zeeder of Kaguyak remembered, "I heard the water. Like the wind, you know. She was noisy." Regarding Old Harbor, Alutiiq Elder Nick Alokli said, "We could just hear SSHHHH!! – Just so loud. It was just boiling, I think." Other people of Old Harbor stated, "The men in the village heard clam shells rolling and ran for the hill." Right before the final major wave hit Old Harbor, Larry Matfay and Mike T. "jumped off the boat, held each other by the hand, and ran up the beach. They 'could feel it coming, the roar.'"

Heed tsunami warning signs, both natural and official. For low-lying areas along the coast, safety precautions require that people move inland and uphill quickly in the event of an earthquake. Wait for an official "all clear" before returning.

Activity Preparation:

Cut up the cards on the TEACHER INFORMATION SHEET: "Warning Cards."

Activity Procedure:

1. Explain that students will learn about tsunami warnings. Employ “how do you know?” to trigger prior knowledge of observations before a tsunami strikes.
2. Share information from the *Whole Picture* section. Display the VIDEO FILE: “Warning Signs” and guide students through the information and game.
3. Make the game kinesthetic by taping two pieces of paper to the board. Write “nature” on one sheet and “technology” on the other. Divide the students up into two teams. Shuffle the cards. Give the fly swatters to one person on each team. Students take turns hitting the correct answer, nature or technology, as you show each card. The person with the first correct answer gets a point for the team.
4. Distribute STUDENT WORKSHEET: “Tsunami Warnings” (Grades K-2) or STUDENT WORKSHEET: “Tsunami Warnings” (Grades 2-4) for student completion.

Extension Idea:

- Make a bulletin board to share information on types of warnings. Illustrate each type of warnings with photos from your community or student artwork.

Lesson Information Sources:

Alaska Tsunami Education Program. Nick Alokli in Elder Mentor Lecture, recorded December 13, 2006.

Atwater, B. F. (1999). *Surviving a tsunami--lessons from Chile, Hawaii, and Japan*. Reston, Va: U.S. Dept. of the Interior, U.S. Geological Survey.

Davis, Nancy Yaw. *The Effects of the 1964 Earthquake, Tsunami, and Resettlement on Two Koniag Eskimo Villages*. Unpublished Ph.D. Dissertation, University of Washington, 1971.

Tufty, Barbara. *1001 Questions Answered About Earthquakes, Avalanches, Floods and Other Natural Disasters*. New York: Dover. 1969.

Answers:

STUDENT WORKSHEET: “Tsunami Warnings” (Grades K-2)

1. *technology*
2. *nature*
3. *technology*
4. *nature*
5. *technology*
6. *technology*
7. *nature*
8. *technology*
9. *up hill and/or inland*

STUDENT WORKSHEET: “Tsunami Warnings” (Grades 2-4)

1. *A-D. Any four of the following: sirens, telephones, televisions, internet warning messages from tsunami warning centers, NOAA weather radio, and CB radio.*
2. *Answers will vary but responses should include: a strong earthquake along the coast; seeing and/or hearing unusual bubbles in the seawater; unusually low, receding waterline; unusual quiet in a normally surf-pounded area; or a roaring sound coming from the ocean.*
3. *go uphill*

Name:_____

Grades K-4

Tsunami Warnings (Grades K-2)

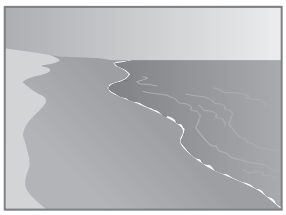
Student Worksheet

Directions: Circle "Nature" for Nature's tsunami warnings or "Technology" for official warnings.

1.

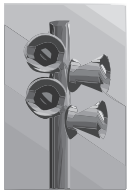
Nature Technology

2.



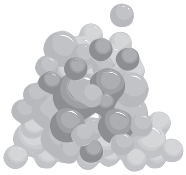
Nature Technology

3.



Nature Technology

4.

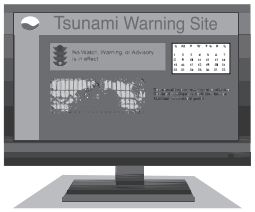


Nature Technology

5.

