QGIS Practical 7: Working with Rasters

During this practical exercise, you will work with a raster dataset representing elevation. We will begin by focusing on the styling of raster datasets, and then undertake some simple processing tasks.

1.0 Getting Started

We will start by adding the datasets. First, we need to create a new QGIS project.

1. Open a new QGIS project
2. From the folder ...\GIS\2_Active_Data\206_elev add the elevation raster: grd_elev_dem_ras_s0_srtm_pp_elevation90m.tif
3. From the folder ...\GIS\2_Active_Data\201_admn add the grd_admn_ad1_py_s1_gadm_pp_parish*

*we will use this admin 1 layer to create a single admin area

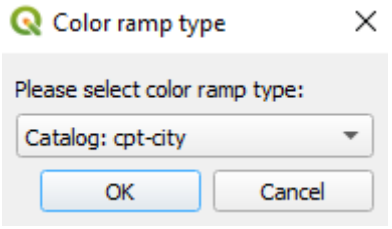
2.0 Raster Styling

In this section, we will demonstrate ways in which you can enhance the styling of raster layers to make them easier to interpret.

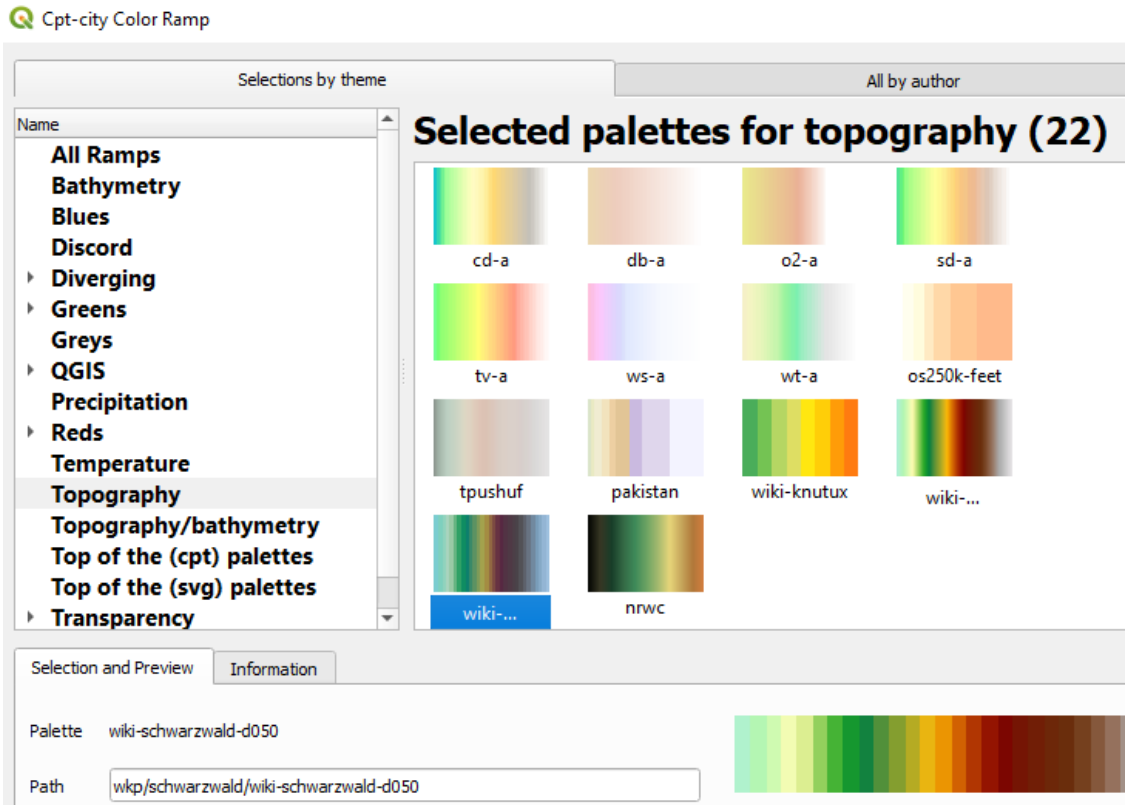
2.1 Elevation

We will now explore more raster styling options, this time using the **digital elevation model (DEM) data**. Here we will explore further options for more sophisticated colour palettes that are available.

