Student Workbook

Tsunami & Other Coastal Hazards Warning System Project
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Notes to Teachers

There are seven activities suggested for use with this lesson. The teacher is to select the ones that are most suitable for his/her class.

Each activity may be printed out separately for use in the class if each student does not have a personal copy of the Workbook.
**Student Activity 1**

Fill in the **K** and **W** columns before the start of the lesson and the **L** column after the lesson has been taught so that you can chart your progress in class.

<table>
<thead>
<tr>
<th><strong>K (What I know)</strong></th>
<th><strong>W (What I want to know more about)</strong></th>
<th><strong>L (What I have learnt)</strong></th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

KWL Worksheet
Student Activity 2
Portugal, Barbados, the Caribbean, the Atlantic Ocean were mentioned in the Tsunami Warning! Cartoon Booklet. Locate these places on the map below.

Map of the Atlantic Ocean and surrounding countries
Student Activity 3
Get together in groups and dramatise the events leading up to the Lisbon tsunami event presented in the *Tsunami Warning!* Cartoon Booklet.

Student Activity 4
After reading *Tsunami Warning!* Cartoon Booklet and the *Tsunami Smart* teaching charts, answer the following questions individually or in groups:

1. What are the characteristics of a tsunami?
   a. How fast do they travel?
   b. How many waves are there in a tsunami?
   c. Which wave tends to be the largest and so most destructive?
   d. How far apart are the waves?
2. What action did the family in Portugal take that saved their lives?
3. What do you think caused the tsunami?
4. What instruments help detect tsunamis?
5. What do scientists do at a Tsunami Warning Centre?
6. What is the difference between a Tsunami Watch and a Tsunami Warning?
7. How did people know about the tsunami in Portugal and in Barbados?
8. What is the difference between a local and a distant tsunami?
9. If you are on a cruise ship at sea, would you feel the tsunami? Why or why not?
10. Why do the waves in a tsunami grow taller as the tsunami reaches the shore?
11. To what height can a tsunami reach?
12. What can your local disaster management agency do when they know that a tsunami is coming?
13. What must you do after you are told that a tsunami is coming?
14. What is an inundation zone?
15. If you are in such a zone, what should you do,
   a. If you at school?
   b. If you are at home?
   c. If you are at the beach?
   d. In a boat at sea?
   e. Where must you go in tall buildings?
16. What are the signs of an approaching tsunami?
17. How long should you remain in a safe building?
18. If you cannot enter a tall building, where else can you go for safety?
19. How do you know when you can return to your school or home?
20. What might a coastal village or town look like after a tsunami has struck?
Student Activity 5
Write a story about how you would feel if you knew a tsunami was going to strike your coastal village or town, and you are at school.

Student Activity 6
Unscramble the following words and write the word in the space provided.

<table>
<thead>
<tr>
<th>Scrambled word</th>
<th>Unscrambled word</th>
<th>Scrambled word</th>
<th>Unscrambled word</th>
</tr>
</thead>
<tbody>
<tr>
<td>LiChe</td>
<td>dintaunnoi</td>
<td>zdhraa</td>
<td>napaJ</td>
</tr>
<tr>
<td>mitasun</td>
<td>aHiwia</td>
<td>estrc</td>
<td>caloovn</td>
</tr>
<tr>
<td>srisatde</td>
<td>dislleand</td>
<td>gnanwir</td>
<td>htkeuaraq</td>
</tr>
</tbody>
</table>

Student Activity 7
Match the words and their meaning by writing the letter to which the statement relates in the matching response column.

