



CSGM Workshop

Introduction to the Use of GIS in the RiVAMP Methodology –

With focus on the Negril Pilot Study in Jamaica

Objectives

1. To introduce participants to the basic concepts of Geographic Information Systems (GIS)
2. To inform participants of the importance of GIS to the risk assessment process
3. To briefly examine how GIS is used in risk assessment with particular focus on the RiVAMP methodology

At the end of the lecture and exercise participants should be able to:

1. Understand the basic concepts of GIS
2. Understand how GIS can be used effectively to support and enhance the risk assessment process
3. Have a knowledge of the basic data sets that can be used in a risk assessment methodology,

Training Material

The exercise uses files that were used in the RiVAMP study and represents a very small section of the computations and analyses done to achieve the various outputs of the project. Access to the complete training manual, open-source GIS software, files and presentations can be obtained at the following link:

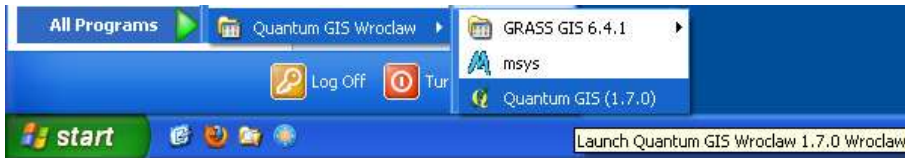
[:http://www.grid.unep.ch/index.php?option=com_content&view=article&id=47&Itemid=253&lang=en&project_id=204F6705](http://www.grid.unep.ch/index.php?option=com_content&view=article&id=47&Itemid=253&lang=en&project_id=204F6705)





Starting Quantum GIS

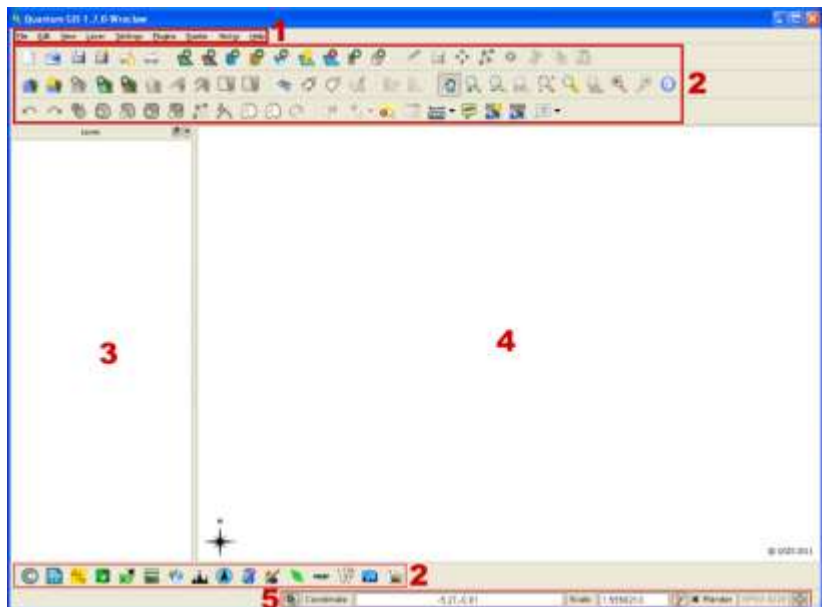
To start Quantum GIS click **Start > All programs > Quantum GIS Wroclaw > Quantum GIS (1.7.0)** as illustrated in the figure below



When you start QGIS, by default you get a *QGIS Tips!* window every time you start the application. Even if it is a good source of information you can switch it off by checking the *I've had enough tips,...* checkbox to remove it from the start up.

The QGIS graphical interface is divided in 5 zones:

- 1 Menu bar,
- 2 Toolbars facilitate the access to the different functions (also available in the menu bar),
- 3 Table of Content (ToC) to manage the layers,
- 4 View, where you can interact with the map,
- 5 Status bar where you can see information such as coordinates of the pointer, extent, scale, coordinate system; start/stop rendering or define how the view is displayed.

