

Lab 5- Uncertainty & Sea Level Rise

Number of points: 50

Due – March 1, 2017

Geography 5563: Advanced GIS Spring 2017

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Goal

For this assignment you will create a sea level rise analysis for Washington DC. You will decide the anticipated level of sea rise based on your own research. You will find that sea level rise projections are based in uncertainty and we will have to deal with that in our final product by using a range of predictions.

After completing this lab you should:

- Be comfortable with installing new plugins into QGIS and using them
- Get to know basic Raster manipulation capabilities in QGIS
- Working with uncertainty and visualizing it using transparency

Relations

Plugins are a powerful way to make use of all the developments in Open Software. Plugins allow features and functions to be easily added into the application based on user's need. Most of QGIS's features are implemented as plugins, so being aware and comfortable with the use of plugins is critical for success as a QGIS-user.

Data

2 Data sets are provided for you and are contained within a zip file located on the Moodle site.

- A DEM of Washington DC in feet as a .TIFF file
- A DEM of Washington DC in meters as a .TIFF file

Methods

Major Tasks to sea level rise calculations include:

1. Researching common sea level rise predictions and defining a minimum and a maximum sea level rise prediction accordingly
2. Use the Open Layers Plugin to display the Open Street Map basemap in QGIS
3. Extracting the DEM dataset and opening it in QGIS
 - a. The DEM is provided in both Meters and Feet, make sure you are using the appropriate DEM for your sea level rise prediction
4. Display the DEM to be visually descriptive of the elevation
 - a. This can be done using the Raster Terrain Analysis Plugin by creating a relief file
5. Use the Raster Calculator to create a mask for the current sea level

- a. You may need to adjust the display style of your mask to make non-water translucent
6. Use the Raster Calculator to subtract the Estimated Sea Level Rise from the DEM and create a new mask at the new sea level.
 - a. Do this at least twice for two different estimations of sea level rise
7. Create a final map of the DEM Relief, the original sea level, and your two sea level rise estimations using different levels of translucency for each display.
 - a. Pay attention to the order of your sea level rise masks, as that will affect their display
 - b. Use the Print Composer to export your final map
8. Use the Qgis2threejs Plugin to make a 3D model of your DEM in your browser
 - a. Use your original DEM file for the DEM attribute
 - b. Use your Relief Image for the Display type by selecting a layer image
 - c. Save your HTML file somewhere where you can find it and Run the Qgis2threejs tool
 - d. Open your HTML file in your browser of choice and interact with your 3D model
 - e. In the control box, create a custom plane make it blue and adjust the plane height to your sea level rise estimates. Feel free to explore the controls and change the opacity.
 - f. When you are done adjust your settings and perspective to take a screen shot of your 3D model with the custom plane representing the new sea level.

Notes:

- This lab is designed to be a little more complex than previous labs, when in doubt refer to the lab 1 resources we gave you. QGIS has plenty of documentation available, and if you know what you are looking for you can usually find the answers you need within the documentation pretty easily. Work with your peers to solve problems together
- Setting the transparency of the relief will help visualize the context by making use of the basemap features
- There are many ways to go about making a formula for a Raster Mask. Consider how the Raster Calculator works and what your end product needs to look like. Some solutions may be more efficient than others, but there are many “correct” formulas to work from.

Submission:

Please submit a lab write up of the process you went through to complete your sea level rise analysis, noting what formulas or properties you used along the way. Be sure to note any areas you had difficulties with and how you resolved them.

Answer briefly why did you choose the sea level rise estimates that you used and justify them with the sources.

Your lab write up should be about two pages in length, but should not extend past three pages.

In addition to your write up please include two maps in your document

- 1- Your final Sea Level Rise map from QGIS, including all map elements (title, north arrow, ect.)
- 2- A screenshot of the file you created with the Qgis2threejs plugin opened in your browser