HOMEWORK 1

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COURSE NAME : SPATIAL ANALY. AND ALG. IN GIS

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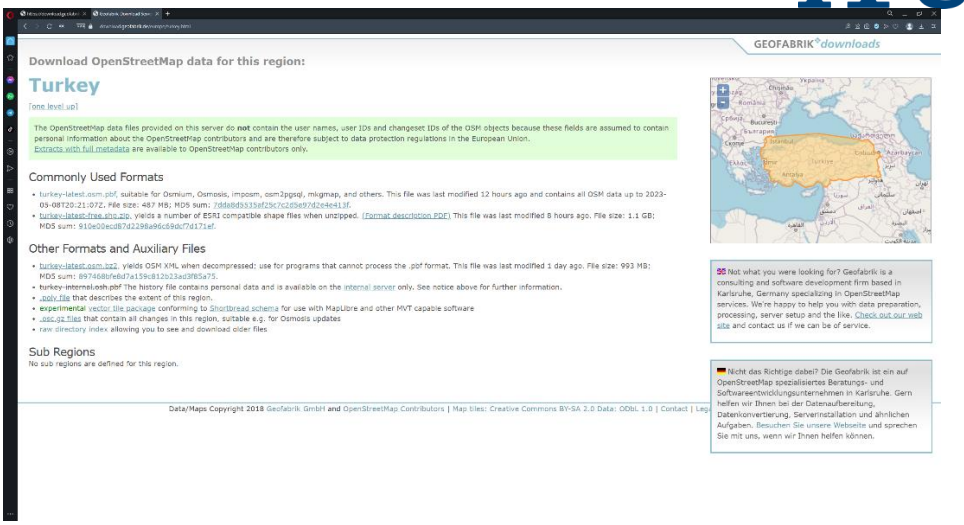
One of the most dangerous natural disasters is flooding. Floods annually have an impact on people and their lives. In order to prevent flooding, it is necessary to identify the area that would be affected. This assignment tries to apply a flood risk analysis to a pre-given subset area.

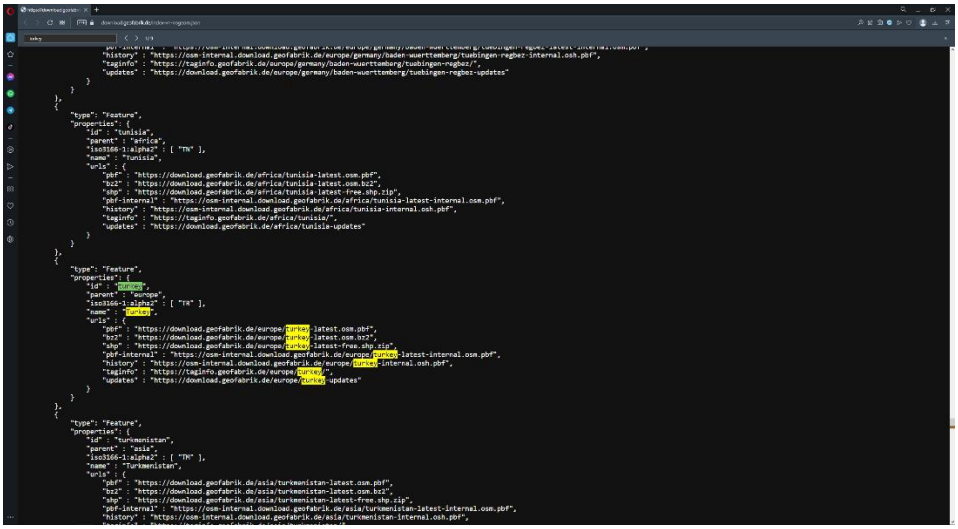
From the “Geofabrik” website, the shapefiles that will be used in this project were downloaded. Additionally, raster data from USGS Earth Explorer that gives us a Digital Elevation Model was obtained. QGIS received a study area (json) file import. the import of Open Street Map. It used the TUREF TM 30 - EPSG5254 coordinate system. Then, the raster data and shapefiles that had been downloaded were imported into QGIS.

