Tsunami: The Environmental Impact of Ocean Disasters

Lesson Overview:
The intent of the lesson is to provide the students with an understanding of the impact of the environment on humans. Ocean natural disasters are not uncommon and the residents living nearby may be affected to varying degrees. The focus of this study will be on the tsunami disaster of 2004. The disaster itself, the human loss, the environmental concerns, the international aid, and rebuilding will all be discussed. A review of the frequency of tsunamis in Southeast Asia will be conducted through a mapping activity. The lesson will be followed up with a discussion of the risk of tsunamis for the Canadian population. For extended learning, the students could examine the Newfoundland tsunami disaster of 1929.

Grade Level:
Grade 7

Time Required:
Three classes (45 minutes per class).

Curriculum Connection (Province and course):
Saskatchewan
Grade 7 – Canada and its Pacific Neighbours

Link to Canadian National Geographic Standards:
Essential Element #4: Human Systems
Oceans Scope and Sequence Standard #4: Human Systems
- Oceans as providers of goods and services

Essential Element #5: Environment and Society
- Impact of natural and technological hazards/disasters on human and physical environment.
- Perceptions of and reactions to extreme natural events.
Oceans Scope & Sequence Standard #5: Environment and Society
- Ocean influences on humans
- Freshwater resources
- Interconnections between atmospheric, land and ocean issues
Essential Element #6: Uses of Geography
- Effects of physical and human geographic factors on major historic events

Oceans Scope & Sequence Standard #6: Uses of Geography
- Impact of ocean processes on the location of and outcome of historical events.

Geographic Skill #1: Asking Geographic Questions
- Identify geographic issues, define geographic problems, and pose geographic questions

Geographic Skill #2: Acquiring Geographic Information
- Use maps to collect and/or compile geographic information.

Geographic Skill #4: Analyzing Geographic Information
- Interpret information obtained from maps, aerial photographs, satellite-produced images, and geographic information systems.
- Interpret and synthesize information obtained from a variety of sources.

Additional Resources, Materials and Equipment Required:
- Map of the Pacific Rim
- Atlases – both hard copy and online formats
- Overhead Projector
- LCD projector
- Websites – National Atlas of Canada
  http://atlas.gc.ca/site/english/index.html
- Canadian Broadcasting Company www.cbc.ca
- Canada’s Earthquakes and Tsunamis
  http://archives.cbc.ca/IDD-1-75-1561/science_technology/earthquakes_and_tsunamis/
- TSUNAMI http://www.ess.washington.edu/tsunami/index.html (various other related sites are available from this link)
Main Objective:
This lesson is to provide the students with some understanding of the impact of the ocean on the residents living near its waters. Natural disasters affect people living near the ocean. The tsunami disaster of 2004 will be used for an example as the story is current enough for students in middle school to recall and relate to. The human loss of life, the economic impact and relief effort will be examined. The level of preparedness for a tsunami in the South Pacific will be discussed. If local survivors, volunteers or organizations who were involved with providing aid or raising money for the tsunami disaster relief are available, they would be excellent guest speakers for the class. Real life stories are a great way to enrich the experience for the students. The lesson will be followed up with a discussion of the risk of a tsunami in Canada. The current situation and historic cases such as Newfoundland will be examined.

Learning Outcomes:
Knowledge:
Students will know that:
- Geography involves the study of human-environmental interactions (give examples of these interactions).
- There are some positive and negative consequences of human interaction with the environment.
Skills:
Students will:
- Explain and give examples of the five elements of geography: location, place, region, human-environmental interaction, and movement and communication.
- Explain what a tsunami is
- Retell the story of the tsunami of December 2004, including:
  - impact on the local residents
  - risks to fresh water supply
  - economic loss due to residents not being able to fish for a period of time
  - loss of tourism industry
  - map the area affected
  - personal fear
- Discuss the contribution of the global community to the relief effort
- Examine the risk of a tsunami in Canada
- Discuss how culture and experience influence people's perception of places.
- Interact effectively in groups to achieve specific tasks.
- Speculate on the long term effects of economic loss following a natural disaster
- Explain how people prepare for natural hazards

Value/Attitudes:
Students will:
- Be aware that humans depend on the environment in a variety of ways.
- Appreciate that humans have a responsibility to manage and protect their environment.
- Appreciate the vulnerability of people in the environment
- Appreciate the health risks involved for residents
- Appreciate the need for an early warning system
The Lesson:

