

Lesson #6: “Are YOU Ready?”

- Teacher Information
- “Tsunami Travel Times to Honolulu Harbor (Minutes)”
- mini-brochure “Tsunami Safety”
- mini-brochure “Tsunami Safety” Teacher Answer Sheet
- mini-brochure “Tsunami Safety” Rubric
- “Tsunami Information Bulletins” from Lesson 5
- “Preparing for a Tsunami” from the O’ahu Civil Defense Agency
- “Sensing a Tsunami” from ITIC
- “Tsunami: The great waves” from ITIC

LESSON #: 6

TITLE: “Are YOU Ready?”

OVERVIEW:

In Lesson #6 students learn safe responses for both locally generated and distant tsunamis. Each student creates a convenient-sized tsunami brochure, which can be Xeroxed for sharing with family members.

KEY CONCEPTS:

1. LOCAL TSUNAMIS could be generated within the Hawaiian Islands. While at the beach, if the ground moves or the ocean looks odd or there’s an unusual loud sound, evacuate the area immediately.
2. DISTANT TSUNAMIS could be generated primarily from places faraway from Hawai’i; follow each of the 3 Tsunami Information Bulletins:
 - Advisory (listen to radio or tv),
 - Watch (listen to radio or tv and prepare for possible evacuation)
 - Warning (evacuate if in an evacuation zone)
3. Evacuation is done either
 - horizontally, by immediately moving inland one-half mile or more
 - vertically, by immediately moving to the 3rd floor or higher in a steel/concrete reinforced building which is 6 stories or taller

STANDARD(S)-BENCHMARK(S):

Standard 2: Nature of Science

Benchmark 6.2.1: Explain how technology has an impact on society and science.

NOAA ocean literacy:

Essential Principle #6: The ocean and humans are inextricably interconnected.

FC (f) Coastal regions are susceptible to natural hazards (tsunamis, hurricanes, cyclones, sea level change, and storm surges).

TEACHER BACKGROUND:

On the *Tsunami Education Resource Kit (TERK)* website (see complete citation in Resources below), this quote is given from a story by Peter Pissierssens in the January 1, 2005 London Times:

“Tilly Smith, a 10 year old girl from Oxshott, Surrey, England saved a hundred fellow tourists from the December 26, 2004 tsunami. She urged her family to get off Maikhao beach in Phuket, Thailand after seeing the tide rush out. Her mother and father alerted others to clear the beach. She learned about tsunamis from an earthquake project that her geography teacher, Andrew Kearney, had her complete at Danes Preparatory School.”

Like Mr. Kearney, we can educate our students about the dangers of tsunamis, and the students in turn can educate their family by making a mini-brochure, “Tsunami Safety.” The completed brochure can be Xeroxed and given to other family members. It is conveniently small enough to stick in a purse, wallet, or school book bag.

In order to prepare their “Tsunami Safety” mini-brochure, students will need information. All information necessary for Lesson #6 is included here for the teacher. However, additional pamphlets, information papers, and other materials are available from these sources, if they are given enough time:

- State Civil Defense; 733-4300, x524
Mr. Ray Lovell, Public Relations
- C&C Honolulu’s Department of Emergency Management; 523-4122
(old name: Oahu Civil Defense Agency)
- Dr. Daniel A. Walker
Tsunami Memorial Institute
59-530 Pupukea Road
Haleiwa, HI 96712
- UNESCO’s International Tsunami Info. Center (ITIC); 532-6422
Mr. Brian Yanagi, Office Mgr.; Ms. Linda Sjogren, Technical Info Specialist
<http://www.tsunamiwave.info>

ITIC has a library of videos and DVDs; these may be borrowed, but you would need to visit their small offices to make your selection.

Evacuation maps are toward the beginning of the phone directory, white pages. According to Justin Fujioka’s tsunami preparedness information aired in April 2007 over KITV, Channel 4 (see Resources below), it will also be possible to access an online site for evacuation maps. Jessi Huart of NOAA is developing these maps; they will be similar to maps found on Google Maps and other such sources.

The current site is: http://www.csc.noaa.gov/psc/project_pages/tsunami.html

A person will be able to enter his/her home, work or school address; the map will pinpoint the location, and the viewer will be able to see whether or not the location is in an evacuation zone. When these maps become available, NOAA as well as standard local civil defense sites (e.g., state of Hawai'i, C&C Honolulu, and Red Cross) will provide links.