<table>
<thead>
<tr>
<th>Word</th>
<th>Matching response</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Trough</td>
<td>a.</td>
<td>The peak of a wave</td>
</tr>
<tr>
<td>2. Landslide</td>
<td>b.</td>
<td>Tsunamis that are near their source</td>
</tr>
<tr>
<td>3. Tsunami</td>
<td>c.</td>
<td>A higher than normal wave height</td>
</tr>
<tr>
<td>4. Plate tectonics</td>
<td>d.</td>
<td>Rapid movement of material down steep slopes at the coast</td>
</tr>
<tr>
<td>5. Tele-tsunamis</td>
<td>e.</td>
<td>The movement of parts of the crust at the Earth’s surface</td>
</tr>
<tr>
<td>6. Tsunami Watch</td>
<td>f.</td>
<td>The alert call for people to take action when the tsunami that is about to hit.</td>
</tr>
<tr>
<td>7. Crest</td>
<td>g.</td>
<td>The deepest part of a wave</td>
</tr>
<tr>
<td>8. Tsunami</td>
<td>h.</td>
<td>Tsunamis that come from far away source</td>
</tr>
<tr>
<td>9. Surge</td>
<td>i.</td>
<td>The movement of water as a series of waves</td>
</tr>
<tr>
<td>10. Local tsunami</td>
<td>j.</td>
<td>Origin of a tsunami</td>
</tr>
<tr>
<td>11. Tsunami Warning</td>
<td>k.</td>
<td>The first official warning that a tsunami is approaching</td>
</tr>
<tr>
<td>12. Seismic sea wave</td>
<td>l.</td>
<td>Another name for a tsunami</td>
</tr>
</tbody>
</table>
Lesson 2: Experiencing a Tsunami

Notes to Teachers

There are seven activities suggested for use with this lesson. The teacher is to select the ones that are most suitable for his/her class.

Each activity can be printed out separately for use in the class if each student does not have a personal copy of the workbook.

Banda Aceh, Indonesia in the aftermath of the 2004 Indian Ocean Tsunami.
Photo Courtesy: UNESCO IOC ITIC
Activity 1
Write T or F next to the statement that you think is either true or false. Then have your classmate check your responses.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tsunamis are single waves</td>
<td></td>
</tr>
<tr>
<td>2. The first wave to arrive in the tsunami is the most dangerous</td>
<td></td>
</tr>
<tr>
<td>3. Tsunamis can last for several hours</td>
<td></td>
</tr>
<tr>
<td>4. Tsunamis can travel faster than a person can run.</td>
<td></td>
</tr>
<tr>
<td>5. Tsunamis can occur only in the daytime.</td>
<td></td>
</tr>
<tr>
<td>6. Landslides can cause tsunamis.</td>
<td></td>
</tr>
<tr>
<td>7. People on cruise ships can feel a tsunami as it passes under the ship.</td>
<td></td>
</tr>
<tr>
<td>8. The greatest destruction is experienced at the source of the tsunami.</td>
<td></td>
</tr>
<tr>
<td>9. Tsunamis commonly occur in the Pacific Ocean.</td>
<td></td>
</tr>
<tr>
<td>10. All earthquakes cause tsunamis.</td>
<td></td>
</tr>
<tr>
<td>11. The Caribbean region has never had tsunamis.</td>
<td></td>
</tr>
</tbody>
</table>

Activity 2
After reading the story Colours, answer the following questions. You may either provide written answers or discuss the answers in groups.

- In which country did this story take place? Locate it in your atlas or wall map. What ocean surrounds it?
- Which of her senses did Aaliya use to figure out that the danger she was facing was a tsunami?
- What words did she use that made you think that the hazard was a tsunami?
- Describe the effects of the tsunami on Aaliya’s village.
- Why do you think the area was so vulnerable to tsunamis? Do you know of any other territory that might be vulnerable to tsunamis?
- Why do you think the writer named the story, Colours?
- What colours appeal to you and why?
- What emotions do you think Aaliya felt in the choice of her colours for the drawing?
If you were her friend, what would you say to her?

Make a list of emotions that children can have after a disaster happens.

Brainstorm ways you can help someone deal with losing something they value.

Activity 3
The other story is ‘The Christmas Angel’ by Cliff McNish, who chose to tell the story of Anne, a girl from England, who witnessed a tsunami in Thailand. You can read aloud parts of the story to the rest of the class, while your classmates examine the information on the warning signs of an approaching tsunami.

Questions for you to answer:

- What was the first indication to Anne that a tsunami was about to strike?
- What did she notice at the beach?
- Describe the strange behaviour of the animals in southern Thailand in advance of a tsunami.
- Where did Anne learn about tsunamis?
- Why didn’t the adults on the beach listen to Anne?
- Where did the family seek refuge from the tsunami?
- Why do you think Anne had to use the old-time phrase, ‘tidal wave’?
- Describe the tsunami from the time it approached to the time it retreated.
- Describe the hotel resort after the tsunami event.
- What are the similarities in the description of the tsunami events in the two stories, Colours and The Christmas Angel?