First, the fixed geometries tool was used to fix the vectors. By using batch processing, all the layers were repaired at once. This program can be used to fix any shapefile issues that can arise. Before moving on, the entire set of data's projection was changed to TUREF TM 30 - EPSG5254 using the reproject layer tool. (The anticipated number of downloaded data was 4326) Additionally, Warp (Reproject) DEM data were reproduced. The projection of all the data was therefore identical. But the vector data also included information for the entirety of Turkey. Shapefiles were therefore trimmed based on the study area.

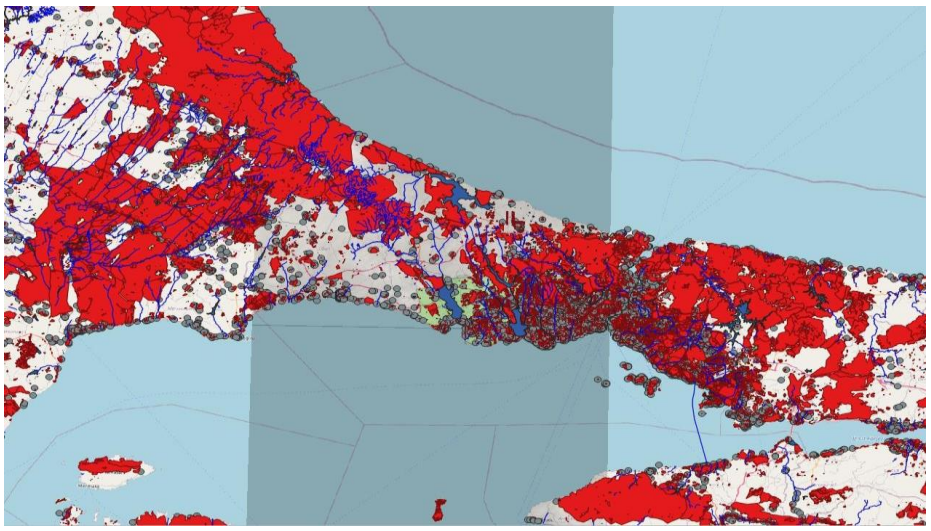
The streams and aquatic bodies must be used as raster data rather than vector for the following procedures. It was necessary to convert vectors into raster files. At that time, the rasterize (vector to raster) tool was being used. Waterways and other bodies of water had a resolution of 30x30 and were rasterized. The proximity raster ad raster calculator can therefore be used in further operations.

The given workspace was opened from the open source GIS named QGIS.

