TSUNAMI

Teacher's Guide

For 4th to 6th Grades
TSUNAMI

FOR 4th to 6th GRADES

The Project of "Education for Disaster Preparedness in Primary School" is funded through the UN Flash Appeal initiative "Evaluation and Strengthening of Early Warning Systems in countries affected by the 26 December 2004 Tsunami". It is a multi-donor, multi-partner initiative coordinated by UN/ISDR and supported by generous contributions from the Governments of Japan, Germany, Finland, Netherlands, Norway and Sweden and the European Commission Humanitarian Aid Office.

ISBN 974-269-5814
PREFACE

The Indian Ocean Tsunami disaster that occurred on December 26, 2004 caused the loss of thousands of lives and massive destruction. The serious damage alerted the Office of the Basic Education Commission (OBEC) to emphasize the importance of providing the curriculum knowledge about tsunami and other natural disasters for schools. Therefore we have initiated a project on Disaster Preparedness in Primary School in conjunction with the Asian Disaster Reduction Center (ADRC), Japan and the Department of Disaster Prevention and Mitigation (DDPM), Ministry of Interior, Thailand.

The purpose of the project is to provide knowledge and capacity building for teachers and students in primary schools in case they encounter tsunami or other natural disasters in the future. A text book "Tsunami for 4th - 6th Grades" and its "Teacher's Guide" have been developed as a tool to achieve the project's objective.

Regarding the Teacher's Guide, the contents are deliberately to lead the teachers into an effective approach of how they will manage classroom activities. It provides teacher's basic information about the scientific knowledge of the earth, the mechanism of earthquake and tsunami, tsunami warning systems, self knowledge and management when a tsunami is approaching, emergency evacuation drills, including a short story from student experience of the tragedy.

The book was tested in Phra Rat Chatan Talab Lamu School, Tai Muang District, Phang-nga Province and Ban Ka Lim School, Krato District, Phuket Province. After the pilot classes were conducted, we invited a number of relevant officials from the Ministry of Natural Resources and Environment as well as the experts in the Ministry of Education to review and approve the book. This procedure enabled us to adjust the book's content for the best practical use in classrooms.

We hope the Teacher's Guide will assist teachers with valuable materials to teach tsunami and other natural disasters in their classes. Finally, we would like to thank to all those who dedicated their time and energy to complete this book.

The Office of the Basic Education Commission
INTRODUCTION

The overall objective of the "Tsunami for 4th - 6th Grades" and "Tsunami Teacher’s Guide" is to give students and their teachers the opportunity to gain accurate knowledge about tsunami and other natural disasters from both scientific explanation and practical implementation.

The teacher’s guide is provided to accompany the student’s textbook. The guide provides teachers with an effective approach of how to conduct classroom activities as well as offering basic scientific knowledge of the earth, the cause of an earthquake and a tsunami, and self management including preparedness when a tsunami approaches or other natural disasters.

The teacher’s guide consists of six components that provide the basic instructions on how to conduct classes. They are,

- purpose; key issues of the topics to achieve
- materials; items to help student understanding
- guidance; the process of conducting a class
- timeline; a standard timeframe of the topic
- teacher’s data; further information for teacher
- image; complementary pictures or photos

As every teacher knows, classroom management is vital when working with students and the key to manage classes effectively is to teach varied and balanced lessons which are purposeful, relevant and meaningful. It also should present an appropriate degree of challenges.

To accomplish these key elements of managing classes, the following steps will help teachers to prepare for their classes.

<Steps>

1. Read the teacher’s guide by yourself this will help you plan a schedule and to choose the materials which you might like to use for class activities.
2. Explain to the students the objectives of the textbook and activities they will challenge in the class.
3. Form teams or groups before doing the activities if specified.
4. Read the textbook with the students in order to provide the introduction that raises students’ motivation and interest.
5. Discuss with the students prior and after completion of the activities.

