Tsunami Evacuation Guidelines for Schools in Hawai‘i

The Pacific Tsunami Museum’s mural of Laupāhoehoe School honors the students and teachers who were lost in the April 1, 1946 tsunami. It was created by Elfie Wilkins, Leah Higa, and Ruby Iwata of Hilo, Hawai‘i.

INTRODUCTION

Tsunamis are by far Hawai‘i’s most deadly natural disaster. They have killed more people in Hawai‘i than all other natural disasters, including floods, earthquakes, volcanic eruptions, and hurricanes, put together. In the past, schools in Hawai‘i have been seriously impacted with tragic loss of life of students and teachers. Recent tsunami events around the world have shown the value of tsunami education and preparedness in saving lives of students and staff.

Illustration by Brook Kapukuniahi Parker

Though general plans may already exist for your school, each one is unique. The school’s urban, suburban, or rural setting, and particular geographic location, topography, and near and offshore sea floor bathymetry make each site different from all others. Furthermore, the demography of each school and its surrounding area adds to the necessary uniqueness of each school’s tsunami preparedness plan to include hazard education, evacuation training, and practice.

This document shares lessons learned, often at a painful cost, by schools that have been impacted by tsunamis in 2004, 2006, 2009 and 2011 across the Pacific and Indian Oceans, as well as tsunamis in 1946 and 1960 in Hawai‘i.

GENERAL RULES

1. Flexible and Dynamic

All plans must be flexible, dynamic and designed to include provisions for adapting to fluid situations. Many natural hazards can occur simultaneously. For example, a large local earthquake, in addition to generating tsunami waves that can arrive within minutes, may well destroy bridges along your evacuation route and create local landslides in your area. Such an earthquake or a tsunami could occur during a period of inclement weather when normal evacuation routes are inundated or impassible from rainfall flooding. These eventualities may seem remote, but they have all occurred in the past and will happen in the future.

- ❖ Your plan must take these possibilities into consideration, as well as, accounting for inevitable improvements and adaptations you will make to your plan as you run though it every year.

2. Notification Procedures

Understand the Civil Defense warning system, but do not assume that you will receive a timely warning. Civil Defense sirens do occasionally malfunction and do not cover all areas. Telephone service for cell and landlines will become saturated and inoperable, and power failures will occur.

- ❖ Do not rely on using the PA or bell system during a tsunami emergency. Power failures may make the system inoperable. Have a back-up system, such as a megaphone or actual bell, and practice with the back-up system, so that both staff and students understand its significance.
- ❖ Appoint a “Communications Officer” for your school, who will be in charge of making sure that the school-wide notification system and its back up are regularly tested i.e. bell, bull-horn, fog horn etc. He/She would verify that teachers understand, and regularly test intra-school communication devices, such as walkie-talkies, and that there are multiple communication systems in place to receive notification from agencies and first responders. A good fall-back procedure is to have a NOAA weather radio or other portable radio tuned to a local radio station with back-up power. These stations are part of the Emergency Alert System and will broadcast critical information.

Tsunamis generated from distant sources may allow several hours for notification and orderly evacuation, but a locally-generated tsunami can arrive with <u>NO WARNING</u> other than nature’s own warning - an earthquake. Past local tsunamis in Hawai‘i in 1868 and 1975 allowed only minutes to evacuate between the earthquake tremors and arrival of the first tsunami waves.

3. Evacuation Plan and Materials

- ❖ Many schools have a prominently-marked red *tsunami emergency folder* in each classroom and office. This folder should include:
  a. simple, step-by-step evacuation instructions;
  b. a clearly marked evacuation map that someone unfamiliar with the school i.e. a substitute, visitor, etc…can understand;
  c. a frequently updated class roster;
  d. any necessary student medical histories;
  e. emergency contact information for parents/guardians; and
  f. clip board, pen, with protector sheet for wet conditions.

