GEOG204: Tutorial 7

Spatial Analysis III

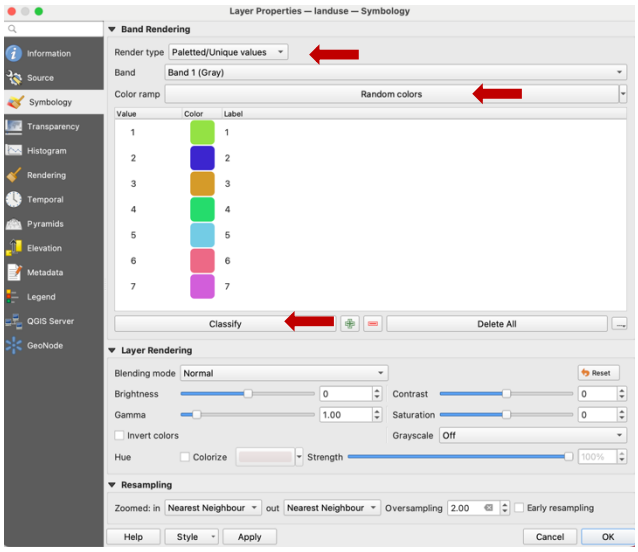
In this tutorial we will explore additional functions principles used in spatial analysis. The scenario used in this exercise is adapted from one prepared by ESRI.

In the town of Stowe, it has been decided that a new school must be built to take the strain off the existing schools, and as the town's spatial analyst you have been assigned the task of finding the potential site. The necessary data are provided the Stowe folder. Make a copy of the data in your folder for this tutorial on the K drive.

Dataset	Description
Elevation	Raster dataset representing the elevation of the area
Landuse	Raster dataset representing the land-use types over the area
Roads	Feature class representing the linear road network for the town of Stowe
Rec_sites	Feature class representing point locations of recreation sites
Schools	Feature class representing point locations of existing schools
Destination	Feature class representing the destination point used when finding the best route for a new road

1. Open QGIS and add the data.
2. Right Click on the landuse layer and go to Properties >> Symbology.
   In the Band Rendering Section:
   Render type – Palleted/Unique values
   Color Ramp – Random Colors
   Then click Classify

