

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: kna_elev_dem_ras_s0_srtm_pp_elevation90m.tif
- 3. From the folder ...\GIS\2_Active_Data\201_admn add the kna_admn_ad1_ln_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.

- Turn off the display of the population layer and turn on the display of the DEM.
- Right-click on the DEM (kna_elev_dem_ras_s0_srtm_pp_elevation90m) in the Layers list and select Properties
 - o 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









🔇 Color ramp ty	/pe X
Please select color	ramp type:
Catalog: cpt-city	•
ОК	Cancel

- Click on Topography, then select 'wiki-schwarzwald-d050'
- Click OK.
- Click Apply

🔇 Cpt-city Color Ramp

Selections by the	me			A	ll by author
Name	^	Selected	palette	s for topo	ography (22)
All Ramps Bathymetry Blues					
Discord Diverging Greens Greys		cd-a	db-a	o2-a	sd-a
 QGIS Precipitation Reds Temperature 		tv-a	ws-a	wt-a	os250k-feet
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Transparency Selection and Preview Information	•	wiki	nrwc		
Palette wiki-schwarzwald-d050					
Path wkp/schwarzwald/wiki-schwarzwa	ld-d050				

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]

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**

▼ Band Rend	lering
Render type	Hillshade 🔻
Band	Band 1: Band_1 (Gray)
Altitude	45.00°

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

3.0 Clipping raster data

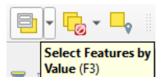
In this section, we will demonstrate how raster datasets can be clipped to a specific region. This is useful when data is supplied for a larger area than you need, or where you want to show detail for a specific region only. In this example, we will clip the elevation raster to the extent of the admin 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 kna_admn_ad1_ln_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 James Windward









🔇 kna_admn_a	nd1_py_s1_gadm_pp_parish — Select Featu	res		×
ADM0_EN			Case sensitive	Exclude Field
ADM0_PCODE			Case sensitive	Exclude Field
ADM1_EN	Saint James Windward	×	Case sensit	tive Contains
ADM1_PCODE			Case sensitive	Exclude Field
Reset Form Fla	ash Features Show in <u>Table</u> <u>Zoom to Feature</u>	res	elect Featur	es 🔻 Close

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

oom to Features Select Features Close	

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

You should see both **Saint James Windward** 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.

 Right-click on kna_admn_ad1_ln_s1_gadm_pp_parish in the Layers list and select Export > Save Selected Features As

Layers	Export •	Save Features <u>A</u> s
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▶ _ with a start of the st	Add Layer Notes	Save as Layer Definition File
► uzb_elev_dem_ras_s0_srtm_pp_высота_90m ✓ uzb admn ad1 py s1 unocha pp вилоят viloyat	Properties	Save as <u>Q</u> GIS Layer Style File









• 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 kna_admn_ad1_py_s1_gadm_pp_parish_StJames.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

Select CRS	×
Select the coordinate reference system for the vector file. reference system.	The data points will be transformed from the layer coordinate
Predefined CRS	
Filter Q utm zone 20N	×
Recently Used Coordinate Reference Systems	
Coordinate Reference System	Authority ID
WGS_1984_Complex_UTM_Zone_20N	ESRI:102570
Predefined Coordinate Reference Systems	► Hide deprecated CRSs
Coordinate Reference System	Authority ID
SIRGAS 1995 / UTM zone 20N	EPSG:31989
SIRGAS 2000 / UTM zone 20N	EPSG:31974
SIRGAS_UTM_Zone_20N	ESRI:31920
WGS 72 / UTM zone 20N	EPSG:32220
WGS 72BE / UTM zone 20N	EPSG:32420
WGS 84 / UTM zone 20N	EPSG:32620
WGS 84 / UTM zone 20N Properties • Units: meters	

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









6. Turn off the display for kna_admn_ad1_py_s1_gadm_pp_parish_StJames.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

- Turn off the display of all layers, then turn on the display of kna_admn_ad1_py_s1_gadm_pp_parish_StJames
- 2. From the Raster menu select Extraction > Clip Raster by Mask Layer
 - For the input layer select the DEM layer
 kna_elev_dem_ras_s0_srtm_pp_elevation90m
 - For the mask layer select the admin1 area
 kna_admn_ad1_py_s1_gadm_pp_parish_StJames
 - 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
 - o Turn off the display of layers to view the clipped version of the elevation data

Parameters Log			
Input layer			
kna_elev_dem_ras_s1_srt	tm_pp_90m [EPSG:4326]		
Mask layer			
kna_admn_ad1_ln_s1_ga	adm_pp_parish_StJames [EPS0	G:32620]	•
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Source CRS [optional]			
Target CRS [optional]			
Target extent [optional]			
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	ie to output bands [optional]		
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Advanced Parameters			
Clipped (mask)			
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mapaction/Preparedness/202	.3-kna-001-cdema-training/202	23-kna-001-cdema-training/GIS/2_/	Active_Data/206_elev/kna_elev_dem_ras_s1_srtm_pp_

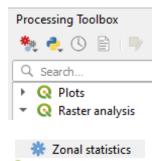




4.0 Zonal Statistics

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 ²⁸⁵ 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 kna_admn_ad1_py_s1_gadm_pp_parish
 - Raster layer: DEM layer -

kna_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**
- o Click Run









Parameters Log			1	Zonal statistics
Input layer				This algorithm calculates
kna_admn_ad1_py_s1_gadm_p	pp_parish [EPSG:4326]	- C) 🕹		statistics of a raster layer each feature of an
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kna_elev_dem_ras_s1_srtm_pp	2_90m [EPSG:4326]			
Raster band				
Band 1 (Gray)			•	
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Statistics to calculate				
Mean				
Zonal Statistics				
Preparedness/2023-kna-001-cdema	a-training/2023-kna-001-cdema-training/GIS/2_Activ	/e_Data/206_elev/ElevationStats.shp 🗵		

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
- 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**





 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.