- Be sure to have any necessary evacuation equipment distributed where needed so as to avoid the time lost picking up equipment from "the office:"
  a. traffic control vests,
  b. flashlights,
  c. walkie-talkies,
  d. bull horn or whistle, and
  e. traffic control aids.

- The optimum solution is to have all necessary emergency equipment and materials i.e. essential files, etc. in a backpack with a note attached for any other items that should be included, but have other regular uses in the classroom or office.

- Have the school nurse or health aide transport a first aid kit, other needed medical supplies, and water/cups to the safe area.

- Have custodial staff bring toilet paper and trash bags - you don't know how long you'll be in the safe area.

- Have food services staff transport liquids to prevent dehydration and non-perishable edibles, if available.

Critical to the smooth operation of any tsunami evacuation plan is the focused, undivided attention and participation of school faculty and staff.

- Because many faculty and staff have their own families, who are naturally their first priority, it is essential that all faculty and staff have a family emergency plan in place, which can operate without their personal active participation. This should be updated prior to the first day of school each year or with any change in the family situation.

4. Training

All students, faculty and staff should be trained to recognize nature's warning signs of an impending tsunami both with and without a large local earthquake i.e. water withdrawing, surging inland, strange noise from the sea, etc. and know the correct action to take. They should also understand the necessary action to take during an earthquake which may occur prior to a local tsunami. They should practice evacuating using the actual primary route, and a back-up route that could be used, during the announced annual training event. At regular intervals there should also be unannounced evacuation exercises when an unprompted response can be determined, analyzed, and if necessary, improved upon.

- Panic: Both students and adults may panic during a real natural hazard event. Drilling to create a practiced response can help prevent panic. Unannounced drills can also help highlight areas that need fine tuning or things for which the plan and contingencies did not account.

- Every Staff Persons' Kuleana: Not only administrators and current teachers should be familiar with the evacuation plan, but also coaches, substitute teachers, and aides, as they may end up being responsible for students during an evacuation.

- Parents' Kuleana: As part of training for an evacuation, parents/guardians should be repeatedly informed NOT to come to the school, as their children will NOT be there. Parents trying to find their children during an emergency have led to added confusion, needless traffic congestion, and even loss of life during actual tsunami events.

5. Evacuation Mode

All students, faculty and staff should avoid using motor vehicles for evacuation whenever possible. Motor vehicles have proven to be death traps during real tsunami events when panic and the resultant traffic congestion make roads impassable. To this is added the possibility of road and bridge damage from a local earthquake.

- Evacuate on foot if at all possible.

- Arrange to have assistance provided for those in need of help during an evacuation by pairing up younger children or slower students with a buddy or older students to assist them.

- Have a buddy system in place to use during both tsunami drills and actual events.

6. Evacuation Route

- Plan your evacuation route and an alternate route bearing in mind a worst-case scenario when a local earthquake might generate landslides at the base of steep slopes, or rainfall might create flood conditions along local streams, storm sewers or flood canals. Tsunamis have been shown to follow streams and flood canals and may therefore propagate much farther inland than noted on some current evacuation maps.

- Look for overhead power lines that could fall during an earthquake or high wind conditions, and be aware of any potential hazardous materials i.e. petroleum, gas, sewage lines, etc.-along or near your evacuation routes

- Update plans as necessary due to changes in any of the above.

- Have Crisis Team carry out a final sweep to make sure no one is left behind. It is also important that school utilities such as gas and electric be cut off at their source prior to final evacuation. This can reduce damage to facilities, and avoid potential lawsuits due to collateral damage adjacent to school property.

7. Self-sufficiency

Do not rely on police, fire, civil defense, emergency managers, Red Cross or other agencies during a tsunami emergency. They will have their hands full and/or be unable to reach you. You must be prepared for all eventualities.

Do not plan to evacuate to a Shelter. Shelters are not opened until after a tsunami event has passed, so there will be NO official shelter during an evacuation.

Do not wait to have your evacuation confirmed by the DOE. They may be unable to communicate with your school and you would be left waiting for the disaster to occur.