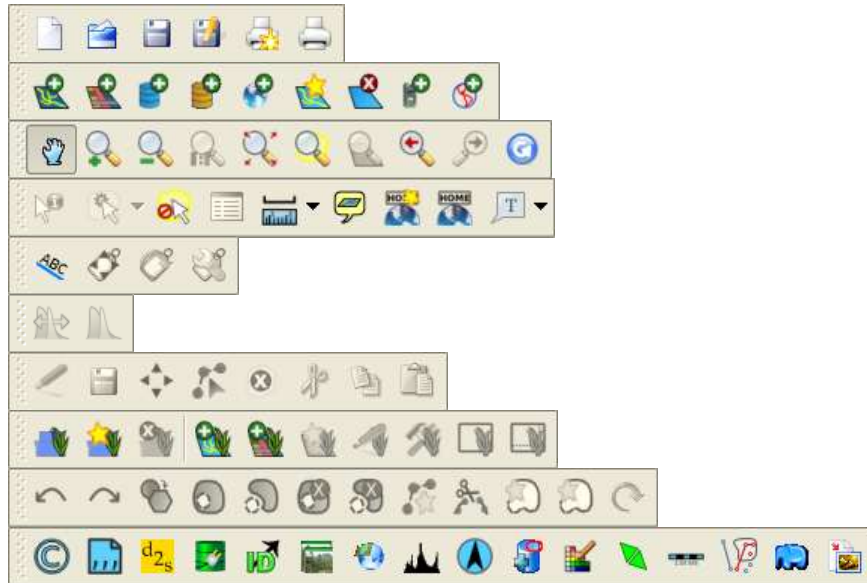


Toolbars are aggregated based on the functionality of the icons (greyed icons means they are inactive because the appropriate conditions to use them are not fulfilled). Some of them are included by default in QGIS, some others can be added/removed from the interface:





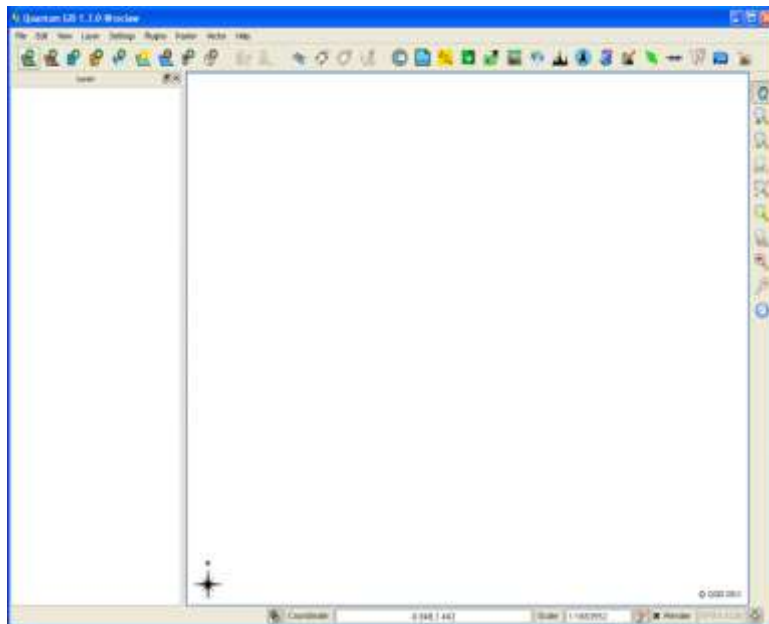
- File
- Manage Layers
- Map Navigation
- Attributes
- Label
- Raster
- Digitizing
- GRASS plugin
- Advanced Digitization
- Plugins



The functionality of each icon will not be described here, some of them will be used during this training, and you can discover the remaining ones on your own.

The toolbars can be added/removed from the interface by *right clicking* in any empty area of any toolbar or menu and enable/disable them. They can also be moved using *drag and drop*. The Figure on the right shows one way in which the interface can be organized in order to keep it functional.

Once you get a layout that is satisfactory, close QGIS and start it again. As you can see the interface remains as you arranged it.

