ERC Levant Workshop Two: Georeferencing, Working with Raster Data

1. Download the zip folder from the Dropbox link provided and extract it to your working folder.

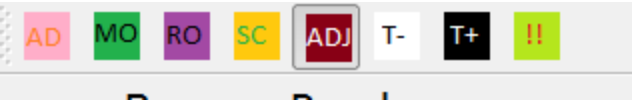
2. Open QGIS Desktop. Navigate to the downloaded folder through your Browser Panel, you should see a precipitation folder, as well as an image file called CanaanRoads. There should also be a georeferenced CanaanRoads file, which you should ignore for now.

3. In QGIS, navigate to the Plugins tab > Manage and Install Plugins. We will be installing a few plugins which we will use to georeferenced and display data.

4. First, if you do not already have it installed, search and install “OpenLayers” plugin and the “QuickMapServices” plugin.

5. Next, search and install the “Freehand raster georeferencer” plugin and the “Georeferencer GDAL” plugin (which may just need to be checked off if already installed).

6. Once you’ve installed these plugins, close the Plugin Manager dialog box. You should now see a new panel in your toolbar:



This is the set of tools for the “Freehand georeferencing plugin” which allows you to align a historical map or image layer to the right spot on your map. Georeferencing is necessary when you are working with maps that you have scanned from images or historical sources, and that you want to include as a GIS layer. Basically, you must tell the GIS software how to line up your map image with the other GIS layers which are in a projected coordinate system.

First, let’s add a basemap. In the “Web” tab, click OpenLayers > Google Hybrid which will add a satellite layer with labels. Zoom to our area of interest, around the Middle East/Levant.

In order to begin georeferencing our Canaan Roads map, click the “AD” icon in the toolbar, which if you hover your mouse over it, tells you it is the icon or tool to add a layer to be georeferenced.

A pop-up will appear; click “Browse” and navigate to the CanaanRoads.jpg file in the downloaded folder. Choose this image.

The map should appear on your mapping view. In this case we now need to align it to our satellite basemap. You can align, move, scale, and adjust your map by playing with the icons in your georeferencing toolbar.

MO – moves map

RO – rotates map

SC – scales map

ADJ – adjusts map

T+ and T- - changes transparency

!! – allows you to save your georeferenced image.

Work to align your map, and export to a georeferenced image format when complete.

7. Now that we've used one method to georeference our map, we will go through a second, more traditional georeferencing tool, based on the GDAL Georeferencer plugin we added. To find a detailed walkthrough of this method, go to:

https://github.com/CenterForSpatialResearch/MappingForTheUrbanHumanities/blob/master/Tutorials/04_MakingData01.md

8. We should now have a georeferenced map that we can digitize road data from. For a detailed walkthrough of how to digitize data, go to:

https://github.com/CenterForSpatialResearch/MappingForTheUrbanHumanities/blob/master/Tutorials/05_MakingData02.md

We previously digitized points in the first workshop. Now we will digitize roads, represented by lines.

9. Choose Layer > Create Layer > Create New Shapefile, and create a line shapefile, adding columns or fields:

Roadtype: a text field where we will categorize the roads we digitize by "main road" or "minor road" based on the map.

Roadname: a text field for the road name.

Once you've filled out the layer information, choose a name and folder location to save your new file.

10. Begin digitizing the roads, by right clicking the new file in your "Layers Panel" and clicking "Toggle Editing". Then turn on the New Features tool (refer back to the step by step guide for workshop one or the link above).

11. Choose a road to trace. In order to add a feature, click to drop points which will be used to connect your trace. Once you are finished with a line segment, right click to fill out the road information that will be added to the Attribute Table.

12. If you made a mistake or want to redraw/delete a traced line, right click the layer in the "Layers Panel" and "Open Attribute Table". From the attribute table you can select and delete a row or line you drew. You may also delete the drawing as you are working on it by right-clicking and choosing "Cancel" when prompted to finish the segment.

13. Once you've digitized some roads, save your edits and turn editing mode off by right-clicking the layer in the "Layers Panel" and choosing "Save Edits" and "Toggle Editing".

14. Next, we will take a look at working with and processing “Raster” data, or image data in a continuous format. Recall we spoke briefly about this in the first workshop, and if need be return to the PDF explanation of raster and vector data: https://erc.barnard.edu/sites/default/files/introduction_to_gis_workshophistorical.pdf

We will be working with a precipitation dataset. It has precipitation data for the entire world, and we will do a bit of processing to use that data for our specific example region, Lebanon.

15. In your “Browser Panel”, find the prec_1 folder, and bring in the hdr file in the folder to your “Layers Panel”. A new layer should appear, in raster format representing precipitation.

16. Double-click this layer and navigate to the Style tab to style this layer as a “Singleband pseudocolor” and click the “Classify” button, then click “OK”. Play around with styling your raster layer using different color bands and classes.

17. While this type of visualization is useful, it is not the easiest to extract information from. In order to overlay this in a meaningful way with our Lebanon region, we will “Vectorize” the precipitation data, and layer it with our region data.

18. Navigate to the “Raster” tab, then click Conversion > Polygonize. This will provide a dialog box to make our raster precipitation data into a shapefile.

19. Fill out the dialog box. Save the output file as an “ESRI Shapefile” in your folder. Make sure to check off “Load into canvas when finished”. When prompted, choose the “WGS 84 Pseudo Mercator” as the coordinate reference system you will be using.

20. You should have a new layer added which has a gridded structure, and is a shapefile where each area is given the precipitation value from the original raster file. The reason this is useful is we can now overlay and add that information to our region.

21. Next, we will clip or crop this layer to just have the data for Lebanon. To do this, navigate to Vector > Geoprocessing > Clip in the Vector tab. A dialog box will appear. The input value is the precipitation vector layer and the clip feature is “Lebanon”. Make sure to save your layer as a shapefile.

22. Once you’ve run the clip tool you should have a new shapefile of Lebanon with the precipitation grid data. You can style it in the Properties dialog box, and may choose to style it as a “Graduated” color scheme.

23. Save and export your work!