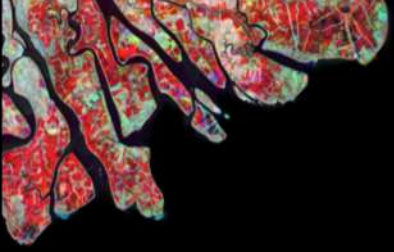




Earth Observation and
Ecosystems Dynamics Laboratory

ZAMEP GIS Training

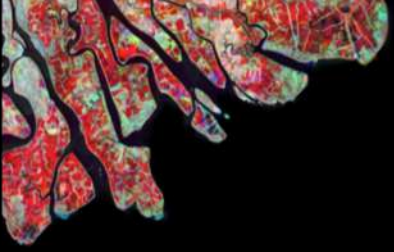
An Introduction to QGIS
Worksheet 2



Recap of Worksheet 1

In Worksheet 1 we learnt how to view GIS layers in QGIS and create a map

In this Worksheet we shall convert a spreadsheet to a GIS layer and also do some spatial analysis



Importing data from a CSV

Often we store geographical data in a simple spreadsheet form, like a CSV

We can import this data in QGIS

To do this we shall use some sample data from the MCN (Malaria Case Notification) system

Open this data (filename: coconut-2020-01-01-2022-05-20.csv) in Excel and take a look

	A	B	C	D	E	F	G	H	I	J	K
1	Malaria Case	Index Case D	Index Case D	Classification	Evidence For	District	Shehia	Village	Household Lc	Household Location - Longitu	
2	127938	01/01/2020	2020-01	Index Case: I	Imported: Co	MAGHARIBI	MBWENI	Mbweni	-6.1462015	39.2192027	
3	129950	01/01/2020	2020-01	Index Case: I	Indigenous: T	KASKAZINI A	MKWAJUNI	Mkwajuni	-5.8823114	39.2540897	
4	129951	01/01/2020	2020-01	Index Case: In Progress		MJINI	MWEMBETANGA				
5	129952	01/01/2020	2020-01	Index Case: In Progress		MIINI	IANGOMBE				



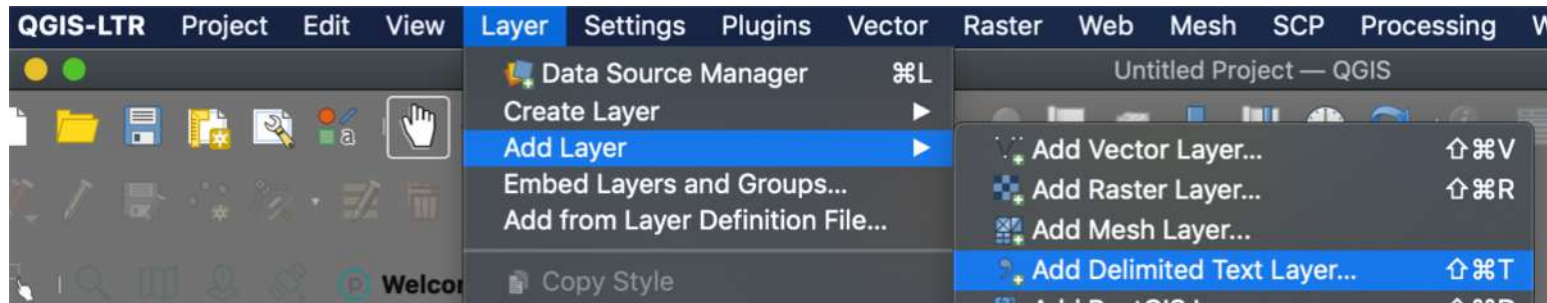
Now let's open this up in QGIS

If it is not open already, start QGIS

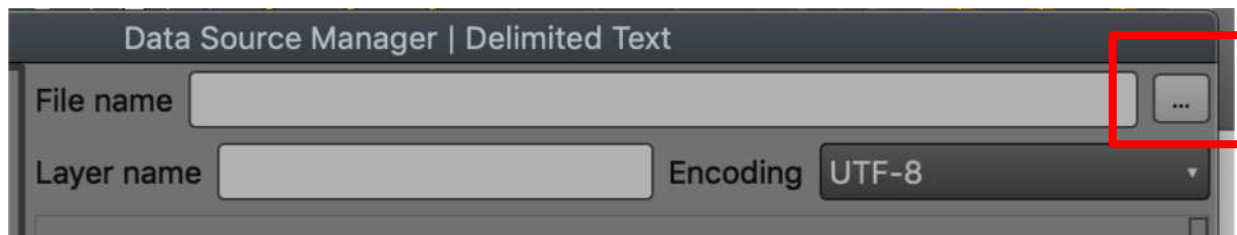
Note the GPS
information here

Importing data from a CSV

In QGIS, go to Layer > Add Layer > Add Delimited Text Layer



In the next window, locate and open coconut-2020-01-01-2022-05-20.csv

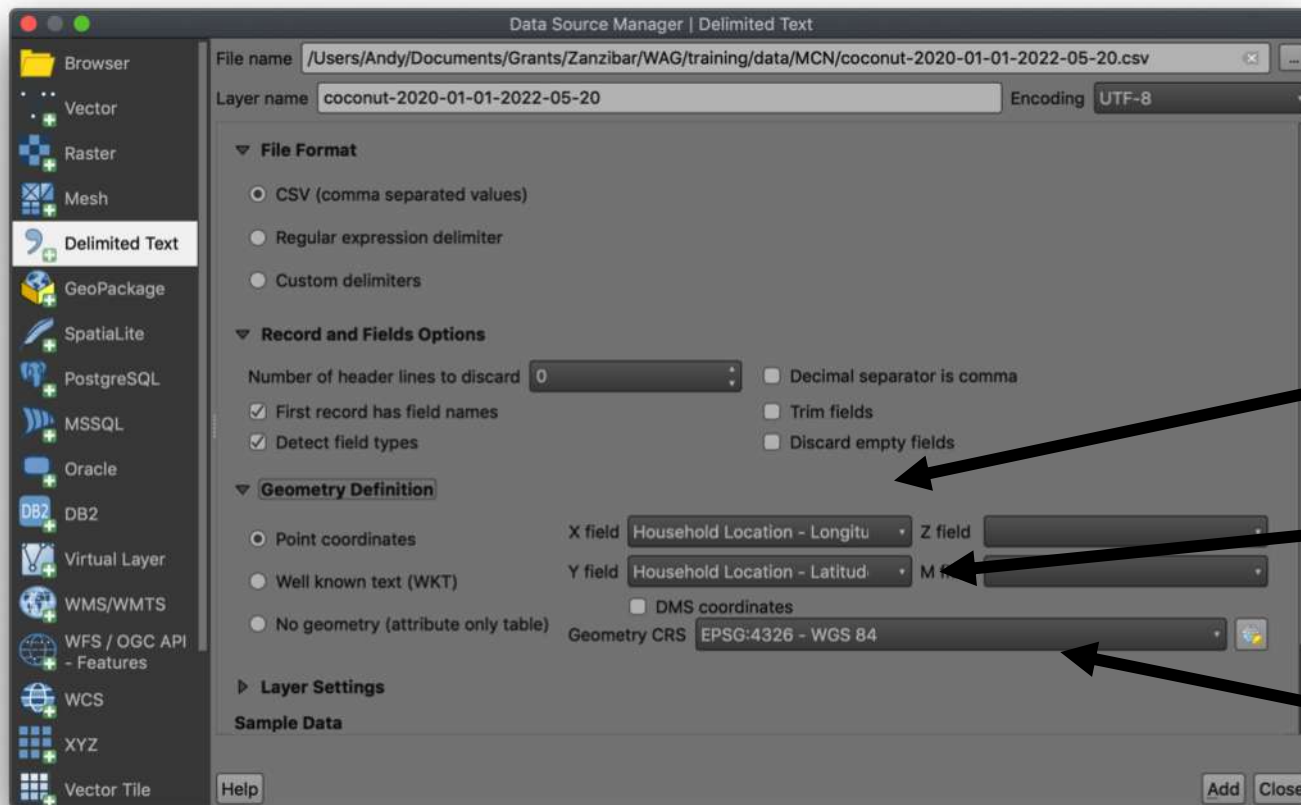


Next page...