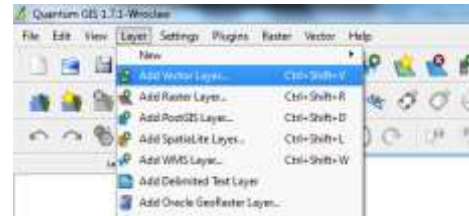




Adding a Vector Layer

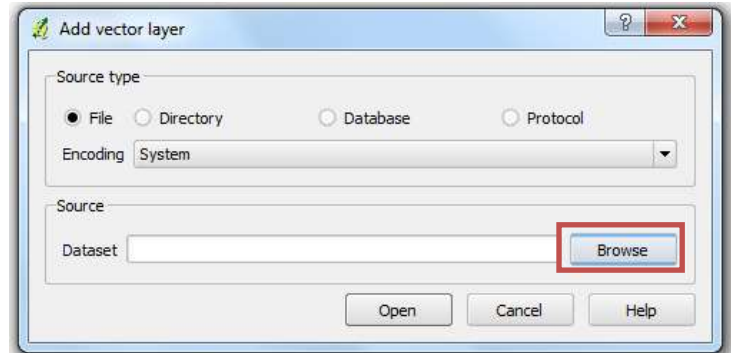
Now let's add a vector layer to the View window. Select **Layer > Add Vector Layer** (as illustrated at right) or the

Add Vector Layer button 



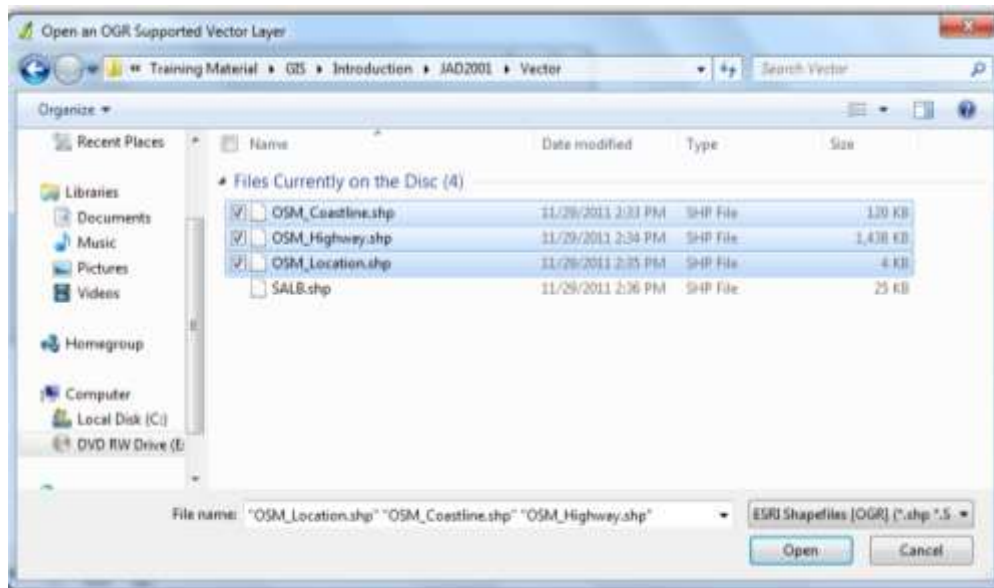
The **Add Vector Layer** Window will appear

- Click the **Browse** button,
- Set the *Files of type* to **ESRI Shapefiles [OGR]**,
- Select the 3 **OSM_*.shp** files from the directory where you have uploaded the exercise files
OSM_Coastline.shp – Jamaican coastline
OSM_Highway.shp – Street Network,
OSM_Location.shp – location of towns and points of interests



