PRACTICAL 1

Practical 1 - Familiarizing Quantum GIS: Installation of QGIS, datasets for both Vector and Raster data, Maps.

1. Installation of QGIS

To install QGIS, follow these steps:

For Windows:

1. Visit the official QGIS website: https://qgis.org
2. Download the latest **QGIS Standalone Installer** for Windows.
3. Run the installer and follow the installation steps.
4. Launch QGIS Desktop from the Start Menu.

For Mac:

1. Download the QGIS Mac Installer from QGIS official website.
2. Open the downloaded .dmg file and follow the installation instructions.

For Linux:

1. Open a terminal and use the following command for Ubuntu-based distributions:

sudo apt update

sudo apt install qgis

2. For other Linux distributions, follow instructions from the QGIS website.

2. Understanding Datasets in QGIS

QGIS works with **Vector** and **Raster** datasets.

Vector Data

Vector data represents geographic features using **points, lines, and polygons**. Common formats:

- **Shapefiles (.shp)**
- **GeoJSON (.geojson)**
- **KML (.kml)**
- **GPX (GPS data format)**

Adding Vector Data in QGIS

1. Open QGIS.
2. Click on **Layer → Add Layer → Add Vector Layer**.
3. Browse to select a **.shp**, **.geojson**, or other vector file.
4. Click **Open** to load the data.

Raster Data

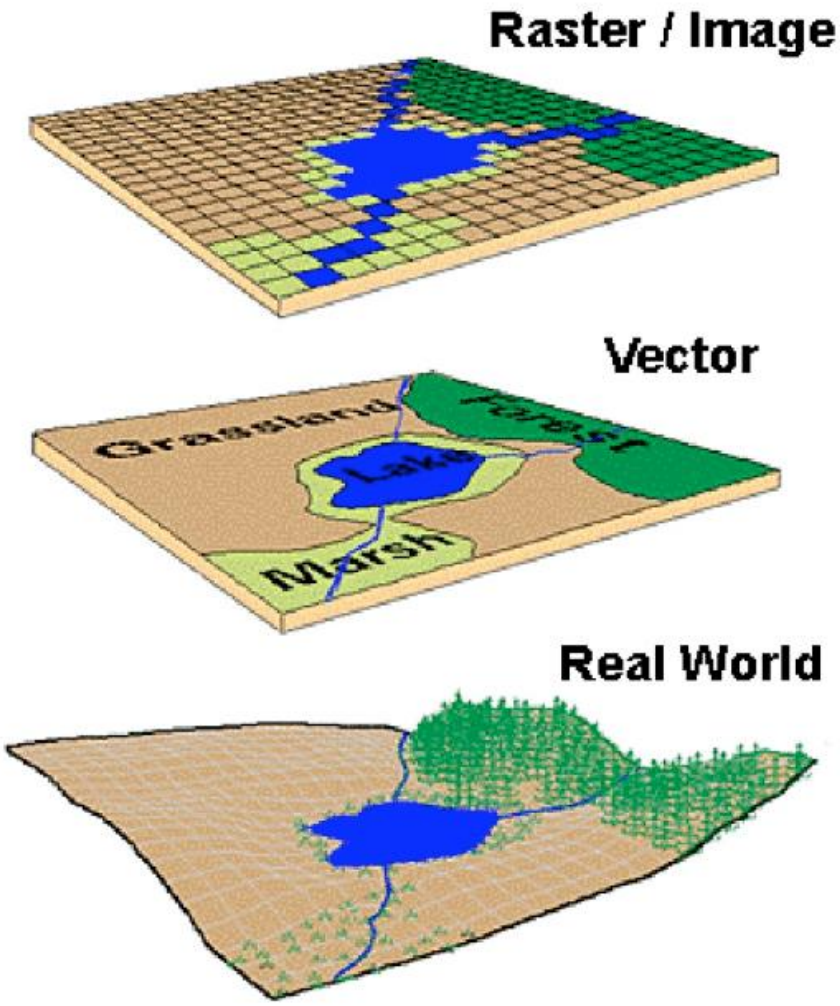
Raster data consists of grid-based images such as satellite imagery and elevation models. Common formats:

- **GeoTIFF (.tif)**
- **JPEG (.jpg)**
- **PNG (.png)**
- **DEM (Digital Elevation Model)**

Adding Raster Data in QGIS

1. Open QGIS.
2. Click on **Layer → Add Layer → Add Raster Layer**.
3. Browse and select a **.tif** or other raster file.
4. Click **Open** to visualize the raster dataset.

3.



Working with Maps in QGIS

Creating a Basic Map

1. Load vector and raster layers as described above.
2. Use the **Layers Panel** to manage visibility and symbology.
3. Apply symbology:
    - Right-click on a layer → **Properties** → **Symbology**.
    - Choose colors and styles.
4. Use **Labels**:
    - Right-click on a layer → **Properties** → **Labels**.
    - Enable and configure labeling for better visualization.

Exporting a Map

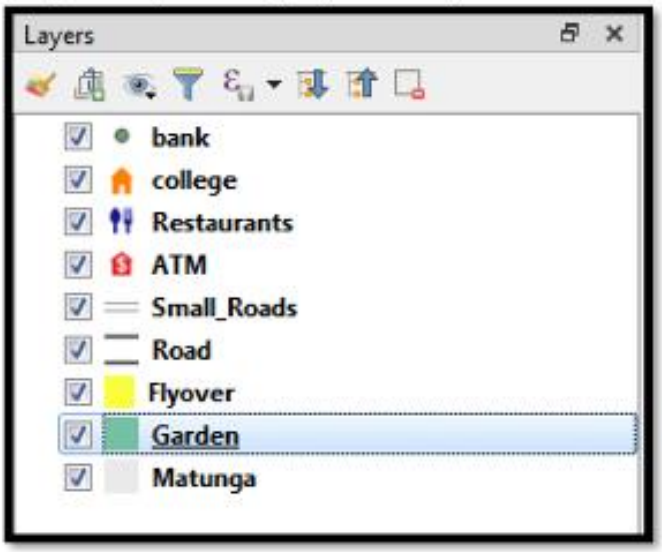
1. Go to **Project → New Print Layout**.
2. Add map elements like title, legend, and scale bar.
3. Click **Layout → Export as PDF/PNG** to save the map.

PRACTICAL 2

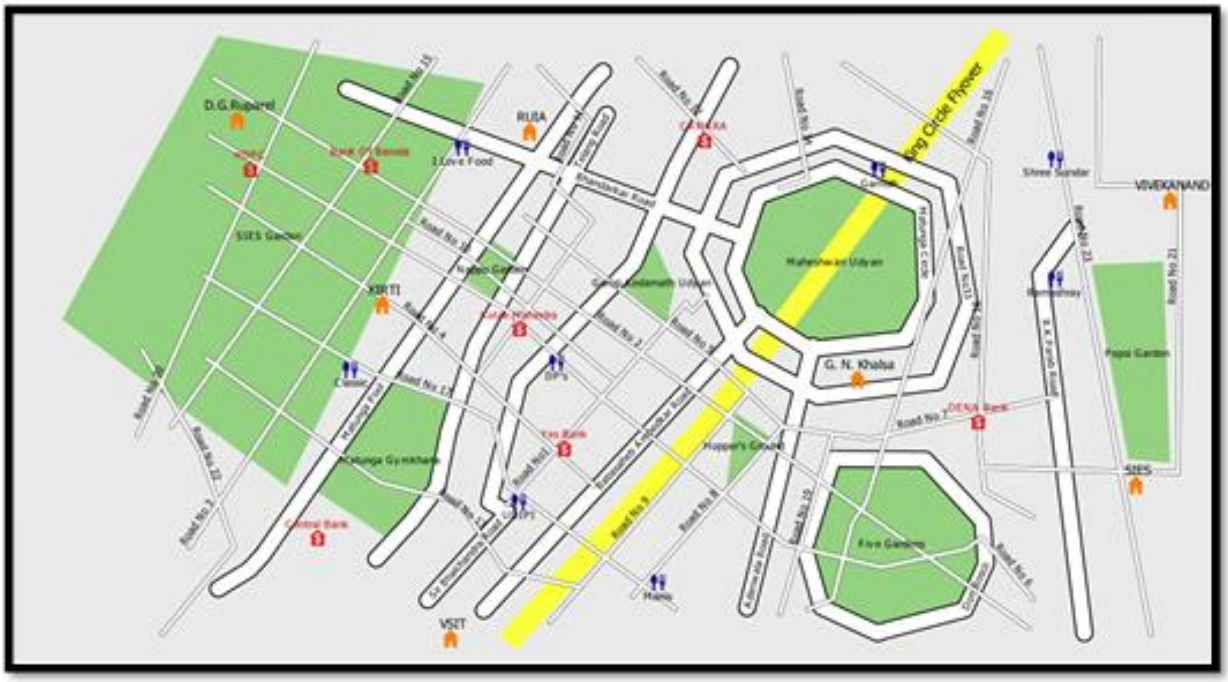
Practical 2 - Creating and Managing Vector Data: Adding vector layers, setting properties, formatting, calculating line lengths and statistics

a. Adding vector layers (Polygon, Line, Points)
   - Polygon layers (We have taken **2** layers Matunga, Garden)
   - Line layers (We have taken **3** layers Small_Roads, Road, Flyover)
   - Point layers (We have taken **4** layers bank,college,Restaurants,ATM)

b. Setting properties (Labeling, Symbolism)



- **Our aim is to create map representing a location and its surrounding as follows:**

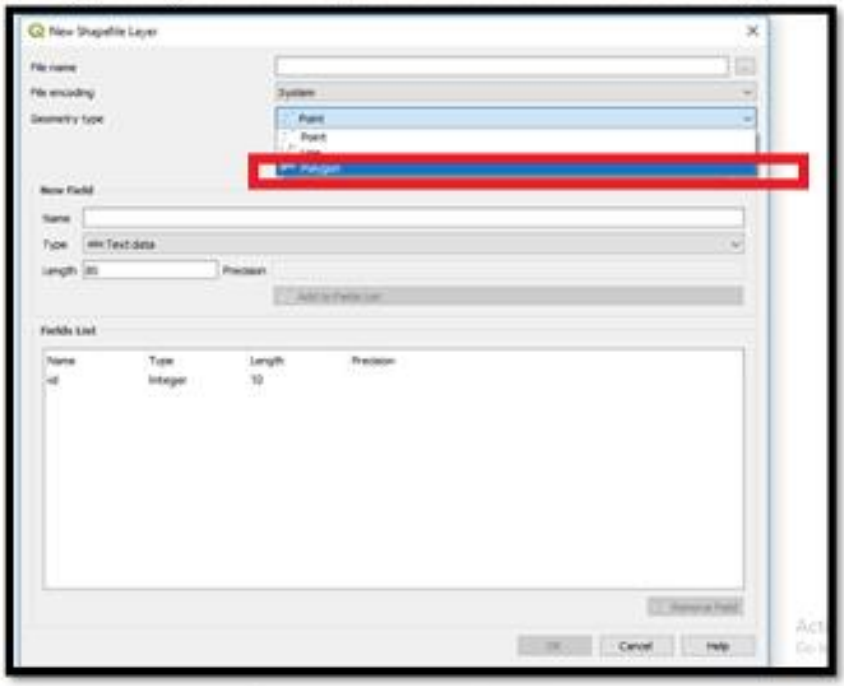


a) Creating Polygon vector layer

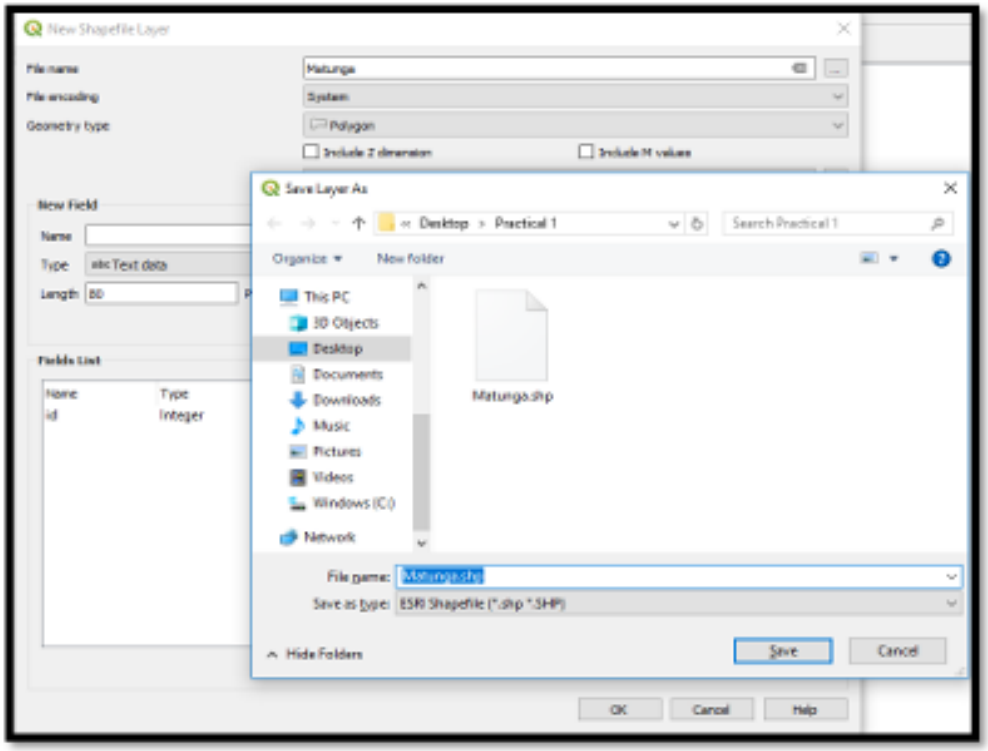
- Select **Project→New**

- Select **Layer→Create Layer→New Shapefile Layer**

- Following dialog box will appear on the screen. Select Polygon option from Geometry type.



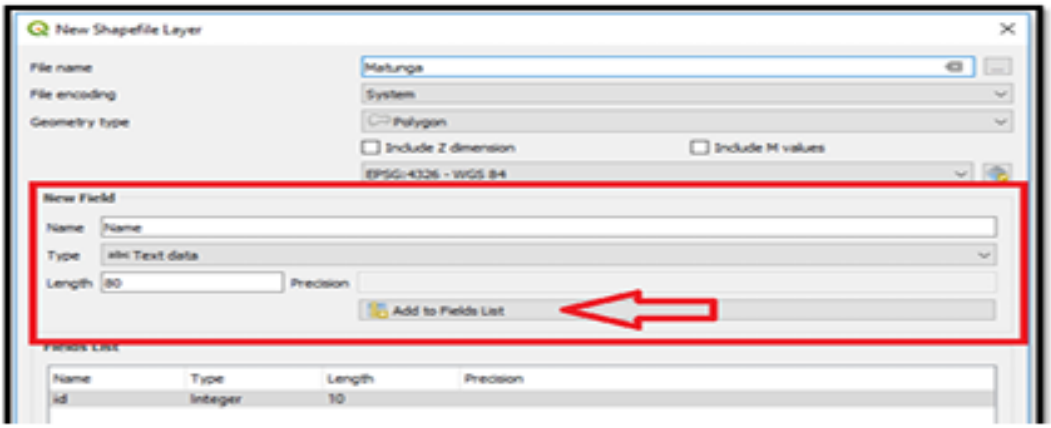
- Fill the appropriate information in each text box.
  - File name :
    - By default the file will be saved in bin folder.
    - To avoid it click on following button to change the location of file.