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<th>Teacher Activity</th>
<th>Student Activity</th>
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<td><strong>Introduction</strong></td>
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<tr>
<td>Show the students the “<em>Oceans for Life</em>” brochure and have them brainstorm how the ocean’s physical features and processes influence humans.</td>
<td>Students respond to brainstorming session.</td>
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<td>The teacher will show the class images from the 2004 tsunami disaster in Southeast Asia. Print off the images or use an LCD projector to show the class. This will provide for discussion and give materials for the students to include in their list of details.</td>
<td>Together as a class, students will discuss the tsunami disaster of December 2004.</td>
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<td>The teacher will identify and have the students identify the location of the disaster on a world map during the class discussion.</td>
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<td>The teacher will ask students to recall the Southeast Asia tsunami disaster of December 2004.</td>
<td>Students will record the list of details in their notebooks. This can be done as a list or a concept map.</td>
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<td>Have the class brainstorm a list of things that they remember about the tsunami of 2004.</td>
<td>Students should be encouraged to tell what they recall about the disaster.</td>
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<td>Record answers on the board either as a list or a concept map.</td>
<td>Personal stories of survivors, pictures of the disaster, human loss of life, aid relief, fundraising efforts, etc.</td>
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1. Define a tsunami. Use overheads, online simulations, etc. to explain to the students how a tsunami takes place and the type of devastation it can create.

2. Show the students online footage from one or more of the CBC broadcasts. Using a concept map, timeline or a paragraph summary, guide the students in creating a record of the events of the tsunami of 2004. Include the extent of the disaster, loss of human life, destruction of buildings and boats, economic loss (fishing and tourism), risk of disease, need for a safe water supply, personal fear of an aftershock, and global aid for example.

3. The teacher will provide maps for the students to work with:
   Map 1 – Locate the affected area of the 2004 tsunami. Use wall maps and/or online sources to present the affected region and the extent of the disaster.
   Map 2 - Have the students map other tsunamis in the Pacific from the past 100 years. The students should record the dates and areas affected.

4. As a class, compare the locations of the disasters. Discuss the need for an early warning system in certain regions prone to earthquakes (tsunamis).

5. Discuss the possibility of a tsunami effecting Canada. Refer to CBC FAQ to see the results.

1. Students should record a definition for “tsunami” in their notebooks. Include an explanation of the type of devastation that it can cause. Use diagrams to illustrate the tsunami.

2. Together as a class or on their own, students will record a summary of events of the tsunami of 2004. A concept map, paragraph form or timeline would be effective ways of recording events.

3. Map 1 – The students will label the affected area of the 2004 tsunami on a world map. Include the names of the nations and major cities on the map. Colour the map.
   Map 2 - The students will label a second world map. On this map, have the students label tsunamis in the Pacific during the past 100 years. The maps should include dates and the affected areas. Colour the map.

4. Students will compose one to two paragraphs in their books explaining the need for early warning systems to allow people time to protect themselves from natural disasters. Students should provide examples from the Southeast Asia Tsunami in their write up.

5. Students will prepare a one page “Tsunami Guide for Canadians”. This guide must describe how Canadians would be warned of a tsunami, how residents should protect themselves, the likelihood of a tsunami affecting Canada, and any other significant points of interest.
Conclusion
As a class, create a display about the tsunami disaster of 2004. The teacher will provide class time and resources for the students to use to complete a wall display and presentation on the affects of tsunamis on human life. The project should include:
• map of the area
• explanation of tsunami
• photos
• graphs of statistics of loss of life, injury, orphans, the missing, damage, etc.
• relief effort
• rebuilding
• human case studies of survivors and/or relief workers
• how to prepare for a tsunami
• relationship between humans and the environment
• historic and modern examples of tsunami

Students will prepare a display of the Tsunami Disaster of 2004. Depending on the size of the class this could be done in groups or as a class.

This display could be presented to parents or another student group. Through the display, students could explain the fragile relationship between humans and their ocean environment.

Lesson Extension:
Guest speakers are excellent classroom resources. If there are survivors of the tsunami, relief workers, fundraising volunteers, etc. it would be good to invite them in to speak to the class regarding their experience/perception of the disaster. Guest speakers should be encouraged to bring pictures and any artifacts from the experience.

Refer to the Atlantic Ocean. Where has a tsunami hit our Atlantic coast? Play a CBC Archive news broadcast of the Newfoundland tsunami in 1929 for the class. Have the students prepare a poster display or a PowerPoint presentation on this situation. Include: the event, how the people responded, the after effects, and rebuilding effort. Historical photos and information should be included.

Assessment of Student Learning:
• Create a rubric with the students as a form of evaluation for tsunami display project.
• Rubrics to grade the maps. (Rubistar.com is an online rubric creator for teachers.)
• Rubrics to grade the one page Tsunami Guide for Canadians
• A picture and journal writing as a follow up to a speaker
• Rubric to evaluate the poster/PowerPoint on the Newfoundland tsunami of 1929