To educate students successfully, teachers should go beyond just transferring knowledge about the cause of earthquake and tsunami and self management in the event of an approaching tsunami and other natural disasters. Teachers are required to provide the practical skills that will enable students to take appropriate actions. Lastly, teacher’s self improvement is strongly recommended to make their classes more effective and attractive. Consequently, disaster education in school contributes to long-term disaster risk reduction as well as knowledge dissemination widely to communities where they live.
# Table of Contents

**Introduction**

1. The Earth ........................................... 1
2. Earthquake and Tsunami .............................. 11
3. Evacuation ........................................... 21
4. Countermeasure ........................................ 27
5. Short story ........................................... 33
1. The Earth

Purpose
Chapter 1 provides a timeline of the creation of the galaxy, solar system, and the earth. It is important to acquire background knowledge about the generation of the earth before learning about tsunami and earthquake. Using the calendar, you can teach the history of the earth. This method is called a "cosmic calendar."

Materials
- Calendar

Guidance
1. Teach the time outline of the earth
2. Ask questions by using a calendar
   (For example, the day when space generated is assumed January 1, present is 23:59:59, December 31,...Q1: When did the earth generated? Q2: When was the dinosaur born? Q3: When was the human born?)
   Answer and explanation
1. The Earth

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
<th>Teacher</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 ~ 10</td>
<td>Lecture</td>
<td>Lecture</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10 ~ 20</td>
<td>quiz</td>
<td></td>
<td>Discussion</td>
</tr>
<tr>
<td>3</td>
<td>20 ~ 30</td>
<td>Answer and explanation</td>
<td>Answer</td>
<td></td>
</tr>
</tbody>
</table>

**Teacher’s note**

Cosmic calendar: Show the timeline from the beginning to present using the calendar:
- Beginning of April: Birth of a galaxy
- September 9: Birth of the solar system
- September 14: Birth of the earth
- December 24 to 28: First Dinosaurs appear
- 23:58 December 31: Birth of the Homo sapiens
- 23:59:40 December 31: Homo sapiens start (humans) agriculture

(http://school.discovery.com/schooladventures/universe/itsawesomecosmocalendar/page2.html)
1. The Earth

Purpose

In these two pages, students will be able to learn about the surface of the world. At the end of the lecture, students will study the geographical features in Thailand by using the map of Southeast Asia.

Materials

- Southeast Asia Map (initially focus around Thailand, then move to other countries)

Guidance

1. Lecture about the timeline of the earth
2. Distribute the Southeast Asia Map to the students. They will learn the geographical features in Thailand using the map.
1. The Earth

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 ～15</td>
<td>Lecture</td>
</tr>
<tr>
<td></td>
<td>15～30</td>
<td>Discussion</td>
</tr>
</tbody>
</table>

Teacher's data
Ridge: a long narrow elevation on the ocean floor
Trench: a long, steep-sided valley on the ocean floor
Hot spot: an area of intense heat, radiation, or activity
Lithosphere: the outer layer of the earth, consists of the crust and upper mantle, approximately 100 km thick.
Asthenosphere: a zone of the earth's mantle that lies beneath the lithosphere and consists of several hundreds of kilometers of deformable rocks.
1. The Earth

**Purpose**

In these two pages, students will be able to learn about the interior of earth. There are two key points. First, the crust is where we live, which is really thin. The second point is the interior of the earth is extremely hot and molten (liquid). You will teach the interior features of the earth by using a boiled egg.

**Materials**

- Boiled egg
- Knife

**Guidance**

1. Teach about the interior layers of the earth.
2. Teach the interior of earth by comparing the layers of the boiled egg.
1. The Earth

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
<th>Teacher</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 ~ 10</td>
<td>Lecture</td>
<td>Lecture</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10 ~ 20</td>
<td>Lecture (by using boiled egg)</td>
<td>Observation</td>
<td></td>
</tr>
</tbody>
</table>

Teacher's data

The outermost layer of the Earth is the crust. This comprises the continents and ocean basins. The crust has a variable thickness, being 35-70 km thick in the continents and 5-10 km thick in the ocean basins. The crust is composed mainly of aluminosilicates.