Importing data from a CSV

The Data Source Manager window now gives us some options

ZAMEP collects data for household locations using a GPS in the coordinate system WGS84. Using this information, check the following settings:



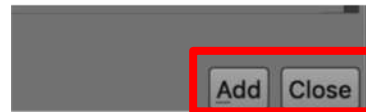
X-field set to
Longitude

Y-field set to
Latitude

CRS is set to
EPSG:4326 – WGS84

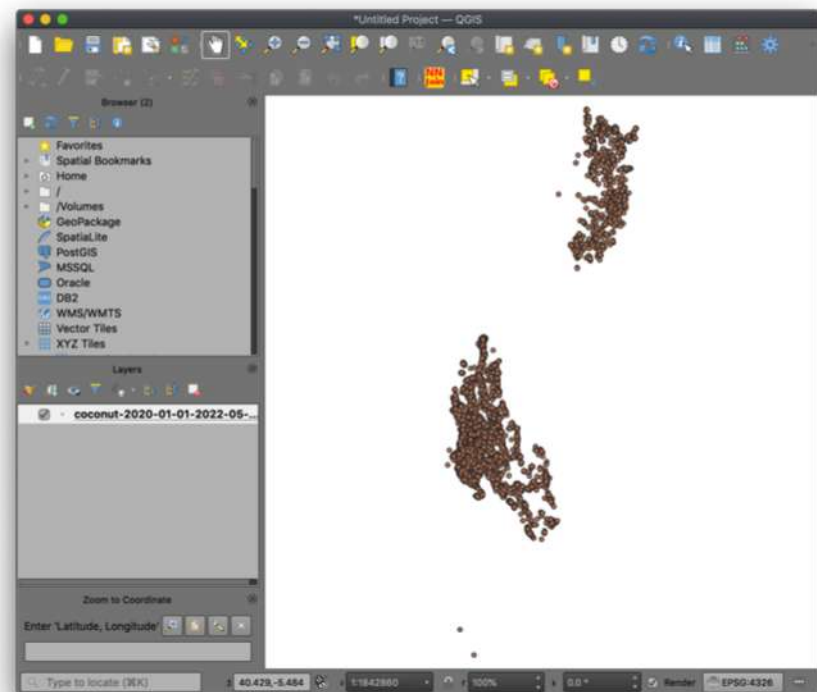
Importing data from a CSV

Once you are happy with the settings, click Add, the Close



You should see all the MCN records appear in QGIS for Unguja and Pemba

Save your project as MCN_Import



Basemap Layer

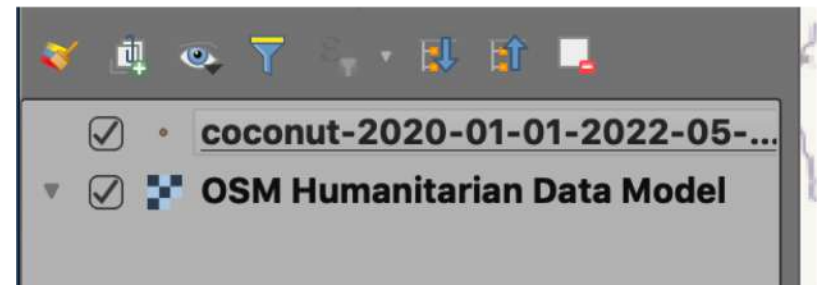
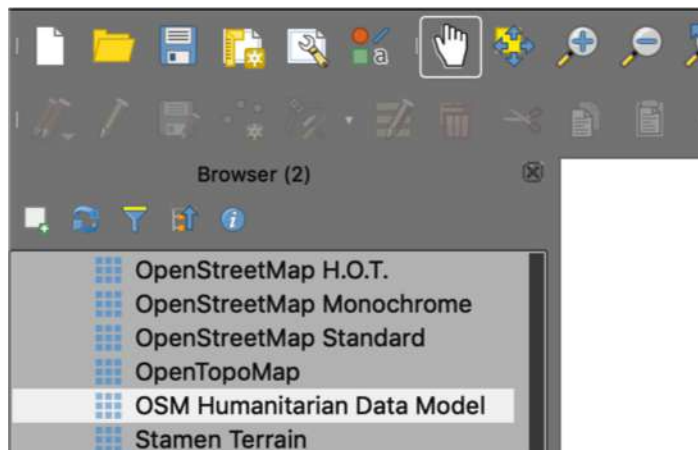
Currently our map only has the MCN points

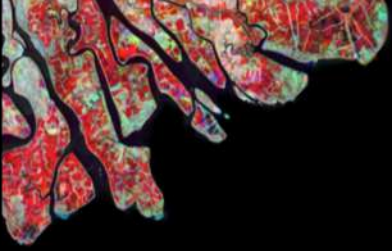
To add context to our map we shall add OpenStreetMaps as basemap layer

-- Can you remember how to do this from Worksheet 1? --

Recall that we do this using the Browser panel on the left-hand side

Also, remember to reorder you layers so the basemap is at the bottom



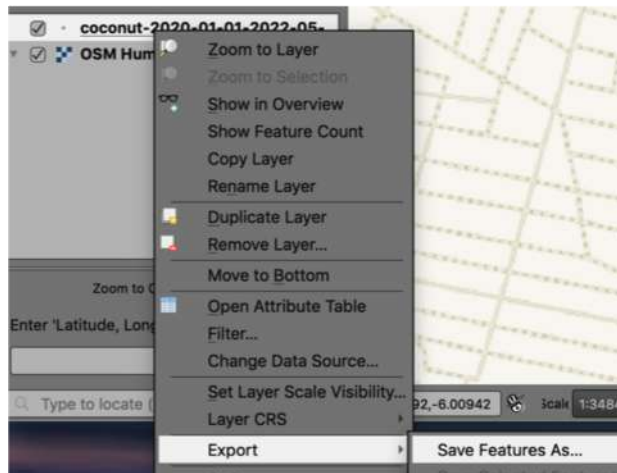
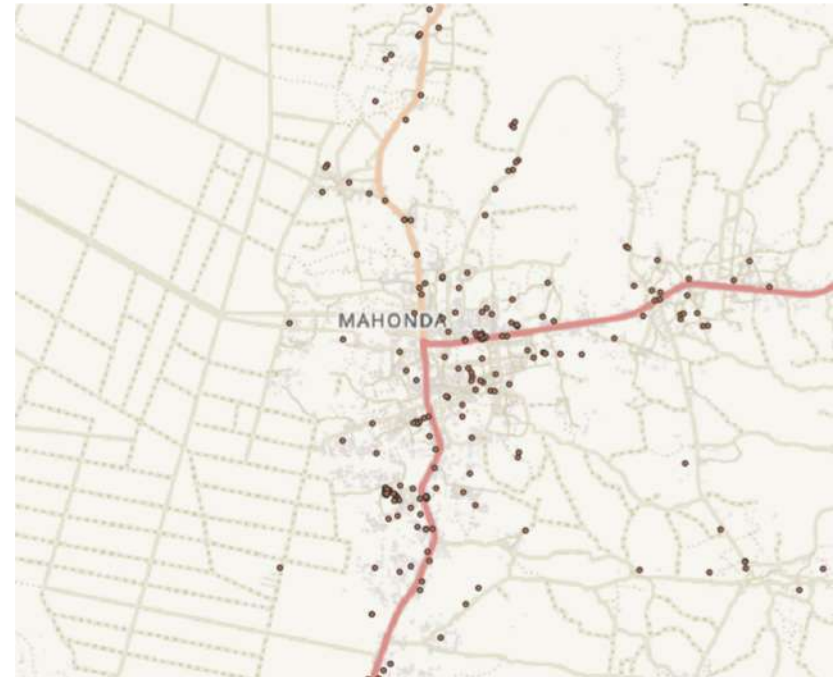