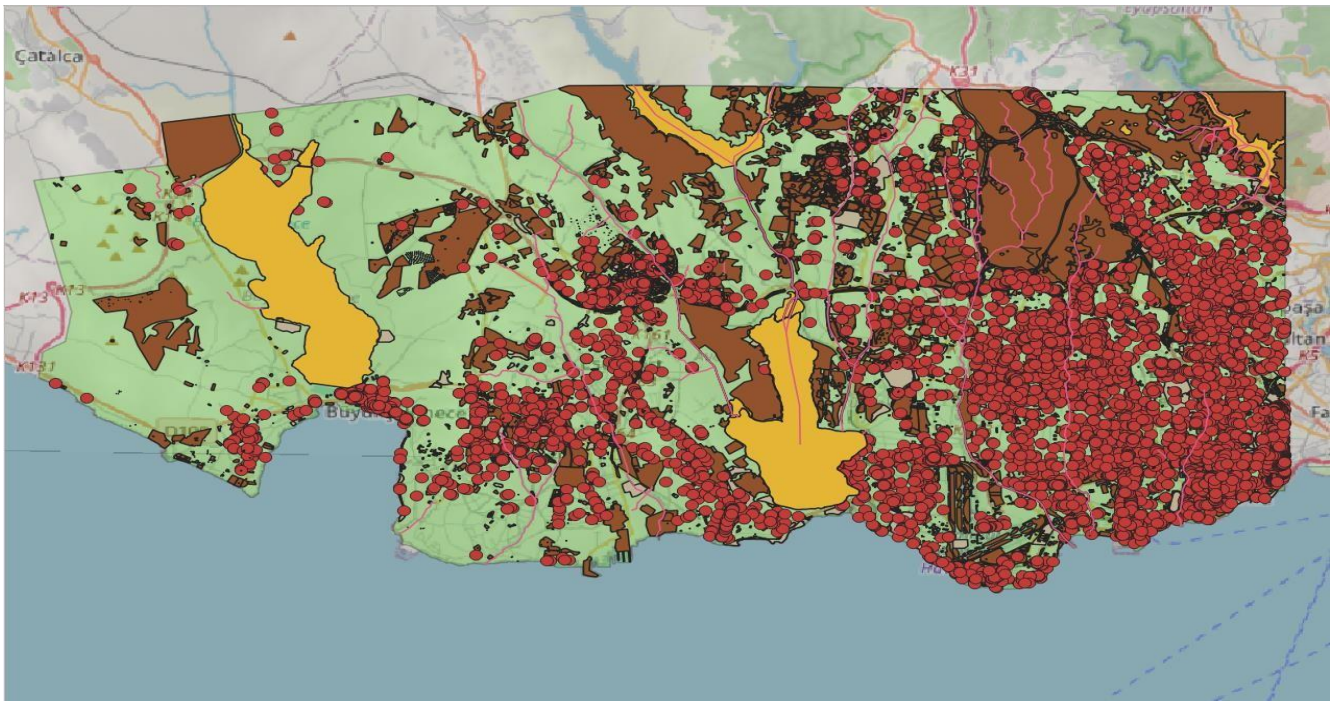




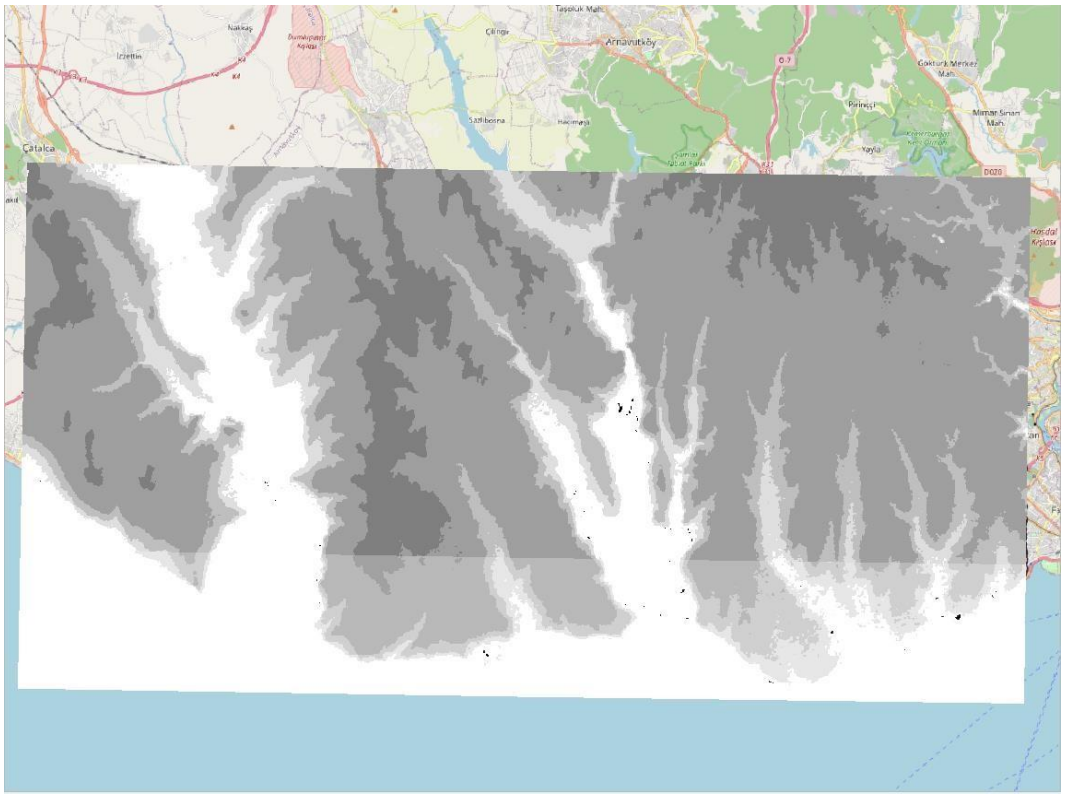
Desired vector data was taken from the website of 'geofabrik' for Turkey.



