

MAPS-GIS Lesson: Tectonic Hazards along the Oregon Coast

Subject Area: Geography: The Natural Environment

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Lesson Description:

The Tsunami Hazard Activity is a four-week project designed as a collaborative simulation to support the concepts of earthquakes and hazards. Students will be assigned a small coastal community and asked to assume the role of community planners. Each team member will read “Oregon at Risk,” a DOGAMI publication that gives an overall description of the history of the Cascadia Seduction along the Oregon coast. Each team will evaluate the hazards related to the occurrence of an 8.8 subduction zone earthquake along the Oregon coast. They will evaluate the current Tsunami evacuation plan for their city and make recommendations for both long-term and short-term improvements and address needs for a community education programs. They will present their findings and recommendations during a mock State Hazard Commission meeting.

Standards:

ITSE National Technology Standards:

- 1) Develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.
- 2) Use technology tools to enhance learning, increase productivity, and promote creativity.
- 3) Use technology tools to process data and report results
- 4) Use technology resources for solving problems and making informed decisions.
- 5) Understand the ethical, cultural, and societal issues related to technology.
- 6) Employ technology in the development of strategies for solving problems in the real world.

Geography for Life:

- 1) To learn how to use maps and other geographic representations, tools, and techniques to acquire, process and report information from a spatial perspective. a) Make inferences and draw conclusions from maps. b) Systematically gather data from a variety of sources.
- 2) To understand the processes that shape the Earth's surface. a) Prepare summaries on geographic issues. b) Identify correlations between the locations of different phenomena using maps. c) Use information on natural hazards and people's attitudes to develop generalizations regarding the link between hazards and attitudes towards them.
- 3) To understand how human action modifies the physical environment and how physical environments affect human activity.

Objectives: The student will be able to:

- Evaluate the potential hazards of a place using demographic, geologic and environmental data
- Use a variety of data layers to develop a risk assessment.
- Evaluate existing tsunami evacuation plans
- Make recommendations for community education
- Understand the relationship between earthquakes, ground shaking and landslides
- Work in teams to evaluate data, refine research, and present research findings.
- Research other uses of GIS in natural hazards

Prerequisites:

Students will have used Web-based GIS in three activities prior to this project, the MAPS-GIS Tutorial, MAPS-GIS Coordinates, and Math/Science –Richmond Weathering. Students will understand layer hierarchy, measurement, buffering and the query process. The student will need to

understand the mechanics of subduction zone earthquakes, liquefaction and slope failure. This will be accomplished with lecture, readings and a video “When the Bay Area Quakes.” Students should have taken the MAPS-GIS Pre-test.

Materials:

Student handouts

Material on line from

Cascadia Winter 2001

<http://www.oregongeology.com/sub/quarpub/images/CascadiaWinter2001.pdf>

Dogami evacuation plans for each city:

<http://www.oregongeology.com/sub/earthquakes/Coastal/Tsubrochures.htm>

Dogami Open file report Hazard Map for each city:

(<http://www.oregongeology.com/sub/earthquakes/Coastal/Tsumaps.HTM>)

Video - *When the Bay Area Quakes* [video recording] / produced by Doug Prose; narrated by Wendy Tokuda, Berkeley, Calif. : Extension Media Center, University of California, 1991

Lesson Estimated Time: This lesson is designed to be a four-week research project.

Lesson Procedure: Detailed below. Students participate in guided research to understand elements of earthquake hazards along the Oregon coast. The format is designed so students research outside class then meet in class for 15 or 20 minute to share their findings and plan the next phase of research. Evaluation will be based on the group presentations, student progress reports, and the MAPS-GIS post-test

References and Citations:

Data from:

Faults: Walker and Macleod - 1991 Geologic Map of Oregon at 1:500,000 scale - The citation of this is USGS Open File Report 03-67.

Liquefaction, groundshaking <http://nwdata.geol.pdx.edu/DOGAMI/IMS-10/>

Oregon Department of Geology and Mineral Industries Interpretive Map Series No. 10

Authors, Ian P. Madin and Zhenming Wang

Background: roads, state, census tracts, hospitals, airports, schools, hillshade ESRI - edition 2005 *Originator:* ESRI *Publication_Date:* 20050401 - *Publication_Place:* Redlands, California, USA

Tsunami Inundation line <http://www.oregon.gov/DAS/EISPD/GEO/alphalist.shtml>

Distribution_Liability: - Oregon Geospatial Data Clearinghouse

<http://www.oregon.gov/DAS/EISPD/GEO/docs/metadata/tsunami.html#2>

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Tsunami Deposit - U.S. Geological Survey - Open-File Report 03-13- Cascadia Tsunami Deposit Database- By Robert Peters, Bruce Jaffe, Guy Gelfenbaum, and Curt Peterson - <http://geopubs.wr.usgs.gov/open-file/of03-13/>