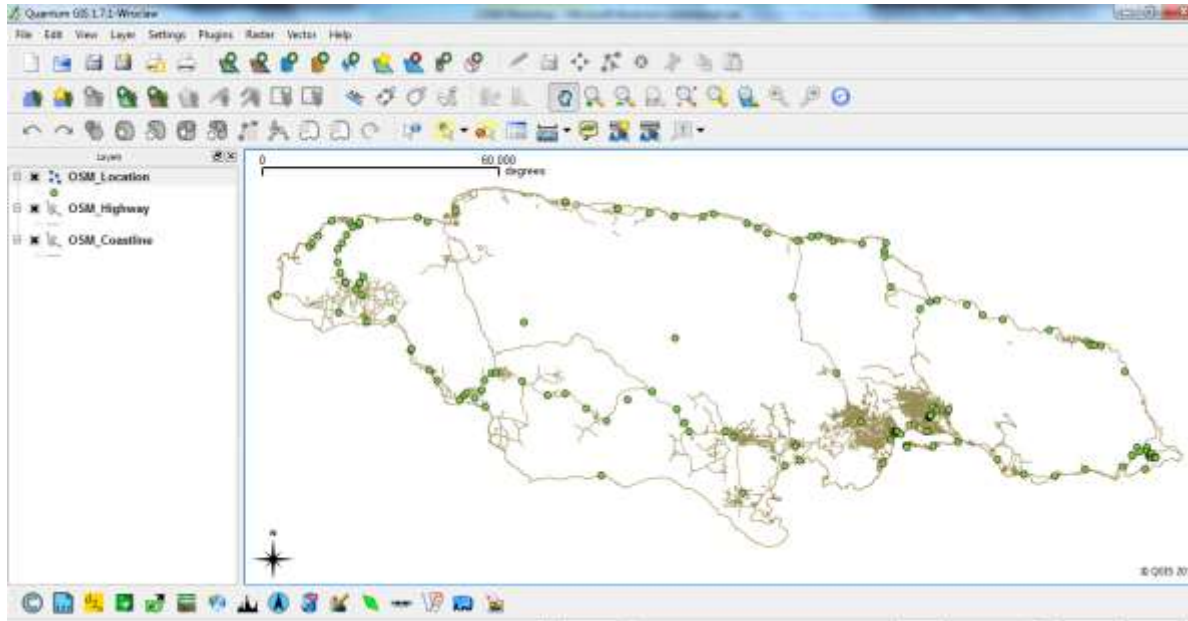
(Select all three files by holding down the **Shift** button as you click on each file)

- Click the **Open** button in the current window and then click the Open button in the **Add Vector Layer Window**





Your view window should look similar to the snapshot below.



Now add a polygon layer containing the parish boundaries of Jamaica (**SALB.shp**). As the polygon layer hides the others layers, *drag and drop* it to the bottom of the Table of Content (ToC).

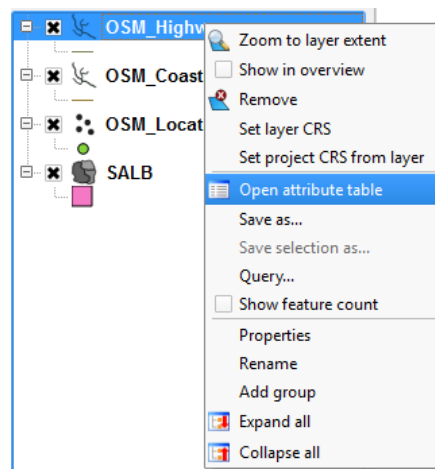


Exploring the Attributes of A Layer

One of the strengths of a GIS is the ability to store information associated with the layer as a part of the layer. This information is referred to as attributes.

To see the attributes of a layer right click on the layer and select **“Open Attribute Table”**

Explore the attributes of the **OSM_Highway** layer. Click on the **NAME** attribute to organize the street names in alphabetical order as illustrated below.





Attribute table - OSM_Highway :: 0 / 7054 feature(s) selected

	TYPE	NAME	ONEWAY	LANES
0	residential	Zinnia Avenue	NULL	0
1	secondary	Young Street	yes	0
2	residential	Wynter Pen Road	NULL	0
3	residential	Worthington Te...	NULL	0
4	residential	Woodlawn Ave...	NULL	0
5	residential	Woodland Rise	NULL	0
6	residential	Woodland Heig...	NULL	0
7	residential	Woodhaven Av...	NULL	0
8	secondary	Woodglen Ave...	NULL	0
9	residential	Winston Ave	NULL	0
10	secondary	Windward Rd	NULL	0
11	tertiary	Windsor Road	NULL	0
12	tertiary	Williams Street	NULL	0
13	tertiary	Williams Street	NULL	0
14	tertiary	Williams Street	NULL	0
15	residential	William Street	NULL	0
16	road	William St	NULL	0
17	secondary	William St	NULL	0