   Leave the other sections at their default settings



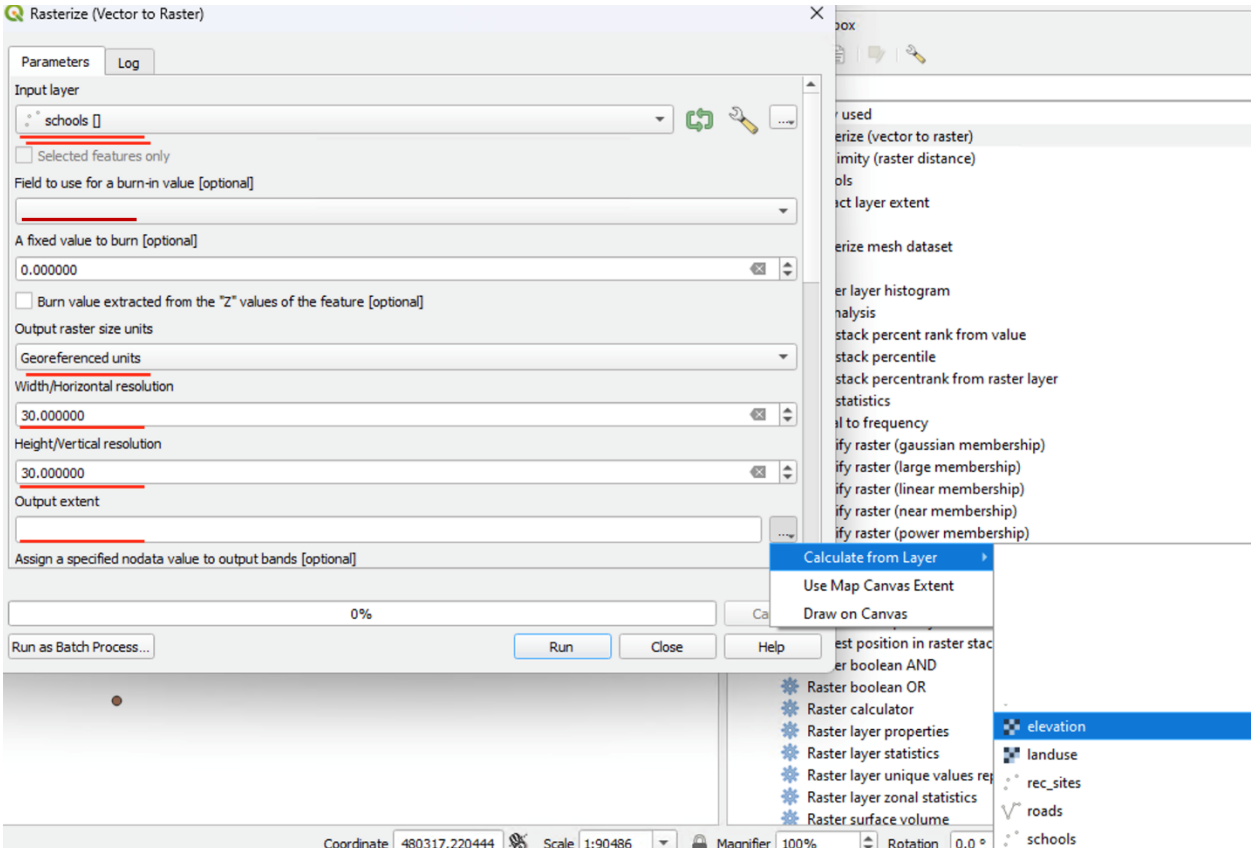
3. In the Processing Toolbox search for the Hillshade function under the Raster terrain analysis group. Apply the Hillshade function on the elevation layer using the default settings.
    - Next arrange your layers such that the resulting hillshade layer is at the top.
    - Set its transparency to 30%. (Properties >> Transparency >> Global Opacity)

In order to identify suitable sites for the new school, we need to consider:

- the slope angles around the town,
- the distance to recreation sites
- as well as the distance from the existing school.

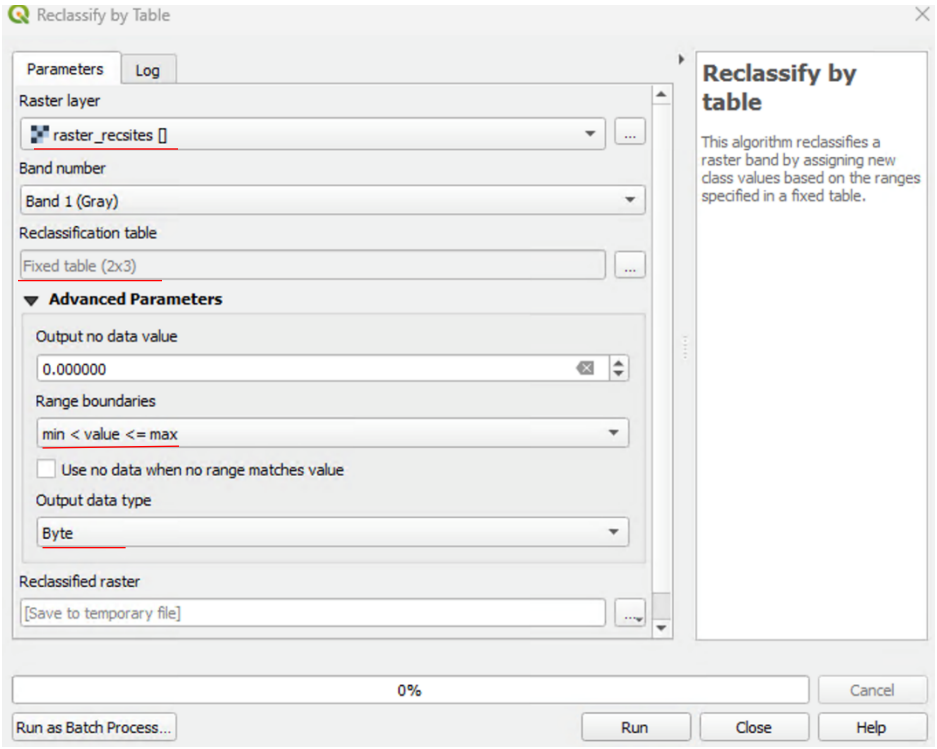
4. Apply the Slope function to the elevation layer. Save your slope file as a tiff format
    - In the Processing toolbox >> Choose Slope under the Raster terrain analysis category

