

THE EARTH: WORK IN PROGRESS

GRADES 5-8
JANIECE MISTICH

TIME ALLOTMENT:

Introductory Activity: 15-30 minutes
Learning Activity: 60 minutes
Culminating Activity: 2-3 class periods to research, create, and present project

OVERVIEW:

A natural hazard is an uncontrollable and often unexpected natural event that threatens an ecosystem and/or the lives and property of people. A natural disaster is a natural hazard event that has occurred, resulting in widespread destruction of property, loss of life or injury of people, and/or negative changes to habitat.

Every person will probably experience the impact from at least one natural disaster in their lifetime. As more people build in areas that are prone to natural disasters, the costs in both property losses and lives continue to increase.

It is important to be aware of natural hazards because human activities can sometimes increase how often a natural hazard occurs and how severe a natural hazard can become. For example, many avalanches occur as a direct result of activities by people. Understanding when, where, why, and how natural hazards occur can help us better prepare for their possibility, therefore minimizing their impact.

In this lesson, students explore different natural hazards that affect our lives and impact the environment and create a brochure to help others prepare for a natural hazard event.

SUBJECT MATTER: Environmental Science,
Physical Science

LEARNING OBJECTIVES:

Students will be able to:

- Identify the effects of each of the following natural hazards: volcanoes, earthquakes, tsunamis, avalanches, sinkholes.
- Gather information to assist them in preparing an emergency preparedness plan.
- Create a brochure giving natural disaster information and emergency preparedness advice for a natural hazard event.

STANDARDS:

National Science Education Standards

<http://www.nap.edu/readingroom/books/nses/html/>

Content Standard F: Science in Personal and Social Perspectives
Natural Hazards

Excellence in EE—Guidelines for Learning

http://naaee.org/npeee/learner_guidelines.php

Strand 2: Knowledge of Environmental Processes and Systems

1. Processes that Shape the Earth

Louisiana Science Frameworks:

State Standards for Curriculum Development

<http://www.doe.state.la.us/doe/assessment/standards/SCIENCE.pdf>

SI-M-A1: Identifying questions that can be used to guide a scientific investigation;

SI-M-A3: Using mathematics and appropriate tools and techniques to gather, analyze, and interpret data;

SI-M-A7: Communicating scientific procedures, information, and explanations;

SI-M-B1: Recognizing that different kinds of questions guide different kinds of scientific investigations;



SI-M-B2: Communicating that current scientific knowledge guides scientific investigations

SI-M-B4: Using data and logical arguments to propose, modify, or elaborate on principles and models

ESS-M-A7: Modeling how landforms result from the interaction of constructive and destructive forces

ELA-5-E2: Locating and evaluating information sources (e.g., print materials, databases, CD-ROM references, Internet information, electronic reference works, community and government data, television and radio resources, audio and visual materials); (1, 3, 4, 5)

ELA-5-E4 and ELA-5-M4: Using available technology to produce, revise, and publish a variety of works; (1, 3, 4)

ELA-4-M2: Giving and following directions/procedures; (1, 4)

MEDIA COMPONENT:

Video:

Enviro-Tacklebox™ — *The Earth: Work in Progress*

An LPB Production which examines how the forces released during earthquakes, volcanic eruptions and sinkhole formations result in dramatic change to the Earth's surface, often redesigning local habitats.

Web sites:

Enviro-Tacklebox™ <http://www.envirotacklebox.org> This is Louisiana Public Broadcasting's Web site providing teaching information, films, articles and student activities involving environmental science.