MCN data

Browse the map and zoom in to examine the point data

Here we are looking at Mahonda

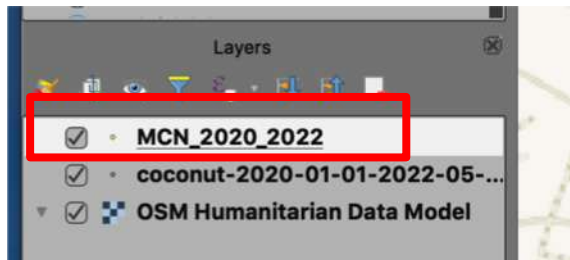
We can now save this as a GIS Layer
Right-click the Layer name and select
Export > Save Features As



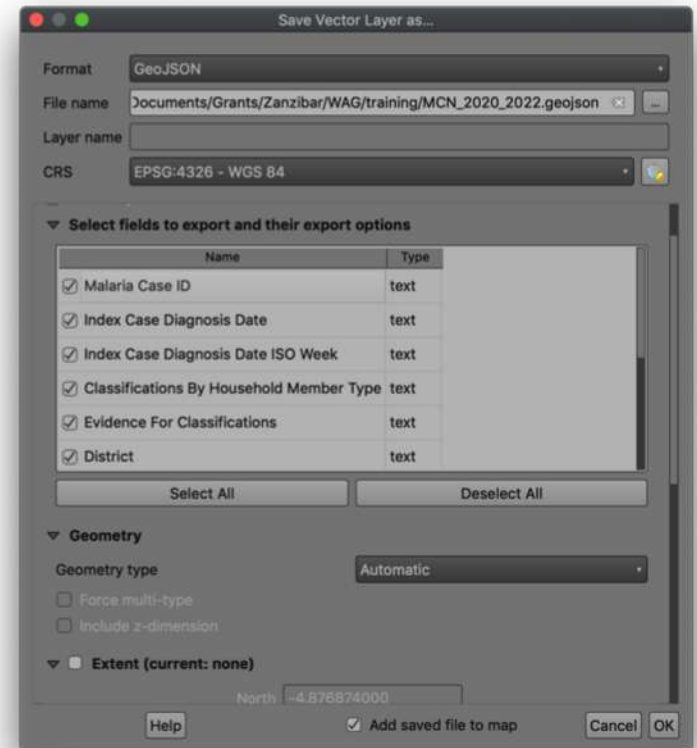
Next page...

Save as GIS Layer

In Save Vector Layer As window give the filename `MCN_2020_2022.geojson` and click OK
This will save the data as a GIS vector layer, specifically, a GeoJSON type file
Notice that it has been added to your list of layers in the Layers panel



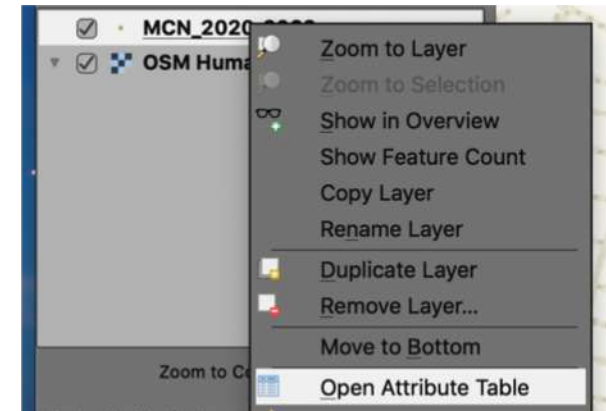
You can now remove the original coconut-2020-01-01-2022-05-20 CSV from QGIS. Do this by right-clicking the name and selecting Remove Layer



Attributes

Behind each point feature in our vector layer, we can store lots of information within the Attribute Table

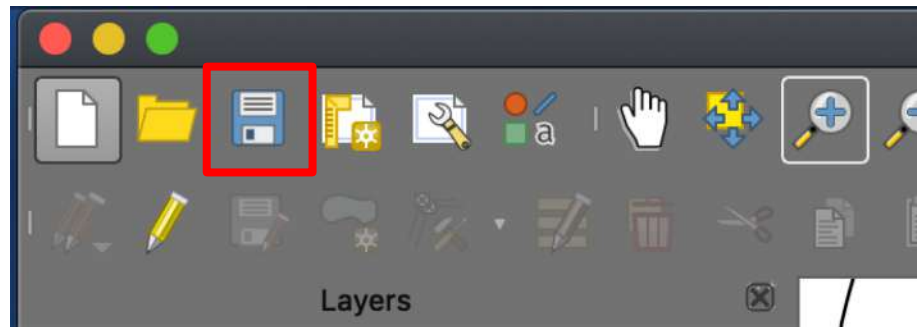
Right-click MCN_2020_2022 and select Open Attribute Table

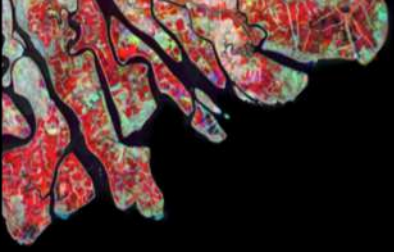


Here we can view all the different attributes that are associated with our vector layer. Have a look through...

MCN_2020_2022 — Features Total: 21487, Filtered: 21487, Selected: 0										
	Malaria Case ID	x Case Diagnosis	e Diagnosis Date	is By Household N	nce For Classifica	District	Shehia	Village	hold Location - L	old Location - Lc
1	127938	01/01/2020	2020-01	Index Case: I...	Imported: Co...	MAGHARIBI B	MBWENI	Mbweni	-6.1462015	39.2192027
2	129950	01/01/2020	2020-01	Index Case: I...	Indigenous: T...	KASKAZINI A	MKWAJUNI	Mkwajuni	-5.8823114	39.2540897
3	129951	01/01/2020	2020-01	Index Case: I...	NULL	MJINI	MWEMBETA...	NULL	NULL	NULL

Save your map





Viewing Attributes

We shall use these attributes to visualize the geographical data

Specifically, we are most interested in local cases, rather than imported cases

In QGIS, we can select the features that we are interested in

For the purposes of this worksheet, we shall be selecting cases where:

- The case occurs in Unguja
- Their case classification is indigenous

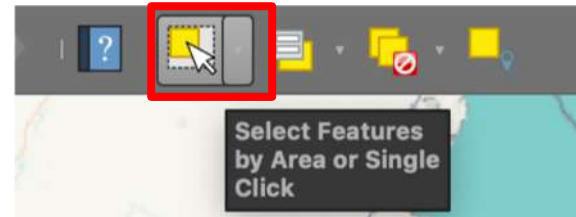
Selecting by Attributes

Selecting cases in Unguja:

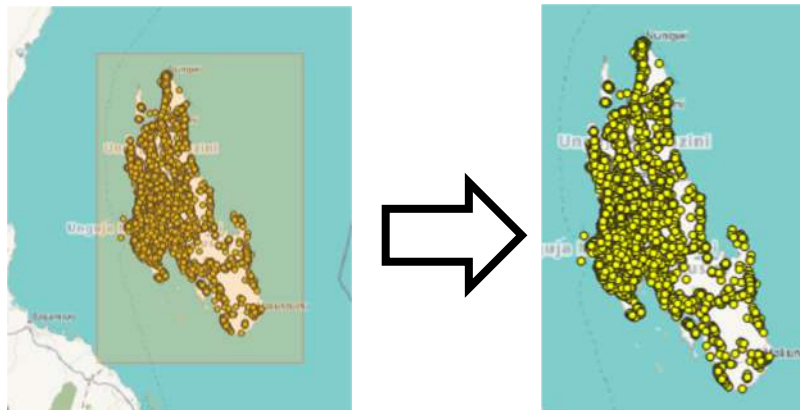
Zoom to the extent of the MCN layer by right-clicking and going to Zoom to Layer



Click on the Select Features tool



Click-hold-drag to draw a box around Unguja. Notice that all the points in Unguja will be highlighted in yellow

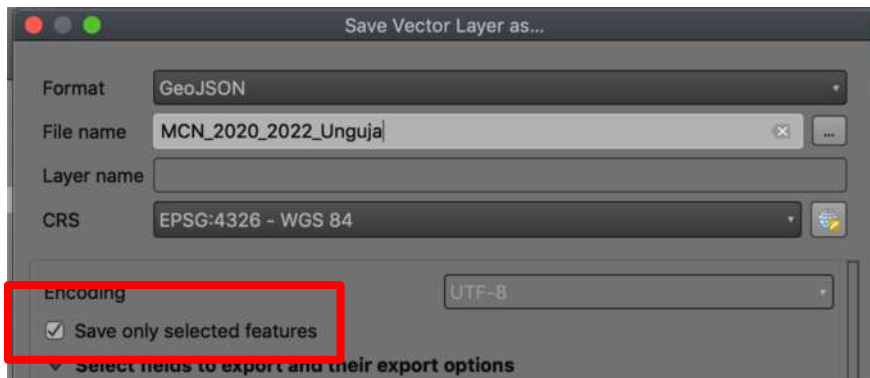
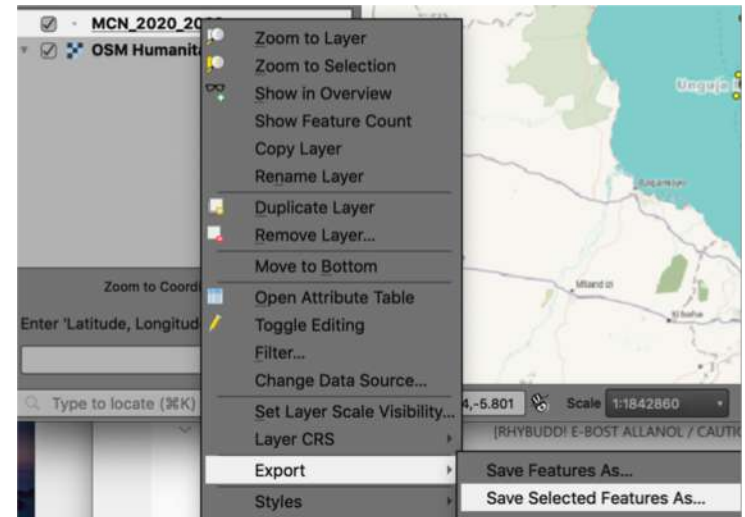


Selecting by Attributes

We can now export all our selected features to a new GIS vector layer

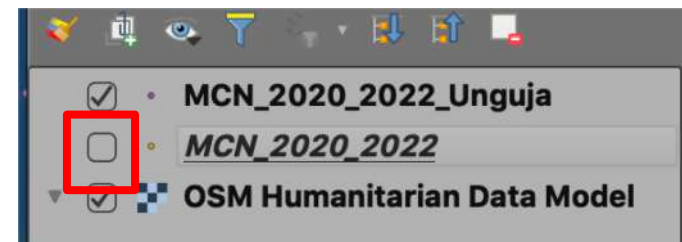
Do this by right-clicking MCN_2020_2022 and selecting Export > Save Selected Features As

Save this as a GeoJSON with the name MCN_2020_2022_Unguja



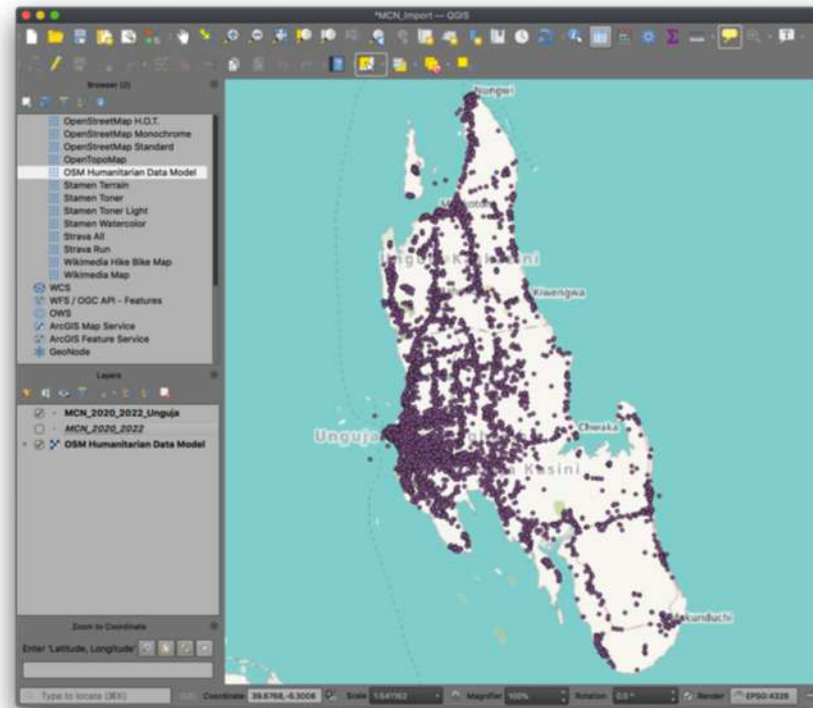
Ensure that Save only selected feature is ticked

You can now untick the MCN_2020_2022 layer



Selecting by Attributes

We now have a new vector dataset with all the malaria cases just for Unguja



We will now select the point features representing indigenous cases

Selecting by Attributes

Open the Attribute Table for MCN_2020_2022_Unguja

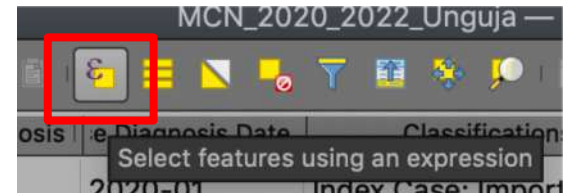
Video 2.2

We want to select all the features where...

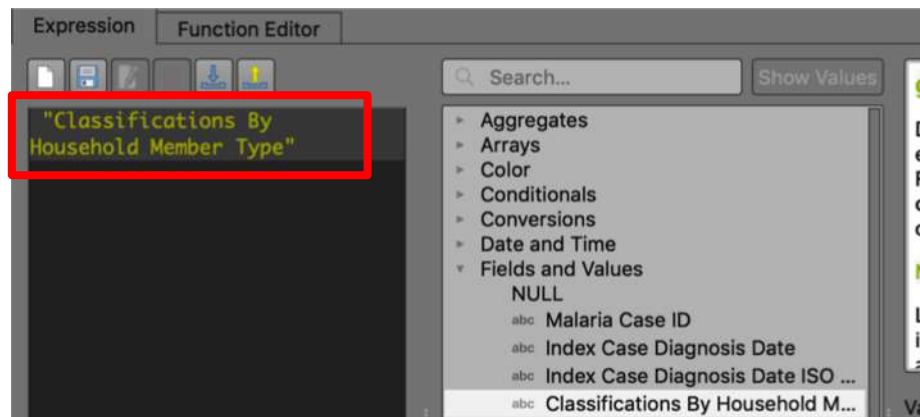
Classifications By Household Member Type = Index Case: Indigenous

We shall do this using Select features using an expression

In the Select by Expression window, under Fields and Values, double-click Classifications By Household Member Type



Notice that the attribute name is added into the Expression box



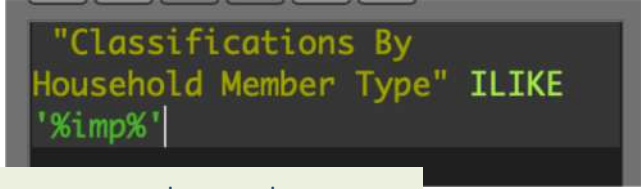
Next page...