Look for in TYPE

Show selected only Search selected only Case sensitive

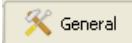
REMEMBER TO SAVE YOUR QGIS PROJECT REGULARLY

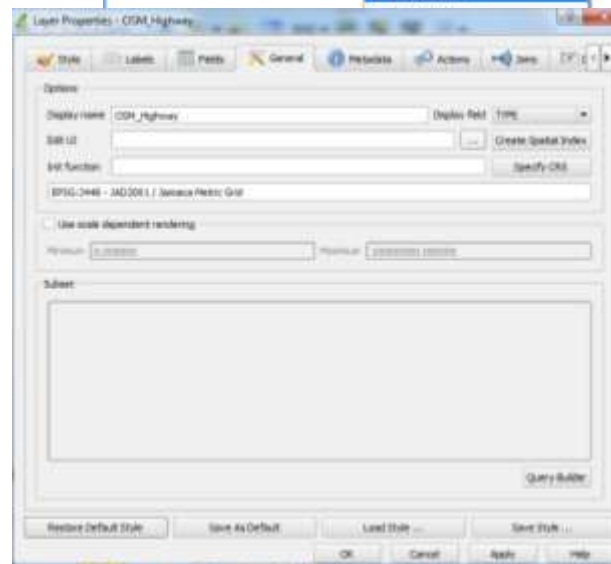
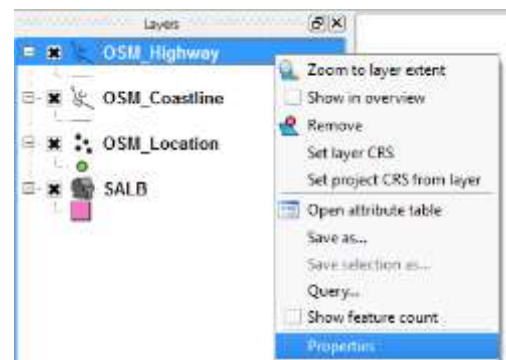


Customizing the way a layer is displayed


Currently the street network layer (OSM_Highway) is displayed showing a single symbol, a line. QGIS, however, allows the user to display the contents of the layer in various ways, using the attributes of the table associated with the layer to customize the appearance of the layer.

Let's see how we can customize the way this layer is displayed. Right Click on the **OSM_Highway** Layer in the ToC. Select **Properties** as illustrated at right. The Layer Properties dialog box opens

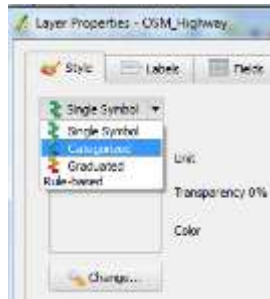
- Rename the Layer by clicking the  **General** tab and typing "Street Network" as the *Display Name*





- You can change the way the layers display with the  Style tab.

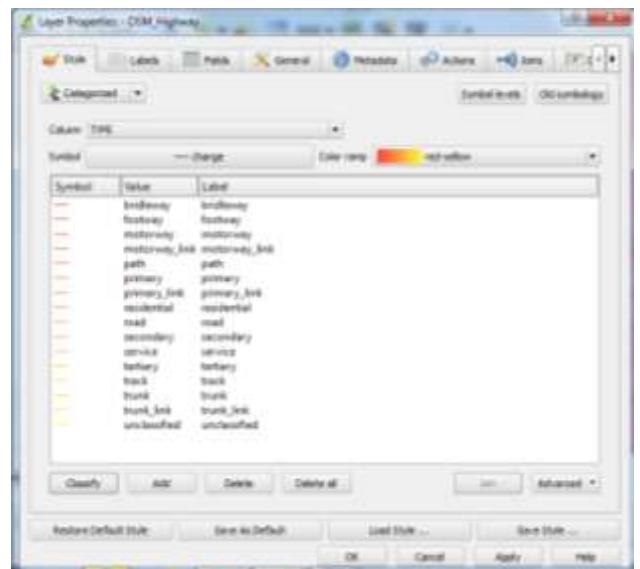
- Click on the drop down arrow beside **Single Symbol** and select **Categorized**



- In order to display the streets by type, set the **Column** to **Type** – this shows the contents of the **TYPE** column in the table

- Set the Color Ramp to red_yellow or New Color Ramp... and experiment with the colours.