The next layer is the mantle, which is composed mainly of ferro-magnesium silicates. It is about 2900 km thick, and is separated into the upper and lower mantle. This is where most of the internal heat of the Earth is located. Large convective cells in the mantle circulate heat and may drive plate tectonic processes.

The last layer is the core, which is separated into the liquid outer core and the solid inner core. The outer core is 2300 km thick and the inner core is 1200 km thick. The outer core is composed mainly of a nickel-iron alloy, while the inner core is almost entirely composed of iron. Earth’s magnetic field is believed to be controlled by the liquid outer core.

(http://scign.jpl.nasa.gov/learn/plate1.htm)
1. The Earth

Surface of the earth is moving
In 1912 Alfred WEGENER, a German scientist, proposed a theory that all continents used to be joined in the past in a huge mega continent called "PANGAEA" which means many lands. Some scientists believed that Pangaea began breaking up and shifting many millions of years ago, the result of the motion of a super continental drift. The continents moved over the ocean floor until they reached their present positions.

The earth is composed of many plates
The earth's crust is composed of huge pieces of enormous plate pieces. Every plate is a huge plate and is called the lithosphere. The earth is composed of plates moving over the mantle.

Purpose
In these two pages, the student will be able to identify the Plate Tectonic Theory of WEGENER. It is important to understand that the continents of around the world are constantly in motion.

Materials
- World map (It is enough in copied)
- PANGAEA map
- Scissors
- Glue

Guidance
1. Teach the Theory of Plate Tectonics
2. Obtain copies of the world map. Cut out the oceans and the continents depicted in the PANGAEA map. Combine the pieces together to form PANGAEA.
3. Conduct discussion about the Theory of Plate Tectonics.
1. The Earth

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
<th>Teacher</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 ~ 10</td>
<td>Lecture</td>
<td>Lecture</td>
<td>Lecture</td>
</tr>
<tr>
<td>2</td>
<td>10 ~ 30</td>
<td>Experiment</td>
<td>Experiment</td>
<td>Experiment</td>
</tr>
<tr>
<td>3</td>
<td>30 ~ 40</td>
<td>Discussion</td>
<td>Discussion</td>
<td>Discussion</td>
</tr>
</tbody>
</table>

Teacher's data

The Pangaea theory is one that states that all present continents were once joined together and collectively known as a ‘super continent’ called a Pangaea. The word Pangaea means 'all lands' in Greek, defining the formation of continents over 200 millions years ago before it split up. These split-up pieces drifted slowly apart and became the way they are today. Even until now, the shape of the Earth surface is still changing, and there will be continued movement, as long as the mantle underneath the Earth’s crust gets heated and convection currents in the magma keeps dragging the plates. The Pangaea theory was treated with much skepticism when it was first raised. But since then, there have been much evidence to support this theory.

Image

(http://www.ocean-institute.org/edu_programs/materials/P/PDF/PDF_FGIES_A3.pdf)
1. The Earth

Purpose

In this section, there is no experiment. You teach about the plate boundaries that are Convergent Boundaries, Divergent Boundaries, and Transform Boundaries. This content may be difficult for students. So please explain this section slowly.

Materials

(No) Only lecture

Guidance

1. Lecture about the plate boundaries
1. The Earth

**Timetable**

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0~20</td>
<td>Teacher</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Student</td>
</tr>
</tbody>
</table>

Teacher's data:

**Convergent Boundaries.** Places where plates crash or crunch together are called convergent boundaries. Plates only move a few centimeters each year, about the rate of fingernail growth, so collisions are very slow and last millions of years. Even though plate collisions take a long time, lots of interesting things happen. For example, in the drawing above, an oceanic plate has crashed into a continental plate. Colliding is like looking at a single frame in a slow-motion movie of two cars crashing into each other. Just as the front ends of cars fold and bend in a collision, so do the "front ends" of colliding plates. The edge of the continental plate in the drawing has folded into a huge mountain range, while the edge of the oceanic plate has bent downward and dug deep into the Earth. A trench has formed at the bend. All that folding and bending makes rock in both plates suddenly break and slip, causing earthquakes. As the edge of the oceanic plate digs into Earth's hot interior, some of the rock in it melts. The melted rock rises up through the continental plate, causing more earthquakes on its way up, and forming volcanic eruptions where it finally reaches the surface.