The mini-brochure shows two tsunami logos. This one seems to be more common in countries around the world--



while this is more commonly used in the U.S.--



Most tsunamis are generated by earthquakes at geological areas called subduction zones. These zones are thousands of miles away from Hawai'i; see the map of tectonic plates in the Procedure section in Lesson #2. These distant tsunamis are the most likely tsunami, or indeed natural disaster, to hit Hawai'i.

However, the Hawaiian Islands, built over a convection hot spot, are very geologically active. Although it's unlikely in our lifetime, Hawai'i could experience an unusually large earthquake or landslide, especially near the Big Island, that could generate a disastrous tsunami. Such a local tsunami could sweep up the island chain within half an hour, causing extreme loss of life.

DURATION: roughly 1 class period, or about 45 minutes

VOCABULARY: (Note: Some of these vocabulary words are continued from Lesson #5, since the focus is now on appropriate responses by the public to the tsunami advisory bulletins.)

- evacuation = the orderly withdrawal from a dangerous area for protection
- tsunami advisory = the lowest level of tsunami alert; states that an earthquake has occurred which might have generated a tsunami; listen to radio or television for updated announcements.
- tsunami warning = the highest level of tsunami alert; sirens sound; citizens in evacuation zones should be ready to evacuate by moving inland or to the 3rd floor or higher in a concrete and steel reinforced building that is 6 stories or higher.
- tsunami watch = the middle level of tsunami alert; states a tsunami may have been generated; a person should check the phone directly to find out if he/she is in a possible evacuation and, if so, prepare for a possible evacuation. Listen to radio or television for updated announcements.

MATERIALS NEEDED: (All papers with an asterisk, *, are provided within these curriculum materials; the sources are given for information only; also see Resources below.)

For the teacher:

- 1 “Tsunami Safety” mini-brochure completed by the teacher (original template provided in curriculum materials)
- overhead projector and screen
- transparency of “Tsunami Travel Times to Honolulu Harbor (Minutes)”

Per student partnership:

- (optional: colored markers, crayons or pencils...since the final product is to be Xeroxed, and color will not show up.)
- Lesson #5’s “Tsunami Information Bulletins”
- Xerox set of evacuation maps from the yellow-edged section “Ho’omakaukau - Get Ready - Disaster Preparedness Guide” in a *current* phone directory. (Current online site is: http://www.csc.noaa.gov/psc/project_pages/tsunami.html.)
- from C&C Honolulu Dep’t. of Emergency Management (previous name was O’ahu Civil Defense Agency):
 - **Preparing for tsunami*, 11/06
- **from ITIC*
 - **Sensing a tsunami*
 - **Tsunami: The great waves*

Per student:

- flat, un-cut and un-folded “Tsunami Safety” mini-brochure

PROCEDURE:

1. Before the lesson begins, prepare the teacher’s copy of the mini-brochure, “Tsunami Safety.” Here’s how to cut and fold it:
 - Fold the 8½” x 11” mini-brochure in half, lengthwise; crease well.
 - Open it up. Fold it in half again, but this time widthwise.
 - Keep it folded, and fold it twice more. The paper should be divided into eight sections.
 - Open and flatten the mini-brochure. Fold it in half again, widthwise.
 - Position the scissors at the center of the folded edge. Cut along the dashed line that goes from the middle of the fold along what is the middle of the entire paper’s length. Afterward, when the paper is opened flat, there’s a slit in the middle of the paper going between the middle 4 sections of the 8-sectioned document.
 - Crease all the folds a few times so that they’re flexible.
 - Fold the paper in half lengthwise.
 - Hold the ends of the folded paper with your 2 hands so that you’re looking down on the edge with the slit in it.
 - Move your hands together and back out a couple times, to ‘flex’ the paper, opening & closing the slit.
 - Move your hands together a last time, opening the slit and then collapsing it. As you view the paper from the slit edges, the edges now form a + sign.
 - Final step: collapse & fold the paper so that you have the title page, “Tsunami Safety” as the front of the mini-brochure.
 - Draw your tsunami picture, complete the questions (see “Tsunami Safety” Teacher Answer Sheet), and you’re ready for class!
2. As with some of the previous Lessons in this Unit, be sensitive about teaching children when talking about disaster. Perhaps get a copy of *Helping children cope with disaster*, which is produced by FEMA, but is available from the state of Hawai’i’s Civil Defense; see both Teacher Background above and Resources below.
3. Tell the students that, as they learned from the Titanic Tsunami Task Card Poster-Graphs in Lesson #4, tsunamis have been the greatest natural disaster to hit Hawai’i. Although it’s unlikely, a tsunami could be generated by a large Big Island landslide or earthquake; the tsunami could reach Honolulu in less than half an hour. Show the students the transparency of “Tsunami Travel Times to Honolulu Harbor (Minutes)”
4. Perhaps show these segments from the Justin Fujioka CD; see Resources below:
 - 2nd segment -- tsunami watch and warning
 - 4th segment -- Big Island community’s preparedness