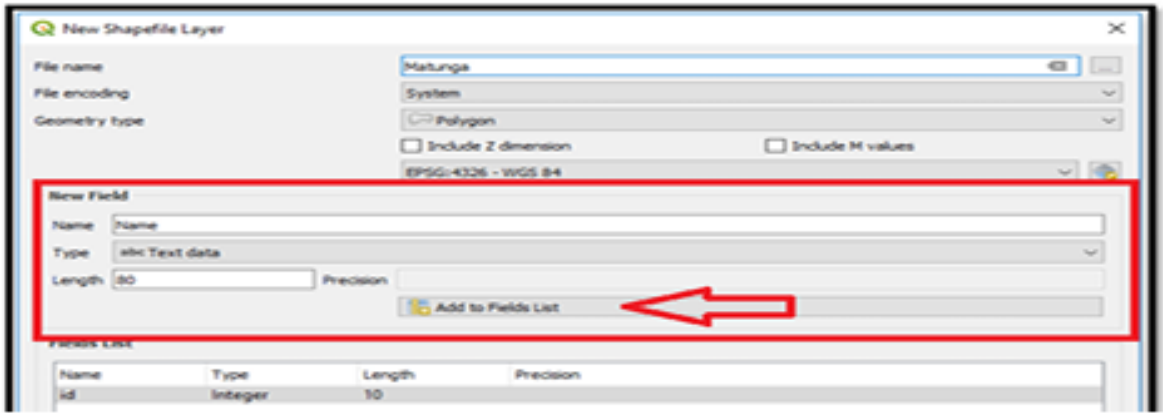
- **Field Panel**
  - Add the **Attribute** you want to show. (**Column Name** for Table)

b. Specify **Type (DataType:**Text Data/Decimal Data/Whole Number/Date**)** of Attribute

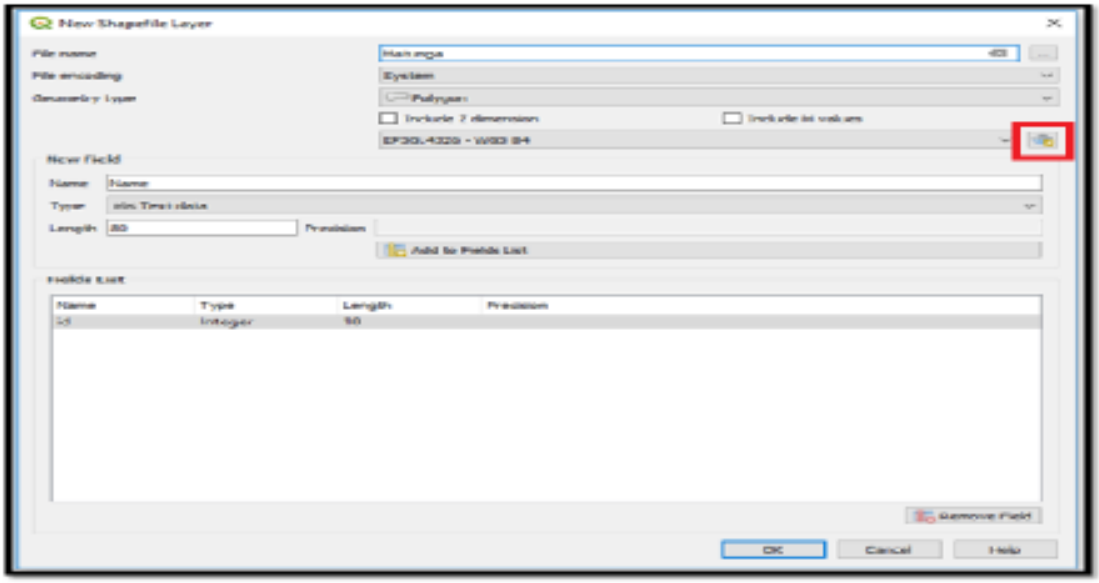
c. Specify the **Length** of the Attribute. Specify **Precision** (If **Data Type** is **Decimal**)



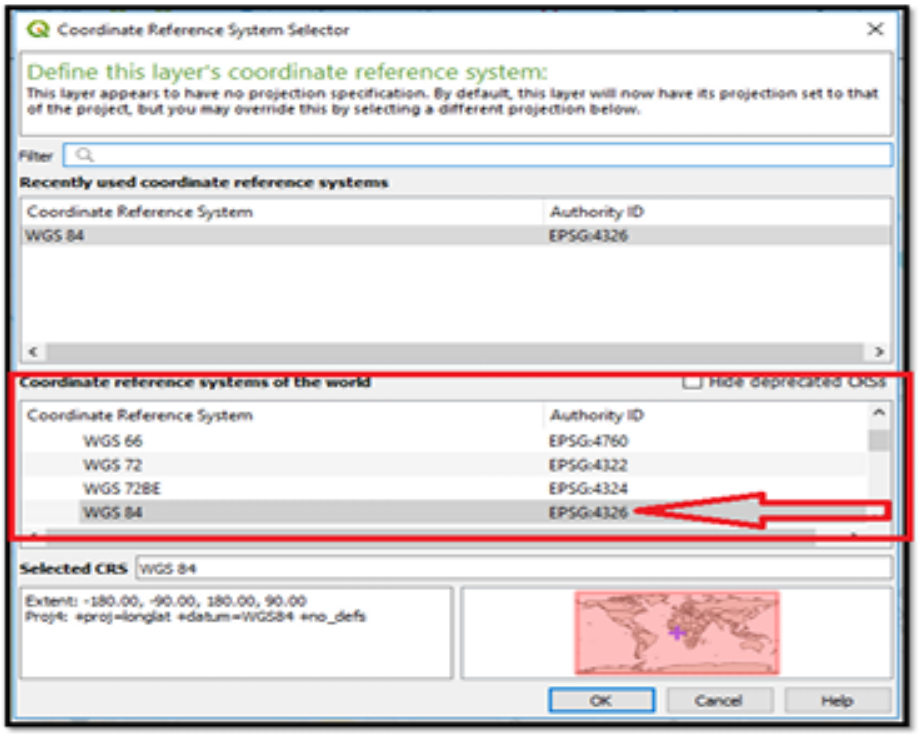
- Click on **Add to Field List** Button.
- You can add as many **fields (Column Name)** as you want for the layer.



- Select Geometry Type as follows
  - Click on the following button

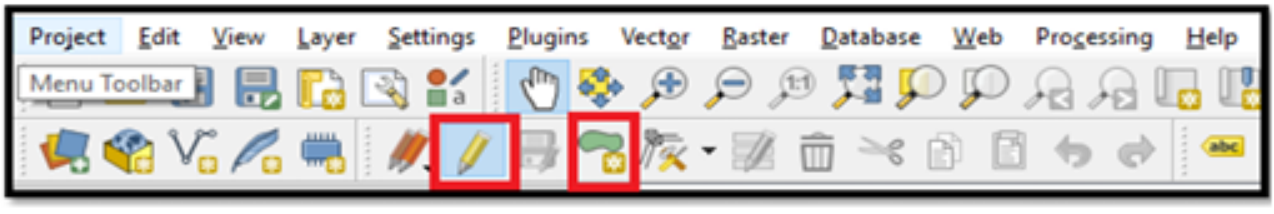


- The CRS dialog box will appear on screen. Click on the WGS84 option and it will be selected as follows. click on **OK**

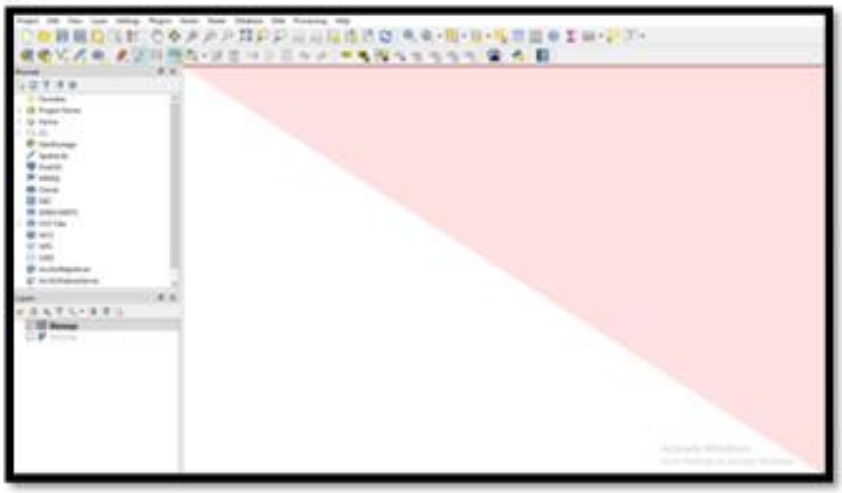


a) Follow the steps to plot **Polygon features.**

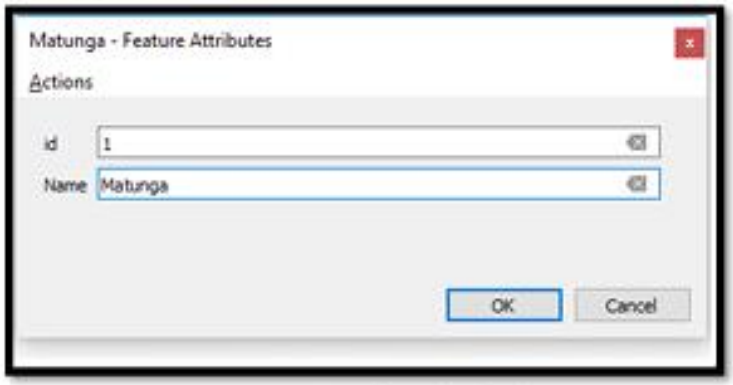
- Select the **Polygon Feature(** In our case it is **Matunga** for **background)** from layer panel



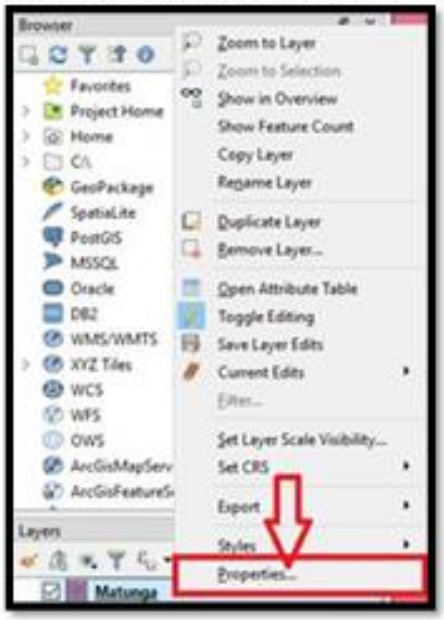
- Click **Toggle Editing Button**  → Click on **Add Polygon**  →Now place the cursor at the location where you want to place the polygon. for **polygon** layer **minimum 3 points** should be selected



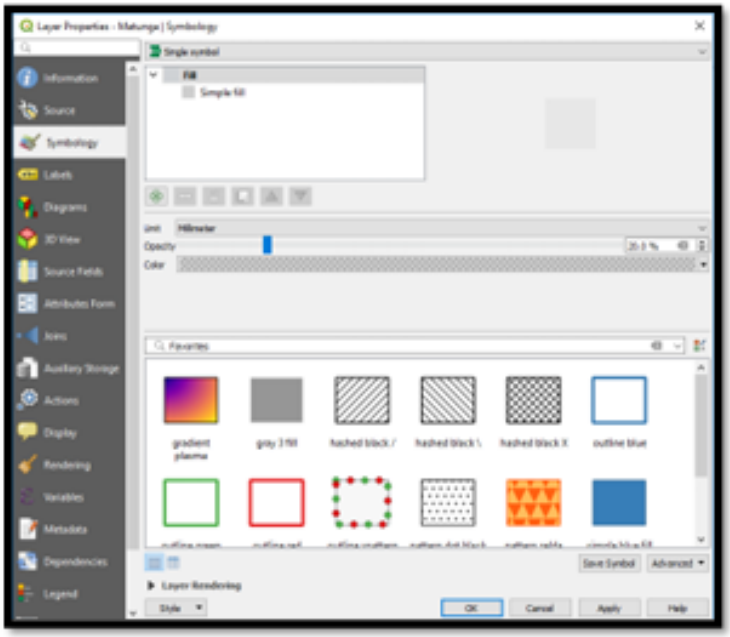
- Save the newly added polygon as follows.



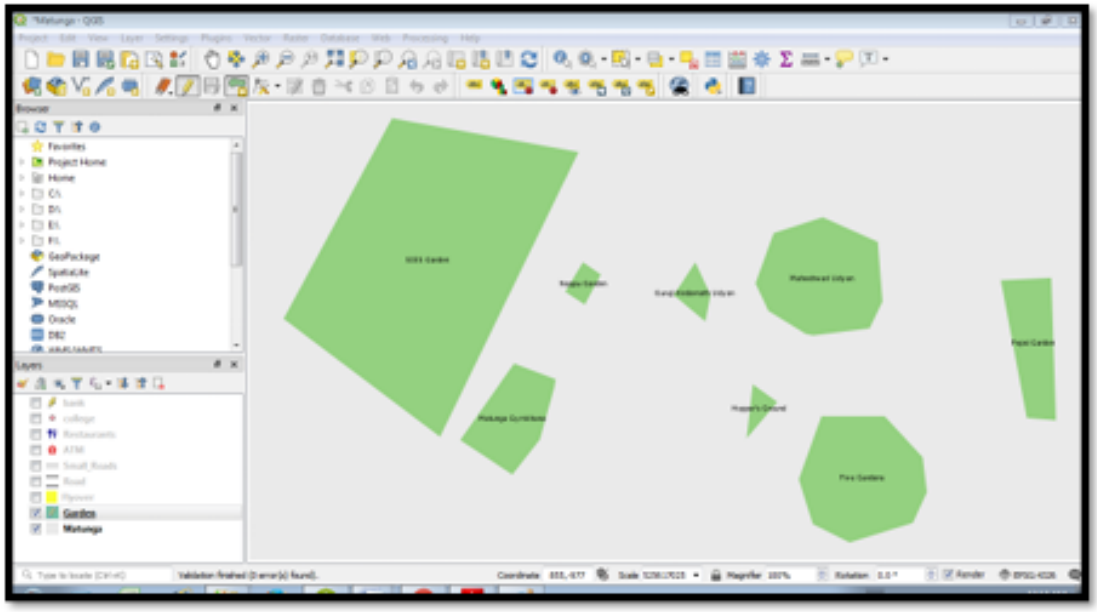
- Set **style** for polygon by using property window(**Right click** on Matunga Layer)



- Following screen will appear on the screen. Select **pattern** as you want and **click** on **OK**.

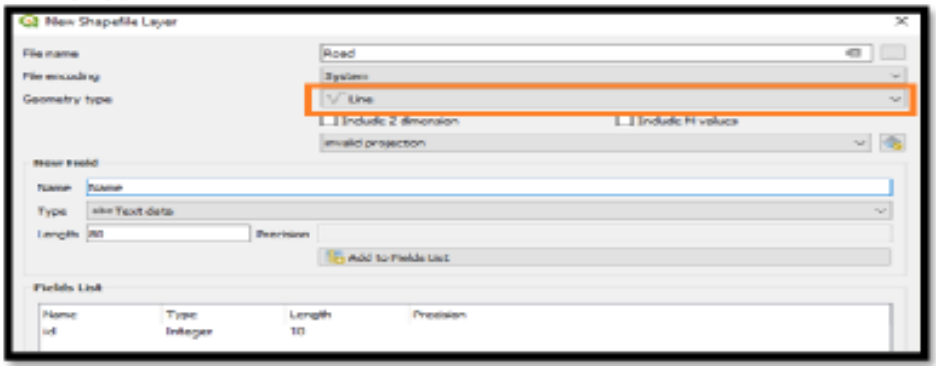


- Same way we can add one more polygon layer for Gardens.



