NATURAL HAZARDS MODULE

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Natural Hazards

Vocabulary

Lahar:
A mudflow or debris flow that starts on a volcano. Lahars can travel up to 60 mph and are very destructive.

Oral history:
Stories passed from one generation to the next through verbal communication

Resilience:
The ability of a person or community to recover readily from adversity such as a natural hazard

Seal and sea lion haul-outs:
Rocky outcrops and beaches where seals and sea lions come out of the water and are easy to hunt

Tsunami:
A wave generated by an impulse such as earthquakes, landslides, underwater volcanic eruptions, or meteor impacts

Volcano:
An opening in the earth's surface through which lava and gasses from below the earth's surface escape.

Written history:
Stories passed from one generation to the next through written communication

Background Infromation

The Kuril Islands are one of the most geologically hazardous places to live in the world. Active volcanoes erupt many times in one person's lifetime, large earthquakes and tsunamis occur ever few generations, and other natural hazards, such as flooding, lahars, and large storms, also are common. One of the goals of the Kuril Biocomplexity Project is to understand how people living in the Kuril Islands responded to catastrophic events, and how human interactions could reduce the vulnerability of the island population.

Today, many natural hazards (but not all) are continuously monitored by government agencies around the world using seismometers, Global Positioning Systems, many types of satellites, and oceanographic buoys. Volcanologists monitor volcanoes to see if they are become more and more active while seismologists and oceanographers can immediately register on seismometers when an earthquake has occurred and use buoys around the ocean to determine if a tsunami was generated. See the list of websites below to learn more about recent events and see if there are any active volcanic or tsunami warnings.

Before the technological innovations of the 20th and 21st centuries, monitoring of natural hazards was not easy. Written records, especially historical archives, provided some estimates of how frequently a nearby volcano might erupt, how often earthquakes or tsunamis occurred, and how large those events were.

In the absence of written records, such as was the case in the Kuril Islands for thousands of years, the only means of knowing the hazards of a region is through orally exchanging knowledge. Children can be taught to read the signs of increasing activity of a volcano, and can be told through stories what happened during past eruptions. Large earthquakes can be followed by big tsunamis, so children can be taught to vacate the beach. Oral traditions are a means of protecting settlements, especially in the situations where the recurrence of events spans more than one generation. Often myths and legends can contain a kernel of truth on how to survive natural hazards. In our techno-savy culture, this can be a hard idea to grasp—that ancestors we never met could instruct us how to survive (or what to expect) in a natural disaster through a story that our parents and grandparents repeated.

U.S.websites for monitoring volcanoes, earthquakes and tsunamis:

Smithsonian and USGS Global Volcanism Program -
Weekly Volcanic Activity Report
http://www.volcano.si.edu/reports/usgs/

USGS - U.S. Volcanoes and Current Activity Alerts
http://volcanoes.usgs.gov/

USGS - Cascade Volcano Observatory Weekly Update
http://volcanoes.usgs.gov/cvo/current_updates.php

USGS - Latest Earthquakes in the World
http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/quakes_all.php

NOAA - Pacific Tsunami Warning Center
http://ptwc.weather.gov/

NOAA - West Coast/Alaska Tsunami Warning Center
http://wcatwc.arh.noaa.gov/

USGS booklet -
"Surviving a Tsunami - Lessons from Chile, Hawaii, and Japan"
http://pubs.usgs.gov/circ/c1187/

Name: _____

Written exercise

Small group discussion

Introduction:

Discussion topic #1:

You and your team are going to make a settlement on an island. You will get food on the island by hunting, gathering and fishing. Make a list of 5 - 10 things you want and 5 - 10 things you do not want on the island. Think about landscape features and desirable resources. Do not list things items that you could bring with you or build such as dwellings or tools.