5. Review Lesson #5. Modern-day technology *can* help science learn more about tsunamis so that society is prepared for a tsunami; there's technological data backing up the Tsunami Information Bulletins that are issued during a tsunami crisis. But when a Tsunami Warning is issued, people need to know for themselves exactly what to do. An additional reason why there was no loss of life in Hawai'i during the 1952 and '57 tsunami (mentioned in Lesson #3) is because the public responded knowledgeably and responsibly to the Tsunami Warning Center's Bulletins; the alerts were not ignored. (By the time there was another tsunami in 1960, people had grown complacent, and there were over 60 lives lost in the state of Hawai'i.)
6. Perhaps tell the students the true story of the English school girl, Tilly Smith, during the Indian Ocean tsunami of 2004; see Teacher Background above and the complete citation for NOAA's *Tsunami Education Resource Kit (TERK)* in the Resources below. Tilly's knowledge saved a lot of lives.
7. There's another interesting example of one person saving many lives from tsunami disaster. In Japan, 150 years ago, an elderly man saved his village by lighting a fire to attract their attention. This event has been retold by Margaret Hodges in her fictionalized children's story, *The Wave*; see the citation in Resources below.
8. Tell students that Lesson #6 will help them and their families know what to do when a tsunami is coming.
9. Pass out a flat, un-cut & un-folded "Tsunami Safety" mini-brochure to each student; pass out scissors that can be shared among several students. Instruct students on how to fold and cut their flat paper to make their own mini-brochure.
10. Tell the students that since their finished mini-brochure will be Xeroxed to provide enough copies for each member of their family, they should complete "Tsunami Safety" without color. They should do a nice, clean job in black & white!
11. Students should be able to find all the answers they need to complete most of the mini-brochure from the pamphlets and handouts provided to them, as well as from what they have learned from the previous Lessons in this Unit, especially Lessons #2, 4 and 5. They will need access to Lesson #5's "Tsunami Information Bulletins" again.
12. Except for page 5, question#3, which can be answered in class, using the evacuation zone maps inside the phone directory, assign mini-brochure pages 5 & 6 as homework, in order to be sure the family information is accurate. Note the need for a parent signature on page 6.

13. If students need more space for any question on any page, they can open the mini-brochure and utilize that space.
14. See mini-brochure “Tsunami Safety” Teacher Answer Sheet.
15. When the mini-brochure has been completed and corrections have been made, Xerox enough copies of each student’s “Tsunami Safety” for them to take home and share with family members.

ASSESSMENTS:

Benchmark 6.2.1: Explain how technology has an impact on society and science. Use mini-brochure “Tsunami Safety” Rubric.

RESOURCES:

- Web:

Kaitoku, T. (2005). *Signs and symbols*. Retrieved April 10, 2007, from International Tsunami Information Centre Web site:

http://ioc3.unesco.org/itic/categories.php?category_no=168

Pararas-Carayannis, G., Wilson, P. & Sillcox, R. (n.d.). *Tsunami warning!* Retrieved April 7, 2007, from Federal Emergency Management Agency (FEMA) Disaster Connection Kids to Kids Web site:

<http://www.fema.gov/kids/tsunami/>

Pararas-Carayannis, G., Wilson, P. & Sillcox, R. *Tsunami warning! Children’s Coloring Book*. (2006). Retrieved April 10, 2007, from International Tsunami Information Centre (ITIC) Web site:

http://ioc3.unesco.org/itic/files/Tsunami_Warning_Cartoon_Book_small.pdf

Preparing for disaster. (n.d.). Retrieved April 9, 2007, from Hawaii State Civil Defense Web site: <http://www.scd.state.hi.us/preparedness.html>

Safety rules. (n.d.). Retrieved April 10, 2007, from International Tsunami Information Centre (ITIC) Web site: <http://www.tsunamiwave.info/>

Sensing a tsunami. (n.d.). Retrieved April 10, 2007, from International Tsunami Information Centre (ITIC) Web site: <http://www.tsunamiwave.info/>

Tsunami. (2006). Retrieved April 9, 2007, from FEMA’s Web site: <http://www.fema.gov/hazard/tsunami/index.shtm>

Tsunami Education Resource Kit (TERK). (2006). Retrieved April 9, 2007, from NOAA's Office of Education Web site:

http://www.oesd.noaa.gov/terk_intro.htm

TsunamiReady™ helps communities and counties at risk. (n.d.). Retrieved April 7, 2007, from NOAA National Weather Service TsunamiReady™ Web site: <http://www.tsunamiready.noaa.gov/>

Tsunami shelters on Oahu. (2007). Retrieved April 9, 2007, from City and County of Honolulu Department of Emergency Management Web site:

<http://www.honolulu.gov/ocda/shelter1.htm>

- Print:

Buck, P. (1974). *The big wave*. New York: the John Day Company.

Emergency checklist. (n.d.). Honolulu: Oahu Civil Defense Agency.

Helping children cope with disaster. (2004). Jessup, MD: Federal Emergency Management Agency (FEMA.)

Preparing for tsunami. (2006). Honolulu: Oahu Civil Defense Agency.

Tsunami evacuation guide: How can I help our visitors and residents during a tsunami? (n.d.). Honolulu: Oahu Civil Defense Agency.

Tsunami: The great waves. (2005). Honolulu: UNESCO IOC (Intergovernmental Oceanographic Commission) ITIC (International Tsunami Information Centre.)

Walker, D. A. (1999). *Tsunami hazards in Hawai'i*. Honolulu: Tsunami Memorial Institute.

- Media:

Fujioka, J. (April 2007). *Tsunami information*. KITV channel 4 evening news.

- 1st segment --Tsunami Survivors from Hilo 1946 tsunami (0:00-2:17)
- 2nd segment -- Tsunami Watch and Warning (2:18-4:16)
- 3rd segment -- Tsunami Evacuation Zones Online (4:17-6:06)
- 4th segment -- Big Island Community's Preparedness (6:07-8:18)
- 5th segment – Technology: DART buoys and NOAA weather radios (8:19-10:45)

Save your lives from tsunami! (2004). Japan: Japan Meteorological Agency. (a CD of a Quick Time video clip)

distant tsunami
ADVISORY

WHAT TO DO:
local tsunami
If you're at the beach and the ground
moves, or the ocean looks odd or
you hear a loud sound --

WARNING

distant tsunami:
WATCH

How is a tsunami different from a wind
wave?

This is what a tsunami looks like:

TSUNAMI INFORMATION:

Tsunami
Safety
by:



"If it's strong enough to knock you
down, leave the beach and head for
higher ground!"

EMERGENCY PHONE NUMBERS:
Oahu Civil Defense 523-4121
hearing impaired 527-5476
Dep't. of Community Serv. 523-4545
hearing impaired 527-6300
Pacific Gateway Center 845-3918
(foreign language translation)

FAMILY

1. Our address is: _____

2. Our phone is: _____

3. Our home is in an evacuation zone:
Yes ___ No __. If yes: our shelter's name
is: _____

4. Childrens' information:

(a) Name: _____

School: _____

Phone: _____

(b) Name: _____

School: _____

Phone: _____

(c) Name: _____

School: _____

Phone: _____

INFORMATION:

5. Adults' information:

(a) Name: _____

Work place: _____

Phone: _____

(b) Name: _____

Work place: _____

Phone: _____

(c) Name: _____

Work place: _____

Phone: _____

6. Name of out-of-state contact person:

Phone: _____

Can people surf tsunamis?
Can people outrun tsunamis?