1. Turn off the display of the population layer and turn on the display of the **DEM**.
2. Right-click on the DEM (grd_elev_dem_ras_s0_srtm_pp_elevation90m) in the Layers list and select Properties
    - Go to **Symbology**
    - From the drop-down list for **Render Type**, select '**Single Band Pseudocolor**'
    - Click on the drop-down list for **Colour ramp** and select **Create new color ramp**
        - Select 'Catalogue: cpt-city', click OK



- Click on Topography, then select ‘wiki-schwarzwald-d050’
- Click **OK**.
- Click **Apply**



3. In the Properties window next, click on **Color Rendering**, and choose **Overlay** as **Blending Mode** [this will create a combined effect on the hillshade, highlighting the nature of the relief]

4. You may also play with the **Min / Max Value Settings**, choosing for instance the **Cumulative Count Cut** option, which arranges the values around the most frequent ones.

2.1.1 Style Hillshade

We will now explore how to add a hillshade effect to the DEM data. To do this we will start by creating a duplicate of the DEM layer.

1. Right-click on the **DEM** layer in the Layers list and select **Duplicate Layer**
2. Turn on the display of the duplicated layer
3. Right-click this new copy of the DEM layer and select **Properties**
4. Under the options for **Source** change the layer name to Hillshade
5. Under the options for **Symbology** change the **Render Type** to '**Hillshade**' then click **OK**

You should now see that combining elevation with a hillshade helps to more clearly show the elevation.

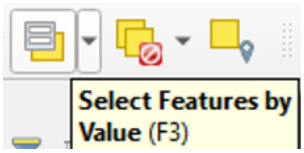
3.0 Clipping raster data

In this section, we will demonstrate how raster datasets can be clipped to a specific region. This is useful when data is supplied for a larger area than you need, or where you want to show detail for a specific region only. In this example, we will clip the elevation raster to the extent of the admin 1 boundary for the parish of Saint Andrew.

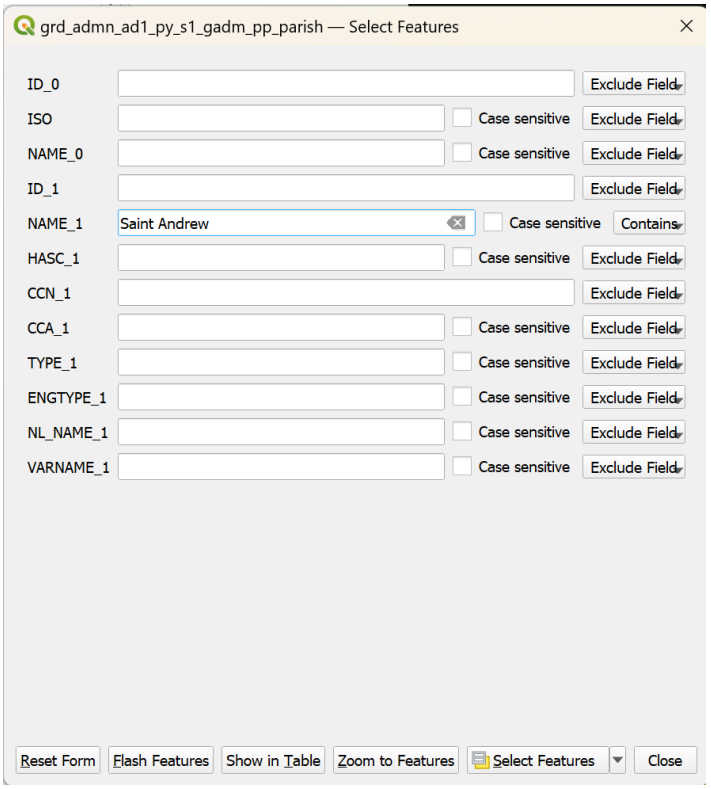
3.1 Selecting and exporting a vector subset

Before we can clip the data to the extent we require, we first need to select the administrative areas that we are going to work with. This time we will use a slightly different method to select the feature we need.

