MAPS GIS
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Earthquake Hazards along the Oregon Coast – Part 1

Before you begin using this module, you will need to know about using a Web-based GIS viewer. You can do this by watching the tutorial video or working through the tutorial. The tutorial video, student activity, and Web-based GIS Tutorial Viewer can be found at http://gis.lanecc.edu → "Modules" tab → "Tutorial" link. The activity works best with a high speed Internet connection.

Prior Skills: You will need to know how to turn layers on and off, use the ID tool and, zoom in and out of the map, toggle from layers to the legend, and perform a search (Boolean) query.

Explanation of Activity:

There are several communities along the Oregon coast that will be affected by a Cascadia Subduction earthquake. There are various hazards related to subduction zone earthquakes. Everyone in the class will assume the role of an Oregon Emergency Response Planning Commissioner for a specific Oregon coastal community. The class will be divided into teams that will cover five cities. Over the next three weeks you and your team members will evaluate the hazards related to an 8.8 subduction zone earthquake. You will also study the current tsunami evacuation plan for your community and make recommendation for both long-term and short-term improvements and address needs for a community education program. Finally, you will present your findings and recommendations during a mock State Hazard commission meeting. This lesson is designed to give you practice in using GIS to answer geographic question that can solve real-world problems.

Make sure you have worked through the tutorial (http:// gis.laencc.edu Web-based Modules Tutorial) and that you have it with you so you can refer to it if you need a reminder about using the viewer's tools.
Your first task is to inform yourself about general hazards and risks along the Oregon coast. Read "Oregon at Risk" and answer the questions below. "Oregon at Risk" can be downloaded from: http://www.oregongeology.com/sub/quarpub/images/CascadiaWinter2001.pdf. It will take a minute or two to load.

1. According to the reading, what are some of hazards related to earthquakes?

2. Look at the fault map on page two and describe the general pattern for faults that have recently moved compared to those faults that have not moved.

3. In general, how are transportation and utility infrastructure affected?

4. Explore the Oregon Earthquake Coastal Hazards Viewer located: http/gis.lanecc.edu,

- Click on the Modules tab → Quake in the list of modules

Explore and describe each data layer listed below. Is it a point (p), line (l) or polygon (s for shape) feature and what kind of usable information is in the table for each layer? (Remember – make the layer active and visible – refresh – use the identify tool – and zoom in if necessary – The data layer "School" is done for you

Schools – p – Name of the school

Historic tsunami

Hospitals

Airport

Tsunami run-up

Tsunami

Liquefaction potential

Landslide potential

Population at risk

Percent Hispanic speakers

5. Look at the five communities listed. You will need to zoom in to evaluate the cities. Which city appears to be in danger from the events listed? Use 3 for high at risk, 2 for moderate risk, and 1 for little or no risk. (Remember if city is "active" and "visible" you can use the "Find" button to locate each city)

Community	Tsunami	Liquefaction	Landslide
Warrenton/Astoria			
Seaside			
Lincoln City			
Newport			
Florence			

6. Based on this preliminary research, develop a hierarchy for the cities in terms of city most "At Risk"

Earthquake Hazards along the Oregon Coast – Part 2

Community Assessment

You have been assigned a coastal community that needs to be evaluated based on potential hazards and current earthquake evacuation plan. Bring the results of your preliminary research to class.

1. Connect to the earthquake map on http://gis.lanecc.edu - Web-based Modules – Earthquake, turn on cities and find your research site. Then zoom in so you can see the city boundaries. The hillshade layer, which shows elevation, becomes distorted when viewed at a large scale. You might want to turn off this layer.

2. Evaluate the risk to your community in terms of tsunami, liquefactions and landslide potential. How could an 8.8 Cascadia Subduction quake affect transportation, schools and hospitals? How many people will need to be evacuated?

3. Go to the DOGAMI evacuation page and find the evacuation plan document for your city. http://www.oregongeology.com/sub/earthquakes/Coastal/Tsubrochures.htm
You can download this .pdf file or read it on the computer. Where are the evacuation routes and meeting places? Look at the site on Google maps (hybrid). Given your preliminary research using GIS, does the plan seem adequate? Explain your answer.

Oregon Coastal Hazard – Part 3 - Evaluation and Planning – In Class

Today you will share your preliminary research within your team and begin to devise an attack plan to gather needed information so you will be able to develop a well-informed evaluation and recommendation report.

1. Team summary - What do you know about the extent of the possible damage to your city from a quake and what questions do you still have? Decide what information you need, how you plan to get the information and who will be responsible. Record that information below.

2. What elements of the existing evaluation plan seem effective and which do not. What information do you need to better-evaluate the evacuation plan. Again, decide and record below, what aspects need researching, how you will accomplish this and who will carry out that plan.

Oregon Coastal Hazard – Part 4- Summation and Presentation Planning

1. Each person will turn in a two page summary of your research so far. The report needs to be: typed, 12 point font, double spaced, 1 inch margins. It must include the following:
   a) An impact statement of the potential damage from an earthquake to this city
   c) An evaluation of the existing evacuation plan
   d) Recommendations for improvements to the plan and/or long-range earthquake planning
   b) A statement related to your research contribution to the team thus far
   c) A list of three follow-up research questions that would clarify this issue

Below are some other Web sites that will be useful as you research the impact of an earthquake along the Oregon Coast. Remember that weather and population along the Oregon coast are not static. Rainfall can impact the likelihood of landslides and tourism can impact even the best conceived evacuation plan.

Open file reports topographic maps for Oregon coastal cities
http://www.oregongeology.com/sub/earthquakes/Coastal/Tsumapsbycity.HTM
Oregon Bluebook – city and state statistics and facts
http://bluebook.state.or.us/local/cities/citieshome.htm
Rainfall – Oregon
http://countrystudies.us/united-states/weather/oregon/
Yahoo Yellow pages – Number of hotels and other businesses
http://yp.yahoo.com/

2. GIS can be an important aid in planning for disasters. In addition to your summary choose two of the hazards listed below and spend a few minutes searching the World Wide Web. Who is using GIS to understand or plan for these hazards and how are they using it. Find three examples for each of the two hazards and include the URL.

For example: Here are two sites that were highlighted when a Google search was done using the terms - GIS Hazard Tsunami

A. The Federal Emergency Management Agency (FEMA) Federal Insurance Rate Map (FIRM) is using GIS to incorporate tsunami hazard for insurance planning
http://pubs.usgs.gov/ds/2006/236/

B. National Public radio reports that relief agencies were using GIS to find and help victims of the 2005 tsunami in Indonesia
http://www.npr.org/templates/story/story.php?storyId=4250296

Hazard and GIS Topics:

GIS hazard tornado
GIS hazards wildfire
GIS hazard hurricane
GIS hazard landslide
GIS hazard volcanic eruption

Oregon Coastal Hazard – Part 5- Presentation Planning – In Class

Work as a team to organize you presentation to be given next week. Discuss and list who will present the following topics:

IMPACT

_____ will present a summary of the impact to the city of earthquake

What we know:

Still need: to find out:

EVACUATION

_____ will present an evaluation of the evacuation plan

What we know:

Sill need to find out

RECCOMMENDATIONS

_____ will present recommendations for change (the plan, city, other)

What we know:

What we sill need to find out:

You will have about 15 to 20 minutes to present your information. Discuss how do you plan to present your information? Will you use posters, overheads, or make a PowerPoint presentation?