National Weather Service: Storm Ready

<http://www.stormready.noaa.gov/awareness.htm>

FEMA Emergency Preparedness

<http://www.fema.gov/rrr/prep.shtm>

American Red Cross Emergency Preparedness Information

<http://www.prepare.org/basic/basicnat.htm>

Natural Disaster Reduction

<http://www.unesco.org/science/earthsciences/disaster/disasterfacts.htm>

Geographic Distribution of Major Hazards in the United States

<http://www.usgs.gov/themes/hazards.html>

Earth Force

<http://www.fi.edu/earth/earth.html>

Natural Hazards.org

<http://www.naturalhazards.org/discover/index.html>

Putting Down Roots in Earthquake Country

<http://www.scecdc.scec.org/homesafe.html>

National Oceanic and Atmospheric Administration <http://www.noaa.gov/> Use the site index map on the left side of the web page to locate specific natural hazards.

Other Planets, Other Moons <http://www.lpb.org/education/classroom/opom/otherhtm/008thow.htm>

This website provides directions and a template for creating your own brochure.

MATERIALS:

Per Group:

- Video: **Enviro-Tacklebox™ — *The Earth: Work in Progress***
- Teacher Sheets — News Articles of Natural Disasters (choose and print from Web sites)
- Student Sheets — Individual Group Previewing and Viewing Questions
- Sample brochure

PREP FOR TEACHERS:

1. Prior to teaching the lesson, preview the video *The Earth: Work in Progress* in its entirety.
2. **CUE** the video to the beginning.
3. Bookmark the Web Sites used in the lesson for each computer in your classroom or in the computer lab.
4. Divide students into groups. Assign each group to one of the disasters to be studied: volcanoes, earthquakes, tsunamis, sinkholes, tornadoes, hurricanes, and avalanches. (Additional natural disasters can be assigned if group sizes warrant it, including insect infestations, drought, landslides, floods, forest fires; however, these are not discussed in the video.)
5. Gather the materials for each activity and prepare for each group of students.
6. Make copies of questions for video viewing (Teacher Handout #1).
7. When using media, provide students with a **FOCUS FOR MEDIA INTERACTION**, a specific task to complete and/or information to identify during or after viewing of video segments, Web sites or other multimedia elements.

INTRODUCTORY ACTIVITY:

1. Read news articles about recent natural disasters to the class. Ask students, "What was similar about each news article? How did each event affect the environment? How did each affect people?" (***all articles dealt with natural disasters and their effects on people; each event disturbed or changed the environment in some way, people living in the immediate area of the event either lost property or lives.***)
2. Ask, "What do we call these events that have such a dramatic effect on the environment and people?" (***natural disasters***)
3. Ask students to list some natural disasters that they have heard about or experienced in their lifetimes. List all responses on the board.
4. Ask students to define the word, "natural." (***occurring in nature, not man-made***) Review their lists and have them remove any responses that are man-made disasters.
5. Tell students that today they will explore different natural disasters to learn what effects they have on the environment and on people.

LEARNING ACTIVITIES:

1. Provide students with a **Focus for Media Interaction**, asking them to watch the video to see if there are any additional natural disasters that can change the earth's crust or affect the environment.
2. **Play** the video until you see Greg Grandy, the host, pick up a model of the earth, and ask the question, "What are some natural disasters that change the earth's crust?" **Pause** the video and ask students to answer the question. (***floods, tsunamis, earthquakes, hurricanes, tornadoes, and meteorites***) Compare the answers given with the list they generated in the introductory activity.
3. Divide students into groups and assign a natural disaster topic to each group. Hand out questions specific to each group (***Student Sheets 4, 5, 6, 7, 8, 9, and 10***). Ask students to answer the pre-viewing questions prior to watching the video. (These questions will ascertain their prior knowledge and create an anticipatory set for viewing the video.) Once students have finished the pre-viewing questions, have them also preview the questions that they will answer after viewing the video.
4. Provide students with a **Focus for Media Interaction**, asking them, "How can volcanoes change the surface of the earth and affect humans?" **Resume** the video, stopping when you see the fish and the words *Holy Mackerel* and hear, "More than 80 percent of the earth's crust, both below and above the surface, was formed by volcanic activity."
5. Allow time for the group assigned to volcanoes to answer the questions; then review questions and answers with the entire class.
6. Provide students with a **Focus for Media Interaction**, asking them, "How can earthquakes change the surface of the earth and what effect do they have on humans?" **Resume** the video, stopping when you see the skyline of San Francisco with the Golden Gate Bridge in the background and hear the words, "When the earthquake occurs, that's all real-life laboratory, and that's the ultimate test of our theories, and also how they're put into practice." **Pause** the video.