Develop plans for evenings, weekend and off-campus school activities. A tsunami emergency may strike when school is not in regular session but school facilities are in use or students are on a field trip or athletic road trip. They will need a plan.

Community involvement is extremely beneficial in collaborating with neighboring schools and communities in practicing evacuation drills, since in an actual event, everyone will be trying to evacuate at the same time. It is helpful for everyone to get as clear a picture as possible of what actual evacuation of an entire community will be like. This will also identify things that other groups do, such as the Community Emergency Response Teams (CERT) and help coordinate plans, so that they work together to help and not hinder your school's evacuation. This also brings a community closer together in better preparing everyone for such events.

A monument stands at Laupāhoehoe Point to honor the 24 lives lost in the 1946 tsunami.

8. All Clear

Do not respond to an "All Clear" message from the media, **unless** it is directly from your own county Civil Defense or Emergency Management (CD/EM) agency. Neither State Civil Defense nor the Pacific Tsunami Warning Center will issue the official "All Clear." This comes only from your own county's CD/EM agency, which will be aware of the local hazardous conditions in the communities on your island. They will need time to make sure that each area is safe and to demobilize emergency personnel. You may wish to have your own "School All Clear" wherein your Crisis Team checks for the safety of facilities, and turns utilities back on prior to permitting re-entry of school facilities by anyone including staff.

CONCLUSION

During the 2009 South Pacific Tsunami, 149 people were killed by the waves in independent Samoa, which was struck primarily along its southeast coast. In American Samoa, the main island of Tutuila was impacted on all sides by the tsunami, but a total of 34 were lost. The difference has been largely attributed to training at schools in American Samoa prior to the event.

The 2004 Indian Ocean tsunami struck on a Sunday, but teachers and students died at a village school in Ranong, Thailand. The students and teachers were at their school that Sunday practicing for the annual New Year's dance performance. They had no plan, and did not understand what was happening.

In Kamishi, Japan during the 2011 tsunami, the high school's broadcast system did not function due to a power failure. Fortunately students had performed drills with students from the nearby middle school. When they observed the middle school students evacuating, they followed suit. Both schools would have sustained heavy casualties had they not evacuated in a timely manner.

Time and again education and training have proven to be the most critical elements in saving lives during a tsunami emergency. Prepare your school for the inevitable tsunami that will strike us here in Hawai‘i.

SCHOOL TSUNAMI EVACUATION PLANNING TOOL

A Self-Assessment Checklist for School Preparedness

○ Understand the Tsunami Warning system and the signals in your area. Have a back-up alert system for notification (for example: NOAA weather radio).

○ Understand Nature's Own Warnings (NOW) - see the next page of this booklet.

○ Have a back-up school alert signal that does not depend on power or technology, i.e. a bullhorn or actual bell, and periodically use during drills to familiarize your school with the signal.

○ Have a tsunami emergency folder in each classroom and office, ready to grab, containing:
- evacuation map,
- class roster,
- student medical histories,
- parent emergency contact information.

○ Have all necessary equipment (walkie-talkies, traffic control vests, flashlights, etc.) in each classroom and office where needed.

○ Ensure that every faculty and staff member has an updated personal family emergency plan.

○ Ensure that all staff, coaches, substitutes, aides, etc know the evacuation plan.

○ Have a plan that helps parents understand that students will **not** be at school, but in designated safe area announced at the beginning of the school year.

○ Evacuate on foot whenever possible - avoid using motor vehicles.

○ Have a "Crisis Team" prepared to do a final sweep of all campus facilities and shut off utilities prior to finally securing the campus.

○ Drill using the actual evacuation route from school to the safe area, and drill using an alternate back-up route.

○ Carry out "unannounced" drills at regular intervals.

○ Carry out joint tsunamis drills with any nearby schools.

○ Respond only to an "All Clear" from your own County's CD / EM agency.

○ Be self-sufficient - do not rely on police, fire, civil defense or other agencies for help.

○ Take this very seriously - it could mean the lives of your students, faculty and staff.