- Select Classify to display all the unique street types as illustrated at right. Click OK.



Adding a Raster Layer

Now that you have become a bit familiar with manipulating a vector layer, let's explore how QGIS displays a Raster layer. We are going to add the layer with the Digital Elevation Model of Jamaica. Digital Elevation Models are data files that contain the elevation of the terrain over a specified area, usually at a fixed grid interval over the surface of the earth. The intervals between each of the grid points will always be referenced to some geographical coordinate system. The closer together the grid points are located, the more detailed the information will be in the file

- Select **“Add Raster Layer”** from the **Layer** pull down menu or click
- Add the layer **SRTM_JAM.tif** and move it to the bottom of the list layers in the Table of Contents. Turn off the layer with the parishes.



of

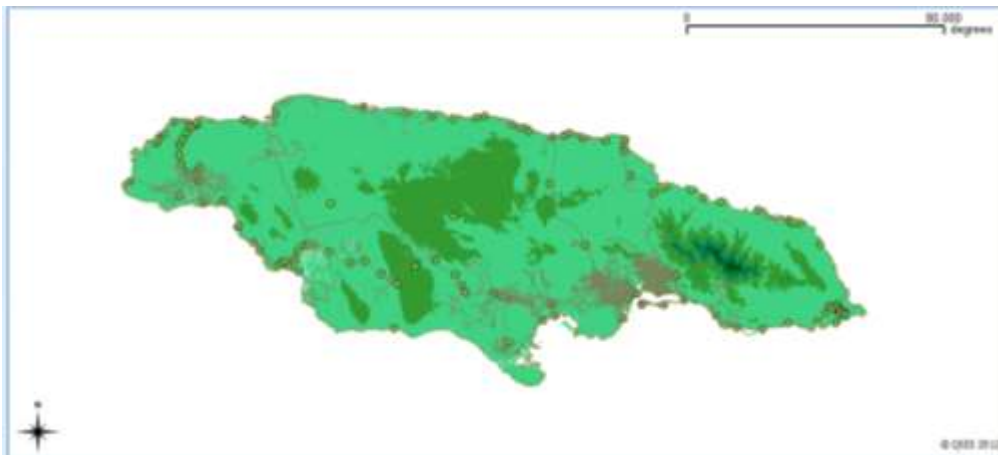




Let's customize this layer with the common **Layer Properties** function:

- **Style** tab: Set the *Color map* to **Colormap**,
- Move to the **Colormap** tab: Set the *Number of entries* to **5** and click the **Classify** button.
- Change the **Value** and the **Color** of each category by double clicking them.
- To avoid displaying the ocean, set the **No data value** to 0 in the **Transparency** tab of the layer **Properties**.
Try to get your map looking similar to the snapshot below.

Value	Color
-17.000000	
0.000000	Blue
500.000000	Light Green
1000.000000	Dark Green
2246.000000	Very Dark Green



Flooded Area Exposure

The aim of this session is to view and explore the land areas potentially exposed to floods due to tropical cyclones and secondly to estimate the population and assets that will be affected.