Activity 4
Discuss the following questions after reading the article from UNICEF on ‘Making heroes out of children…’

- Who is a hero? Did you ever think that children could be heroes? Why?
- What are some characteristics of heroes?
- Do you know of any children who are heroes? If so, relate to the class what they did to be called heroes?
- Imagine yourself as a hero in a disaster, write about how you saved lives of those animals and people that you care about.
- How can children help in disasters?
Activity 5
On the map below, locate the countries and Ocean mentioned in the stories.

Map of the Indian Ocean and surrounding countries.
Lesson 3: Teach your elders about tsunamis

Notes to Teachers

There are seven activities suggested for use with this lesson. The teacher is to select the ones that are most suitable for their class.

Each activity can be printed out separately for use in the class if each student does not have a personal copy of the Workbook.

Young survivors of the 2004 tsunami from Simeulue Island, Indonesia. Villagers used oral tradition to pass on important tsunami safety information through generations.

Photo Credit: Kerry Sieh, California Institute of Technology
Activity 1
On a blank map of the Caribbean (see map at end of chapter), locate and name the following features and places:
(Resources required: Wall map or atlas; blank map of the Caribbean is already provided for Lesson Two.)

<table>
<thead>
<tr>
<th>Caribbean Sea</th>
<th>Past tsunami events</th>
<th>The Caribbean Plate boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic Ocean</td>
<td>Historic earthquakes</td>
<td>Territories that have experienced tsunamis</td>
</tr>
<tr>
<td>Islands of the Lesser Antilles</td>
<td>Volcanic events</td>
<td>Locate with arrows the direction of plate movement</td>
</tr>
<tr>
<td>Islands of the Greater Antilles</td>
<td>Kick ‘em Jenny</td>
<td>Locate and name the volcano in Montserrat</td>
</tr>
</tbody>
</table>
Activity 2
Label the diagram of a tsunami with the following words:

Crest  Trough  Focus of Earthquake  Ocean floor  Wavelength
Fault  Inundation  Propagation  Generation
Activity 3
The map below shows how scientists believe the tsunami generated in Portugal may have traveled across the ocean to the Caribbean. The lines are travel time for the tsunami in hours.

Tsunami travel time chart for the 1755 Lisbon tsunami. Solid ellipse marks position of the earthquake source. Red colour shows the area within 1-hour propagation time. Source: tsun.ssc.ru/TTT_rep.htm

a. Using the map above, estimate the travel time (the number of hours) for the tsunami to hit the Eastern Caribbean.
b. Name the ocean across which the tsunami traveled.
c. How many lives were lost in Portugal? (See the FAQs section)
d. What is the difference between the estimated wave height one hour after it appeared near Portugal and when it reached the Eastern Caribbean? Why is this?
e. Using an atlas, name two countries each in North America, South America and Africa that may have experienced the tsunami.
Activity 4

Group work: Scenario- What schools should do to plan for a tsunami in the Caribbean

Your teacher will use De Bono’s six thinking hats teaching strategy for student-centred learning by dividing your class into groups of six, with each member taking one of the ‘hats’. Each ‘hat’ represents a different view:

- **White hat** Neutral: What are the facts about tsunamis in the Caribbean?
- **Yellow hat** Positive impacts: What have we put in place?
- **Black hat** Negative impacts: To what extent are we unprepared for a tsunami
- **Green hat** Creative: What ideas do we have that can help?
- **Red hat** Emotions and feelings: How do we feel as we plan for a tsunami?
- **Blue hat** Planning and reflection: What is the next step?

Students from each group are to discuss and present their viewpoints to the rest of the class.
Lesson 4: Preparing for a tsunami

Notes to Teachers

There are seven activities suggested for use with this lesson. The teacher is to select the ones that are most suitable for their class.

Each activity can be printed out separately for use in the class if each student does not have a personal copy of the workbook.