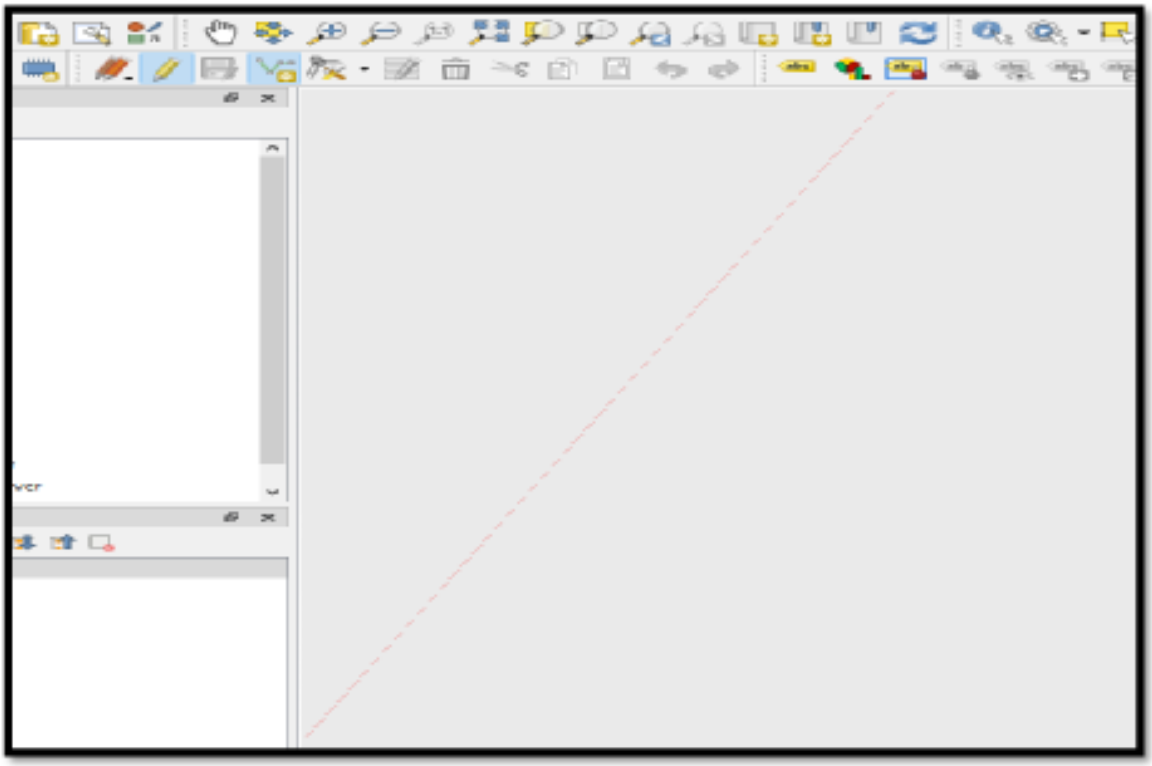
b) <u>Creating Line vector layer</u>

- Repeat the same steps as we have done for polygon layer.
- Select geometry type Line.

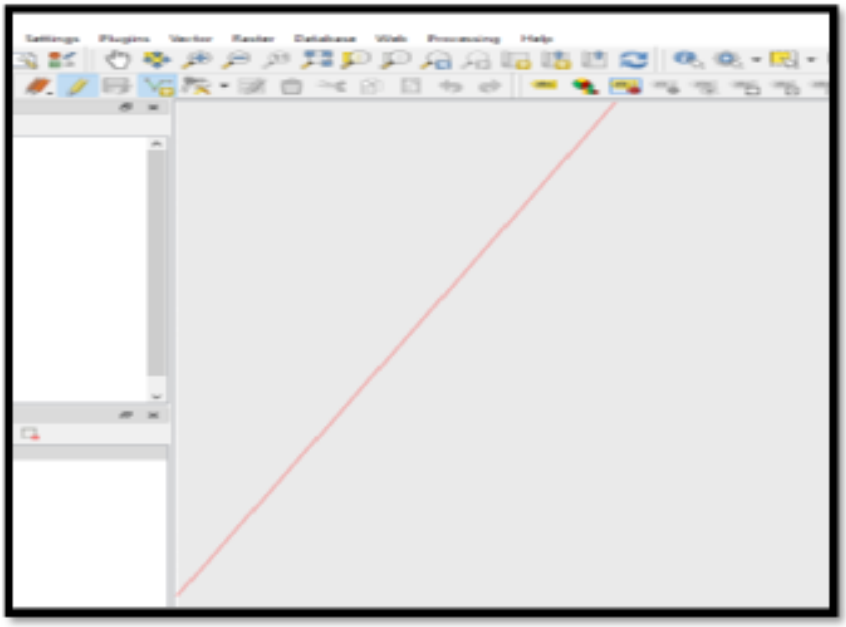


- **Road layer :**
  - To plot road **click** on **Add Line Feature**.

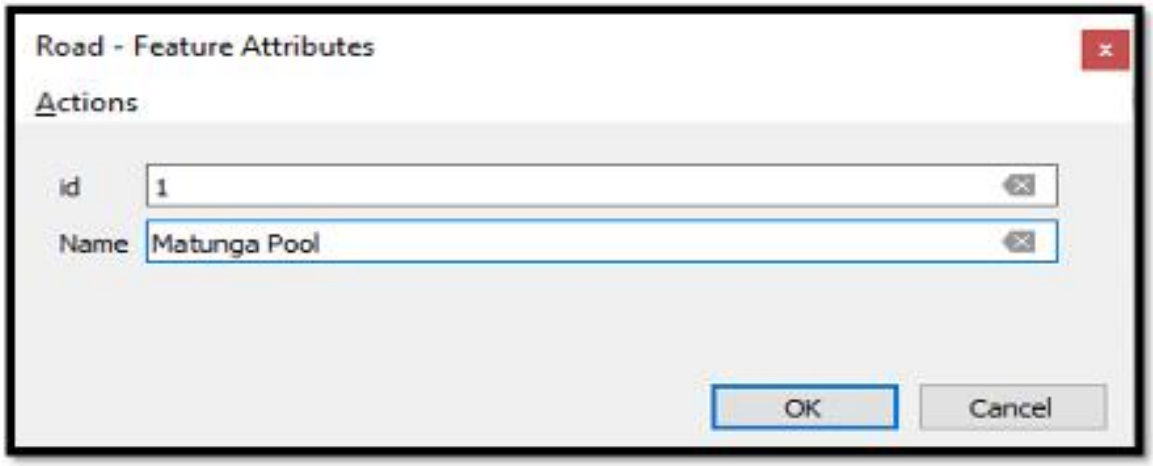
  - Click on the map where you want to draw line.



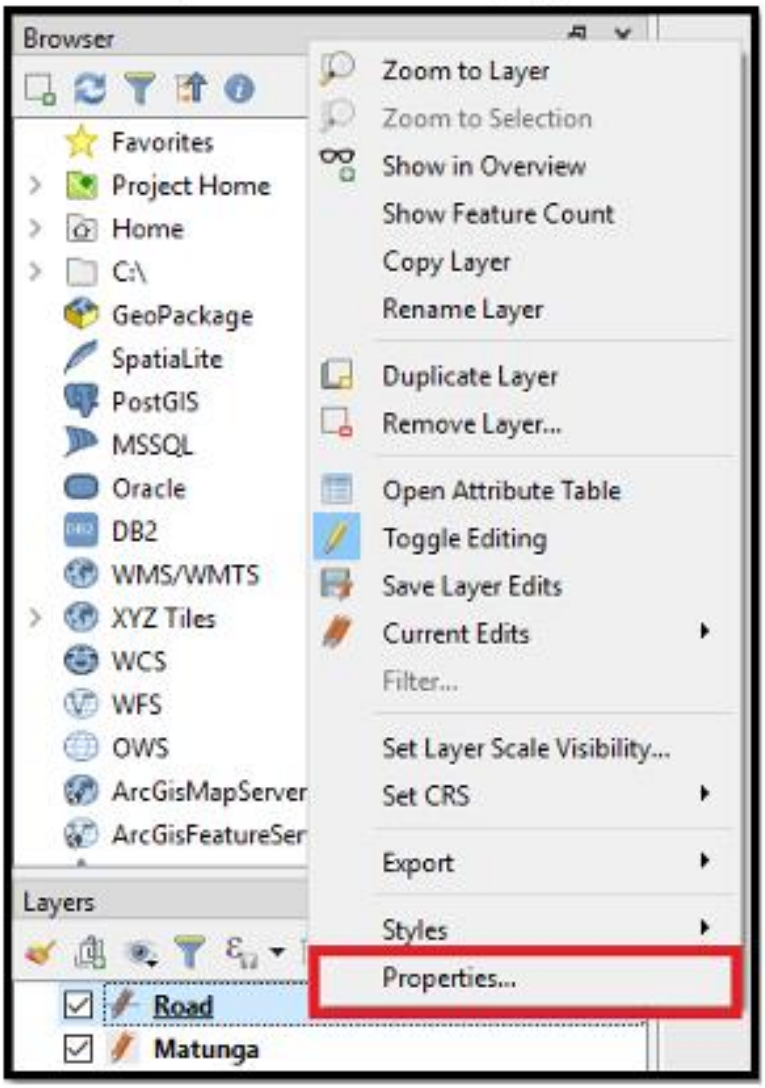
  - Once you are done then **right click** on map (**Dotted line** turn into **solid line**)

