

Tsunami activity 11: **Emergency preparedness plan**

Description: Students research and create an emergency preparedness plan for Port Alberni.

Materials: student handouts (1. Emergency preparedness; 2. Port Alberni)
access to computers

Duration: 2 class periods

Teacher instructions and notes:

1. In advance, look over the British Columbia Fact Sheet "What you need to know about Tsunamis"
http://www.pep.bc.ca/hazard_preparedness/Tsunami_2004.pdf
2. Hold a class discussion to explore the damages caused by tsunamis. Use the following questions to aid with the discussion:
 - a. Have you ever experienced a tsunami or know someone who has? Describe what happened and the damages that were caused. Students may recall television coverage of the Indian Ocean tsunami of dec. 26, 2004.
 - b. If proper warning was given would you have enough time to evacuate before a tsunami hit the coast? (Depends on travel time of the tsunami, your emergency plan and reaction, and possible problems with evacuation traffic.)
 - c. Where could people go to be safe from the tsunami?
 - d. If someone's house gets hit by a tsunami, should they move back to the same place after the water goes down or choose a new place to live? Is that always possible?
 - e. If it is called the 1-in-200 year tsunami, does that mean you do not have to worry about another tsunami? (No, it means that you have a 1 in 200 chance of it occurring every year.)
3. Discuss the tsunami that hit Port Alberni, British Columbia on March 28, 1964.
 - On March 27, 1964, the magnitude 9.2 Alaska earthquake triggered a tsunami. In Canada, waves struck portions of the Queen Charlotte Islands and Vancouver Island. The worst hit area was Port Alberni, where the tsunami caused about \$5 million in damage (1964 dollars; \$25 million in 2006 dollars). In the open ocean, waves travelled at speeds of 830 kilometres per hour. When the tsunami entered Port Alberni Inlet, the waves had slowed to about 50 kilometres per hour. The sea surged up the Somass River, with the highest wave being 4.3 metres and a wave run-up of 1 kilometre inland. The community was struck by three main waves between 00:20 and 3:30 am on March 28. The tsunamis destroyed houses and automobiles, and buildings were dragged seaward. A total of 260 houses were damaged. No one was killed in Canada. (Source: Atlas of Canada)
 - Use the following websites to explore the event, the damages and view pictures of the destruction.
 - a. **Atlas of Canada: Tsunamis** [PDF] - included as part of these resources
 - b. **British Columbia Civil Defence Circular- Special Report on the Port Alberni Tsunami**
http://www.pep.bc.ca/hazard_preparedness/Alberni_Tsunami_Report_1964.pdf
4. Distribute the student worksheets.
5. Option: Although the example given is for Port Alberni, you can choose to design a tsunami emergency preparedness plan for another coastal community, based on the Port Alberni case.

Worksheet answers/comments:

Preparation Before a Tsunami:

1. map of Port Alberni:
 - a. Identify areas at risk. Use the scale bar and a ruler to measure a 1 km zone from the shoreline. Ensure that the students have measured several points from the coast as the coast line is not straight but rounded and the distance inshore should reflect the coastline.
 - b. The safe ground area must be at least 1 km from the coast or on high land.
2. Warning signs:
 - An earthquake, landslide, volcanic eruption or an impact such as a meteorite has occurred.
 - A strong earthquake with shaking lasting for more than 30 seconds is felt locally.
 - A warning notice has been issued and broadcast by news, sirens, police, etc.
 - The ocean has receded along the coastline exposing areas that are normally submerged.
 - A loud roaring sound occurred from the ocean
3.
 - a. Boat at sea – If a tsunami warning was issued it is advisable to stay as far out from shore as possible. This is in fact one of the safest places to be during a tsunami. A boat found far out from shore in deep waters will experience a long wavelength and small amplitude as the energy from an earthquake or landslide can be transferred throughout the entire water column. In deep water, the waves spread out and usually are less than 1 m high with kilometres between crests. The waves would hardly be noticeable to a boat located far offshore.
 - b. Boat near the coast – If a tsunami warning was issued, it is advisable to move far out from the coast into water at least 50 m deep. As the waves get to shallower water, the wavelength and wave velocity decrease rapidly, causing the wave amplitude to increase dramatically to preserve wave energy. A boat located near shore would thus feel the destructive effects of the tsunami. In fact, if there is sufficient warning, boats in the harbour should head out to sea.
4. Tall buildings – It would be best to move higher ground, but if that is impossible move to higher levels of the tall building. There is concern about the structure of the building itself. The force at which a tsunami wave hits shore may be strong enough to damage or destroy the building or even sweep the building away. The safest buildings are structurally sound, constructed of reinforced concrete or steel, and ideally have an open first floor that allows the wave to pass through. Even after the tsunami has passed, flooding and hazardous debris in the water may trap people in the buildings.
5. Items for an emergency kit for 72 hours.
 - Water- enough to supply your entire family for several days. Each person needs approximately 2 litres of water per day;
 - Food- Non-perishables such as canned and dried food;
 - Can Opener- Most non-perishable food items are canned and it can be difficult to open without the proper tools;
 - Flashlight;
 - Batteries;
 - Matches or lighter;
 - Candles;
 - First Aid Kit;
 - Toilet paper and other personal care supplies;
 - Blankets;
 - Warm Clothing.