10 things you want:	10 things you do not want:
1:	1:
2:	2:
3:	3:
4:	4:
5:	5:
6:	6:
7:	7:
8:	8:
9:	9:
10:	10:

Name: _____

Written exercise
Group activity

Discussion topic #2:

Your group will be given a map of an island and your village location. You will also receive a short oral history of your village. Compare the location of the current village to the wish list you made in made in Discussion topic #1.

What are the best attributes of your village?

What are the most prominent hazards?

Name: _____

Written exercise
Group activity

Discussion topic #3:

Elect one member of your group to be the explorer.
The explorer will take the map of the entire island chain and travel around to other villages. At the other villages the explorer will interview the villagers about

1. natural hazards
2. resources
3. possible new village locations.

The explorer should take notes of the island chain about potential locations and their pros and cons. The explorer should interview 5-6 other groups.

The other members of your group will remain in your village (at your desks). The village will answer the questions of other group's explorers.

Name: _____

Written exercise
Group activity

Discussion topic #4:

After your interviews are complete, explorers should return to their village and the group will discuss and choose where to build a new village. You cannot build a village in a site where there is already a village.
Write a paragraph about why you chose your village site including the frequency and type of natural hazards you expect to experience and your proximity to resources.

Name: _____

Homework:
Oral history

The Kuril Islands are not the only location prone to natural hazards. Western Washington is also prone to natural hazards. This activity is designed to look at how we understand natural hazards in western Washington.

Oral history:

1. How long have you lived in western Washington? What natural hazards do you remember occurring here? How many of each type of event do you remember? (Storms, landslides, earthquakes, tsunamis, volcanic eruptions)

2. Natural hazards are often more dangerous to transient populations. People who have recently moved to an area do not know the natural hazards an area is prone to or how to respond.

   Example: During the 2004 tsunami in the Indian Ocean, very few people died on Simeulue Island. People in the village remembered stories of a large tsunami in 1907 and taught younger generations to run to high ground after strong earthquakes. On nearby islands, the populations near the coast did not have as long of a history and many people died.

   a. How long has your family lived in western Washington? _____

   b. Talk to some of your family that has lived here a long time. What natural hazards do they remember?

Name: _____

Worksheet:
Oral history

c. How many of each type of event do they remember? (Storms, landslides, earthquakes, tsunamis, volcanic eruptions)

d. Based on your families oral history, are you well do you know about all of the natural hazards in Washington?

3. Based on your family's knowledge, what do you think are the most common natural hazards in western Washington? What do you think are the most severe?

Name: _____

Worksheet:
Written history

Written history:

1. The Puget Sound was first explored in 1792 by George Vancouver. The first permanent settlement 1833 (Fort Nisqually). Arrival of the transcontinental railroad of the railroad in 1888. How good do you think the record of natural hazards is before 1792? _____

   Between 1792 and 1833? _____

   Between 1833 and 1888? _____

   Since 1888? _____

2. Look at the chart of Major events in Washington State. Which natural hazards are not included in the list?

   Why? _____

   Based on the written records in the chart, what is the most common natural hazard in western Washington?

3. What natural hazards would we not know about if not for the geological record?

4. The 1700 Cascadia earthquake is known from written records but the event occurred before there were written records in Washington. How do you think this occurred?

Name: _____

Worksheet:
Mordern planning

Modern planning:

1. Look at the natural hazards map of western Washington. It has been stylized to be similar to the maps you used in class. Given what you have learned about natural hazards, where would you build a village? Pick four locations for villages considering proximity to resources and natural hazards and mark them on the map.

2. What current city in Washington—Seattle, Tacoma, Everett or Bremerton-- is subject to the greatest threat from natural hazards? Why?

3. The map shows zones of hazard for tsunamis, landslides and lahars. What other hazards are we subject to in Washington? Are these events more frequent or less frequent? Do you think these events cause more or less damage? If you are building a town, what hazards would you consider a planning priority, one that happens every year but causes local damage (Floods and landslides), or one that occurs on average every hundred years or more but causes widespread damage (Large earthquakes and lahars)?