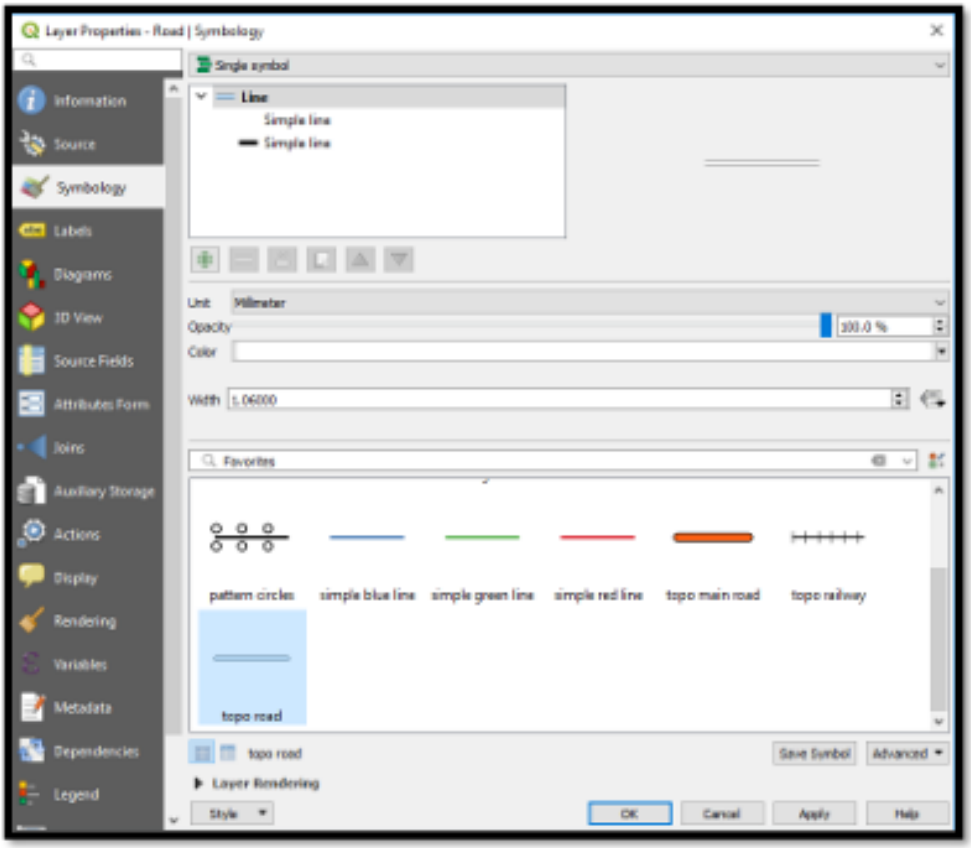


  - **save** your data

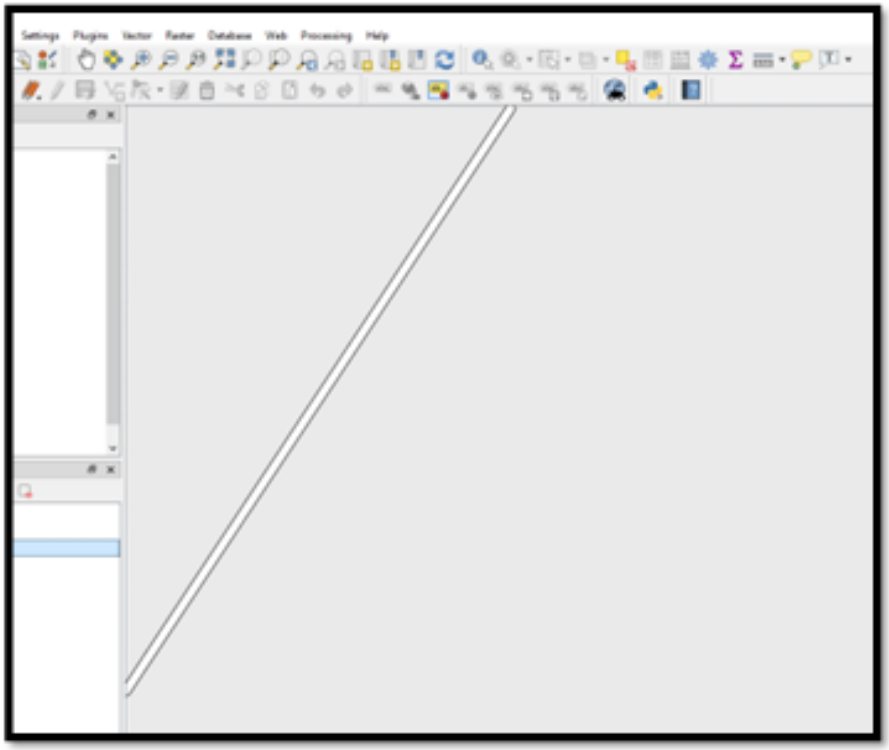


- set **style** for Roads in the same way as we have done for polygon

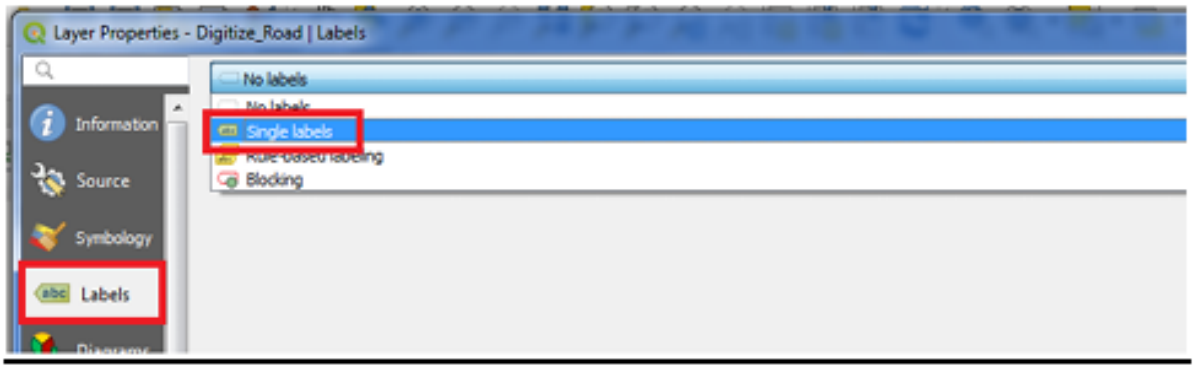




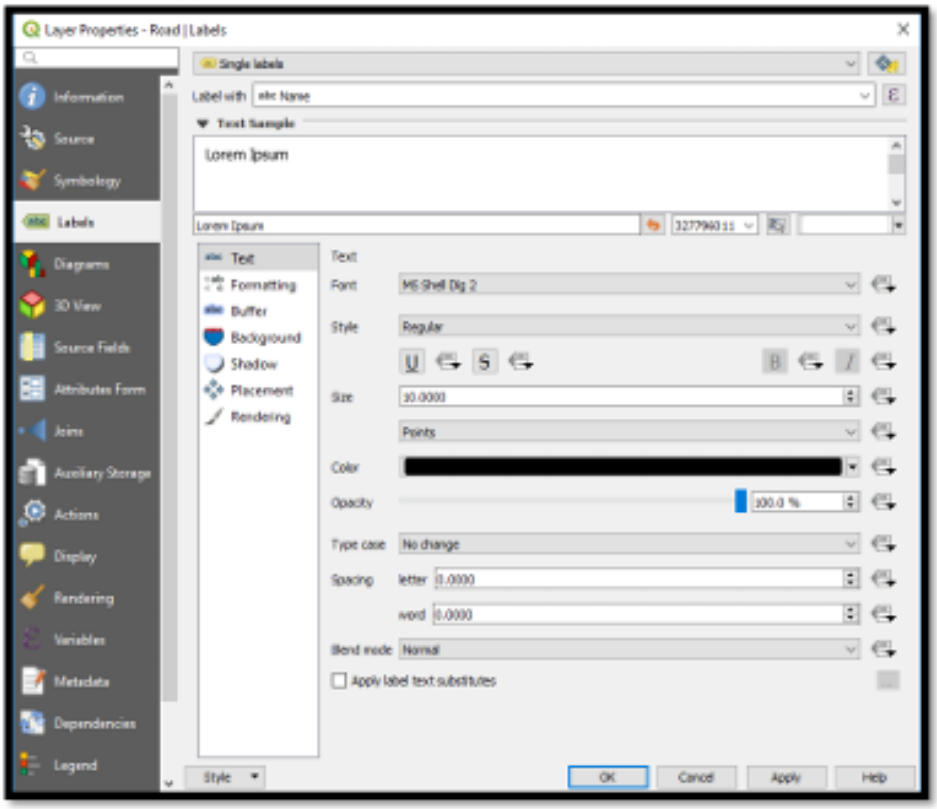
- Road will look as below



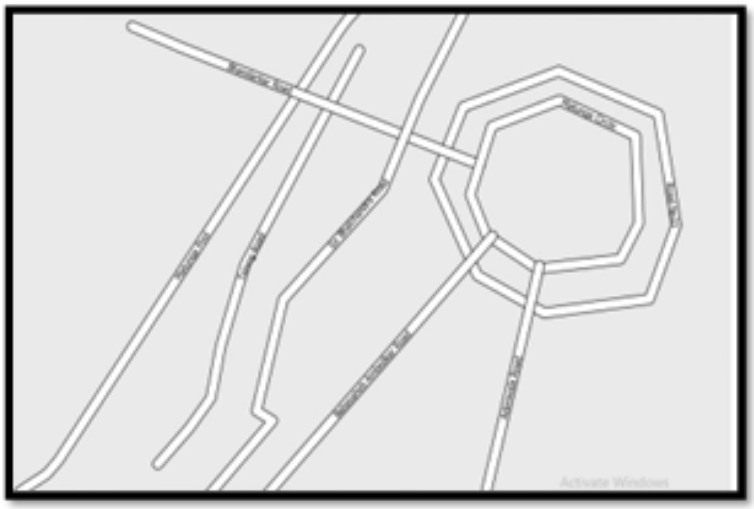
- To label your roads **Right click** on **Road layer** .Go to **properties** window then select label and set single **label property**



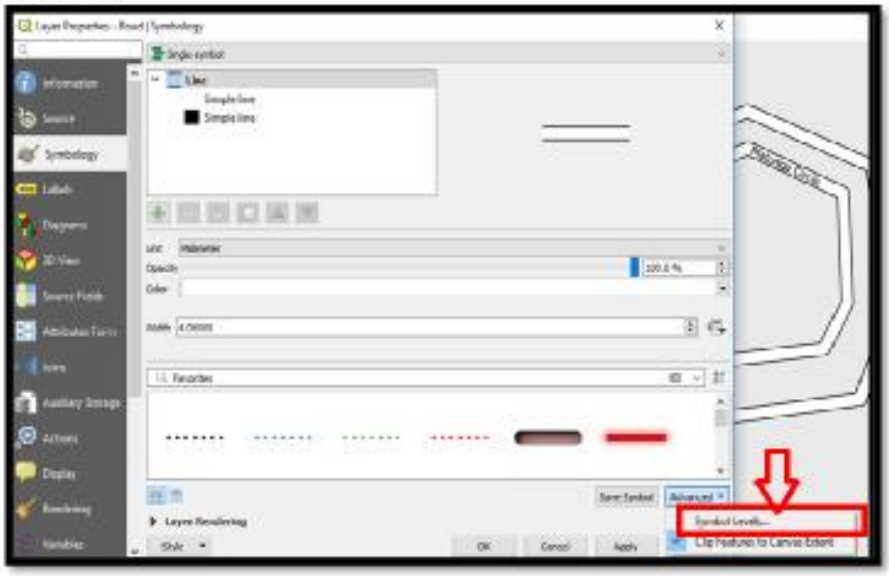
- Following window will appear on the screen



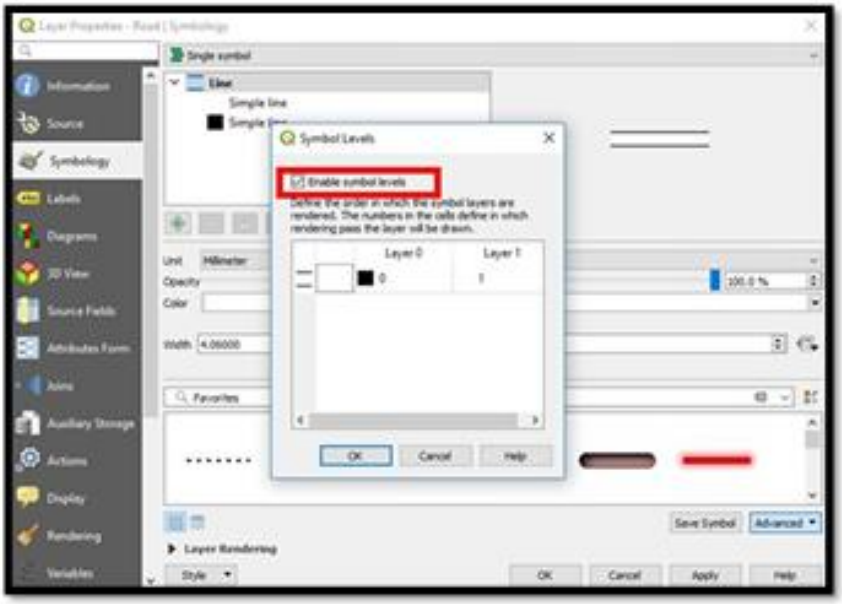
- Roads will look like these



- To merge roads
  - Go to **properties** of road then select **symbology**. Click on **Advanced button** select Symbol levels.



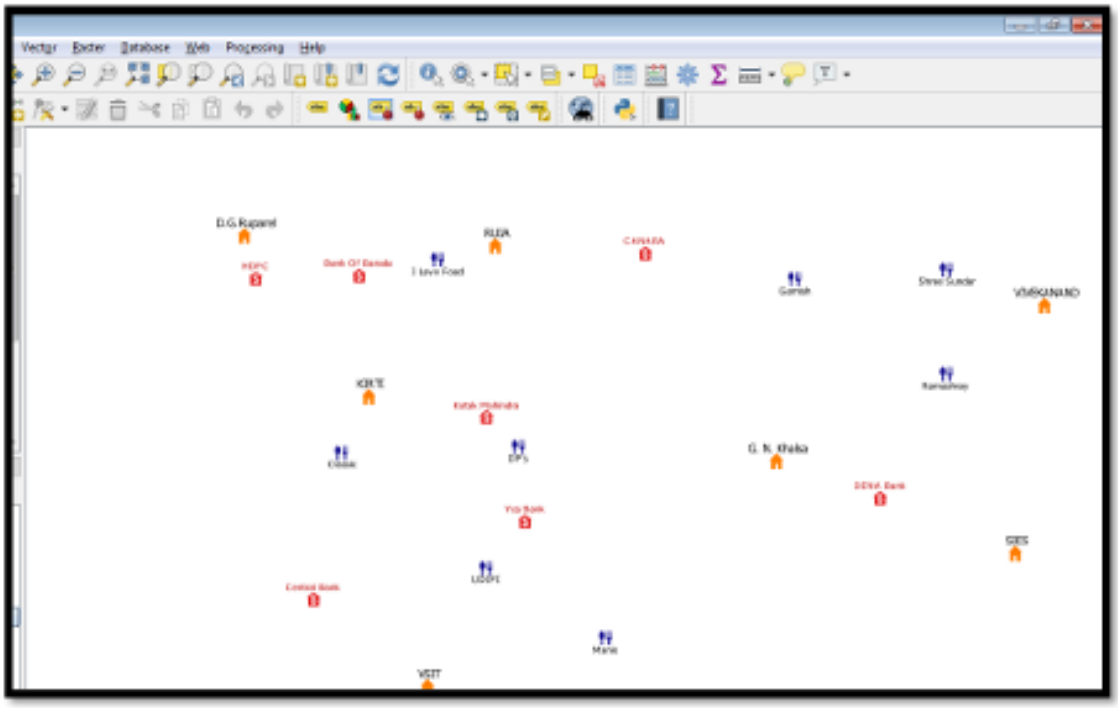
- Check **Enable symbol levels** option



- Click ok & Road will appear as follows

C. Create Point vector layer

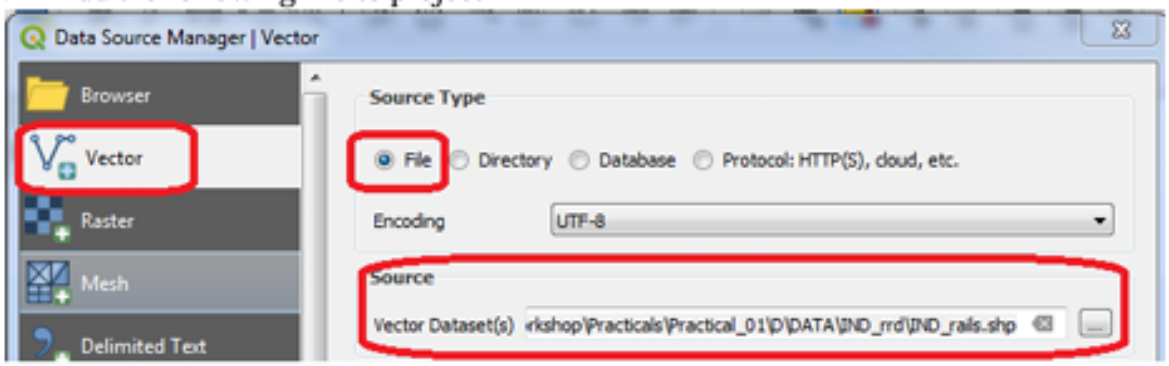
- Repeat same steps to add point layers as we have done in previous layers.(For ATM, Restaurants, Banks, Bus Stops etc)



Final output:

d) Calculating line lengths and statistics

- Go to Layer → Add Layer → Add Vector Layer
- Add the following file to project

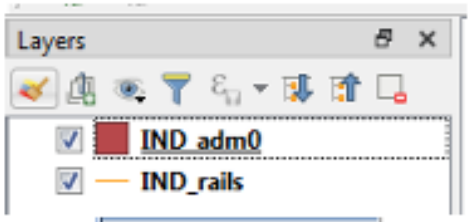


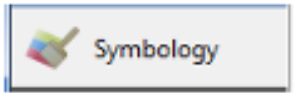
"\GIS_Workshop\Practicals\Practical_01\D\DATA\IND_rrd\IND_rails.shp"
Press "ADD"

- Also add India Administrative Map

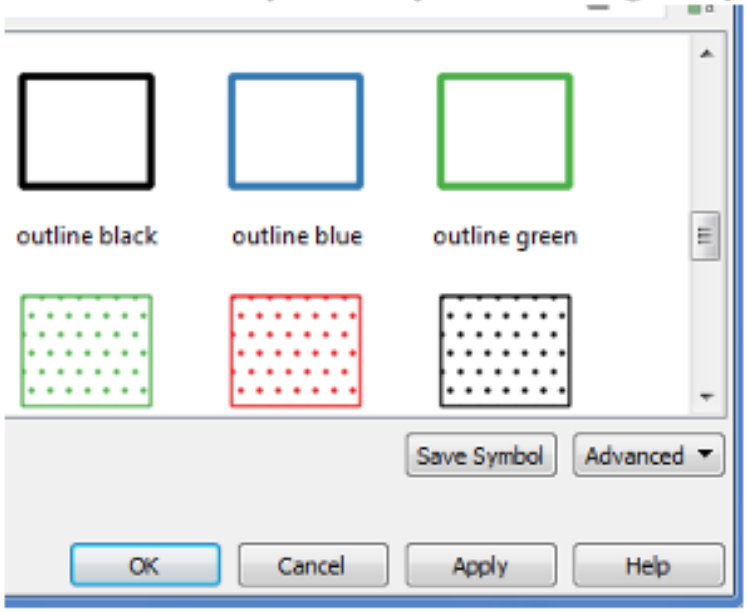
"GIS_Workshop\Practicals\Practical_01\D\DATA\IND_adm\IND_adm0.shp"

- Double Click on IND_adm0



Select 

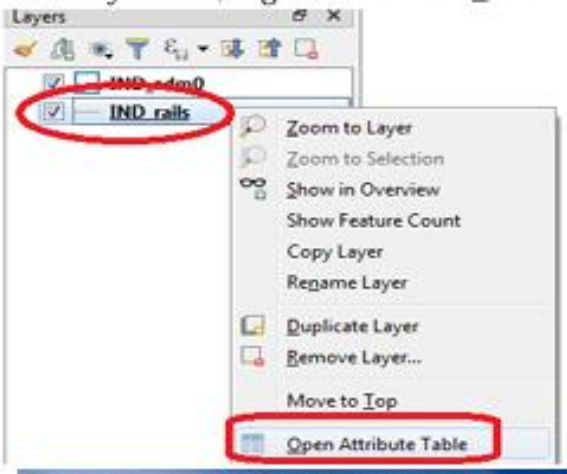
→ Select any outline style from below given options.