**Divergent Boundaries.** Places where plates are coming apart are called divergent boundaries. When Earth's brittle surface layer (the lithosphere) is pulled apart, it typically breaks along parallel faults that tilt slightly outward from each other. As the plates separate along the boundary, the block between the faults cracks and drops down into the soft, plastic interior (the Asthenosphere). The sinking of the block forms a central valley called a rift. Magma (liquid rock) seeps upward to fill the cracks. In this way, new crust is formed along the boundary. Earthquakes occur along the faults, and volcanoes form where the magma reaches the surface.

**Transform Boundaries.** Places where plates slide past each other are called transform boundaries. Since the plates on either side of a transform boundary are merely sliding past each other and not tearing or crunching each other, transform boundaries lack the spectacular features found at convergent and divergent boundaries. Instead, transform boundaries are marked in some places by linear valleys along the boundary where rock has been ground up by the sliding. In other places, transform boundaries are marked by features like stream beds that have been split in half and the two halves have moved in opposite directions.

(http://www.coff.edu/ete/modules/msese/earthsysstr/plates1.html)

Image

(Non) Only lecture
2. Earthquake and Tsunami

Purpose
First page in the chapter 2 shows the causes of an earthquake. Students will able to learn about the mechanism of the earthquake occurrence. It is important to identify that most tsunamis are caused by earthquakes. Moreover, tsunamis can also be generated by underwater landslides, volcanic eruptions, and meteorite strike into the ocean because massive amounts of water can be displaced.

Materials
( None) Only lecture

Guidance
1. lecture
2. Earthquake and Tsunami

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 ~15</td>
<td>Teacher</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Student</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lecture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lecture</td>
</tr>
</tbody>
</table>

Teacher’s data

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes, the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates. Ground shaking from earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge, destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill and other unstable soil, and trailers and homes not tied to their foundations are at risk because they can be shaken off their mountings during an earthquake. When an earthquake occurs in a populated area, it may cause deaths and injuries and extensive property damage.

(http://www.fema.gov/pdf/hazards/earthquakes/nhrip/earthquake_backgrounder.pdf)

Image

(None) Only lecture
2. Earthquake and Tsunami

Purpose
In these two pages the students will be able to learn about mechanism of the tsunami by using experiment tool. It is a very effective method which takes sometime. It is very important to summarize the proper sequence of events that generate a tsunami 1) Plate tectonic movements cause earthquakes. 2) A large earthquake along a coastline may or may not cause tsunami.

Materials
- Box
- Board
- Plastic sheet
- Piece of wood
- Brick

Guidance
1. Lecture about mechanism of tsunami generation.
2. Experiment
   - Like the picture, put the board in the box. And cover the plastic sheet on the board.
   - Pour the water in the box (a depth of 5 cm). And float the piece of wood on the water.
   - Lift lightly the plastic sheet side of A, keep the movement of water and wood under observation.
   - Make various shore models by using bricks!
3. Discussion
2. Earthquake and Tsunami

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
<th>Teacher</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 ~ 15</td>
<td>Lecture</td>
<td>Lecture</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>15 ~ 45</td>
<td>Experiment</td>
<td>Experiment</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>45 ~ 60</td>
<td>Discussion</td>
<td>Discussion</td>
<td></td>
</tr>
</tbody>
</table>

Teacher’s data
(No data) Only experiment

Image

(http://www.rcen.hokkaido-u.ac.jp/240/chigaku_jikkens/24013-earthquake/13.htm)
2. Earthquake and Tsunami