Nature's Own Warning Evacuation Signals:

Immediate Responses in the Tsunami Evacuation Zone

Nature's Own Warning (NOW)	Immediate Response	Comment
Feel strong earthquake - have difficulty standing	**Protect yourself.** **If in a building, drop** to hands and knees to protect yourself from falling objects. **Cover** your head and neck under sturdy table, desk or with arms and hands. **Hold on** to something stable. **Evacuate** tsunami evacuation zone after shaking stops.	Any strong shaking as measured by difficulty in standing requires you to protect yourself, and then evacuate the tsunami evacuation zone. This is top priority. If in doubt, whether the shaking is strong or not, evacuate.
Feel weak earthquake	**Become Alert** - Start counting the duration of shaking in seconds. Don't turn your back to the ocean, observe the water and listen for sounds. **Prepare to evacuate** the tsunami evacuation zone with little warning.	Feeling an earthquake is likely the first sign you receive related to a locally-generated tsunami. **Yet not all earthquakes generate tsunamis.** People on Hawai'i generally feel 2-3 earthquakes per year. Since 1901, there have been 6 locally generated tsunamis. [2]
Feel earthquake shaking for more than 20 seconds	**Evacuate** the tsunami evacuation zone	As soon as you feel weak shaking, pay attention to the duration by counting to 20 seconds. Pay attention to the ocean for unusual water changes or sounds.
Feel earthquake **and / or** hear rumbling noise from ocean - like thunder, truck noise or a jet airliner	**Evacuate** the tsunami evacuation zone immediately	Sound is often an early warning of imminent danger.
Feel earthquake **and** hear siren	**Evacuate** the tsunami evacuation zone immediately	If no earthquake is felt, the siren is your signal to turn on local TV and radio for further instructions and refer to the Civil Defense information in the front of your phone book.
Unusual disappearance of water; exposed reef	**Evacuate** the tsunami evacuation zone immediately	A later signal – ocean doesn't always recede- may provide enough evacuation time. Better to evacuate, if have earlier signals.
Unusual wall of water	**Evacuate** the tsunami evacuation zone immediately	A later signal – wall of water doesn't always appear first. Even less time to evacuate.

Tsunami Emergency Kit for Schools
List of Supplies

ADMINISTRATION SET

- Walkie-talkie set
- Bull horn
- Whistle
- Portable radio (battery/hand crank)
- Route maps and evacuation plan in Red Folders
- Gate keys or combinations (customized by school)

OFFICE STAFF SET

- Crucial records/documents on portable drives
- Health/medication records for students with special needs

HEALTH SET - FIRST AID KIT:

- Band-aids, or bandages (variety box 20 pack)
- Adhesive tape (1 roll)
- Gauze Packets (5 pack)
- Alcohol swabs (100 count)
- Hand sanitizer
- Q-tips (100 count)
- Gloves (latex or latex-free) (50 count)
- Eye wash (1 bottle)
- Airway mask
- Ice pack (2 packs)

CUSTODIAN SET

- Special tools: bolt cutters (if applicable)
- Traffic control aids (cones, JPO signs, hazard reflectors, flares)
- Walkie-talkie or cell phone
- Trash bags
- Toilet paper

FOOD SERVICE SET

- Non-perishable snack
- Water or other liquids

TEACHER SET (One set per teacher)

- Student roster (Red Folder)
- Backpack (distinguishing color)
- Whistle
- Vest for traffic direction
- Flashlight
- Cell phone or walkie-talkie
- Trash bag (bio hazard)
- Clip board, pen, with protector sheet for wet conditions
- Water bottle
- Hand sanitizer
- Snack (crackers)
- Student activity during wait period (i.e. something like a game)

PROGRAM SYNOPSIS

The Hawai'i Tsunami Education Curriculum Program (HITEC) is a program of the Pacific Tsunami Museum. The purpose is to improve Hawai'i student's academic and technology skills which inform them about tsunami science, climate change, and disaster preparedness with the aim to save lives and encourage local action about the impacts of global climate change. The Program is funded by a three-year grant from the U.S. Department of Education, Native Hawaiian Program. See the website: http://discovertsunamis.org