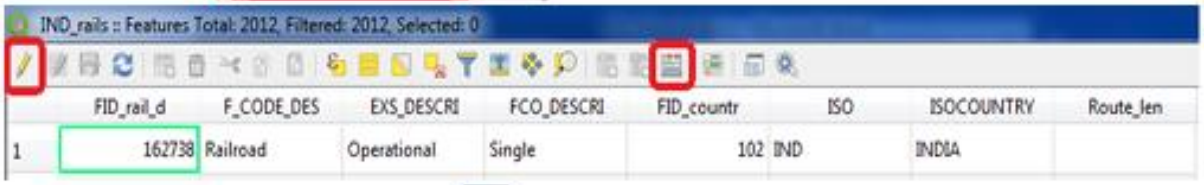


Press OK

- The display window will appear like

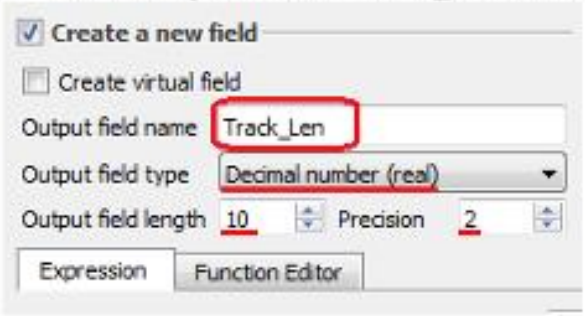
➢ In Layer Pane, Right click on IND_rails → Open Attribute Table



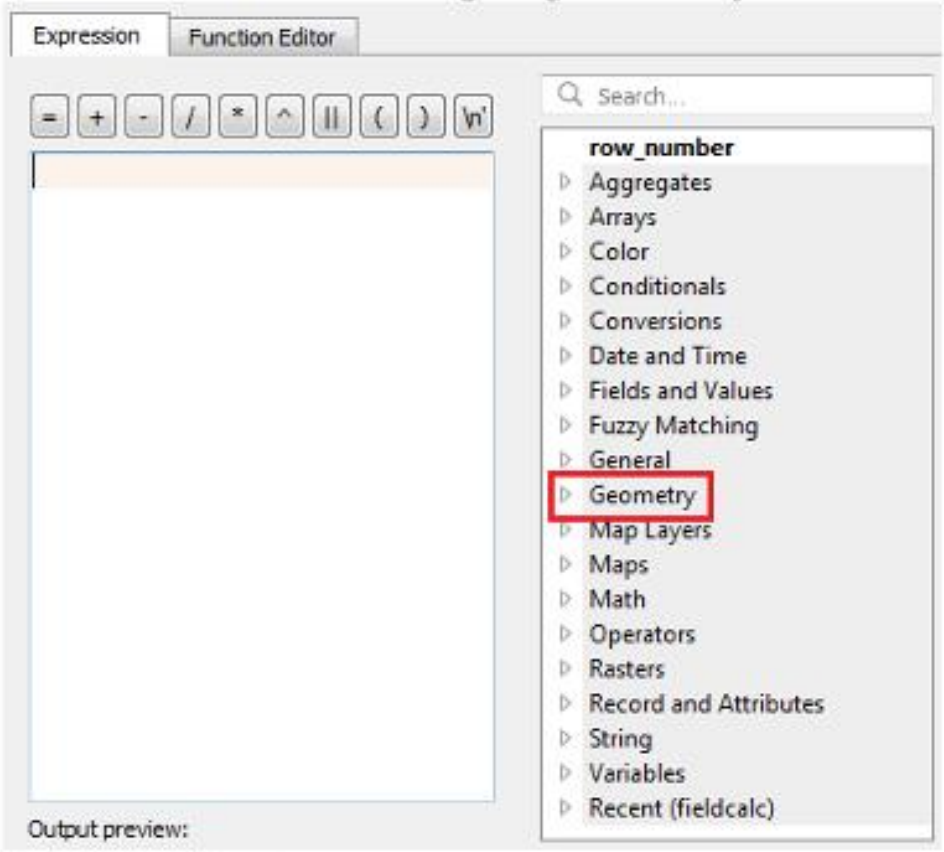


➢ Press Toggle Editing button using  button, on Attribute table window toolbar.

- Press Open Field Calculator using  button.
- Set the output field as “Track_Len”, field type to “Decimal Number”.



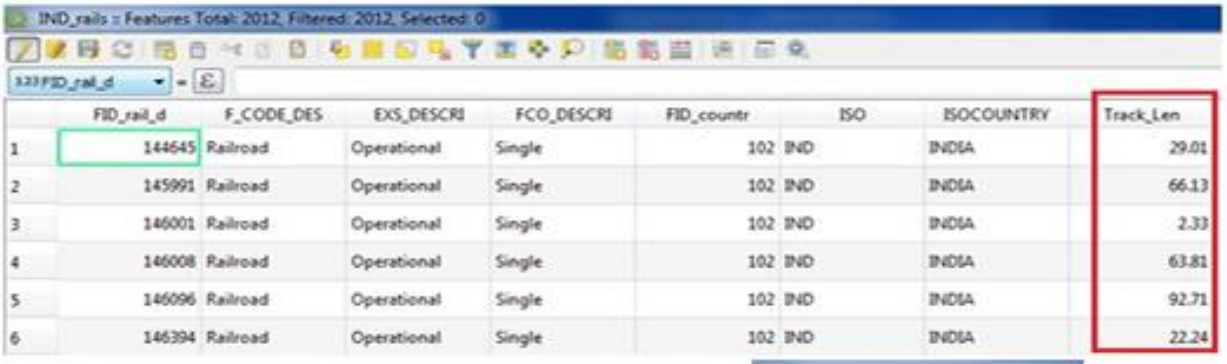
- From Function List search $length or go to Geometry → Select $length

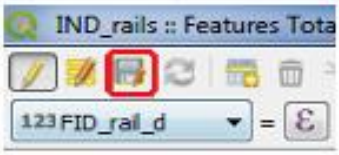


- Set expression as

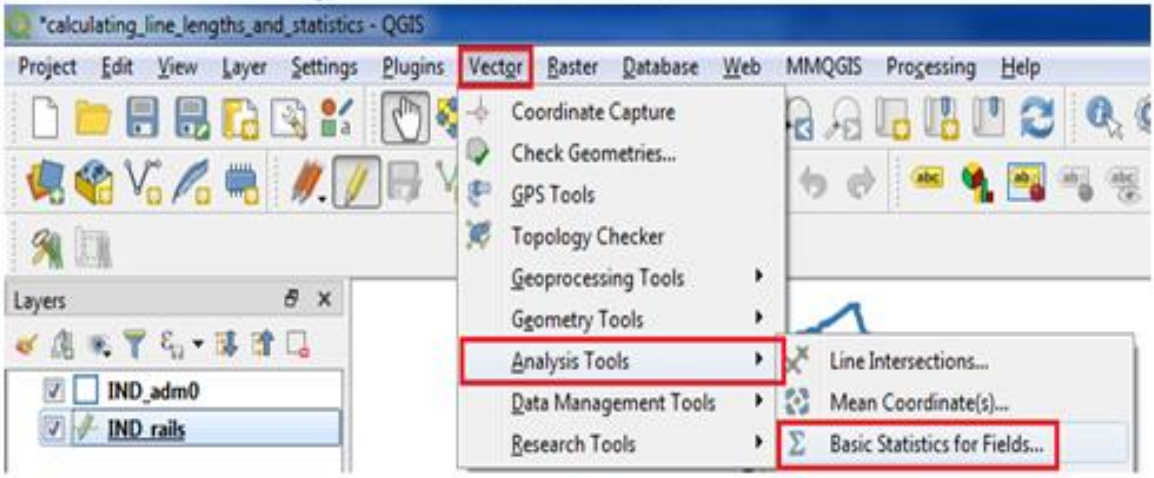
Press “OK”

- A new column is added to the attribute table with value representing the length of track in KM.

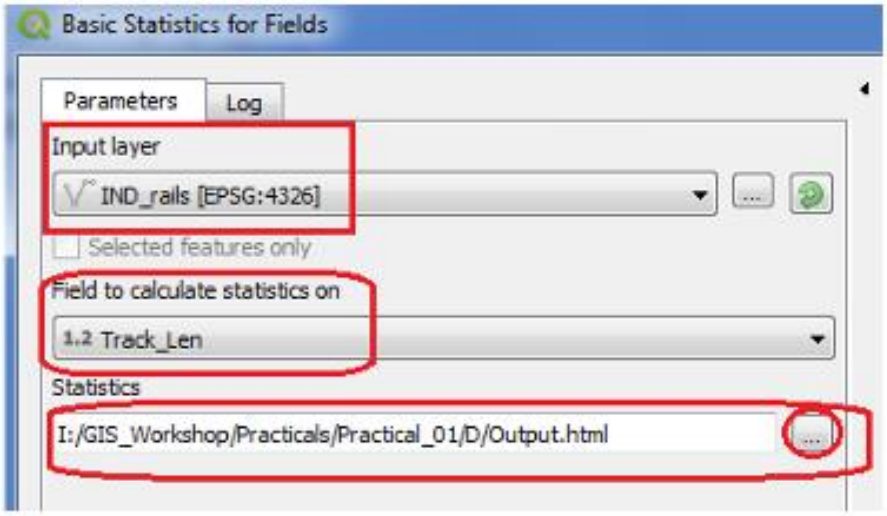




- Press CTRL+S or click on Save Edits option on tool bar
- Close the attribute table window.
- For calculating the total length of Railway tracks in India.
- Select Vector→ Analysis Tools→ Basic Statics for Fields

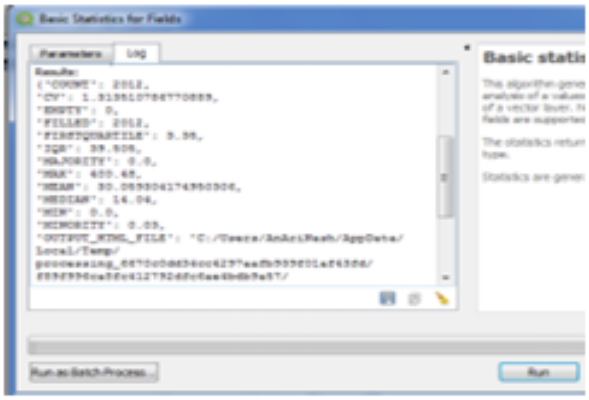


- Select IND_rails layer from input layer. And select Track_Len in "Field to Calculate statistics on"



- Press RUN

- The Result is



- Open the "**output.html"** file to get the field statistics.

Analyzed field: Track_Len
Count: 2012
Unique values: 1608
NULL (missing) values: 0
Minimum value: 0.0
Maximum value: 400.48
Range: 400.48
Sum: 60479.320000000014
Mean value: 30.059304174950306
Median value: 14.04
Standard deviation: 39.483220276624444
Coefficient of Variation: 1.313510786770889
Minority (rarest occurring value): 0.03
Majority (most frequently occurring value): 0.0
First quartile: 3.35
Third quartile: 42.855000000000004
Interquartile Range (IQR): 39.505

- The above statistics show that the total length of Railway track in India is **60,479.32 KM**.

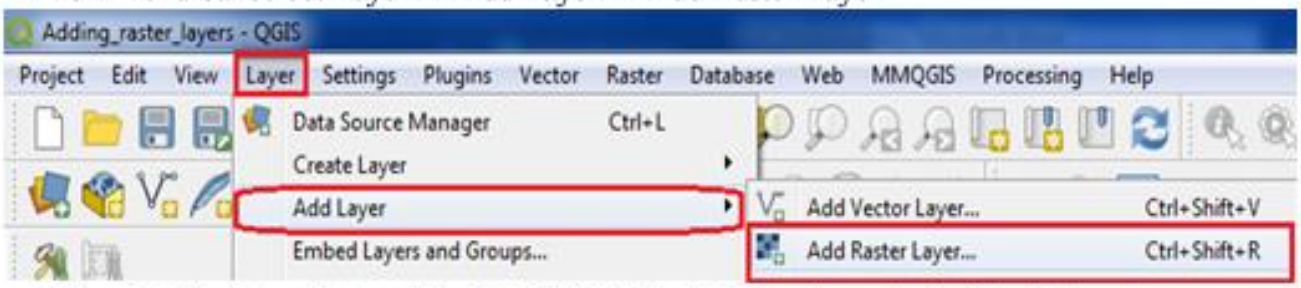
PRACTICAL 3

Practical 3 - Exploring and Managing Raster data: Adding raster layers, raster styling and analysis, raster mosaicking and clipping

Exploring and Managing Raster data:

a) Adding raster layers

- From menu bar select Layer → Add Layer → Add Raster Layer

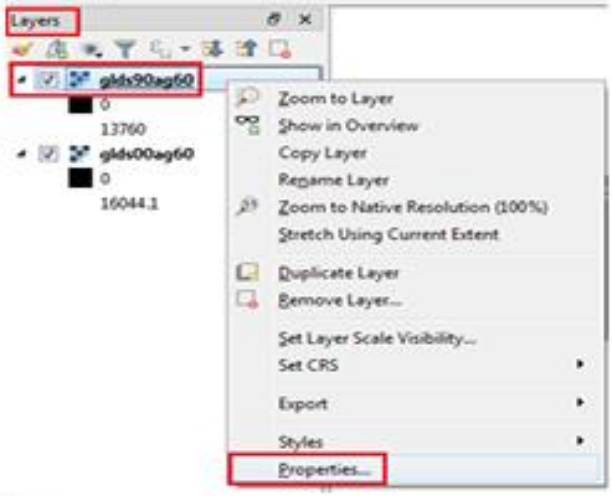


- Select Gridded Population of the World (GPW) v3 dataset from Columbia University, Population Density Grid for the entire globe in ASCII format and for the year 1990 and 2000.
"\GIS_Workshop\Practicals\Practical_02\A\Data\gl_gpwv3_pdens_90_ascii_one\glds90ag60.asc"
"\GIS_Workshop\Practicals\Practical_02\A\Data\gl_gpwv3_pdens_90_ascii_one\glds00ag60.asc"