Purpose
This page shows the how a tsunami spreads across the ocean. It is important to identify the
that earthquakes and therefore tsunamis are unpredictable. Earthquakes and tsunamis can
suddenly strike people. You introduce two cases. One is about the 2004 Sumatra
Earthquake and Indian Ocean Tsunami. The other is about the 1960 Chilean Tsunami that
crossed the Pacific Ocean

Materials

Guidance
1. Lecture (2004 Sumatra Earthquake and Indian Ocean.)
2. Lecture (1960 Chilean Tsunami)
### 2. Earthquake and Tsunami

**Timetable**

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 - 15</td>
<td>Lecture</td>
</tr>
<tr>
<td>2</td>
<td>15 - 30</td>
<td>Lecture</td>
</tr>
</tbody>
</table>

**Teacher's note**

[2004 Sumatra Earthquake and Indian Ocean Tsunami] On 26 December 2004 the biggest earthquake for the past 40 years (magnitude 9.3) occurred between the Australian and Eurasian plates in the Indian Ocean. The quake triggered a tsunami, a series of large waves, that spread thousands of kilometers over several hours. The earthquake caused the sea floor to rupture along the fault line, causing a giant wave which traveled and carved a path of destruction across the 4500 km-wide Indian Ocean over a period of seven hours.

[1960 Chilean Tsunami] 1960 Chilean Tsunami was a result of the largest earthquake ever measured (magnitude 9.5). This quake occurred along the coast of Chile on May 22, 1960. In Chile, the earthquake and the tsunami that followed took more than 2,000 lives and caused property damage estimated at $550 million (1960 U.S. dollars). From Chile the tsunami radiated outward, killing 61 people in Hawaii and 122 in Japan. The 1960 Chile earthquake ruptured a fault zone along which a slab of sea floor is descending, or "subducting," beneath the adjacent South American Continent. Such "subduction zones" are formed where two of the tectonic plates that make up the Earth's outer shell meet. Earthquakes occur when the fault ruptures, suddenly releasing built-up energy. During the 1960 Chile earthquake, the western margin of the South American Plate abruptly moved as much as 60 feet relative to the subducting Nazca Plate, in an area 600 miles long and more than 100 miles wide.

(http://www.usgs.gov/)
2. Earthquake and Tsunami

Perpetua:
These two pages show the height and speed of a tsunami. The explanation of data in detail may be difficult for students. Please teach in simpler terms by using the pictures.

Materials

Guidance
1. Lecture (about tsunami speed)
2. Lecture (about tsunami height)
2. Earthquake and Tsunami

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
<th>Teacher</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 ~ 15</td>
<td>Lecture</td>
<td>Lecture</td>
<td>Lecture</td>
</tr>
<tr>
<td>2</td>
<td>15 ~ 30</td>
<td>Lecture</td>
<td>Lecture</td>
<td>Lecture</td>
</tr>
</tbody>
</table>

Teacher's note

[How fast?]: Where the ocean depth is deep, over 6,000 m, unnoticed tsunami waves at the surface of the ocean can travel at the speed of a commercial jet plane, over 800 km per hour. They can move from one side of the Ocean to the other in less than 24 hours. This great speed makes it important to be aware of the tsunami as soon as it is generated.

Scientists can predict when a tsunami will arrive at various places by knowing the source mechanism characteristics of the earthquake that generated the tsunami, and the characteristics of the seafloor along the paths to those places. Tsunamis travel much slower in shallower coastal waters where their wave heights begin to increase dramatically.

[How big?): Offshore and coastal features can determine the size and impact of tsunami waves. Reefs, bays, entrances to rivers, undersea features and the slope of the beach all help to modify the tsunami as it attacks the coastline. When the tsunami reaches the coast and moves inland, the water level can rise many meters. In extreme cases, water level has risen to more than 15 m for tsunamis of distant origin and over 30 m for tsunami waves generated near the epicenter. The first wave may not be the largest in the series of waves.

One coastal community may see no damaging wave activity while in another nearby community destructive waves can be large and violent. The flooding can extend inland by 300 m or more, flooding large expanses of land with water and debris.