BE TSUNAMI SMART, KNOW THE NATURAL SIGNS

If at the beach and you:

FEEL a severe earthquake?  \(\rightarrow\) RUN

SEE the sea withdraw?  \(\rightarrow\) RUN

HEAR an unusual roar?  \(\rightarrow\) RUN

RUN to high ground or inland if ANY of these Tsunami signs occur

Knowing a tsunami’s natural warning signs could save your life.
Activity 1
You will now view the *Tilly Smith* video, a short film depicting the story of a young girl who was able to use information received during a geography lesson to save lives.

- After viewing the video, answer or discuss the following questions:
  - Which of her senses did Tilly Smith use to recognize that a tsunami was about to hit the area where she and her family were located?
  - What effect did the tsunami have on the area?

Activity 2
This can be done as group work activity as you share your answers with the rest of the class.

**Scenario 1:** You are enjoying a visit to your favourite beach when you feel a strong earthquake:

- What is your first reaction?
- What would you look for?
- What would you pick up?
- Where would you go?
- Would you tell others what you think it might be? If not, why?
- What instructions would you shout to them?
- What would you do if they do not listen to you?

**Scenario 2:** You are at home, and you experience a strong earthquake:

- What would you do?
- Where is the nearest safe place to go to in your community?
- Does your family have a survival kit prepared with items?
- What items would you put in your kit?
- Does your family have a plan if you are all separated? Work with your family to create one if you do not or tell the class about the plan that you have already made.
- Do you or any members of your family need assistance to escape the effects of tsunamis?
- What are the ways you can assist such a person?
Scenario 3: You are at school, and you feel a strong earthquake:

- What would you do?
- Does your school have a disaster management plan for dealing with such a situation?
- Do you know the safest thing to do while at school?
- Would you cooperate with your teachers and principals for your own safety?
- Would you call your parents? Would you get through to them?
- What advice do you think your parent or guardian would give if this happens while you are at school?

Activity 3

Choose one of the following activities below, working in groups for 20 minutes and then making a presentation to the class for 20 minutes.

a. Perform a skit on actions to take before, during and after a tsunami
b. Compose a calypso or rap with information on recognizing the signs of an approaching tsunami, and telling people what to do
c. Create a jingle using key words or actions to take when a tsunami is about to hit.

Activity 4: Who can help?

Creative expression – Making a collage

- Cut pictures from magazines or draw pictures of people who might be able to help you during an emergency.
- Categorise the groups they fall into and stick them together on a large sheet of paper.
- Suggested groups could be:
  - parents
  - students
  - teachers
  - ambulance service
  - police
  - fire service
  - doctors
  - first-aiders or paramedics
  - civil defence
  - media
  - veterinarians
  - voluntary organisations
Activity 5: Field trip
Your teacher will take your class on a field trip along coastal areas to observe and assess what aspects of the coast are vulnerable to coastal hazards and what type. You may wish to take photographs for a class display later.

Activity 6: Designing a poster or brochure
Design a poster or brochure for your school or community to educate people about tsunamis safety. The poster or brochure should have key information on tsunamis such as sensing a tsunami, the URL for the UWI Seismic Research Centre web site and one phrase to instruct people what to do. It should include diagrams, photos or cartoon figures, and be attractive, so that people will want to read it!

Activity 7: Capturing your community through photos and videos.
For this exercise, you may want to think about being a photographer who documents your community. You may wish to capture important buildings, roads, sea defences, poorly built homes, hazards in the community as they exist now. These will become your ‘before’ photos if your community is ever impacted by a tsunami or other coastal hazard. It is important to date photos so they may be used for comparison with the effects of a tsunami or other coastal hazard. Ask your teacher if you can display them in the classroom.

Activity 8: Class Visit by disaster management personnel
Write a letter requesting a visit by someone from a disaster management or scientific monitoring agency to discuss the role of their agency in tsunami preparedness. Prepare a list of questions to ask the person and request permission to document the talk.

Activity 9: Disaster Preparedness Day Display
Request a designated Disaster Preparedness Day at your school. Mount a display on the types of hazards your school or community faces and how to prepare for them. Invite family and members of the community to attend.