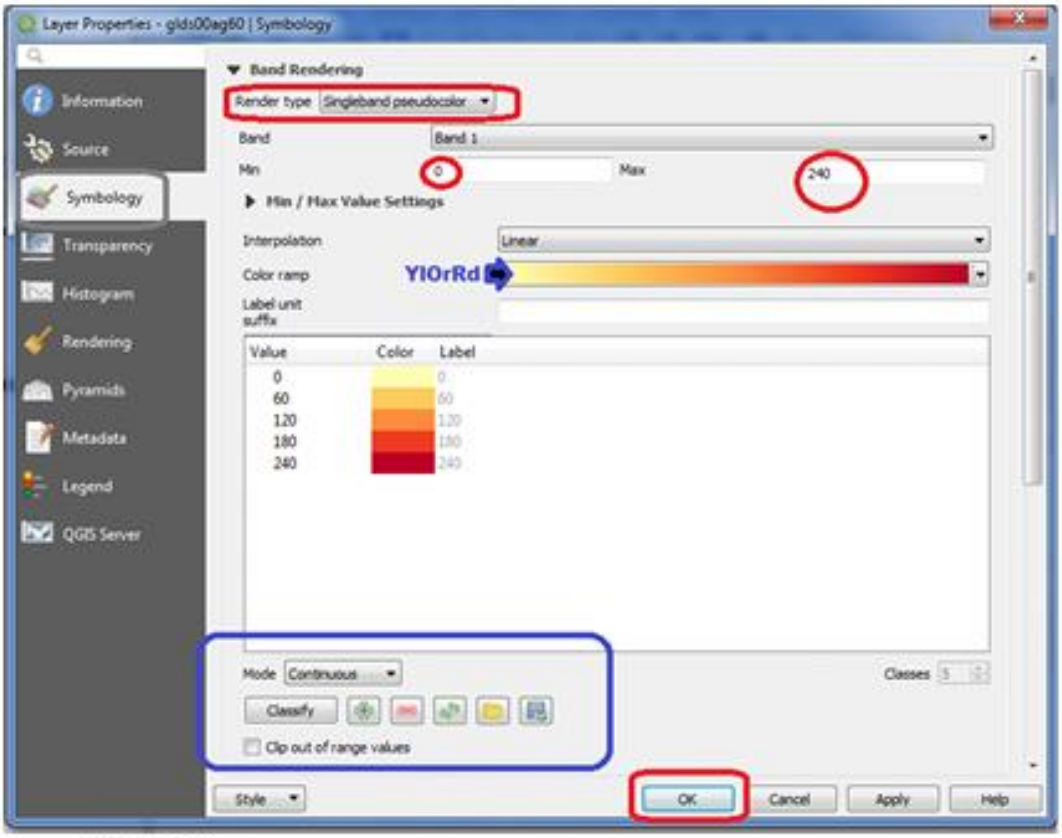
- Go to Project → Properties OR Press the Set CRS option on bottom right corner.
Select WGS 84 EPSG: 4326 and Press OK

b) Raster Styling and Analysis

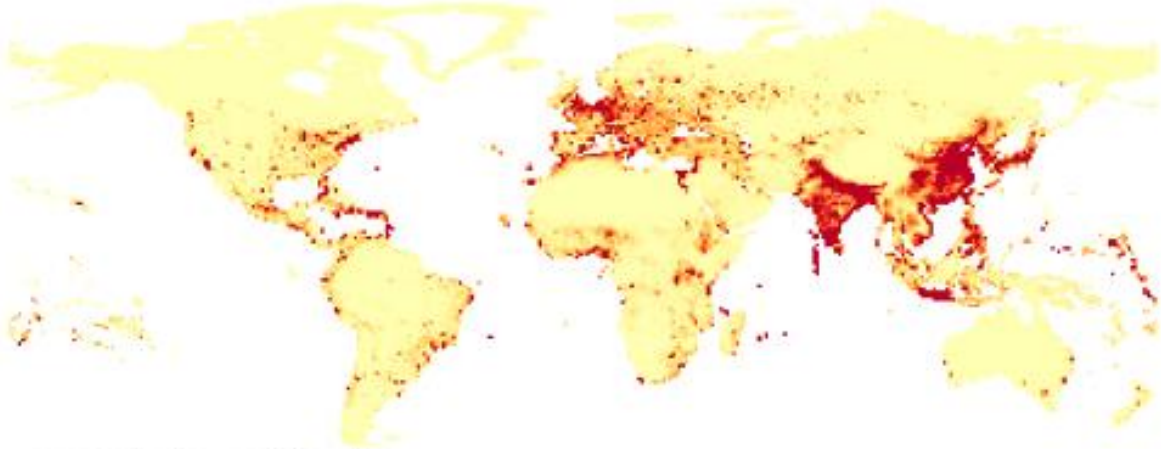
- To start with analysis of population data, convert the pixel from grayscale to Color.
- Select "glds90ag60.asc" Layer form layer Pane → select property OR double click on it.



- Select 

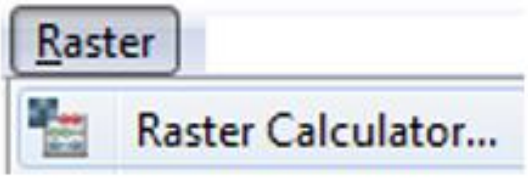


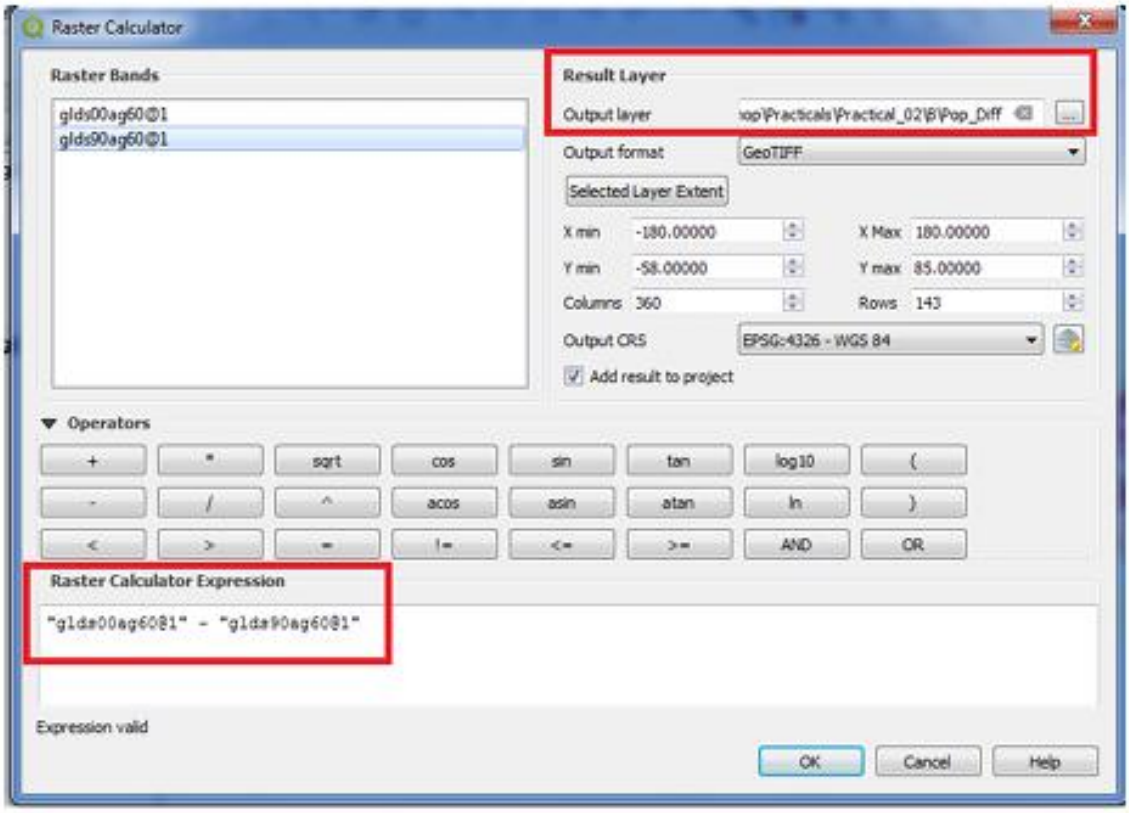
- Press "APPLY"
- Repeat the same for "glds00ag60.asc" Layer



Layer output after applying style.

- The objective this experiment is to analyze raster data, as an example we will find areas with largest population change between 1990 and 2000, by calculating the difference between each pixel values.
- Go to Raster → Raster Calculator





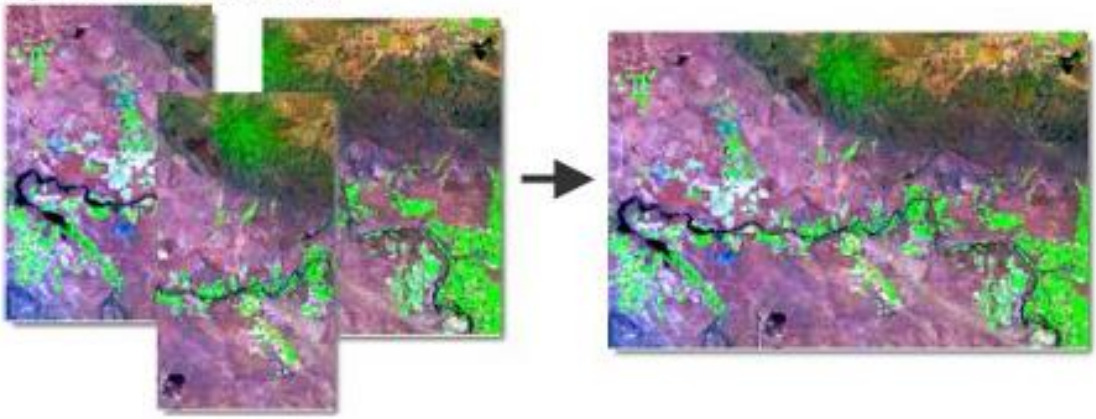
- Put the expression "glds00ag60@1" - "glds90ag60@1"
- Select the output file location & name and Press OK.

c) Raster Mosaicking and Clipping

A **mosaic** is a combination or merge of two or more images.

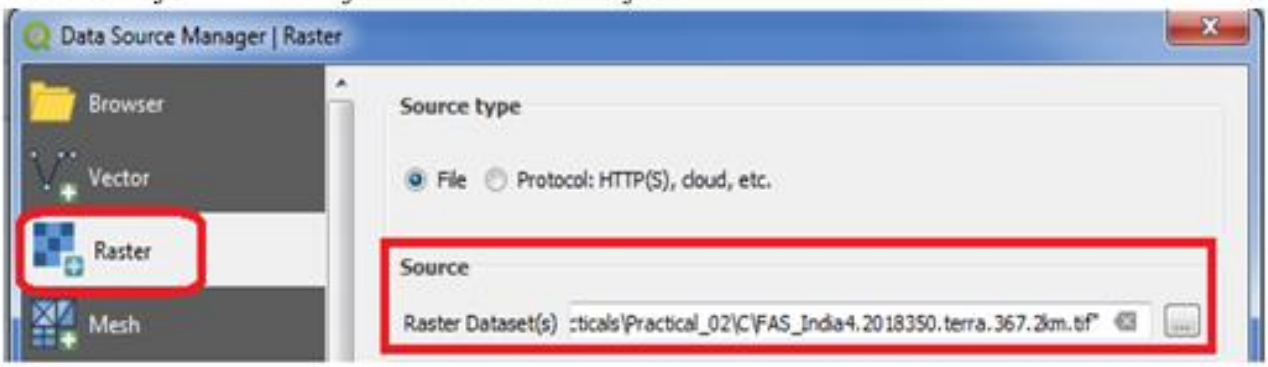
In GIS, a single raster dataset can be created from multiple raster datasets by mosaicking them together.

In many cases, there will be some overlap of the raster dataset edges that are being mosaicked together, as shown below.

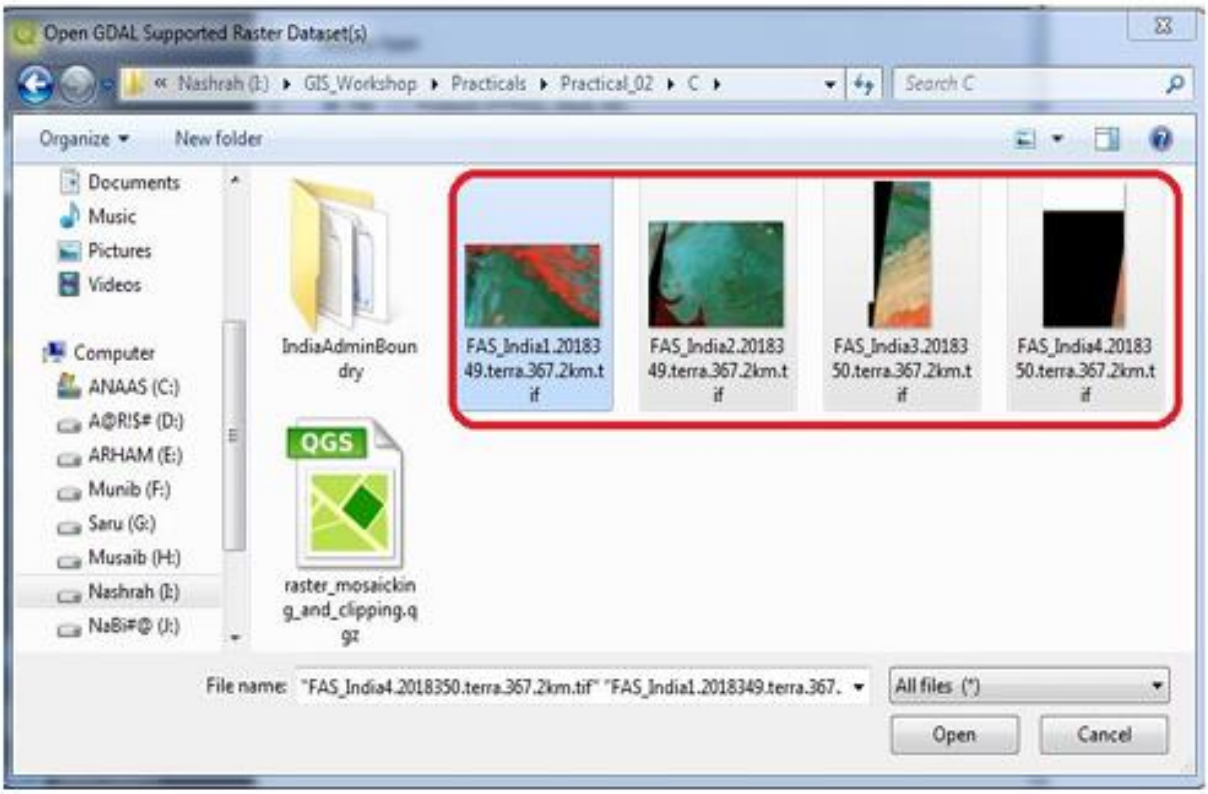


These overlapping areas can be handled in several ways; for example, you can choose to only keep raster data from the first or last dataset, you can blend the overlapping cell values using a weight-based algorithm, you can take the mean of the overlapping cell values, or you can take the minimum or maximum value. When mosaicking discrete data, the First, Minimum, or Maximum options give the most meaningful results. The Blend and Mean options are best suited for continuous data. If any of the input rasters are floating point, the output is floating point. If all the inputs are integer and First, Minimum, or Maximum is used, the output is integer.

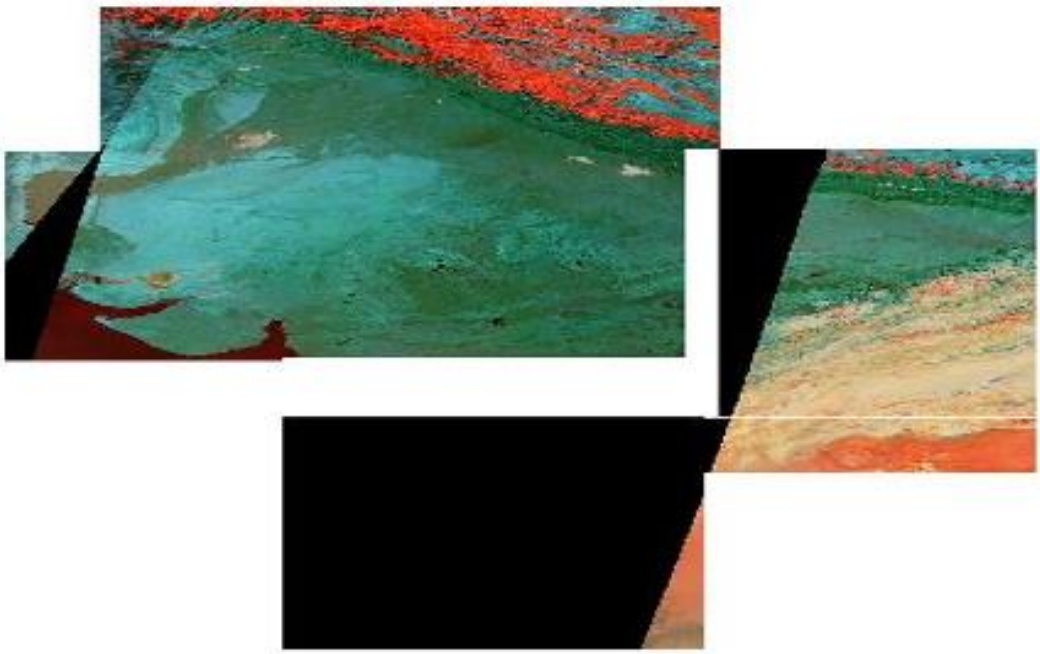
- Go to Layer → Add Layer → Add Raster Layer.