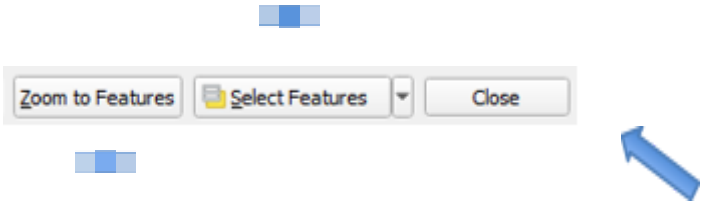
1. Click on **grd_admn_ad1_py_s1_gadm_pp_parish** in the Layers list then click on **Select Feature by Value** from the Selection toolbar (or use the shortcut key F3)



2. In the box for **ADM1_EN** type **Saint Andrew**



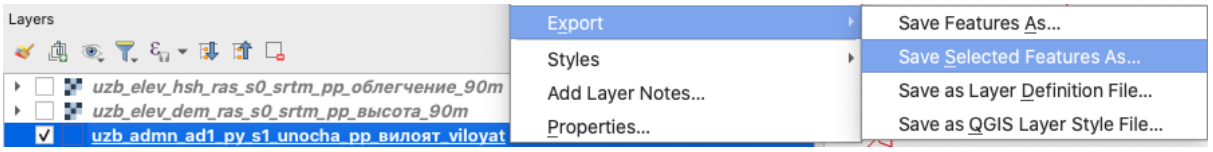
3. Now click **Select Features** to create the selection



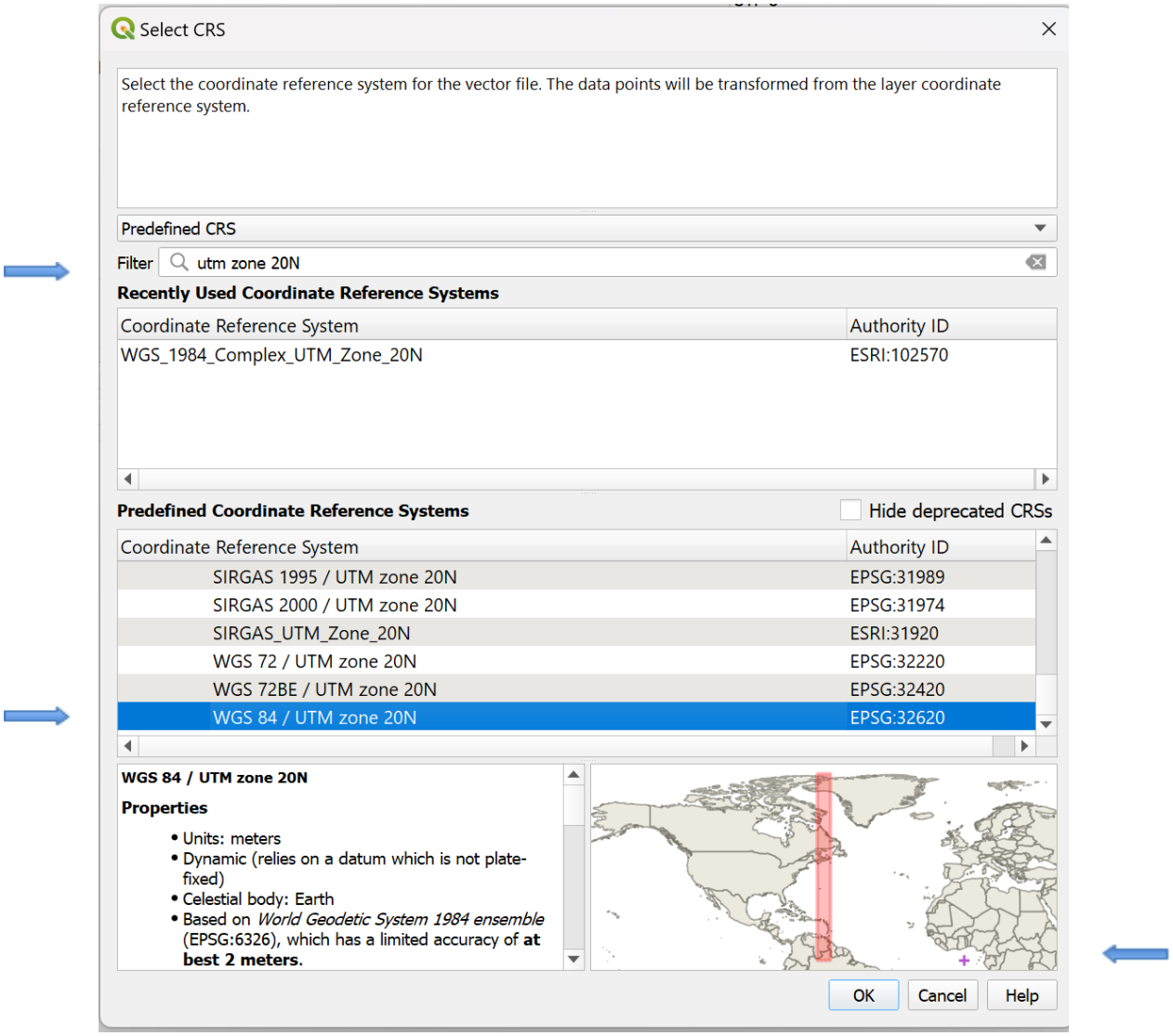
4. Select **Zoom to Features** to zoom in around the selected area. You can then **Close** the selection window.