Activities:

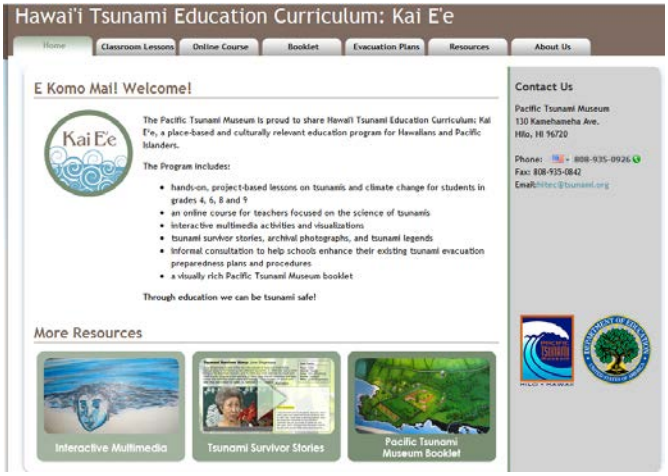
- Curriculum development
- Teacher training and professional development
- Field testing with students at selected schools
- On-line multimedia resource and booklets
- Preparedness consultations with schools to enhance their tsunami evacuation plans and preparedness.

Curriculum:
"Kai E'e – Mounting Seas: Pacific Tsunami and Climate Change," is the new place-based curriculum for grades 4, 6, 8 and 9 by the Pacific American Foundation for the Museum. The lessons are aligned to the new national common core standards for language arts, math, and the draft Science standards. The lessons are also aligned to *Nā Honua Mauli Ola*, Hawaiian Cultural Pathways for Healthy and Responsive Learning Environments. The lessons include literacy building skills and hands-on activities. Students will demonstrate their academic gains through culminating activities which inform their families, communities, and schools about being prepared for the impact of tsunamis and sea rise caused by global climate change. The final curriculum version will contain student journals and logs translated into the Hawaiian language for immersion students.

Teacher Training, Professional Development, and Field Testing: As of June 2012, the Program has trained 32 teachers who are now field testing the lessons with their students at 12 schools on five islands, (Hawai'i, Maui, O'ahu, Moloka'i, and Kaua'i). Schools are selected with priority going to schools located in tsunami evacuation zones with high numbers of Native Hawaiian students. Teachers attend several trainings during the school year and provide critiques to improve the lessons. Teachers also participate and earn professional credits in an on-line course developed and provided by the University of Alaska Fairbanks, Geophysical Institute.

Multimedia Resources and Booklets: The University of Alaska Fairbanks, Geophysical Institute is also developing a program website that includes the lesson plans, appendices, and multimedia interactive features. The website also serves as a teacher resource clearinghouse, communication hub and portal to the online course. The website will serve as the permanent archive for the Pacific Tsunami Museum collection of Pacific tsunami survivor stories, photographs, and videos.

Tsunami Evacuation Plan Consultations: The Museum provides informal consultations to Principals and their safety committees to assist schools to enhance their existing tsunami evacuation preparedness plans and procedures in cooperation with the DOE and County Emergency Management. Schools are assisted in making their plans more robust in meeting a range of contingencies based on lessons learned around the Pacific.



Partnerships: The Pacific Tsunami Museum is working with its partners in the scientific, university, and disaster preparedness communities to critique and review instructional materials and resources to ensure scientific accuracy. The committee is led by University of Hawai'i at Hilo Professor Emeritus Walter Dudley. The HITEC Program partners includes:

The Pacific Tsunami Museum (PTM) is a private, nonprofit founded in 1994 with assistance from the University of Hawai'i at Hilo. Located in Hilo, the Museum develops exhibits, outreach programs, and archives to disseminate public education about tsunamis for the safety of people in the Pacific Region. It serves as an international center for fostering tsunami research, education, and cultural exchange, and serves as a living memorial to those who have lost their lives to tsunamis.