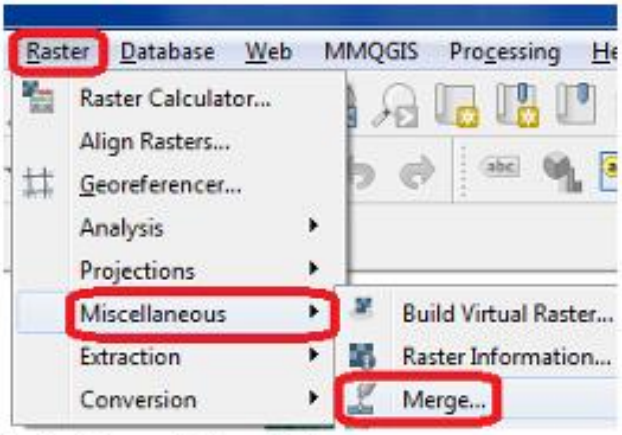
- Select the following "**.tif**" raster images for India from data folder.
  FAS_India1.2018349.terra.367.2km.tif
  FAS_India2.2018349.terra.367.2km.tif
  FAS_India3.2018349.terra.367.2km.tif
  FAS_India4.2018349.terra.367.2km.tif



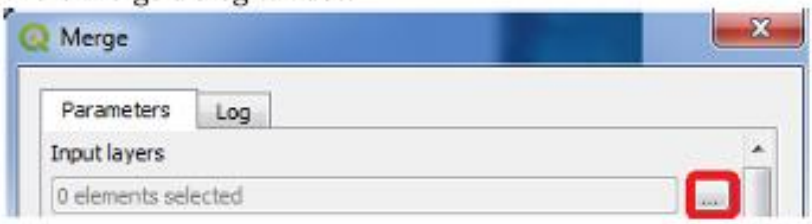
- Press open
- In data source manager | Raster window click Add.



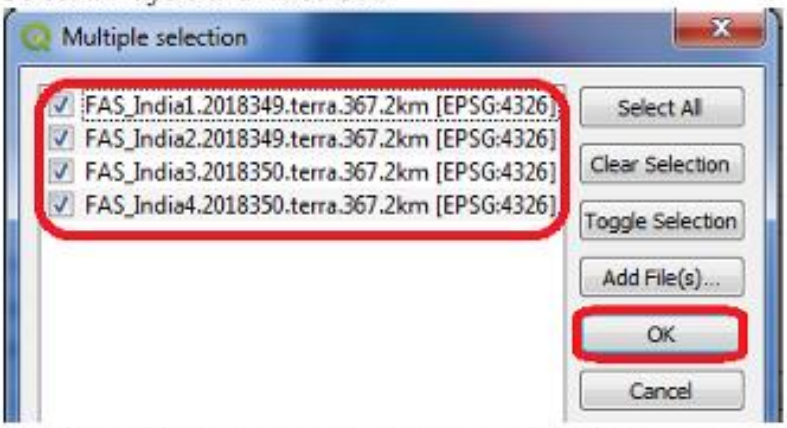
- Go to Raster → Miscellaneous → Merge



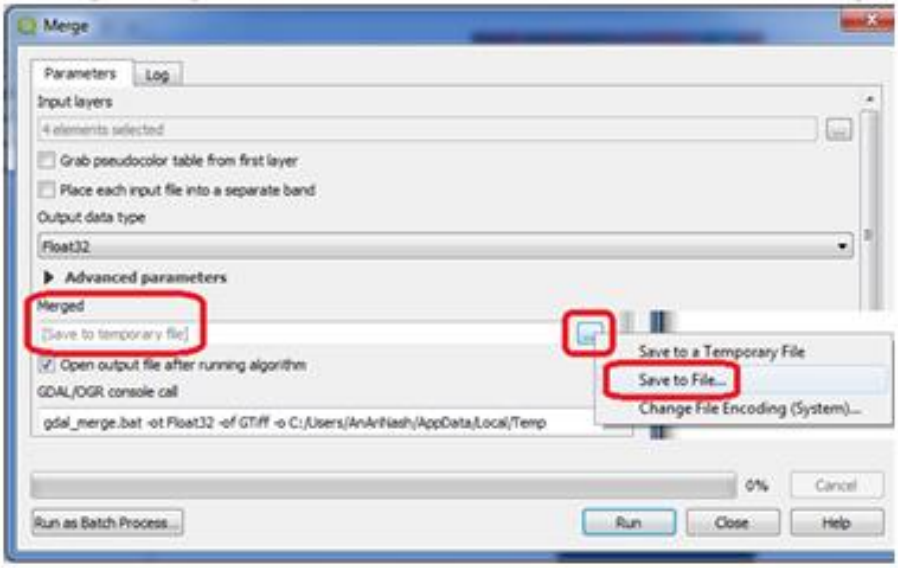
- In the Merge dialog window



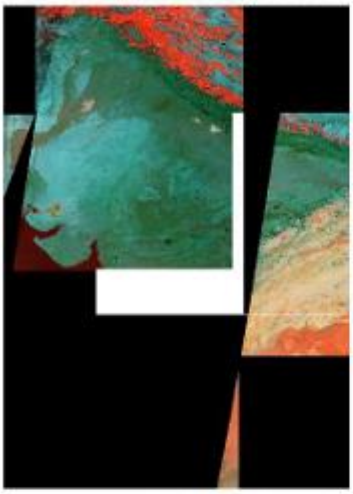
- Select all layers and Press OK.



- In Merge dialog window select a file name and location to save merged images.



- Save the file to "GIS_Workshop/Practicals/Practical_02/C/" location with the name as Merge_Files.tif
- Press Run and after completion of operation close the Merge window dialog box.

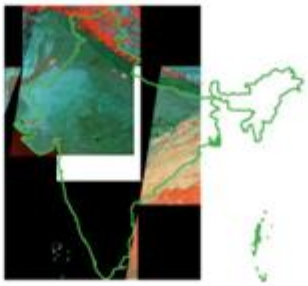


- You can now deselect individual layers from layer pane and only keep the merged raster file.

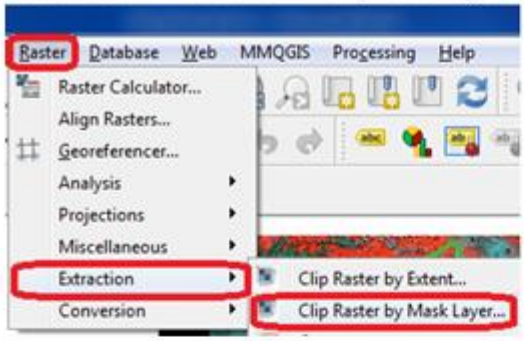
- Go to Layer→ Add Vector Layer → Select \GIS_Workshop\Practicals\Practical_02\C\IndiaAdminBoundry\IND_adm0.shp file.
- From layer properties → select 

→ select any one of the following

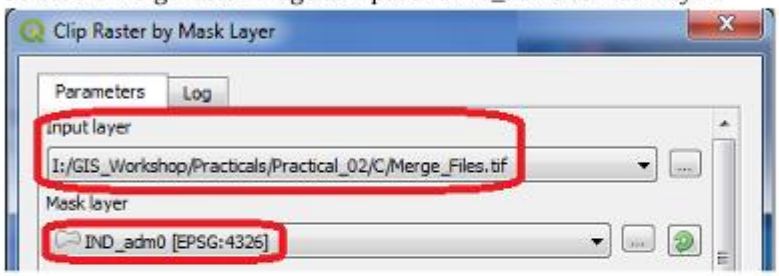
- The result will be



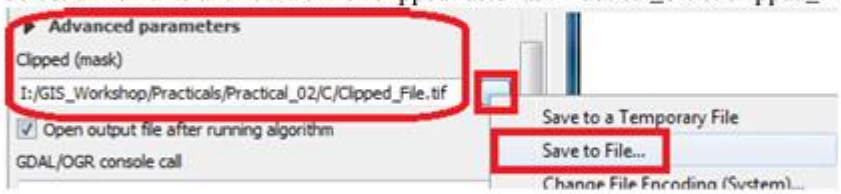
- Go to Raster → Extraction → Clip Raster by Mask Layer



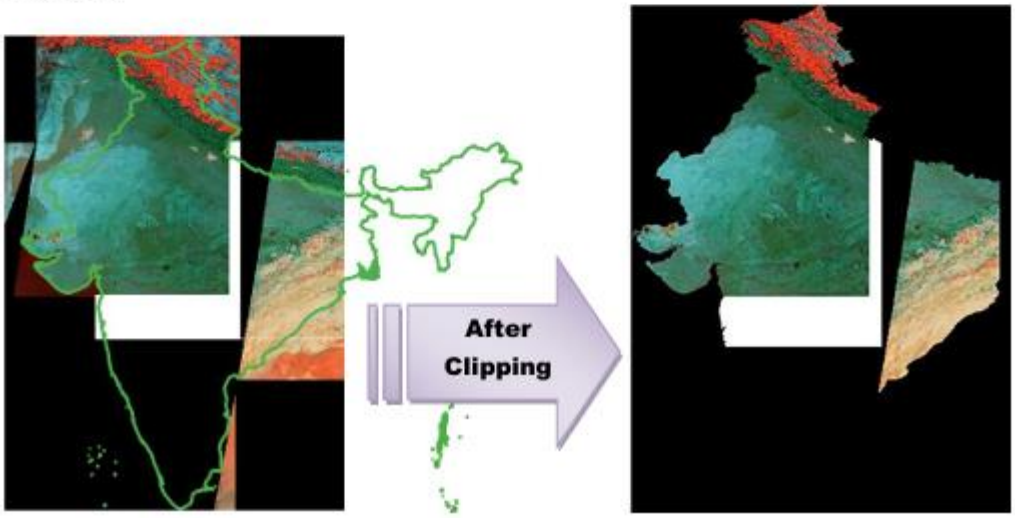
- Select the merge raster image as input and Ind_adm0 as mask layer.



- Select a file name and location for clipped raster as /Practical_02/C/Clipped_File.tif.



- Press RUN.

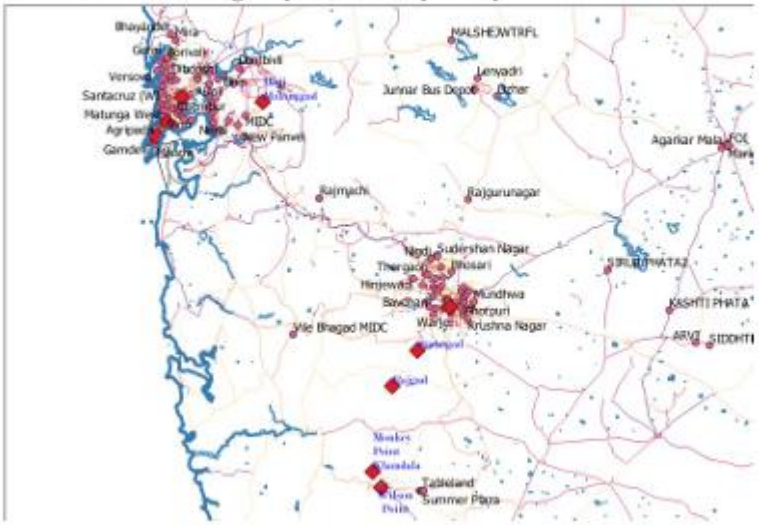


PRACTICAL 4

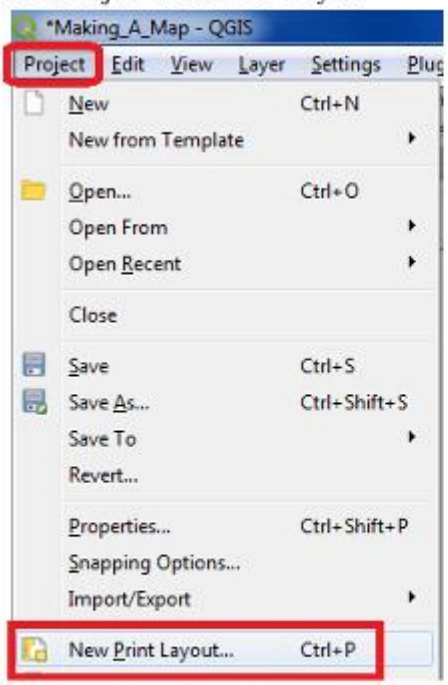
Practical 4 - Making a Map, Working with Attributes, Importing Spreadsheets or CSV files Using Plugins, Searching and Downloading OpenStreetMap Data

a) Making a Map

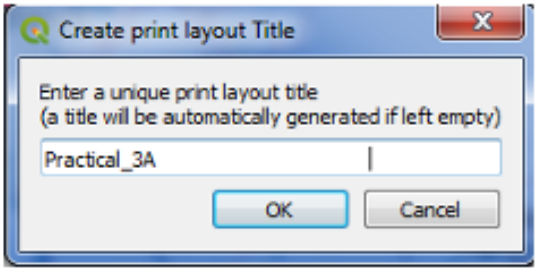
- Create a new Thematic Map or open and existing one
- Consider the following map as an example map



