Do You Want To Risk It?

Student Worksheet: Coastal Hazards Vulnerability Assessment

In this exercise, you will use online tools to gather information about the vulnerability of coastal communities to storm hazards.

Use the following tools to obtain information about your assigned community:

- National Ocean Service Coastal Population Tool (*http://hurricane.csc.noaa.gov/hurricanes/pop.jsp*)
- NOAA's Coastal Services Center's Risk and Vulnerability Assessment Tool (RVAT) (http://www.csc.noaa.gov/rvat/)

1. First, let's look at the National Ocean Service Coastal Population Tool (CPT). From the CPT home page, enter a state and then a county in the appropriate boxes, then click "Submit." A graph will appear showing population trends in ten-year intervals. The graph also shows when hurricanes and severe storms occurred in the county. Now use the Coastal Population Tool to answer the following questions about your two assigned counties:
    a. What was the year of occurrence for any hurricane of category 3 or stronger since 1970?
    b. Does there seem to be any trend in how often these hazards occur?
    c. What is the population trend in this community since 1970?
2. Next, let's explore a few features of the RVAT. From the RVAT home page, click on the link to the Hazards Locator Tool. Enter the following information on the left side of the page:

    County: Volusia
    Street: 5400 Landis Avenue
    Zip Code: 32129

    Click the "Locate Address" button. Shortly, the page should reload with a map showing the location of this address, which turns out to be in Harbor Oaks, FL. On the left side of the page is a box titled "Potential Risk Level" that describes the risk from storm-related floods, wind, surge, and erosion. If you aren't sure what these terms mean, click the "About Hazards" button below the risk level box.

    At the top of the map are tool buttons for zooming in and out (magnifying glass with a plus or minus symbol), panning the map (hand symbol), and getting information about a particular feature (the "i" symbol, which stands for "Identify"). The tool on the far left (two overlapping rectangles) shows or hides the small map in the upper left corner that shows the location of the address within Volusia and Brevard Counties.

    Above the risk level box are tab buttons labeled "Legend," "Find," "Results," "Print," "Help," and "Info." Click on "Help" for more information about these tabs. The "Legend" tab is particularly important. RVAT maps are based on a Geographic Information System (GIS), which is a computer-based system that can be used to organize and analyze information about specific geographic locations. Data about these locations are stored in "layers," with each layer containing a specific type of data. A GIS allows researchers to manipulate and analyze these layers one-by-one or in combination with other

layers. One of the most powerful features of a GIS is the ability to display information graphically - especially on maps - which often makes it much easier to understand relationships between locations.

Click on the "Legend" tab, and the risk level box will be replaced with a list of data layers available for the map (cities, railroads, bridges, etc.) and buttons that allow you to control which layers are visible, see what the map symbols mean, and control which layer is "activated" for the Identify tool. A description of these buttons is listed under "Legend Help" at the bottom of the frame. The small square button with either a plus or minus sign is used to show the map symbols for each type of data. Click on the small square button to the left of "CIty," and you will see that cities on the map are indicated by a small blue circle. Click on the small square button to the left of "Bridge," and you will see that bridges on the map are indicated by a yellow line.

The larger square buttons control which layers are visible. If there is a check in one of these boxes, that layer should be visible on the map (of course, if the mapped area doesn't contain a certain feature then you won't see the symbol for that feature on the map even if the data layer button is checked). Below the layer list is a "Refresh Map" button, and below that is a box labeled "Auto Refresh." If "Auto Refresh" is checked, then the map will automatically re-draw each time you click on one of the large square buttons. Click on the "Auto Refresh" box so that it is not checked. Now click on the larger square buttons so that only the square box next to "HLT Layer" is checked. Click on the "Refresh Map" button and the map will re-draw so that only the searched location is visible on a blue background. Click on the large square box next to to "Road," then click the "Refresh Map" button and the map will re-draw so that roads are once again visible.