Selecting by Attributes

To complete our expression, after "Classifications By Household Member Type" add the text...

`ILIKE '%imp%'`

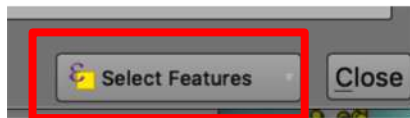
Your expression should now look like this



```
"Classifications By  
Household Member Type" ILIKE  
'%imp%'
```

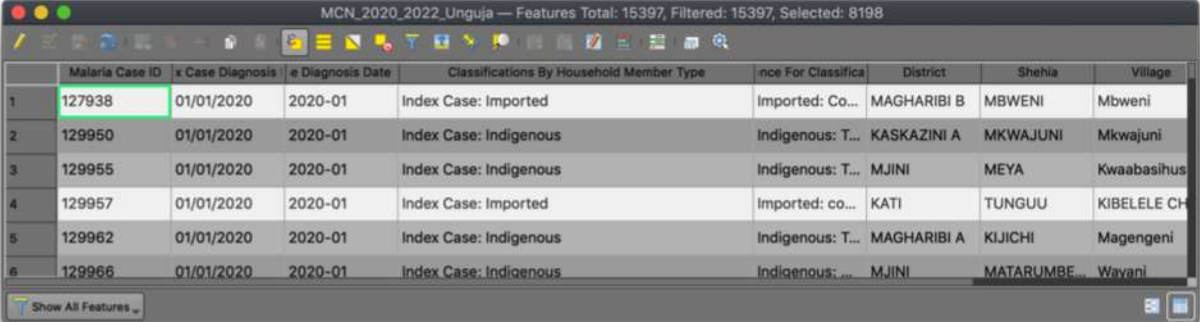
This expression is saying: select features where the text includes the letters 'imp', i.e. for the word imported

Click Select Features and close the Select by Expression window



Selecting by Attributes

Check your Attribute Table. You should see that a number of features (8,198) have been selected:



	Malaria Case ID	Case Diagnosis	Date of Diagnosis	Classifications By Household Member Type	Reason For Classification	District	Shehia	Village
1	127938	01/01/2020	2020-01	Index Case: Imported	Imported: Co...	MAGHARIBI B	MBWENI	Mbweni
2	129950	01/01/2020	2020-01	Index Case: Indigenous	Indigenous: T...	KASKAZINI A	MKWAJUNI	Mkwajuni
3	129955	01/01/2020	2020-01	Index Case: Indigenous	Indigenous: T...	MJINI	MEYA	Kwaabasihus
4	129957	01/01/2020	2020-01	Index Case: Imported	Imported: co...	KATI	TUNGUU	KIBELELE CH
5	129962	01/01/2020	2020-01	Index Case: Indigenous	Indigenous: T...	MAGHARIBI A	KIJICHI	Magengeni
6	129966	01/01/2020	2020-01	Index Case: Indigenous	Indigenous: ...	MJINI	MATARUMBE...	Wayani

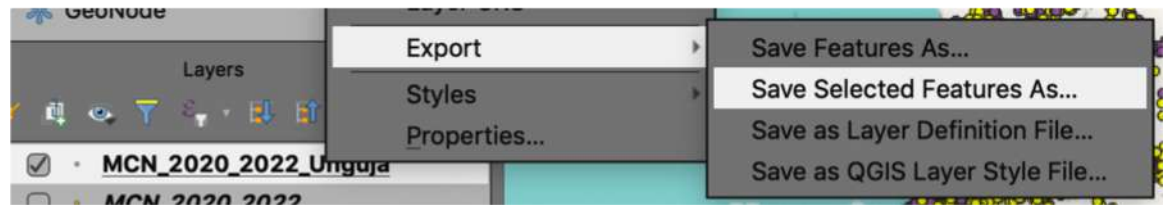
Now check your map display. You should see that a number of points are now highlighted in yellow



Selecting by Attributes

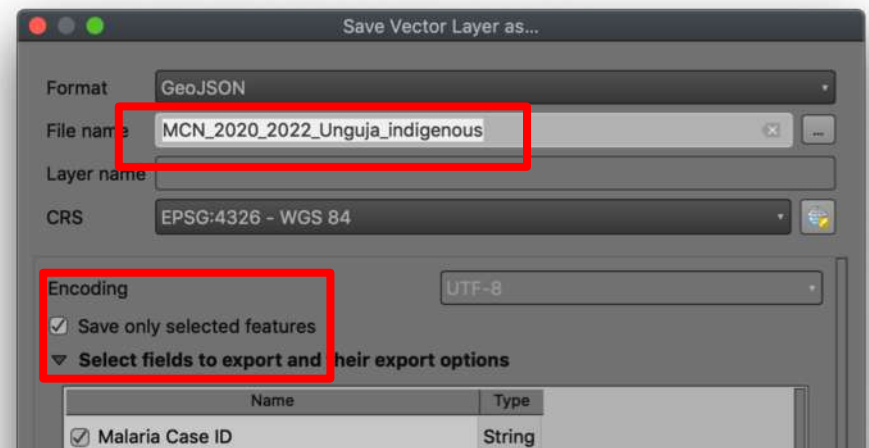
As you did previously, export these selected features as a new point vector layer

Do this by right-clicking MCN_2020_2022_Unguja and selecting Export > Save Selected Features As

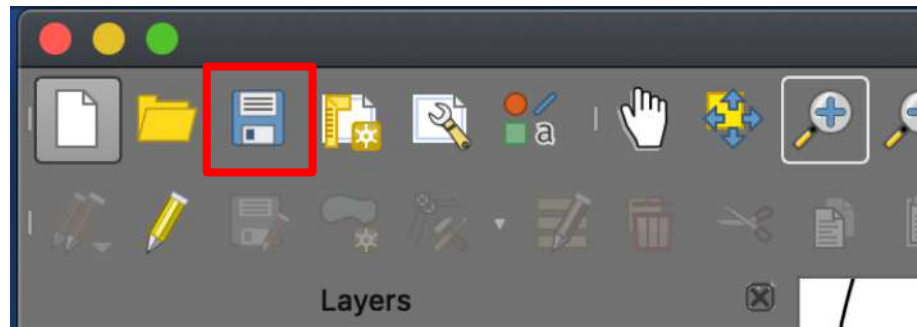


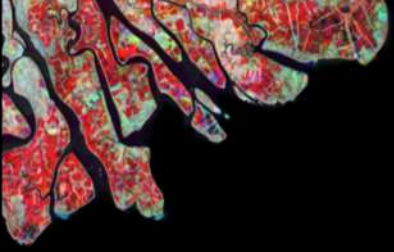
In the Save Vector Layer As window, make sure that Save only selected features is ticked, give the file name MCN_2020_2022_Unguja_indigenous and click OK