7. Allow time for the group assigned to earthquakes to answer the questions; then review questions and answers with the entire class.
8. Continue this process, stopping after each segment to answer and discuss the questions concerning each natural disaster, and then resuming the video. Use the following cues to stop the video:
 - a. When you see the meteorite hitting the water and making a huge splash and you hear the words, "...or by a big meteorite from space hitting the water."
 - b. When you see the countryside landscape with two pictures of huge holes overlaying it and hear the words, "This information warns people to keep their property away from collapsing holes."
 - c. You see a tornado and hear the words, "Tornadoes don't just land in towns that you see on the news. They also drastically change the environment by striking forests and natural spaces."
9. Ask students, "What examples of technology were shown that are used to predict natural disasters or study their effects?" (***seismometers for earthquakes, ground penetration radar for sinkholes***)
10. Provide students with a **Focus for Media Interaction**, asking them, "What other forms of technology have improved predictions of natural disasters?" **Resume** the video, **pausing** when you see the eye of the hurricane and hear the words, "Because of new technologies, hurricanes and other coastal storms never sneak up on us anymore."
11. Ask students what forms of technology are used to predict hurricanes and tornadoes?
(***radar and satellite technology***)
12. Tell students that in the *Culminating Activity*, they will research one of the natural disasters that can occur in the United States to find out where they most often occur and how they can best protect themselves and their property from the devastating effects of it.

CULMINATING ACTIVITIES:

Groups will research assigned natural disasters to learn their effects on both the environment and people, and then create an Emergency Preparedness Brochure for an assigned disaster.

1. Lead students in a discussion of how humans adapt to and prepare for disasters in different parts of the country; including the names of organizations that forewarn people of approaching danger and those that assist people once disasters strike.
2. Provide students with a **Focus for Media Interaction**, telling each group to use at least three of the bookmarked Web sites to locate the following information for their brochures:
 - Type of Natural Hazard
 - Name of state(s) most affected by the natural hazard/disaster
 - Map showing the general location(s) of probable disasters
 - Description of how the natural disaster occurs
 - Typical effects of natural disaster on landscape and environment
 - Dangers to people
 - Warning signs
 - Preparations before, during, and after the event
 - Emergency supplies
 - Phone numbers of local assistance organizations
 - Statistics of damage, loss, and/or recovery costs of a recent event in the area
3. Directions for creating a brochure on the computer can be found at the following website:
<http://www.lpb.org/education/classroom/opom/otherhtm/008thow.htm> In order to utilize the sample template on this site, select the highlighted doc format. It will bring up a sample template. Click inside each part of the document and select Delete to remove the words inside of that section. Students can then type directly into the section. A sample brochure is included for this activity. The teacher may design the location of each item for the brochure or allow students the freedom to design their own brochure.
4. Have students share their brochures with classmates.

CROSS-CURRICULAR EXTENSIONS:**ART:**

- Create posters showing pictures and facts about different natural disasters, including locations where they most often occur.

GEOGRAPHY:

- Create a map of the country or world showing the typical locations where each of the natural hazards occur. A useful website for this activity is: **Geographic Distribution of Major Hazards in the United States** <http://www.usgs.gov/themes/hazards.html>

HISTORY:

- Create a booklet of historic natural hazard events that include pictures, statistics, effects on environment, etc.

LANGUAGE:

- Create newspaper articles describing natural disasters that really occurred, giving specific statistics and effects on the environment and people.