Image

(None) Only lecture
2. Earthquake and Tsunami

Purpose
In this page shows the difference between tsunami and wind waves. These two are different types of waves. You will teach the difference to the students by using photographs and pictures.

Materials
(Non) Only lecture

Guidance
1. Lecture about wind waves
2. Lecture about tsunami waves
2. Earthquake and Tsunami

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0～10</td>
<td>Lecture</td>
<td>Lecture</td>
</tr>
<tr>
<td>2</td>
<td>10～20</td>
<td>Lecture</td>
<td>Lecture</td>
</tr>
</tbody>
</table>

**Teacher’s data**

The waves you see at the beach are generated by wind blowing over the sea surface. The size of these waves depends on the strength of the wind creating them and the distance over which it blows. Generally the distance between these waves from crest to crest, known as the wavelength, ranges from a couple of feet to perhaps a thousand feet. The speed of these waves as they travel across the ocean ranges from a few miles an hour up to sixty miles an hour in some instances.

Tsunami waves resulting from physical mechanisms behave much differently than wind generated waves. The magnitude of the disturbance causing the tsunami is the primary factor influencing the size and strength of the waves. The height of the wave when it is generated is very small, usually less than a few feet. The distance between successive wave crests or the wavelength however, is much larger than that of a normal wave and may be hundreds of miles apart. Depending on the depth of the water in which the tsunami is traveling, it may attain speeds of up to 500 miles an hour.

(http://tsunamifury.org/facts/tsunami_comparison.htm)

(Non) Only lecture
3. Evacuation

When you detect the sight of a tsunami, tell it to your parent or anyone nearby quickly.
As tsunami waves come repeatedly, do not hesitate until the last minute before that it is safe to return to the coastline.

When you are caught by a tsunami:
If you are on the sea, tell your parents or adults nearby not to return to the coast until the warning is cancelled and wait for emergency evacuation to the designated area. If you are on a step or a small hill, move the area and run inland to the higher areas of the nearest building. If you are caught by a tsunami wave, first prepare your clothes and thing on top of it.

Purpose
These two pages explain the signs that a tsunami is approaching. Your role is to teach about tsunami warning information.

Materials
(None) Only lecture

Guidance
1. Lecture about school and family emergency evacuation. Please emphasize the four caution notes.
3. Evacuation

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 ~ 30</td>
<td>Teacher: Lecture</td>
</tr>
</tbody>
</table>

Teacher’s note

Detailed information for emergency school and family tsunami evacuation. If you are in school and you hear there is a tsunami warning, you should follow the advice of teachers and other school personnel. If you are at home and hear there is a tsunami warning, you should make sure your entire family is aware of the warning. Your family should evacuate your house if you live in a tsunami evacuation zone. Move in an orderly, calm and safe manner to an identified evacuation site or to any safe place outside your evacuation zone. Follow the advice of local emergency and law enforcement authorities. If you are at the beach or near the ocean and you feel the earth shake, move immediately to higher ground, do not wait for a tsunami warning to be announced. Stay away from rivers and streams that lead to the ocean as you would stay away from the beach and ocean if there is a tsunami. A regional tsunami from a local earthquake could strike some areas before a tsunami warning can be announced.

(Sources: http://tsunami fury.org/tsunami_warning.htm)

Image

(Not available) Only lecture
3. Evacuation

Out reliable information
When you are in the evacuation area, listen carefully to the radio or television for the latest news. Return to the buildings only when the authorities say it is safe. Evacuations can last for many hours. The size of surrounding towns may be bigger than the first one. Listen to announcements from the authorities.
Absolutely, do not believe rumors.

Help other people
Help those who need assistance such as children, elderly, and people with special needs. But do not move people who are seriously injured to the safety area. Call for professional help.

Purpose
In these two pages, show the activity that should be conducted at an evacuation site. There are two important points. First is getting accurate information, second is helping each other.