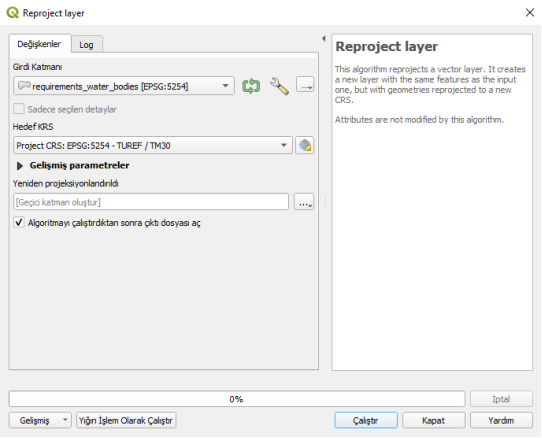
Vector data opened in QGIS is attached.



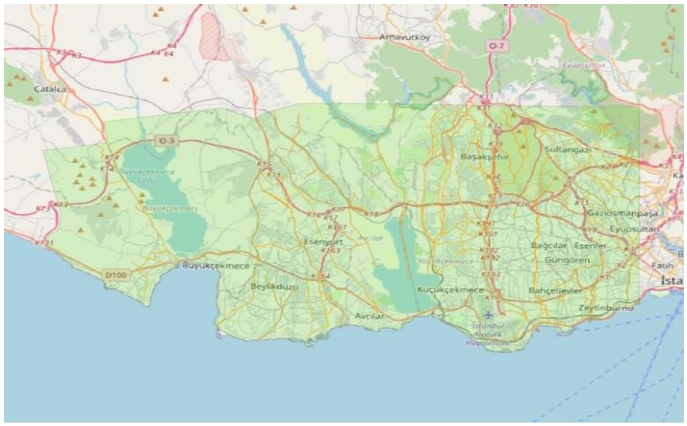
The final version of the subset area is attached.



According to the values given in the homework, the reclassification process was made for DEM. The result is attached.



Water bodies and waterways were first reprojected and transferred to the TUREF TM30 projection.