You should see both **Saint Andrew** highlighted in the map frame. We will now export the selected administrative areas to a new layer. As we save this, we will also change the coordinate reference system (CRS) to one designed for the country. This will allow us to measure distance and area in meters rather than degrees, which will be useful in the second part of this exercise.

5. Right-click on **grd_admn_ad1_py_s1_gadm_pp_parish** in the Layers list and select Export > Save Selected Features As



- Set the format to **ESRI shapefile**
- Click on Browse  next to File name
- Navigate into the folder ...\GIS\2_Active_Data\201_admn then enter the file name grd_admn_ad1_py_s1_gadm_pp_parish_StAndrew.shp then click Save
- Click the button to the right of the CRS drop-down to select a new coordinate reference system 
- In the **Filter** field, type UTM zone 20N then click  – this will find the correct CRS for the country.
- Click on WGS 84 /UTM zone 20N in the list of Predefined Coordinate Reference Systems - you will see the area covered by this zone at the bottom of the dialogue



- Click **OK** to select the zone, then click **OK** to save the new layer

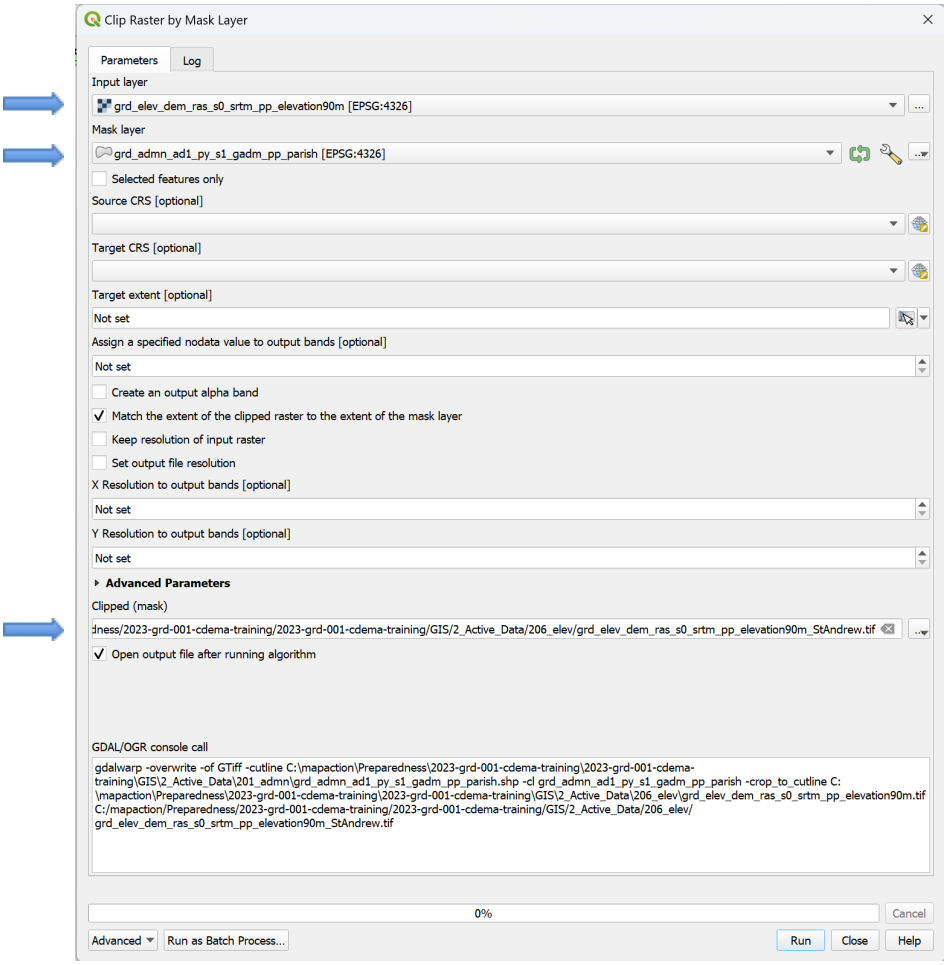
6. Turn off the display for grd_admn_ad1_py_s1_gadm_pp_parish_StAndrew.shp before continuing