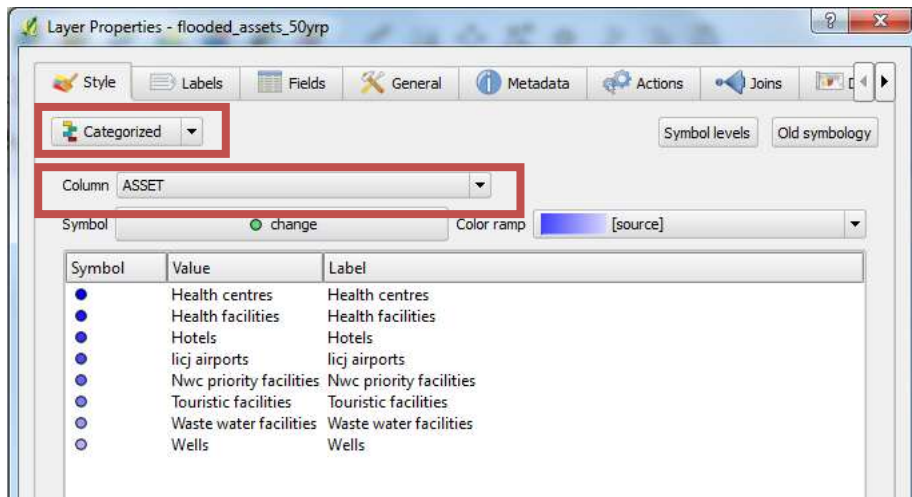
To do so an aggregated version of the Digital Elevation Model (DEM) was used, and the maximum elevation of wave height calculated during the wave modeling for two return period (10 and 50 years). A population distribution raster as well as an assets location layer was also used. For the purpose of this exercise, the detailed calculations involved in identifying the flooded areas and estimating the elements at risk are already done for you. Your task now is to view these layers in QGIS.

- Open a new project in QGIS
- You are now going to explore the layers showing the flooded areas for the 10 and 50 year return periods as well as the assets and population at risk for both periods. Add the following layers:

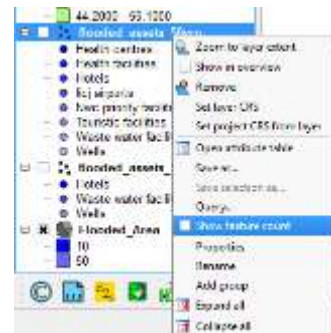
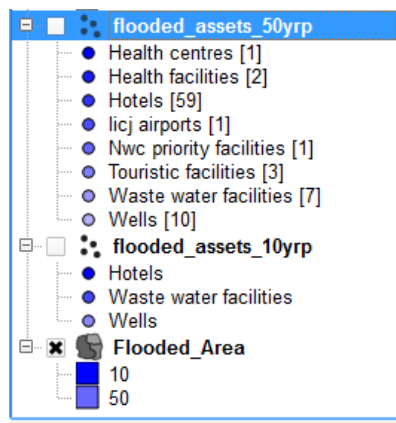




- **Flooded_Area** – Flooded area - 10 and 50 year return periods
 - **flooded_assets_10yrp** – assets at risk in the event of a 10 year flood
 - **flooded_assets_50yrp** – assets at risk in the event of a 50 year flood
 - **Pop_Exp_10yrp_1km2** – population at risk in the event of a 10 year flood
 - **Pop_Exp_50yrp_1km2** – population at risk in the event of a 50 year flood
- Now Customize each layer in your Table of Contents. Use the **DN** column to categorize the Flooded_Area layer
 - Use the **Asset** column to categorize the flooded assets layers as illustrated below.



You can now see which assets are at risk. Right Click on the layer and select “Show Feature Count” to display the number of assets at risk. Your TOC should look similar to the one below.