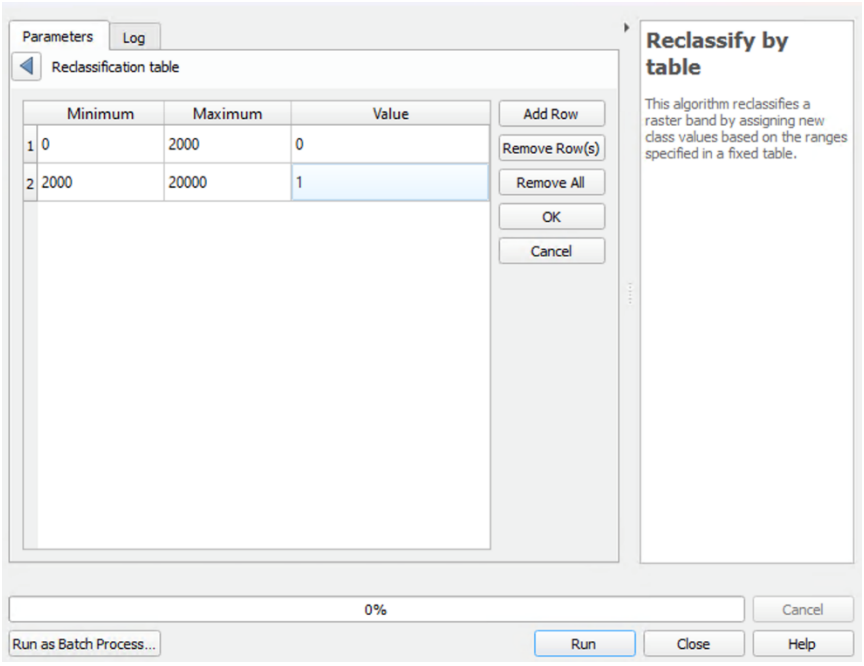
5. Next you will need to convert your point layers i.e the schools and recreational sites - into raster layers.
    - Apply the vector to raster conversion on both the schools and rec-sites layers. Save your files in the geotiff format as raster_schools and raster_recsites respectively.
        - In the Processing toolbox >> Choose Rasterize(vector to raster) conversion under the GDAL vector conversion category
            - Input layer: schools or rec-sites accordingly
            - Burn in Field: ObjectID
            - Output raster size units: Georefenced Units
            - Horizontal Resolution: 30 (30 is the resolution of the elevation layer and the slope layer)
            - Vertical Resolution: 30 (30 is the resolution of the elevation layer and the slope layer)
            - Output extent, make it the same as the elevation layer



6. Apply the proximity function to the raster_schools and raster_recsites layers generated in the step above. This function generates a continuous surface that indicates, for each cell, the distance to the closest facility (i.e. school or recreation facility). Name your layers dist_school and dist_recsites accordingly, using the geotiff format.
    - In the Processing toolbox >> Choose the Proximity under the GDAL Raster Analysis category
        - Input layer: raster_schools, raster_recsites accordingly
        - Distance Units: georeferenced coordinates

7. Next you will create a binary layers indicating distances that are greater than 2000 meters for the recreation sites and schools layers.
    - In the Processing toolbox choose Reclassify by table under the Raster Analysis category.
    - Name your layers as binary_recsites and binary_schools accordingly





8. Repeat the above procedure to reclassify the slope layer. Slopes less than 30 should be assigned a value of 1, those equal to or greater than 30 should be assigned a value of 0. Name your output layer binary_slope

9. Apply the Raster Calculator under the Raster Analysis category to the 3 binary layers.
    - The operation should be a multiplication of binary layers
    - Use the elevation layer as your reference layer