Worksheet answers/comments:**What to do During a Tsunami:**

1. Avoid – Buildings, bridges, some roads (Traffic jams can prevent evacuation. It is often better to evacuate on foot.) (Flooding can often wash out the material underneath roads, making pavement unstable), fallen trees, standing water (can often be contaminated)
2. Returning home- It is not safe to return home after the first wave. Often the first wave is not the most destructive. After the initial wave there are often other waves that follow hours later.

What to do After a Tsunami:

1. What should you be cautious of when returning home? – Check your home for damages. The tsunami waves may have altered the structure of your home and could make it very dangerous to enter.
2. What types of damage can you expect to have happened to your home? – Altered structure, flooding, broken windows, debris could have been forced into your home from the waves, fallen trees, damages to the roof, mould developing in walls, etc.

Emergency preparedness

Following the tsunami in 1964, the city of Port Alberni, British Columbia, worked to develop an emergency preparedness plan to ensure the safety of those in the community. You have been hired by the city to complete the emergency preparedness plan so that residents will know how to prepare and how to react in the event of a tsunami.

1. Read the **Atlas of Canada: Tsunamis** [PDF] - included as part of these resources to learn more about the Port Alberni Tsunami of 1964.
2. Answer the following questions. Your answers will help you to develop your emergency plan.
3. Using the questions and your answers as a guideline, create an emergency preparedness plan for Port Alberni.

Preparation Before a Tsunami:

1. On the map of Port Alberni, British Columbia identify an evacuation zone – places that would need to evacuate immediately if a tsunami warning was issued.
 - a. Identify areas that would be at risk if the tsunami were to move 1 km inland as it did in 1964.
 - b. If your house was located at the star on the map, you would want to make sure that your family had a safe evacuation route. Identify an area of safe ground and highlight the route you would take to move quickly away from your house.
2. What physical signs and government alerts would warn you that a tsunami was approaching?
3. Emergency plans must also consider boats at sea. People may be sailing or fishing when a tsunami approaches and would need to take action as well.
 - a. If you were in a boat located at sea what would you do if you were issued a tsunami warning and why?
 - b. If you were in a boat near the coast what would you do if you were issued a tsunami warning and why?
4. In many parts of the world, high rise resorts and hotels are located close to the coast so that visitors can enjoy the beach area during their stay. If a tsunami warning were issued, would it be advisable for those in tall buildings to remain there and move up to the top levels or would it be best that they evacuate to high ground? Why?
5. Public Safety Canada advises that in a disaster you should be prepared to take care of yourself and your family for a minimum of 72 hours. If a disaster were to occur in your community, it may take emergency crews some time to get to you. In order to be prepared for 72 hours you and your family should create an emergency kit so that you can keep nourished, hydrated, warm, clothed, and capable of performing preliminary first aid until emergency crews arrive.
<http://www.getprepared.gc.ca/knw/kt/kt-eng.aspx>

Create a list of items that you would need in an emergency kit in order to keep safe for 72 hours.