You can now untick the previous layer MCN_2020_2022_Unguja



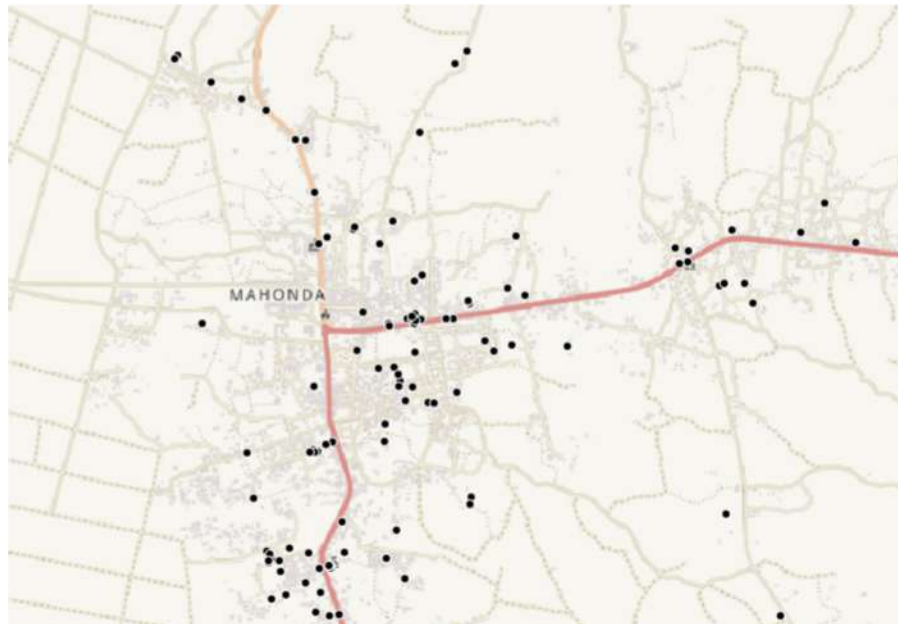
Save your map





Changing the Symbology

Using the skills that you learnt in Worksheet 1, try changing the layer symbology so it looks like the example below:



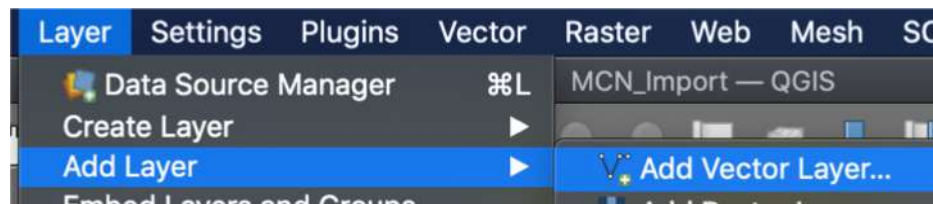
Counting Points in Polygons

We now have a map showing all the indigenous cases of malaria in Unguja between 2020 and 2022

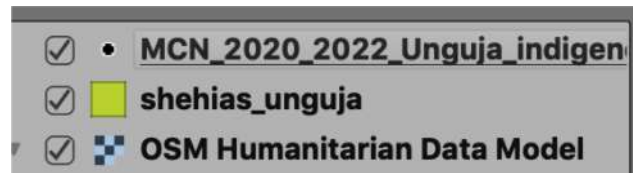
But at ZAMEP you may want to know which Shehias have the highest number of cases

For this, we shall use a vector polygon layer representing Shehias and count the number of cases we have per Shehia

Start by adding the vector layer `shehias_unguja.geojson` to QGIS using:



Reorder your layers to `shehias_unguja.geojson` sits just above your basemap layer



Counting Points in Polygons

Video 2.3

We shall use one of the many QGIS tool for analyzing our layers

Go to Vector > Analysis Tools > Count Points in Polygons



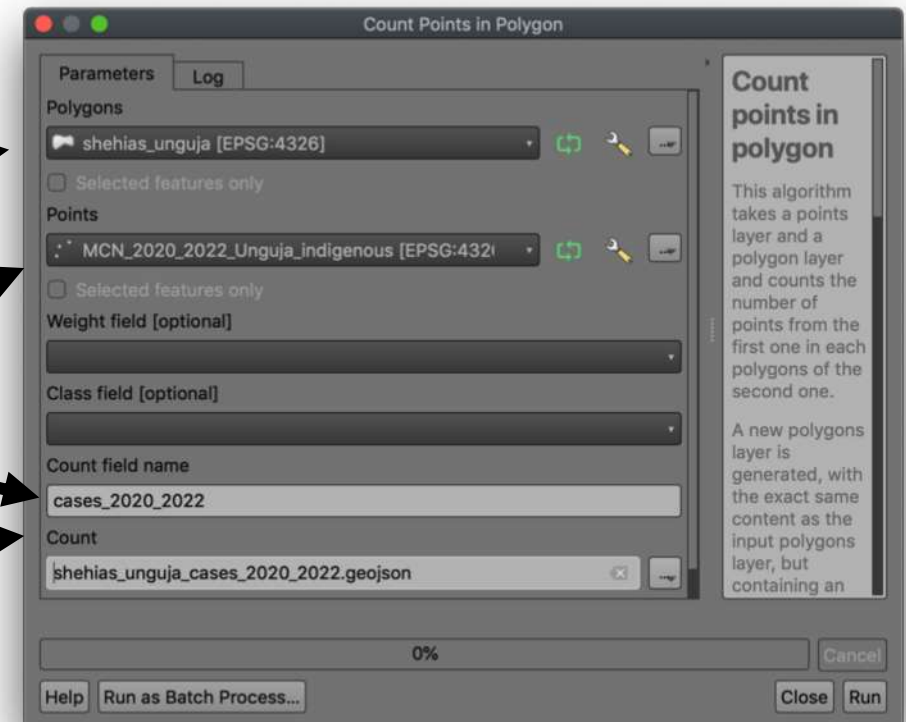
Use the following settings:

Polygons: shehias_unguja

Points: MCN_2020_2022_Unguja_indigenous

Field name: cases_2020_2022

Count:
shehias_unguja_cases_2020_2022.geojson



Click Run then Close

Counting Points in Polygons

After around a minute the tool will have finished working

Check the Attribute Table for your newly created vector polygon layer
shehias_unguja_cases_2020_2022

You should see a new attribute called cases_2020_2022 containing a sum of all the cases recorded for each shehias

	WARD	Region	population	cases_2020_2022
1	KIJINI	North A	15405	44
2	TUMBATU J...	North A	2589	1
3	KIVUNGE	North A	605	19
4	MOGA	North A	1654	1

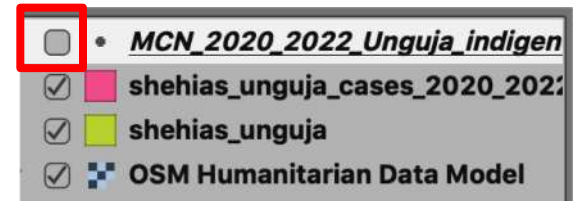
We shall now change the symbology of this layer to visualize the case data...