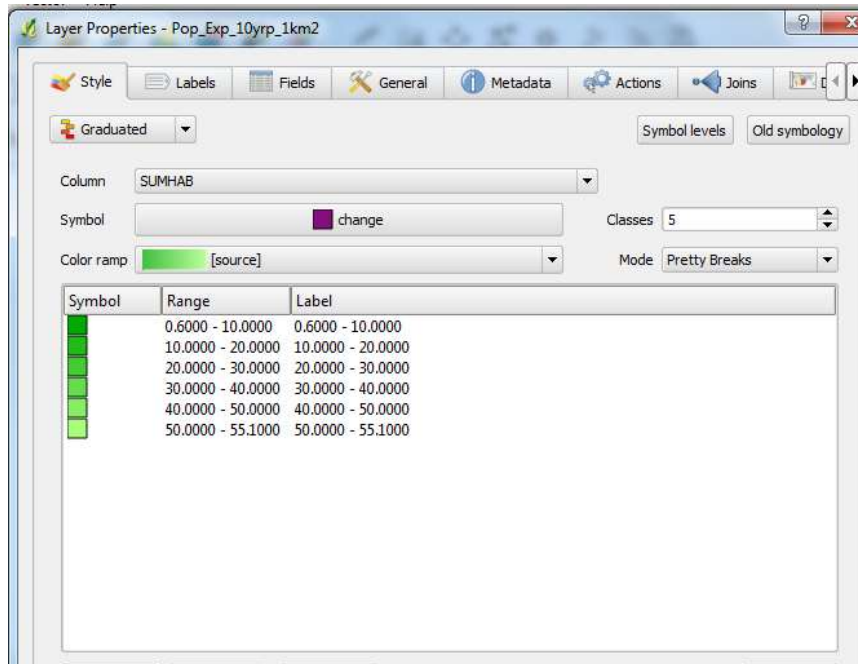


Compare the numbers and types of assets at risk for both return periods. What observations can you make?

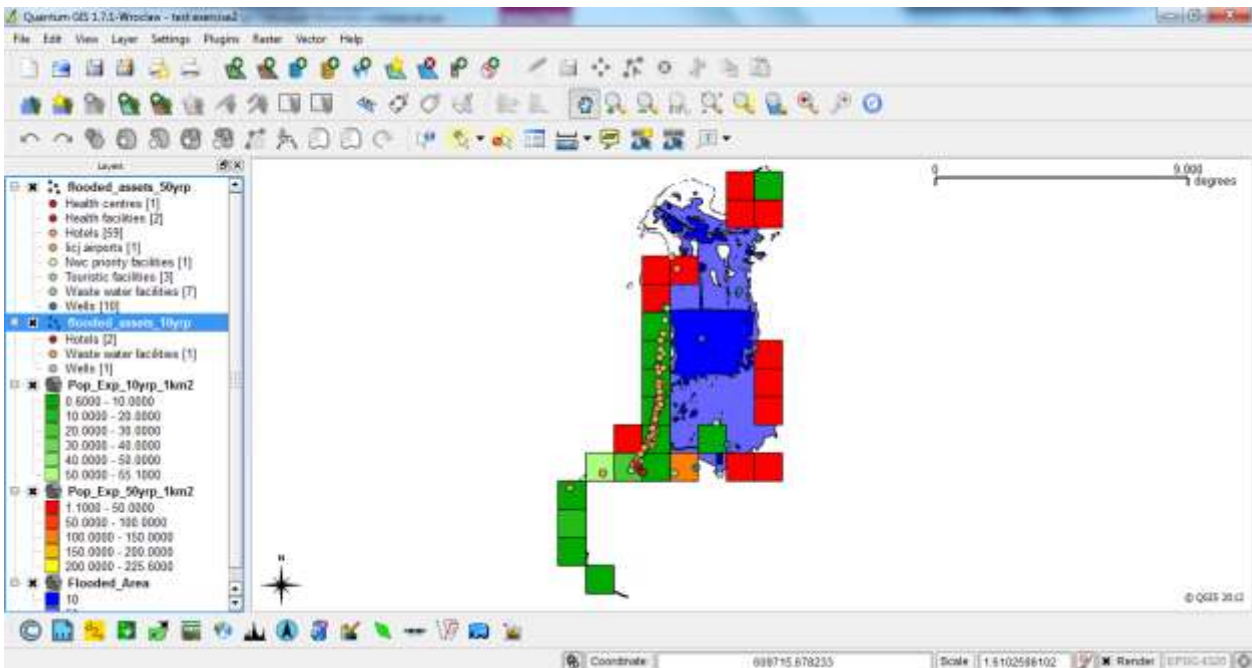




- Use the **SUMHAB** column (number of persons living in each 1km² cell) to customize the **Pop_Exp** layers as illustrated below. Use the Pretty Breaks mode with 5 classes as illustrated below



Your view should look similar to the snapshot below



What observations can you make from viewing both population layers? Discuss among yourselves how this information can be used to support climate change adaptation efforts.

END OF EXERCISE