What to do During a Tsunami:

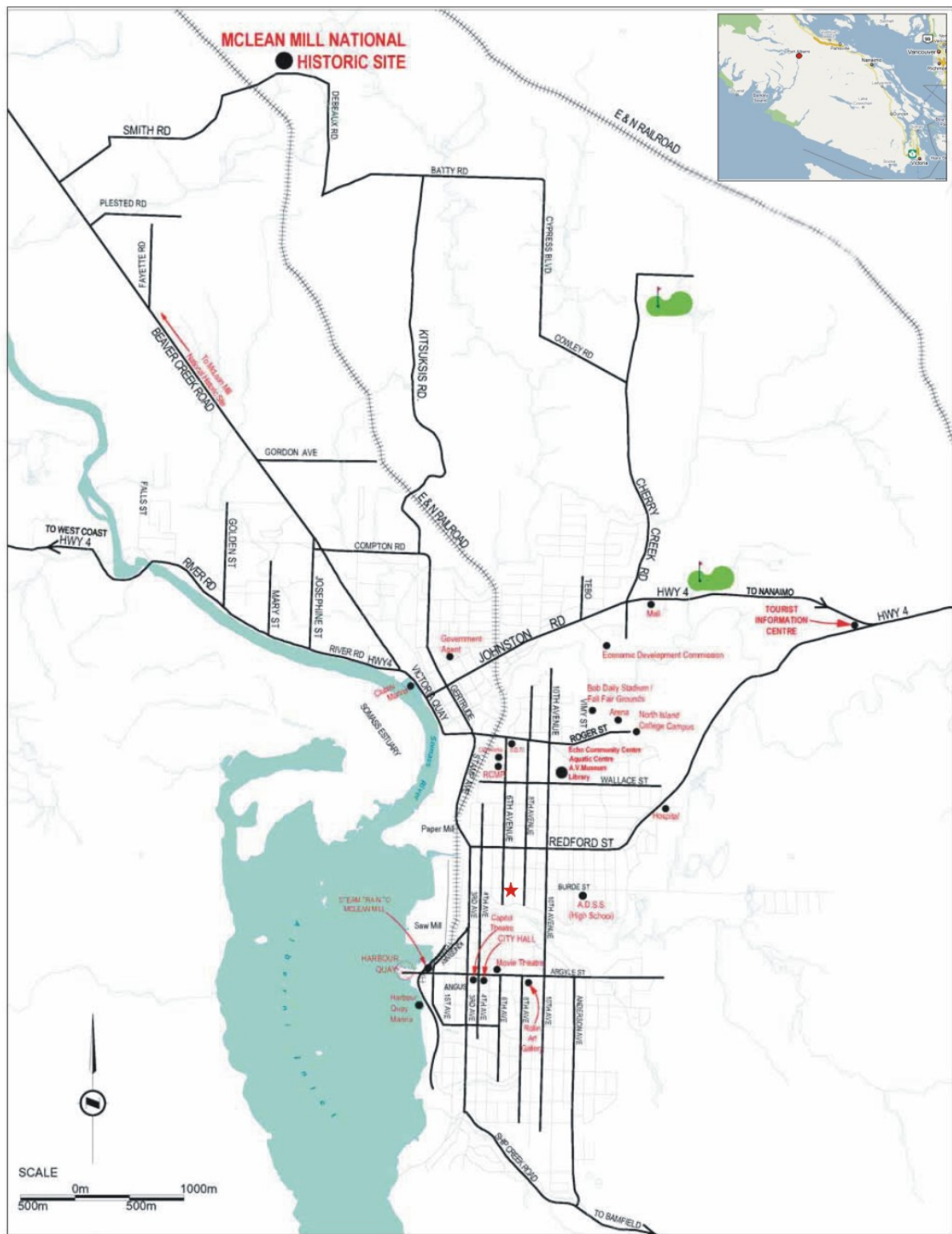
During an evacuation you should avoid other areas of danger and things that could be damaged in a tsunami. It is important to identify them in a plan, because people will be evacuating quickly and may not think to avoid them, possibly putting themselves in greater danger. Identify areas, items and structures that may be hazardous during a tsunami. Is it safe to return to your home during a tsunami after the first wave hits? Why or why not?

What to do After a Tsunami:

After the tsunami warning has ended and officials give an all-clear signal, you may return to your home.

What should you be cautious of when returning home? What types of damage can you expect to have happened to your home?

Port Alberni



Source: City of Port Alberni (<http://www.portalberni.ca/files/Map.pdf>)