Changing Symbology

Firstly, untick the point layer

Now, go to the Symbology settings for the layer
shehias_unguja_cases_2020_2022

Change the settings to match:

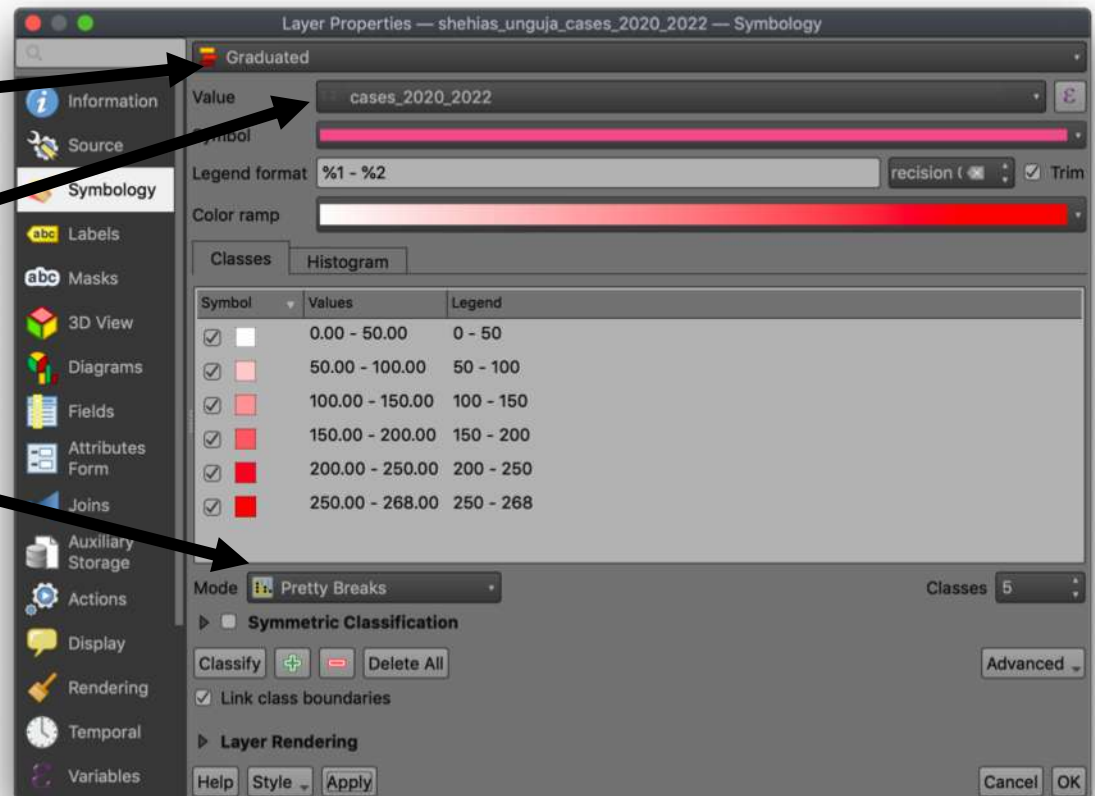


Change to Graduated

Change Value to
cases_2020_2022

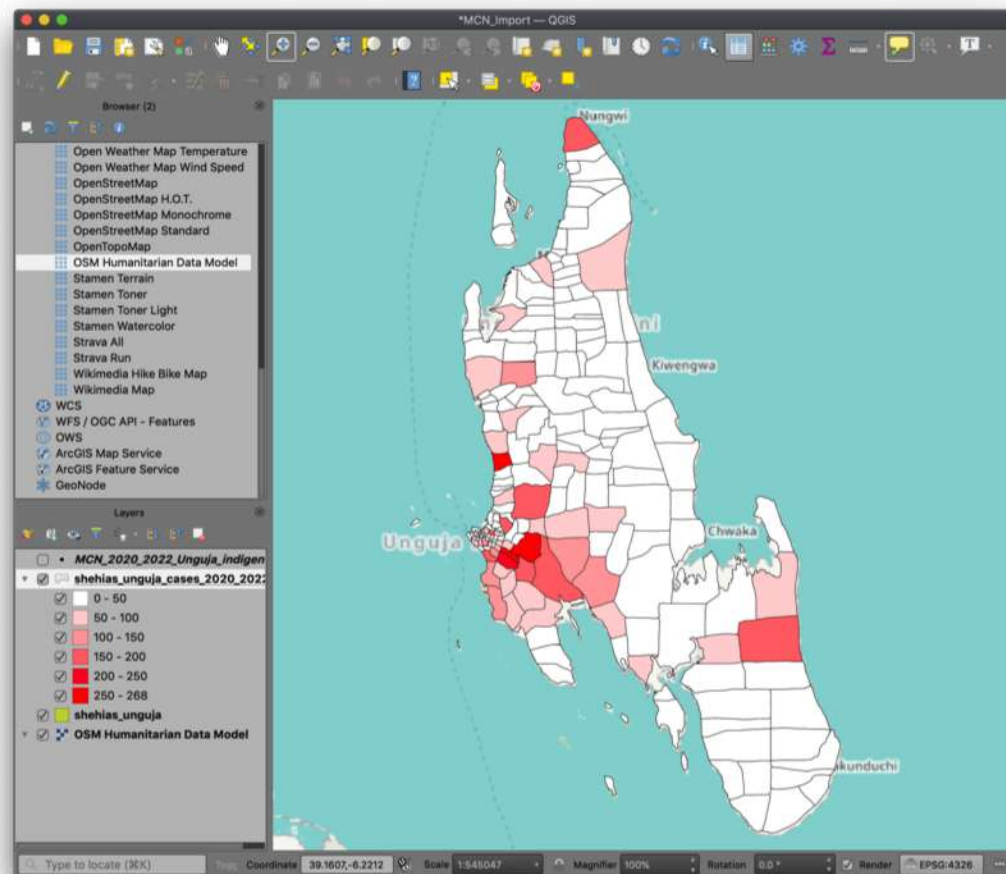
Change mode to
pretty breaks

Click OK

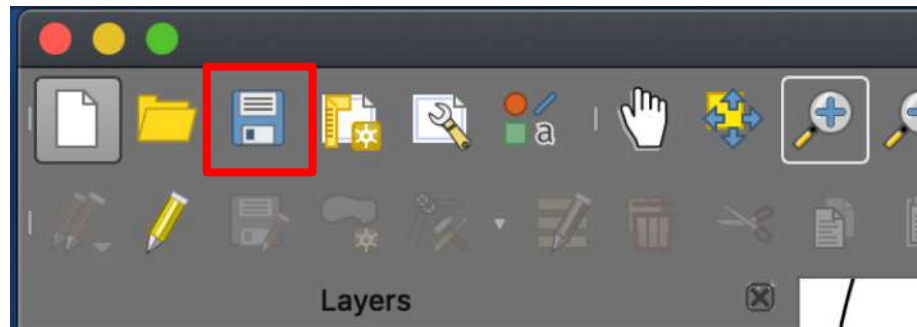


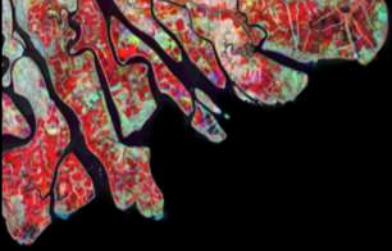
Changing Symbology

We have changed the symbology so that high case numbers are red and low case numbers are white. This helps us to visualize patterns in the data



Save your map





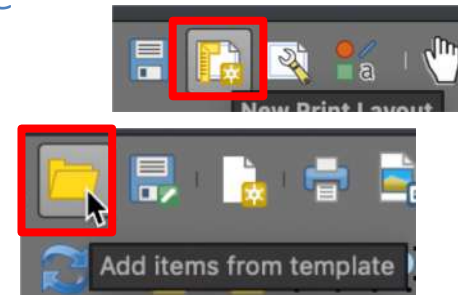
Making a Map

Using the skills your learnt in Worksheet 1, we will now create a map of the case data, using the ZAMEP map template

Got to New Print Layout

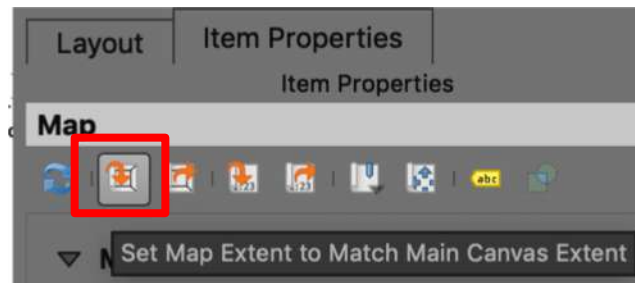
Call your map unguja_cases_2020_2022

Select Add items from template



We now want to make sure our map is zoomed to the extent of Unguja

Select the map item then look for the Set Map Extent to Match Main Canvas Extent option



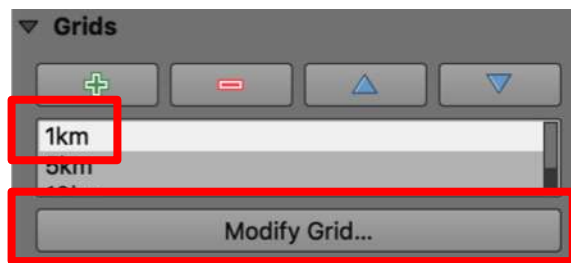
Next page...