The Pacific American Foundation (PAF) serves PTM as a subcontractor and is a nonprofit organization dedicated to improving the lives of Pacific Americans. Established in 1993, the PAF has created a variety of culturally-based and place-based curricula and teacher trainings for public schools.

Geophysical Institute (GI), ***University of Alaska Fairbanks*** serves PTM as a subcontractor and is a leading arctic and geosciences research center. The GI has also conducted a similar project, the "Alaska Tsunami Education Program," for Alaska students.

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PARTICIPATING SCHOOLS (as of Aug. 2012)

Chiefess Kapi'olani Elementary, Hilo
Connections Public Charter, Hilo
Ka Waihona o ka Na'auao, Nānākuli
Ke Ana La'ahana Public Charter, Keaukaha
Ke Kula Ni'ihau o Kekaha Learning Ctr., Kekaha
Kahakai Elementary, Kailua-Kona
Kamaile Academy Public Charter, Wai'anae
Ke Kula 'O S.M. Kamakau, LPCS, Kane'ohe
Kekaha Elementary, Kekaha
King Kamehameha III Elementary, Lahaina
Kua O Ka Lā Public Charter, Puna
Lā'ie Elementary, Lā'ie
Moloka'i High, Ho'olehua
Nānāikapono Elementary, Nānākuli
Wai'alae Elementary, Kahala
Wai'anae High, Wai'anae
West Hawai'i Explorations Academy PCS, Kona

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Wai'alae Elementary
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Wai'anae High
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Richard Salboro
Kristen Sarah Bright
Jason Bray
Kevin Bray

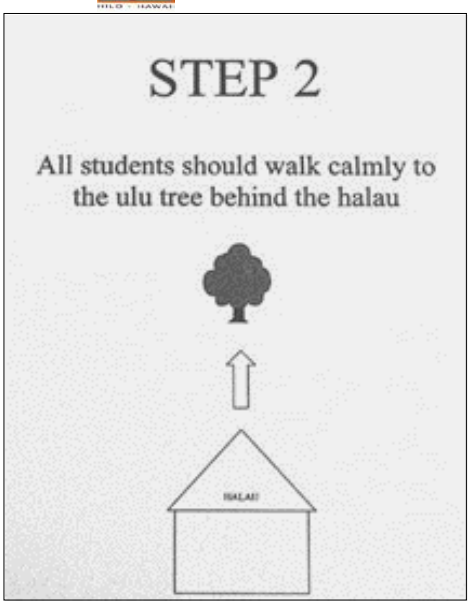
West Hawai'i Explorations Academy PCS
Scott Voorhies
Rita Calvan

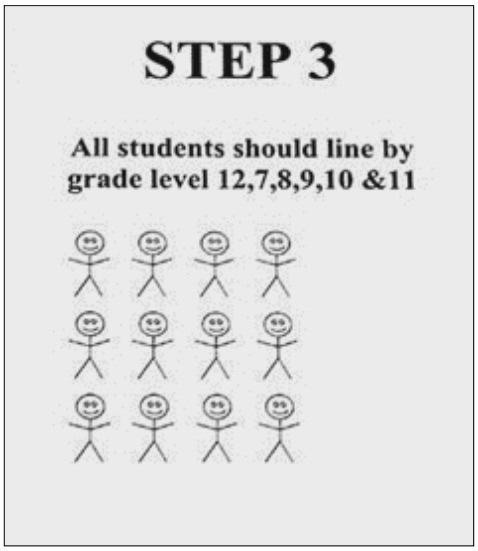
As of August 2012

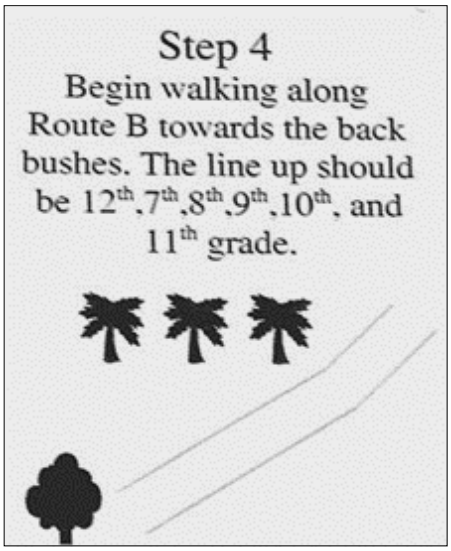
Sample
Tsunami Evacuation Plan
Classroom Posters