You should now clearly see the selected administrative areas within your new layer. We are now ready to use this layer to clip the DEM layer.

3.2 Clipping raster data to a vector outline

1. Turn off the display of all layers, then turn on the display of - **grd_admn_ad1_py_s1_gadm_pp_parish_StAndrew**
2. From the Raster menu select Extraction > Clip Raster by Mask Layer
    - For the input layer select the DEM layer **grd_elev_dem_ras_s0_srtm_pp_elevation90m**

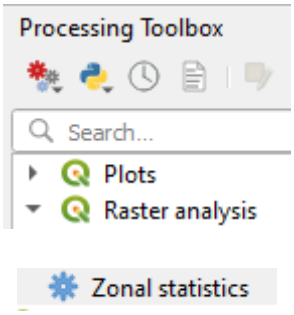
- For the mask layer select the admin1 area **grd_admn_ad1_py_s1_gadm_pp_parish_StAndrew**
- Under **Clipped (mask)** select the option to save to file, then choose an appropriate location and file name (e.g. elevation_clip_StJames.tif).
- Click **Run** then **Close** the window
- Turn off the display of layers to view the clipped version of the elevation data



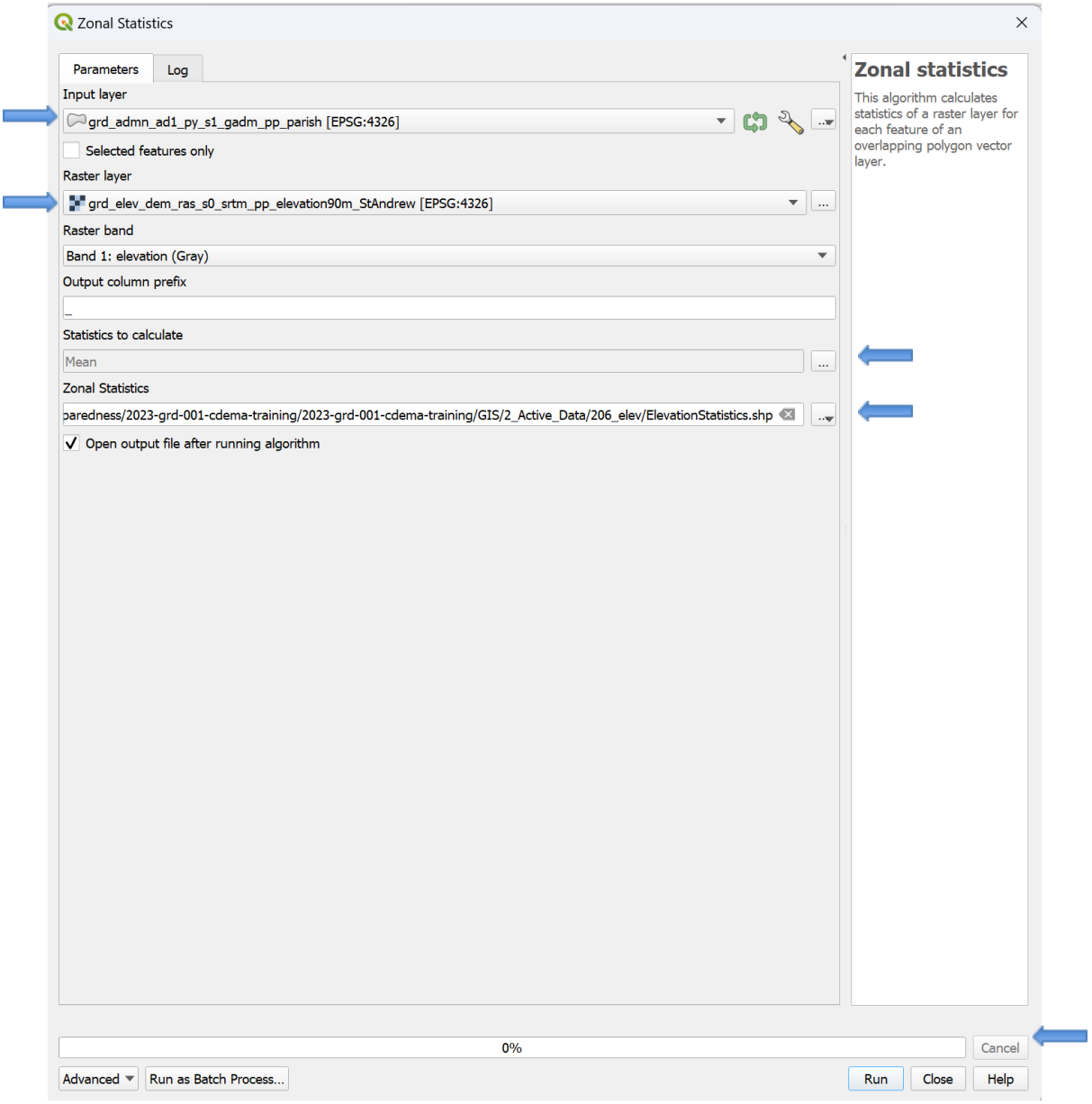
4.0 Zonal Statistics

In this final section, we will demonstrate the use of zonal statistics. In this example, we will calculate the mean elevation within each admin 1 area. You could also use the tools to compute other things like min or max elevation per area or count the total population within each admin 1 area.

1. Turn off the display of all layers
2. Click on  to open the toolbox
3. Within the processing toolbox that appears, expand the options for **Raster Analysis**, then open the **Zonal Statistics** tool



4. Set the parameters to read as follows:
    - Input layer: Admin 1 layer – **grd_admn_ad1_py_s1_gadm_pp_parish**
    - Raster layer: DEM layer - **grd_elev_dem_ras_s0_srtm_pp_elevation90m** Under **Zonal Statistics** click on the drop-down and select **Save to File**, then select an appropriate location and file name. Change the type to SHP files (*shp)
    - Click on ...  next to **Statistics to Calculate** and tick only **Mean**
    - Click **Run**



A new layer should now appear showing the admin 1 boundaries.

5. Open the attribute table for this layer. Scroll to the right of the table and you should see a new field called **_mean** which now contains a value for the mean land elevation in those admin areas
6. **Close** the attribute table
7. Open the layer properties for the new layer and change the symbology to **Graduated** and the Value to **_mean.** Click **Classify**, then click **OK** to see the variation in average land elevation per district.

5.0 Saving a project

Saving a project allows you to return to it later and continue working on it.

1. From the project menu select **Save**
2. If it is the first time saving the project, use the menu prompted by QGIS to save the project within the folder...\GIS\3_Mapping\33_Map_Projects and change its name to call it **PhysMap.**

6.0 Summary

This practical exercise has introduced you to some of the most common tools you might need to use with raster datasets, enabling you to style raster data and carry out some other basic functions.