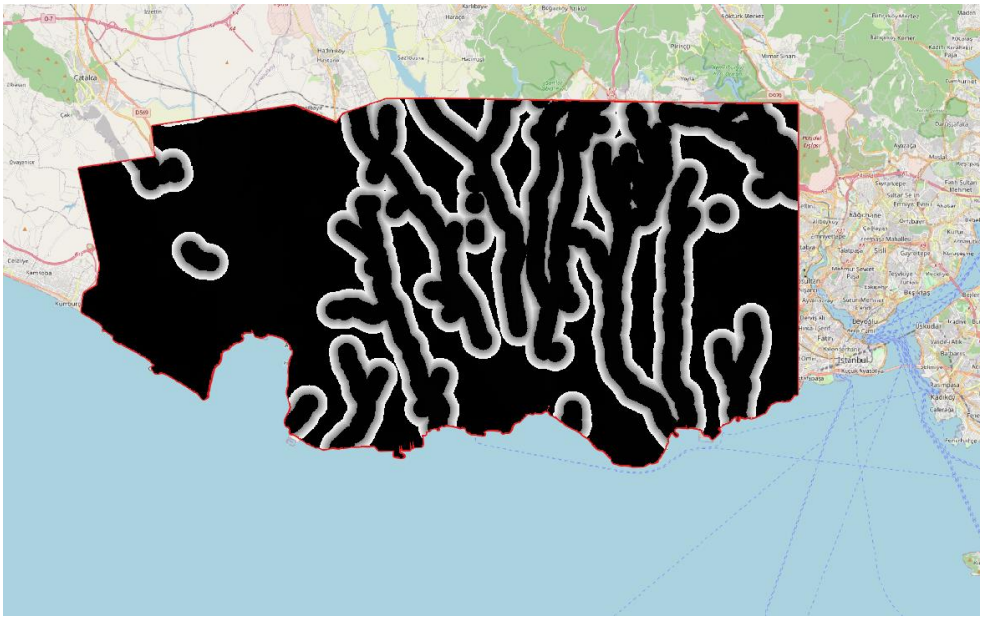
Then these two vectors were converted to raster data.

The required data was rasterized, and proximity raster was used for both. Georeferenced coordinates were chosen as the unit of measurement. Utilizing the tool for proximity (raster distance), these activities were carried out. The goal of proximity raster operation is to determine how far a pixel is from the nearest body of water (for every pixel)

Proximity tool is used for water bodies and water ways.

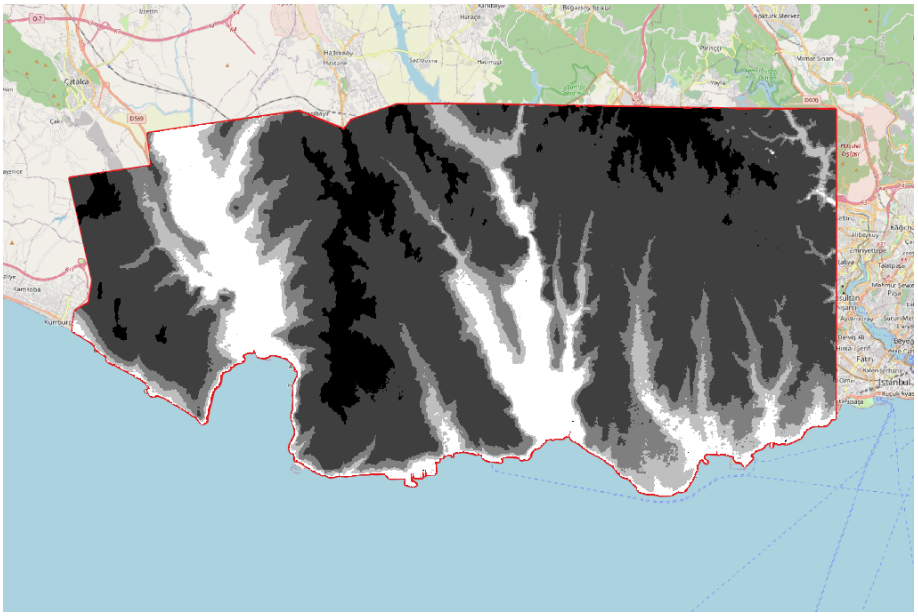
Reclassification is performed on both rasters following the creation of proximity rasters. Reclassification is done using the'reclassify by table' tool and in accordance with Table 3 that is provided in the assignment file.

Risk ratings for the various locations are produced by reclassifying them according to their distance. Additionally to data on water bodies and rivers, DEM is classed in accordance with Table 2.