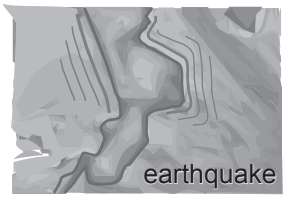
Nature Technology

6.



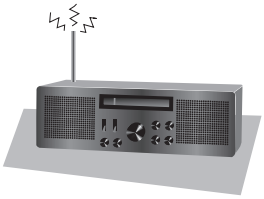
Nature Technology

7.



Nature Technology

8.



Nature Technology

9. Where do you go when there is a tsunami warning?

_____

Name:_____

Grades K-4

Tsunami Warnings (Grades 2-4)

Student Worksheet

1. List 4 types of technology that may be used to warn people about a tsunami.
   - A. _____
   - B. _____
   - C. _____
   - D. _____

2. How do you know when nature is warning you about an incoming tsunami?

_____

_____

_____

_____

_____

_____

3. What do you do when there is a tsunami warning?

_____

_____

_____

_____

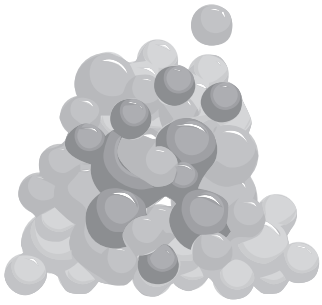
_____

_____

Warning Cards

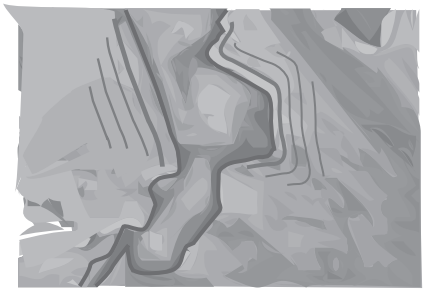
Teacher Information Sheet (page 1 of 2)

Grades K-4



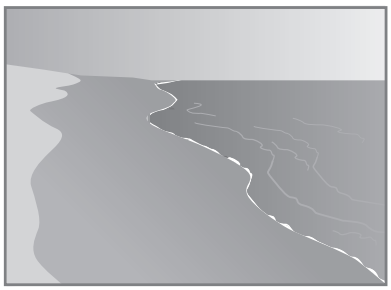
bubbles

CB radio

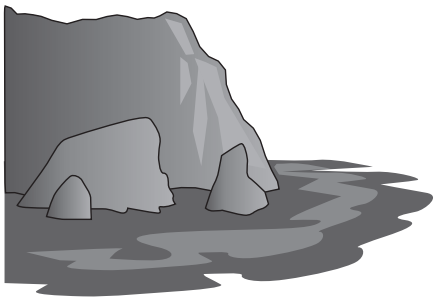


earthquake

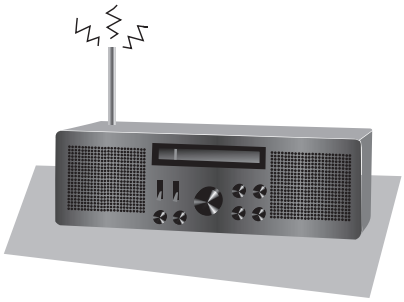
Internet



low water line



quiet surf

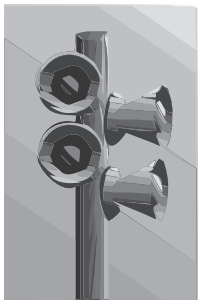


radio

roaring sound

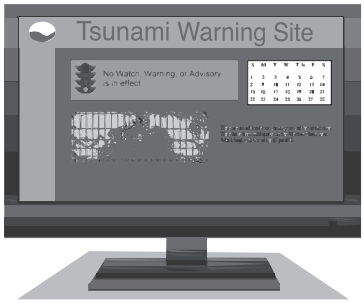
Warning Cards
Teacher Information Sheet (page 2 of 2)

Grades K-4



siren

telephone



television