MATHEMATICS:

- Research and compare the total costs in recovery operations of different natural disasters that have occurred in the United States. Analyze the data to determine if one natural disaster is more costly than another. Explain why.

SCIENCE:

- Create models demonstrating how each natural hazard occurs.

COMMUNITY CONNECTIONS:

- Invite a person from an emergency preparedness organization to speak to the class about local natural disaster preparation.
- Have students prepare relief kits for families affected by natural disasters in the area.
- Make copies of created Emergency Preparedness Brochures that deal with local natural disasters and distribute them to families living in the area.

STUDENT MATERIALS:

- Natural Disaster Video Viewing Sheets
- Data Collection Sheet for Brochure
- Sample Brochure

VOLCANOES***PREVIEWING QUESTIONS***

1. Three ways that volcanoes can be a hazard to people and property are:

- a.) _____
- b.) _____
- c.) _____

2. What is one warning sign that a volcano is getting ready to erupt?

3. How can a person protect his property or life from a volcanic eruption?

**VIEWING QUESTIONS**

4. What do volcanoes release? _____

5. How do volcanoes change the earth's crust? _____

6. What are some of the environmental impacts of a volcanic eruption?

- a.) _____
- b.) _____
- c.) _____
- d.) _____

7. What are some of the beneficial effects of a volcanic eruption?

- a.) _____
- b.) _____

8. How can volcanoes negatively impact people living nearby?

- a.) _____
- b.) _____
- c.) _____

**EARTHQUAKES
PREVIEWING QUESTIONS**

1. What causes earthquakes? _____

2. Name a place in the United States where earthquakes occur frequently.

3. Name some new earth forms that are created as a result of earthquakes.

4. Three ways that earthquakes can be a hazard to people and property are:
 - a.) _____
 - b.) _____
 - c.) _____
5. What is one warning sign that an earthquake is going to occur?

6. How can people protect themselves from earthquakes?

VIEWING QUESTIONS

7. What causes earthquakes? _____
8. What causes a fault to break? _____

9. What are some effects of earthquakes? _____

10. What was the biggest earthquake in California's history?

11. Why do some states experience more earthquakes than other states?

12. Name an instrument that is used to measure earthquakes.

13. How do scientists study the effects of earthquakes on different buildings?

TSUNAMIS
Previewing Questions

1. What is a tsunami? _____
2. How are tsunamis created? _____

3. What are some of the environmental effects of a tsunami? _____

4. How can a tsunami affect people and property? _____

5. Where do most tsunamis occur? _____
6. How can people protect against tsunamis? _____

Viewing Questions

9. What is a tsunami? _____
10. What can cause a tsunami?
 - a.) _____
 - b.) _____
 - c.) _____
11. What other natural hazard is usually associated with tsunamis?

SINKHOLES
Previewing Questions

1. What causes sinkholes? _____
2. Where do most sinkholes occur? _____
3. How do sinkholes affect the environment? _____

4. How do sinkholes affect people and property? _____

5. What is one warning sign that a sinkhole is forming? _____

6. What can people do to protect themselves and their property against the destruction caused by sinkholes? _____

Viewing Questions

7. What type of landform is a sinkhole? _____
8. What causes a sinkhole? _____
9. What types of rocks usually create sinkholes?
 - a.) _____
 - b.) _____
 - c.) _____
10. Why is Florida susceptible to sinkholes? _____

11. Name one effect of sinkholes on the environment. _____

12. Name one effect of sinkholes on people and their property. _____

13. What type of technology helps scientists locate where sinkholes will occur? _____
14. How can people protect their property/belongings against sinkholes? _____

HURRICANES
Previewing Questions

1. Where do most hurricanes form? _____
2. What do hurricanes need in order to form? _____

3. What hazards are included in a hurricane? _____

4. What damage can hurricanes do to people and property? _____

5. How can hurricanes affect the environment? _____

6. How do people protect themselves against hurricanes? _____

Viewing Questions

7. What kind of natural disaster is a hurricane? _____

8. How do hurricanes cause devastation? _____

TORNADOES
Previewing Questions

1. What is a tornado? _____
2. What force do tornadoes have that cause damage and destruction?

3. How do tornadoes change the environment? _____
4. How do tornadoes affect the lives of people? _____
5. What is one warning sign of an approaching tornado?