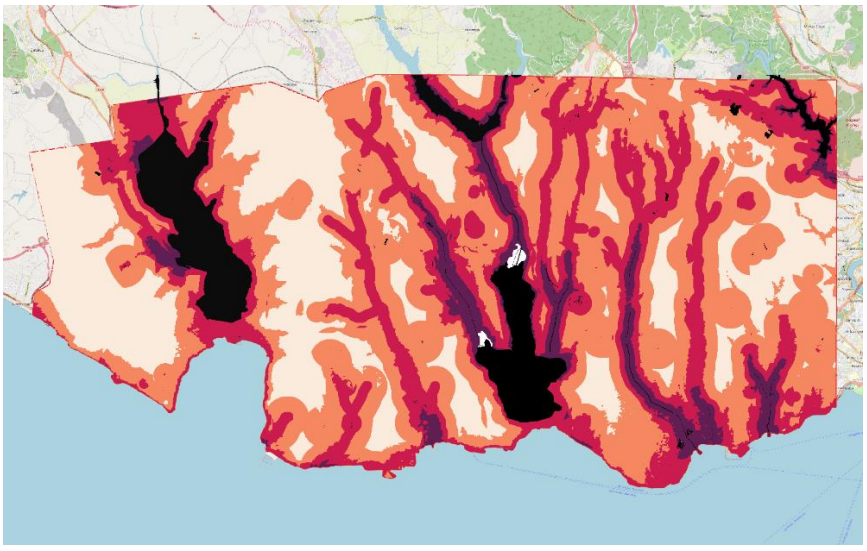
The resulting layer has been reclassified according to the given values.

Raster weights are calculated once the data has been classed by multiplying the specified associated numbers by the updated data. The 'raster calculator' tool is used for this phase. Below is the weighted result that was produced utilizing all three classed rasters.



To create a risk map, the values given in the table were multiplied with the Raster Calculator tool.

The output given above creates the image to be used for risk analysis, to facilitate interpretation, the classified image can be colored according to the risk ratios of the areas. This makes the map more understandable for the user. The final risk analysis map is colored according to the subject as the output below.



Colored Risk Map is attached for polygonized and smooth appearance.

Query Step

Geofabrik weighted raster and raster shapefile downloads are transformed into vector for usage in PostGIS during the query process. The name and kind of the building are among the details from the geofabrik data that are needed to generate this query.

	osm_id	code	fclass	name
13	7424904128	2302	fast_food	ziyafet çiğköfte
14	5667689784	2302	fast_food	Ziyafet cigkofte
15	5667703987	2301	restaurant	Ziyafet cigkofte
16	6965466904	2301	restaurant	Ziyade Et Lokan...
17	8807029267	2301	restaurant	Ziyade Et Balık

For query 1 ,the terms "school" and "name of the schools" are taken from the fclass and name columns, respectively. Since the medium risk assigned with number "3" in reclassification areas that has 3 as dn are picked, the risk rating is determined from the reclassified DEM data.

	name	dn
1	Sultan Fatih Koleji	3
2	Şükrü Yemenici...	3
3	Melahat Öztopr...	3
4	Derin Çocuk Öz...	3
5	Güneşli Ortaokulu	3
6	Merkezefendi İl...	3
7	Özel Sınav Lisesi	3
8	Bahçelievler Ha...	3

“Geofabrik” data is used to gather the information required to produce query 2, which includes building type.

Residential areas are derived for this query from the shapfile that contains the building kinds as polygons. Building areas are computed using the "field calculator" feature in the layer's attribute table.

The terms "residential" and "area," which are derived from related data, are comparable to the first query. In this query, the risk rate of the areas is determined using the same reclassified DEM data as was used in the previous query, but the areas 4 and 5 are picked.

Query | Query History

```
1  SELECT DISTINCT b.dn, i.type, i.area;
2  FROM riskanalysis_vector_done AS x, osm_requirements_buildings_clipped_reprojected AS y;
3  WHERE (b.dn = '4' OR b.dn = '5') AND (i.type = 'residential');
4
```

	dn	type	area
1	4	residential	708.351
2	4	residential	857.477
3	5	residential	376.971
4	5	residential	166.554
5	4	residential	355.372
6	4	residential	647.012
7	5	residential	74.081
8	4	residential	502.563

Flood Risk Analysis Map