Materials
(None) Only lecture

Guidance
1. Lecture about getting accurate information
2. Lecture about helping each other
3. Evacuation

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
<th>Teacher</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 ~15</td>
<td>Lecture</td>
<td>Lecture</td>
<td>Lecture</td>
</tr>
<tr>
<td>2</td>
<td>15~30</td>
<td>Lecture</td>
<td>Lecture</td>
<td>Lecture</td>
</tr>
</tbody>
</table>

Teacher's data

Stay tuned to a battery-operated radio for the latest emergency information. Help injured or trapped persons. Give first aid where appropriate. Do not move seriously injured persons unless they are in immediate danger of further injury. Call for help. Remember to help your neighbors who may require special assistance—infants, elderly people, and people with disabilities. Stay out of damaged buildings. Return home only when authorities say it is safe.

Enter your home with caution. Use a flashlight when entering damaged buildings. Check for electrical shorts and live wires. Do not use appliances or lights until an electrician has checked the electrical system. Open windows and doors to help dry the building.

Shovel mud while it is still moist to give walls and floors an opportunity to dry. Check food supplies and test drinking water. Fresh food that has come in contact with flood waters may be contaminated and should be thrown out. Have tap water tested by the local health department.

(http://www.fema.gov/hazards/tsunamis/tsunamif.shtm)

Image

(Non) Only lecture
3. Evacuation

Purpose
This page shows the recovery activity after a destructive tsunami has struck the coastlines. It is not necessarily safe, even after returning home. It is important to act carefully.

Materials
(None) Only lecture

Guidance
1. Lecture (according to the kid's text)
2. Discussion: The feature of the house is different according to the region. You ask the students where are the danger spots at your house.
3. Evacuation

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0～10</td>
<td>Lecture</td>
</tr>
<tr>
<td></td>
<td>10～20</td>
<td>Discussion</td>
</tr>
</tbody>
</table>

Teacher's data

Note the following points:
- Gas leakages
- Leaks
- Crashed glasses
- Well water
- Unstable furniture
- Others

Image

(None) Only lecture
4. Countermeasure

**Purpose**
The first page in chapter 4 shows how to look for evacuation routes and evacuation sites. Though this preparedness activity takes a lot of time, it is very effective as the students identify the situation of a town in relation to disasters.

**Materials**
- Paper (As large as possible)
- Field note (Note when the outdoors acting)
- Camera (It is possible to print out within the day)
- Colored pencils
- Town map
- Scotch tape

**Guidance**
1. Learn about disasters
2. Know our town
3. Develop a map
4. Conduct group discussions and make presentation
4. Countermeasure

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
<th>Teacher</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 ~ 30</td>
<td>Lecture</td>
<td>Lecture</td>
<td>Lecture</td>
</tr>
<tr>
<td>2</td>
<td>30 ~ 150</td>
<td>Know our town</td>
<td>Know our town</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>150 ~ 270</td>
<td>Develop a map</td>
<td>Develop a map</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>270 ~ 330</td>
<td>Conduct group discussions and make presentation</td>
<td>Conduct group discussions and make presentation</td>
<td></td>
</tr>
</tbody>
</table>

Teacher’s data

1. Participants are given lectures on disasters in the local community and an introduction to the Town-Watching concept.

2. Each group walks around the streets in the local community, looking to identify both positive and negative features relating to disaster risk management activities. Group members make notes and take photographs.

3. Group members create a community based hazard map, manually integrating their observations and findings on a large-scale base map.

4. Each group discusses such issues as about, “What are the potential problems?” “What are the possible preparedness actions?”, and, “Who should be responsible for implementing particular preparedness actions?” Then, a representative of each group’s discussions present to an audience of all the other groups, so that all may share in each other’s findings and suggestions.

Image

(http://www.senpo.or.jp/action/release/news_bosaimap.html)
4. Countermeasure

Purpose
This page is a checklist of survival kit. The students will be able to identify survival kit items by using this page.