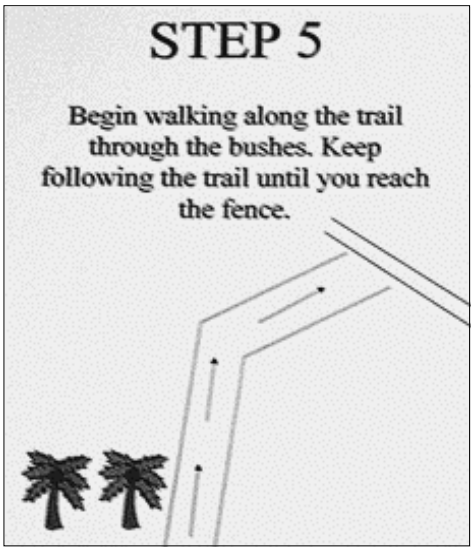
These posters were created by the students of Roxane Kapuaimohalaikalani Stewart, a teacher at Ke Ana La'ahana Public Charter School in Keaukaha, Hilo. Roxane serves as the HITEC Program's School Evacuation Planning Specialist.

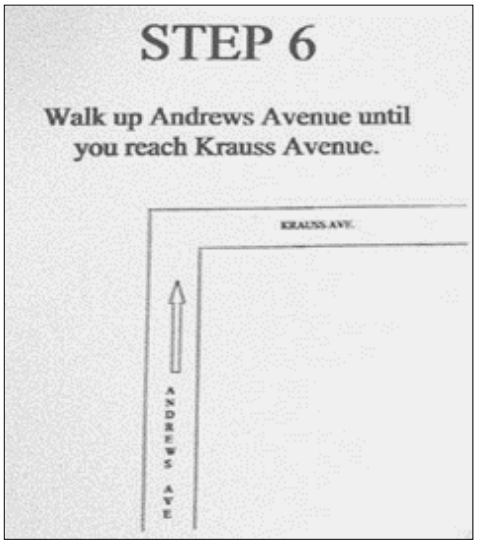
They are an example of student projects that can be adapted for each school and posted in each classroom. They raise student awareness and familiarity with tsunami evacuation procedures.