The round buttons control which layer is "active;" only one layer can be active at a time. To see what this means, let's load the map with a different set of layers that contain data about critical facilities ("critical facilities" are locations that may be important during an emergency, such as shelters, fire stations, hospitals, etc.). On the right side of the RVAT page is a list of available datasets ("Observations and Forecasts," "Hazards," "Critical Facilities," etc.). Click on "Critical Facilities." In a few moments the map will re-draw and a new layer list will appear on the left side of the page. Notice that the data layers are arranged in several folders. To see which layers are in a particular folder, click on the file folder symbol. The "CriticalFacilityLayers" folder should be open, showing the names of the 17 layers in that folder. The large square box next to "Composite Critical Facility Risk" should be checked, indicating that this data layer is visible. Click on the small square box next to "Composite Critical Facility Risk" to show the symbols used. Each of the colored circles on the map corresponds to the location of a specific "critical facility." The color of the circle indicates the combined risk from storm-related floods, wind, surge, and erosion. The risk from each of these hazards is estimated on a numeric scale, and then the individual risk values are added together to find the "Composite Critical Facility Risk" (Table 1 below).

The map shows about ten yellow circles, which indicate critical facilities that have a "moderate" composite risk. To find out more about these facilities, click on the round button next to "Composite Critical Facility Risk" to make that layer active, then click the "Identify" ("i" symbol) button on top of the map. When you move your cursor over the map, and cross-hair symbol will appear. Put the cross-hair over the yellow circle near Landis Avenue and click once. The layer list to the left of the map should be replaced by a horizontal table containing information about the facility corresponding to the dot near Landis Avenue, including the name of the facility, address, latitude and longitude, and emergency functions performed at the facility. Near the right side of the table you will find the individual risk values for floods, wind, surge, and erosion.

Other types of information are contained in other datasets. Clicking on the link to the "Hazards" dataset will produce a map that is shaded to show the "Natural Hazard Summary Risks" which are the combined risks from storm-related floods, wind, surge, and erosion (similar to the Composite Critical Facility

Risk, except for the entire land area of the map instead of specific facilities). The "Societal" dataset contains information on areas with various social needs. The "Economic" dataset includes information on various types of businesses and land use. The "Environmental" dataset has information about areas with high ecological value or that may pose environmental threats during a storm (such as facilities that store oil or hazardous chemicals). The "Mitigation Opportunities" dataset has information on areas that have experienced high losses in previous storms, or that are particularly susceptible to such losses (such as mobile homes).

3. Now that you a somewhat familiar with the RVAT, use this tool to answer the following questions about your assigned location in Volusia County or Brevard County:
    a. What critical facilities are within a 0.5 mile radius of the assigned search address?
    b. Which facility has the highest Composite Risk?
    c. What are the numeric risks from storm-related floods, wind, surge, and erosion for this facility? What is the numeric value of the combined risk?
    d. What is the Natural Hazard Summary Risk on land immediately adjacent to this facility?
    e. What land uses or land cover are found within a 0.5 mile radius of this facility?

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Table 1: Numeric Scales Used to Describe Risk from Storm-Related Hazards

Flood Risk

8.5 = High (areas in the "Velocity" zone)
6.8 = Moderately-High (areas in the 100-year floodplain)
5.1 = Moderate (areas in the 500-year floodplain)
3.4 = Moderately-Low (flood-prone soils outside above areas)
1.7 = Low (other areas)

Wind Risk

8 (areas likely to experience winds of 120 mph or higher)
6.4 (areas likely to experience winds of 110 – 119 mph)
4.8 (areas likely to experience winds of 100 – 109 mph)

Surge Risk

4 (Storm surge category 1 and 2)
3 (Storm surge category 3)
2 (Storm surge category 4 and 5)
1 (Storm surge buffer (0.25 mile from entire surge coverage)
0 (outside surge area)

Erosion Risk

3.3 (Seaward of the CCCL*)
2.2 (CCCL to 30-year average erosion line)
1.1 (30-year average to 50-year average erosion line)
0 (other areas)
99 = No data available

Composite Risk

High = Combined flood, wind, surge, and erosion values of 19.7 - 23.8
Moderately-high = Combined flood, wind, surge, and erosion values of 16.3 - 19.7
Moderate = Combined flood, wind, surge, and erosion values of 14.3 - 16.3
Moderately-low = Combined flood, wind, surge, and erosion values of 11.0 - 14.3
Low = Combined flood, wind, surge, and erosion values of 4.8 - 11.0

** - The Coastal Construction Control Line (CCCL) defines the zone along the coastline that is susceptible to flooding, erosion, and other impacts during a 100-year storm. Properties located seaward of the CCCL are subject to State-enforced elevation and construction requirements.*