Materials
(No) Only lecture

Guidance
1. Lecture and distribute the answer sheet.
2. Discussion the contents of a survival kit. And question; why do you need it? Besides, what is necessary?
4. Countermeasure

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Teacher</td>
</tr>
<tr>
<td>1</td>
<td>0 ~ 10</td>
<td>Lecture</td>
</tr>
<tr>
<td>2</td>
<td>10 ~ 20</td>
<td>Discussion</td>
</tr>
</tbody>
</table>

Teacher's data:
- Flashlight: For night time use and dark location.
- Portable radio: It is effective to understand public information.
- Extra batteries: Maintaining the electric power
- First aid kit: It is effective to the immediate attention.
- Canned food and can opener: It notes it at the best-before date.
- Drinking water: It notes it at the best-before date.
- Instant foods: It notes it at the best-before date.
- Mobile phone: Effective contact method that ties family away
- Cash: It is possible to use it effectively at any time.
- Backpack: The above-mentioned one is put.

Image

(None) Only lecture
Purpose
This page shows the importance of information sharing. Cooperation within school and the family is very useful for preparedness action. And you have to arrange the family's activities.

Materials
(None) Only lecture

Guidance
1. Lecture (at the school)
2. Discussion (at home with your family)
3. Discussion (at the school)
4. Countermeasure

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st day</td>
<td>Lecture</td>
</tr>
<tr>
<td>2</td>
<td>2nd day</td>
<td>Discussion</td>
</tr>
<tr>
<td>3</td>
<td>3rd day</td>
<td>Discussion</td>
</tr>
</tbody>
</table>

Teacher's data
1st day: Please bring the content of the lecture together.
2nd day: The students will talk about disaster preparedness with family.
3rd day: the student will announce the content that discussed at home.

Image
(No image) Only lecture
5. Short Story

Purpose
This section shares student story experiences. However, this story is one example. If it is possible, you can gather the other story, speak to students, and show the real life severity and the hope for the disaster.

Materials
(Empty) Only introduction

Guidance
1. Introduction: the existing materials (experiment story)
2. Discussion
5. Short Story

<table>
<thead>
<tr>
<th>Order of guidance</th>
<th>Time (min)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 ~15</td>
<td>Lecture</td>
</tr>
<tr>
<td>2</td>
<td>15~30</td>
<td>Discussion</td>
</tr>
</tbody>
</table>

Teacher's data

(None) Only introduction

Gather the experiment stories of the student that live in your region.

mage

(None) Only introduction
Reference sources of information

http://www.disaster.go.jp/english/volcanic.html

http://wwwменно.shinj-sakutei.jp/

http://www.tsunamiwave.info/

http://www.jma.go.jp/jma/index.html

http://www.usgs.gov/

http://www.adl.or.jp/

http://www.emd.wa.gov/info/
List of organizer & participants

(Editor)
UNESCO Intergovernmental Oceanographic Commission (IOC), International Tsunami Information Center, 737 Bishop St., Ste. 2200, Honolulu, Hawaii 96813, USA
Tel: (1) 808-532-6424 Fax: (1) 808-532-5576

(Organizer)
Bureau of Academic Affairs and Educational Standards, Ministry of Education
Rajdamnoen Nok Avenue, Dusit, Bangkok 10390, Thailand
Tel: 66 02 2828 118
Fax: 66 02 6825 335

Research and International Cooperation Bureau, Department of Disaster Prevention and Mitigation, Ministry of Interior
3/12 U-Thong Nok Road, Dusit, Bangkok 10300, Thailand
Tel: 66 2 243 3518
Fax: 66 2 243 2202

Asian Disaster Reduction Center
Hitomiinkan 5F 1-5-2 Wakinohamakaigan-dori Chuo-ku, Kobe 651-0073 Japan
Tel: +81 78 262 5540
Fax: +81 78 262 5546

(Publisher)
SARENRIN Printing Co., Ltd.
31 / 289 Moo 4 Nongborn, pravet, Bangkok, 10250 Thailand
Tel: +66 2 726 3191-2, +66 2 726 2382, +66 2 726 7412
Fax: +66 2 726 2474

36