Lesson #6
“Are YOU Ready?”
mini-brochure “Tsunami Safety” Teacher Answer Sheet

cover:

Student’s first and last name should appear on the blanks.

page 1:

As in the rubric for the Titanic Tsunami Task Card Poster-Graph in Lesson #4, the picture should be scientifically accurate for a tsunami, not a wind-generated wave.

A tsunami should *not* be drawn with a curved face, since only a very small percentage of tsunamis have such a shape. (Should a tsunami have a curved face, it probably occurs when the wave is at the horizon, far from shore...and is *certainly* not a wave to be surfed!)

The picture could also include the damage done by a tsunami.

page 2:

How is a tsunami different from a wind wave?

Hopefully, the Lesson #4 Titanic Tsunami Task Card Poster-Graphs are still available for students to look at. Refer to the TTT Cards for specific numbers; however, it is not expected that students put actually numerical values in their answers to the mini-brochure questions. The aim is for students to remember the overall massive power of tsunamis. In summary, tsunamis are bigger in every category:

- speed when traveling both over the deep sea and at the coast, as they come ashore
- time between waves
- distance between waves
- depth of wave’s motion
- wave height at the shore
- run-up, or vertical distance, elevation of the land, where the seawater penetrated farthest inland
- inundation, or horizontal distance inland that is flooded by a tsunami

Can people surf tsunamis? **NO!**

Can people outrun tsunamis: **NO!**

page 3:

WHAT TO DO:

local tsunami

If you're at the beach and the ground moves, or the ocean looks odd or you hear a loud sound --

from *multiple sources (Tsunami: the great waves page 10, Preparing for tsunami, 11/06)*

1. immediately move inland one-half mile or further

or

2. immediate vertical evacuation - proceed to the 3rd floor or higher in steel/concrete reinforced buildings 6 stories or taller

distant tsunami

ADVISORY

from Lesson #5 "Tsunami Information Bulletin"

the lowest level of tsunami alert; states that an earthquake has occurred which might have generated a tsunami; listen to radio or television for updated announcements.

page 4:

distant tsunami

WATCH

adapted from Lesson #5 "Tsunami Information Bulletin"

the middle level of tsunami alert; states a tsunami may have been generated; a person should check the phone directly to find out if he/she is in a possible evacuation and, if so, prepare for a possible evacuation. Listen to radio or television for updated announcements.

WARNING

adapted from Lesson #5 "Tsunami Information Bulletin"

tsunami warning = the highest level of tsunami alert; sirens sound; citizens in evacuation zones should be ready to evacuate by moving inland or to the 3rd floor or higher in a concrete and steel reinforced building that is 6 stories or higher.

pages 5 & 6:

The parent signature should be in place, to confirm the accuracy of the family data. The teacher can look at the answer to question #1, and then help the student be accurate in answering question #3, using *Preparing for tsunami*, 11/06.

Lesson #6 mini-brochure “Tsunami Safety”
RUBRIC

CATEGORY	Advanced	Proficient	Partially Proficient	Novice
Pages 1 & 2: Tsunami Information	Accurate drawing and answered “no” to both questions; gave 3 or more examples of tsunamis’ power	Accurate drawing and answered “no” to both questions; gave 2 examples of tsunamis’ power	Accurate drawing and answered “no” to both questions; gave 1 example of tsunamis’ power.	Accurate drawing and answered “no” to both questions; identified tsunamis as bigger than wind waves, but gave no examples
Pages 3 & 4: Technology’s Impact on Society--Response to Tsunami Conditions	Information was accurate and complete for all 4 tsunami conditions	Information was accurate, but somewhat incomplete, for all 4 tsunami conditions	Information was correct for 3 out of 4 tsunami conditions	Information was correct for 2 out of 4 tsunami conditions
Pages 5 & 6: Family Information	All information complete & accurate, confirmed by parent’s signature	All information as complete and accurate as available from school records	[not applicable]	[not applicable]
Writing Skills	Contains 0-1 spelling, grammar, capitalization, punctuation errors.	Contains 2-3 spelling, grammar, capitalization, punctuation errors.	Contains 4-5 spelling, grammar, capitalization, punctuation errors.	Contains 6-7 spelling, grammar, capitalization, punctuation errors.