Changing the Map Grid

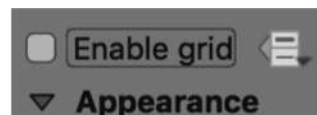
Our map now covers the extent of Unguja but our grid lines are too close together

To change this, go to down to the Grid settings

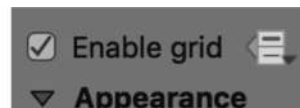
Select the 1km grid and click Modify



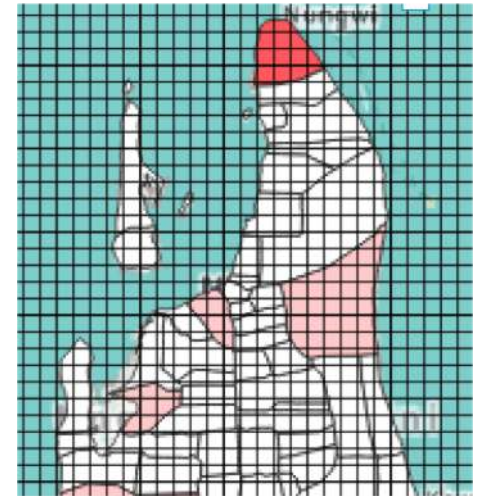
Untick where it says Enable grid



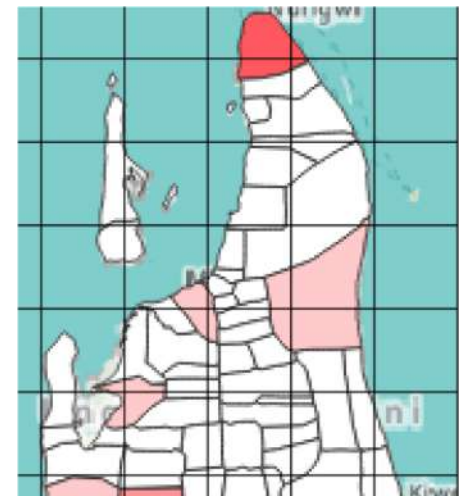
Now, go to the 5km grid, click Modify and tick the Enable grid option

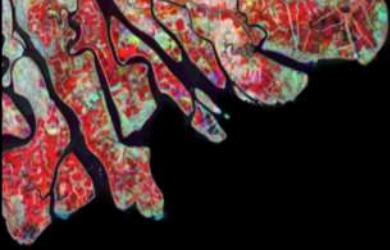


Next page...



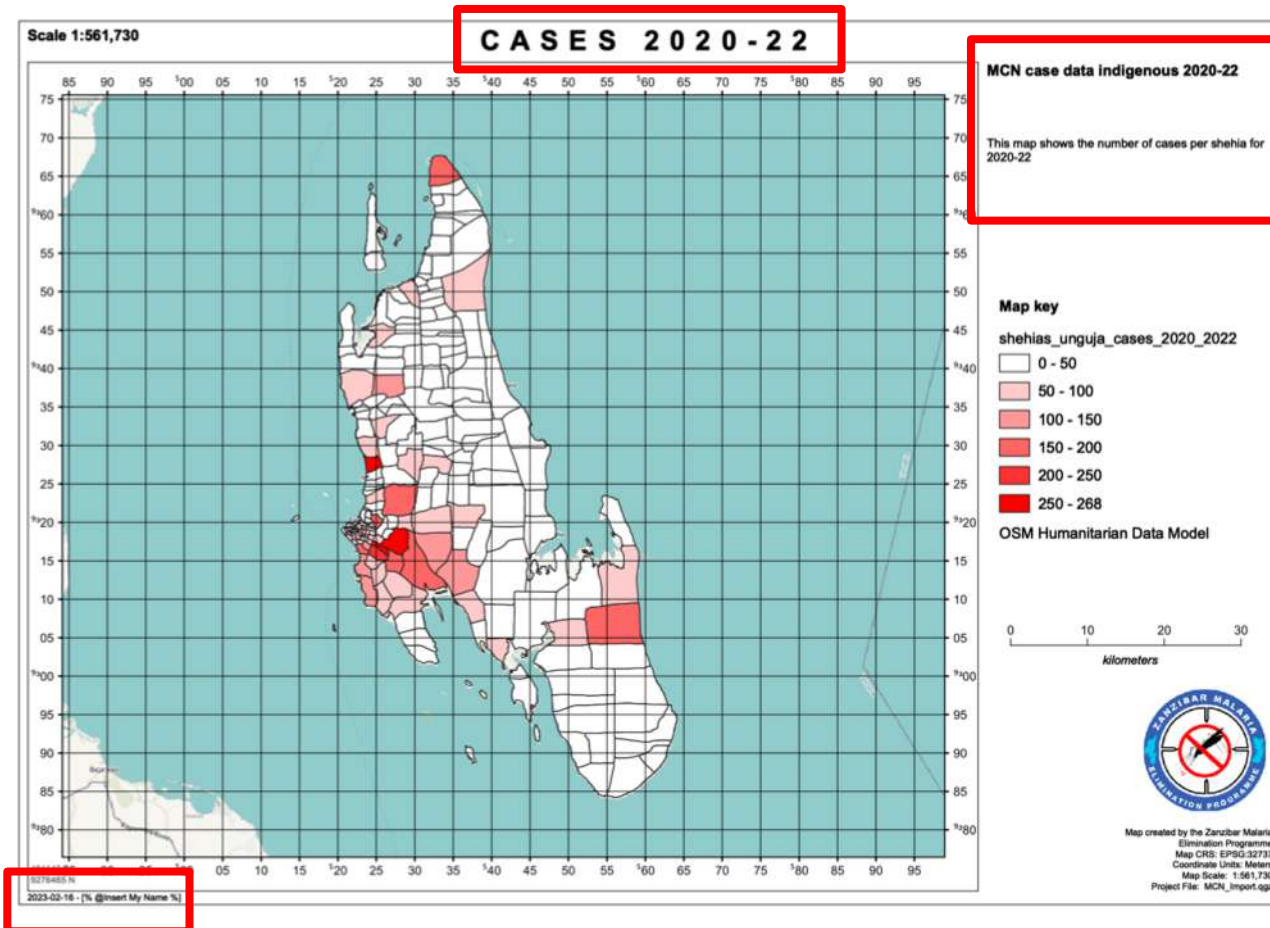
5 km grid





Map of Cases

Just as we did before, we can now edit the map title, description text and map author name to complete our map



Then we can export it as a PNG image



Well done. You have learnt how to import a CSV into QGIS and convert it into a GIS layer

You learnt how to select vector points in different ways, including writing an expression

Finally, you learnt how to sum point case data by shehias polygons and visualize this data