Viewing Questions

6. What type of natural disaster is a tornado? _____
7. How do tornadoes change the environment? _____
8. What do tornadoes do to towns that they hit? _____

AVALANCHES***Previewing Questions***

1. What is an avalanche? _____
2. What causes an avalanche? _____
3. Where do most avalanches occur? _____

4. How do avalanches affect the environment? _____

5. How do avalanches affect people? _____

6. What can people do to protect themselves in the event of an avalanche?

7. What is one warning sign that lets you know an avalanche is about to
occur? _____

Viewing Questions

8. What type of natural disaster is an avalanche? _____

DATA COLLECTION SHEET

Team Members:

_____	_____
_____	_____
_____	_____

NATURAL DISASTER: _____

Website(s) Accessed: _____

What states are most affected by this type of natural disaster?

How does this type of natural disaster occur?

What does this type of disaster do to the landscape?

How does this type of disaster affect the environment; i.e. habitats and ecosystems?

How does this type of disaster affect people?

What warning signs are usually seen before this type of disaster strikes?

What preparations should be taken before this disaster strikes?

What actions should be taken during this disaster?

What actions should be taken after this disaster is over?

What emergency supplies should be gathered prior to the occurrence of this disaster?

Local assistance phone numbers: (agencies that can offer assistance prior, during, and after the event)

A recent occurrence of this natural disaster occurred on _____ .

It took place in _____ .

Description of event: _____

Effects of event on surrounding land, including animals and plants: _____

Estimated costs in damage: _____

Effects of event on people and property: _____

Estimated costs in damage: _____

**FIND A MAP OF THE AREA(S) WHERE THIS TYPE OF NATURAL DISASTER OCCURS.
INCLUDE THIS MAP IN YOUR BROCHURE.**

You can obtain a map at the following Web sites:

Geographic Distribution of Major Hazards in the United States

<http://www.usgs.gov/themes/hazards.html>

Forest Service National Avalanche Center

http://www.avalanche.org/~nac/forecastcenters/forecast_index.html

EMERGENCY SUPPLIES

Divide supplies into lists for different age groups or categories, if appropriate. For example...

General Supplies
Supplies for Infants
Supplies for Children
Supplies for Adults
Supplies for Pets
Supplies for Elderly

Written By: *name of the person completing this section*

Place the names, phone numbers and addresses of local and national emergency preparedness organizations in this section.

This Brochure Published by:
Group Member Names

NATURAL HAZARD

PLACE A
PICTURE
ILLUSTRATING
YOUR HAZARD
HERE.

A definition of your hazard and a description of how it occurs

High Risk Areas in the United States

**Place a Map showing
most typical
locations for this
type of disaster here**

**Write a paragraph here
about where to expect this
type of disaster to occur
most frequently and why. Be
sure to mention the area of
the country and specific
states where this event
occurs.**

*Written By: name of the person
writing this section*

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EMERGENCY PREPAREDNESS CHECKLIST

WHAT TO DO BEFORE:

WHAT TO DO DURING:

WHAT TO DO AFTER:

*Written By: name of the person
writing this section*

3

**Write a paragraph here that
gives the statistics of damage,
loss, and or recovery costs of
this type of event in the last
year or last decade.**

**Picture showing
some of the effects
of this natural
disaster on the
landscape**

**Give specific statistics of the
most recent event of this type
that occurred here, including
date, place, and loss of life.**

*Written By: name of the person
writing this section*

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