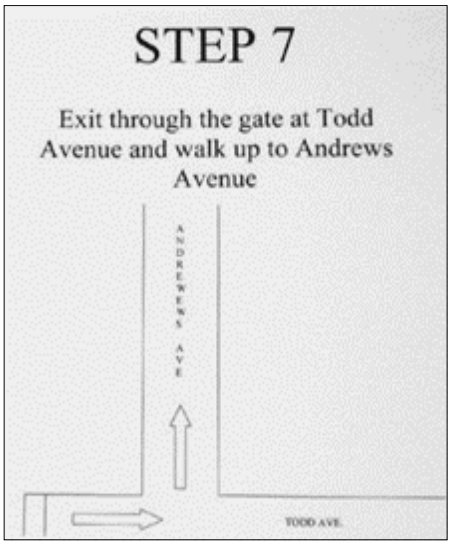


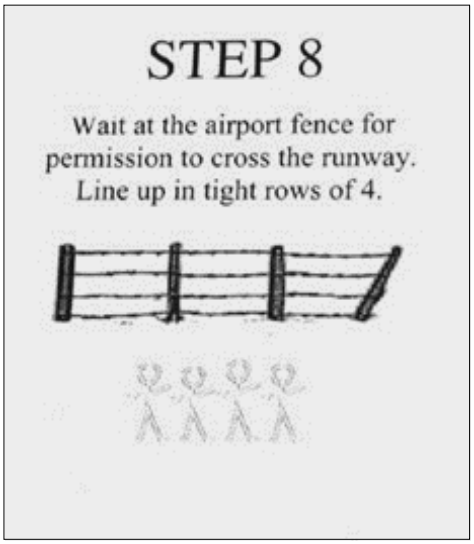












Kai E‘e: Hawai‘i Tsunami Education Curriculum Program
of the Pacific Tsunami Museum

A Teacher Workshop Series on Tsunamis and Climate Change

For New and Returning Teachers in Grades 4, 6, 8, 9
from schools in or near the evacuation zone

First Workshop in a Series of Three:

2-Days:

Saturday, September 15, 2012

times and locations in Hilo to be announced

Sunday, September 16, 2012

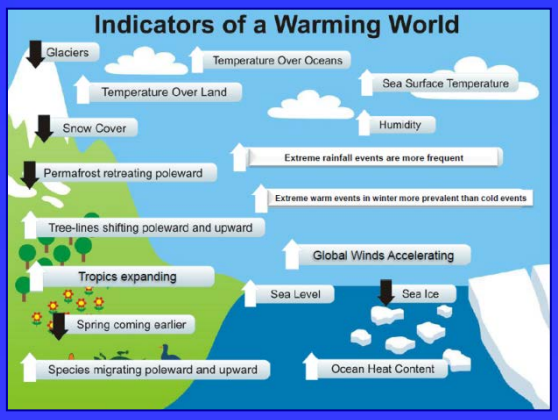
BENEFITS FOR TEACHERS

- FREE SUPPLY KIT per grade unit (grades 4, 6, 8, or 9)
- STIPENDS: Teacher stipends are provided incrementally for completion of each of the responsibilities listed below.
- FREE TUITION: tuition fees are provided for University of Alaska Fairbanks online credit courses.
- FREE TRAVEL: Interisland airfare travel, hotel, meals, dinner stipend, and ground transportation

TEACHER RESPONSIBILITIES:

- Attend 3 workshops (4 days) during school year in Hilo and O‘ahu;
- Implement grade unit lessons with your students, conduct pre- and post-assessment student surveys, collect samples of exemplary student work, and report student data to evaluators; and
- On-line Courses on Tsunami Science: new teachers are offered 2 courses (Fall and Spring) for 3+3 credits. Returning teachers are offered the Spring course for 3 credits.
- Returning teachers will share their experiences from last year with new teachers.

A Slide from “Hawai‘i's Changing Climate: Sea Level Rise,” 2012 by Dr. Chip Fletcher, Associate Dean and Professor, SOEST, University of Hawai‘i at Mānoa



FOR FURTHER INFORMATION contact:
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http://www.discovertsunamis.org/

To Register go to:
www.surveymonkey.com/s/HITEC-9-2012
Registration Deadline:
August 24, 2012

Returning teachers from SY 2011-12 are asked to update your contact and student information via the online registration. Attending the 1st workshop will provide you the updated lesson plans, assessment surveys, new science presentations, sign-up for a new online credit course, and share your experience with the new teachers.

ACTIVITIES AND RESOURCES FOR TEACHERS

- Teachers receive the Program’s updated curriculum, “Kai E‘e, Mounting Seas: Pacific Tsunami and Climate Change” and:
  - Opportunity to practice using classroom and field lessons
  - Student pre-/post-assessments, rubrics, and authentic indicators of students’ achievement
- Tour of Pacific Tsunami Museum
- Cultural presentation of tsunamis in Hawaiian culture: oli, mo‘olelo
- Guided field trip to tsunami and sea-rise sites
- HITEC Website: clearinghouse for multimedia resources, videos, animations, interactive games, lessons and appendices, and portal to online courses
- HITEC Education Booklet
- Tsunami Evacuation Planning guidelines for schools

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