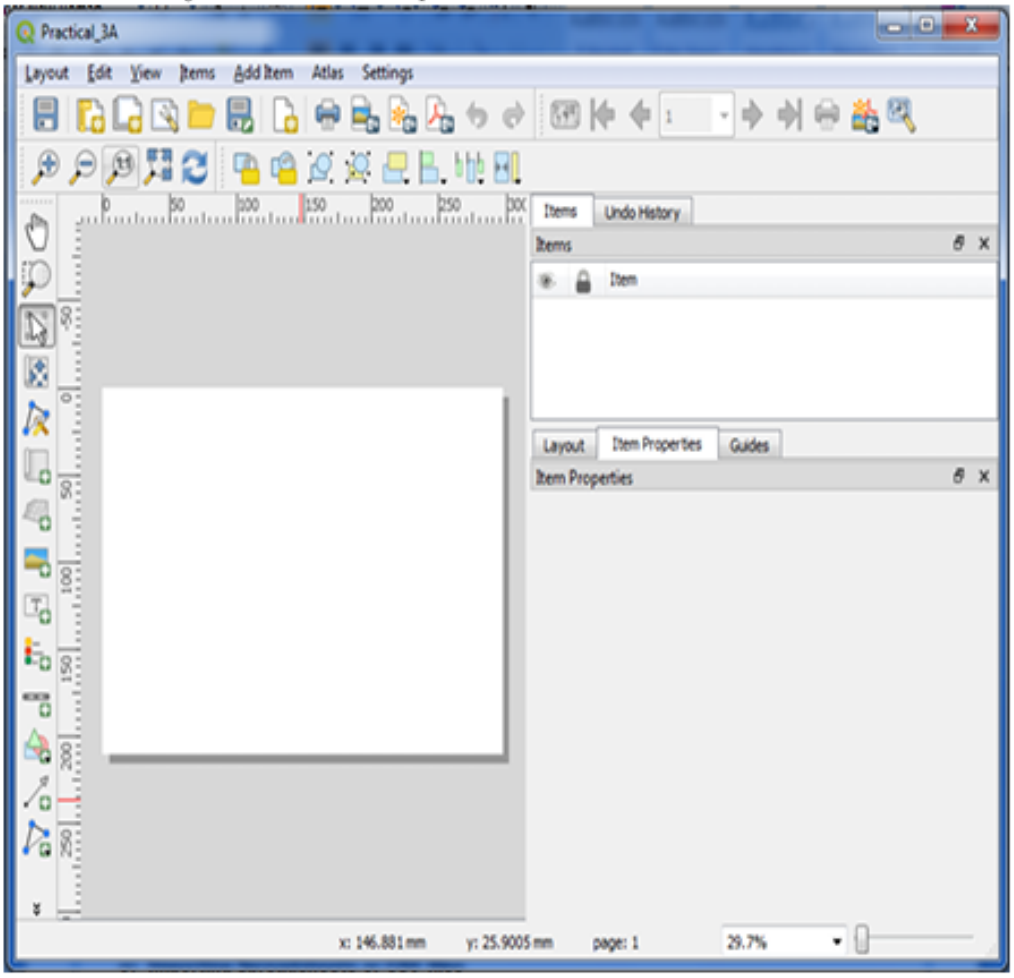
- Go to Project → New PrintLayout



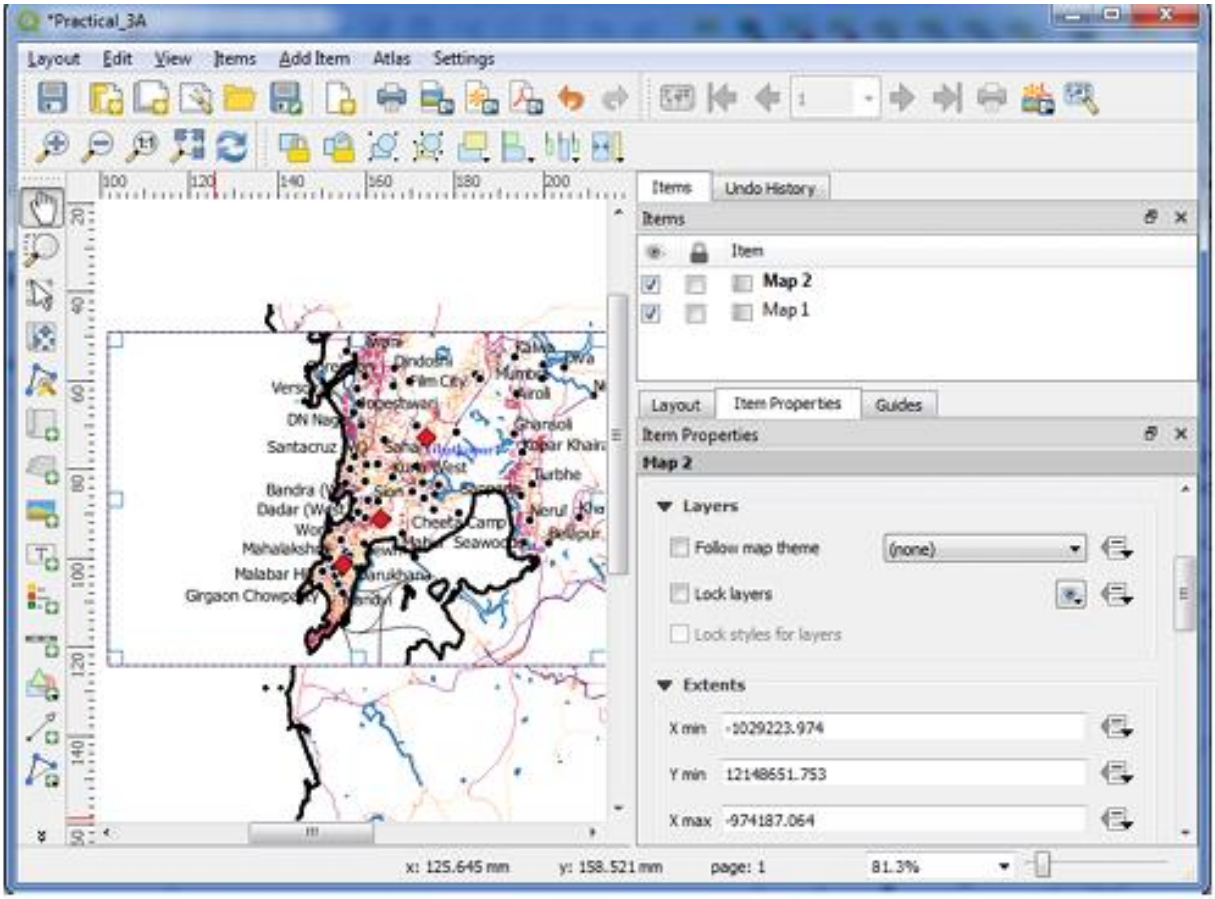
- Insert a suitable title and press "OK".



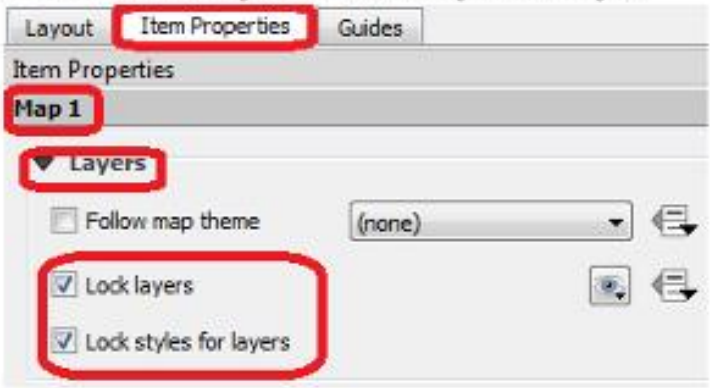
- A new Print Layout window will open



- Select Add Item → Add Map

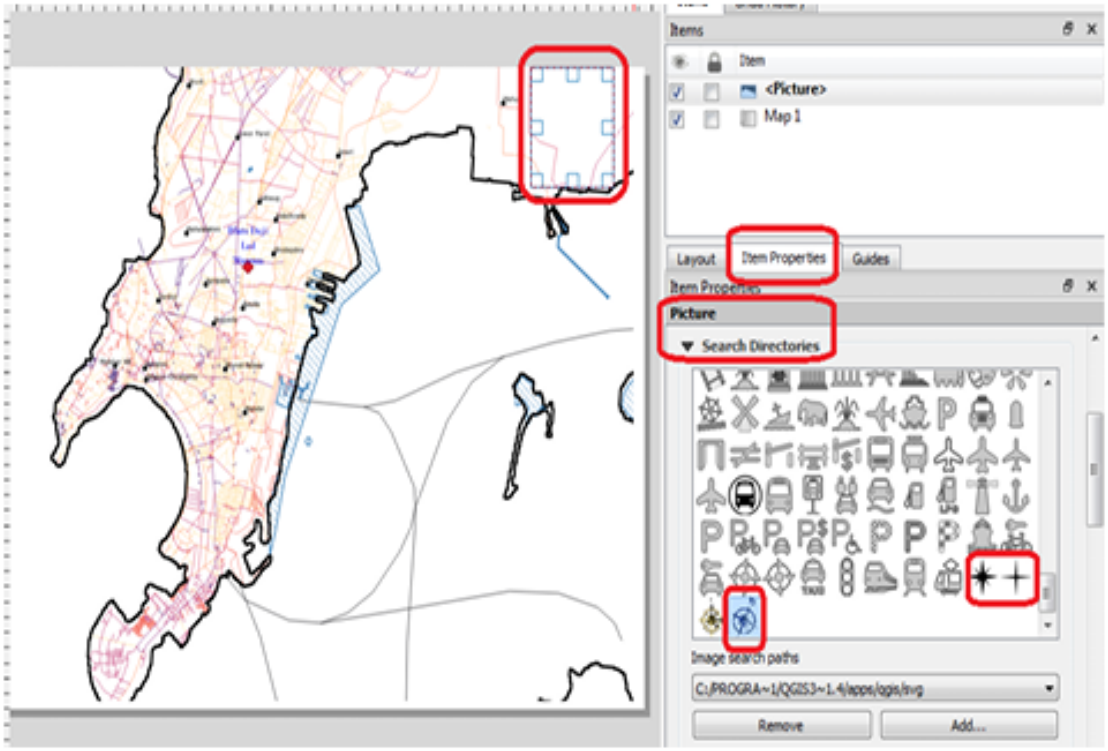


- After adding map go to ItemProperties → Map1→ Layers
  Check on Lock Layers and Lock Styles for Layers

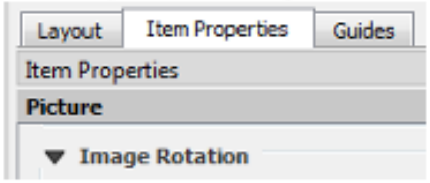


This will ensure that if any change in layers or change their styles, the Print Layout view will not change.

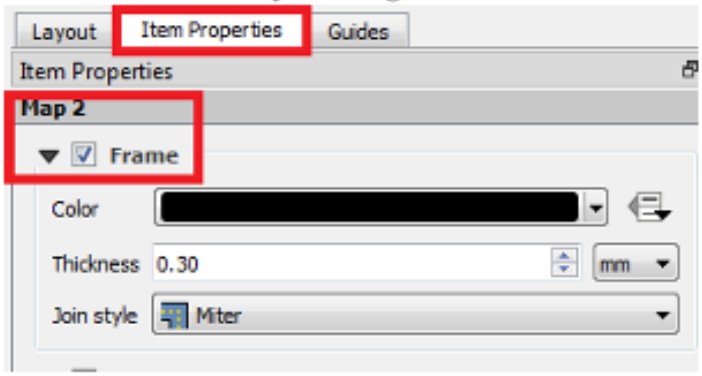
- Go to Add Item → Add Picture → Place a picture box at appropriate location.



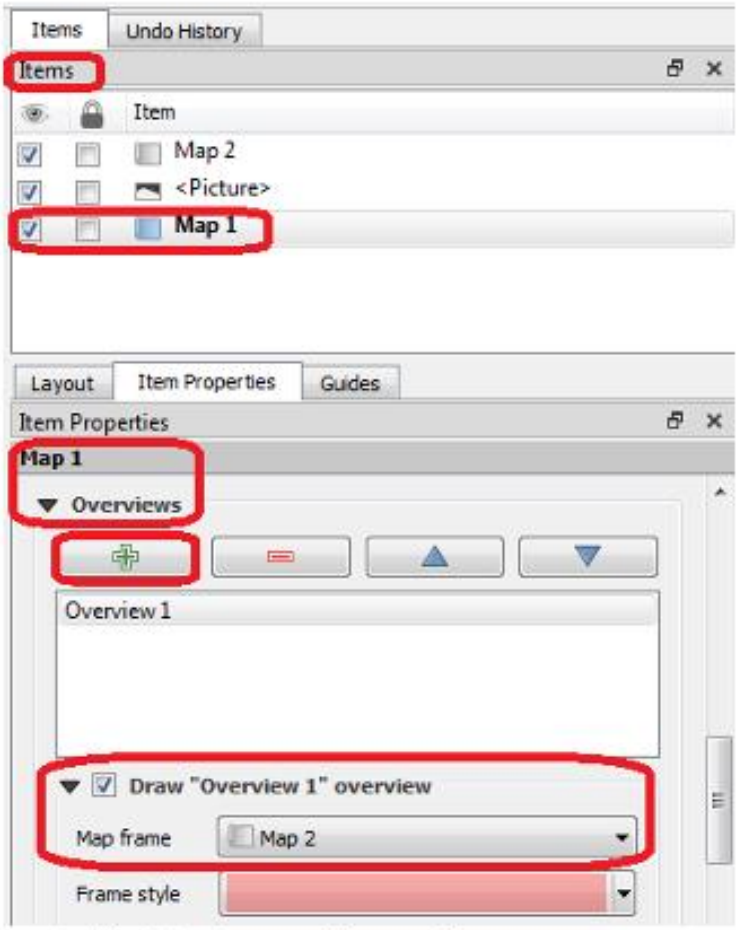
- Also adjust Image Rotation to its appropriate value.
- Item Properties → Image Rotation



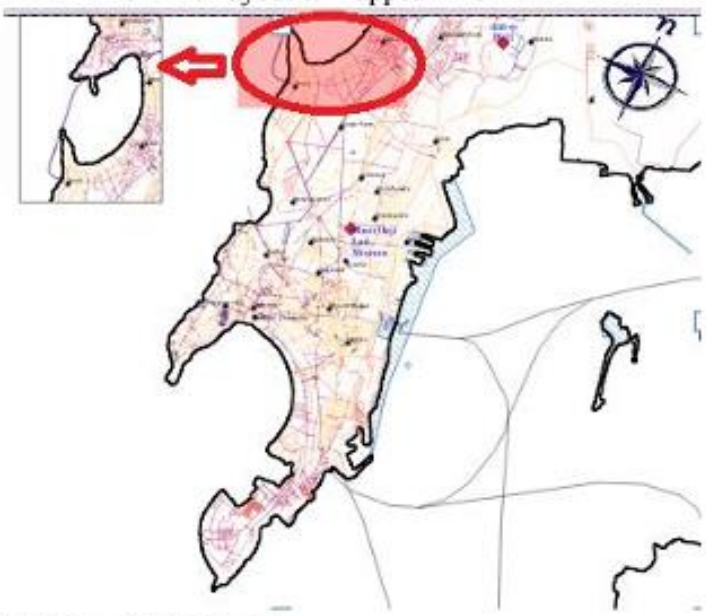
- Add an inset Using Add Item → Add Picture → Select an area to be highlighted on main Map.
- Set a frame for Inset by enabling the check box for Frame.



- To highlight the area shown in Inset
- Select the Picture representing main Map from Items pane.
- In Item Properties → Overviews → using  icon add an overview.
- Select the checkbox Draw Overview
- Name the Picture object representing inset (Map1 in our case).



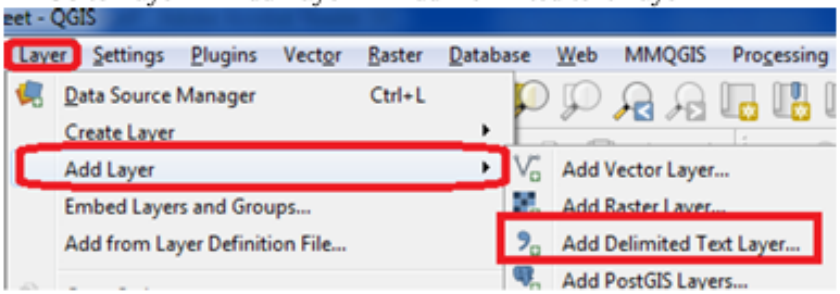
- The Print Layout will appear like



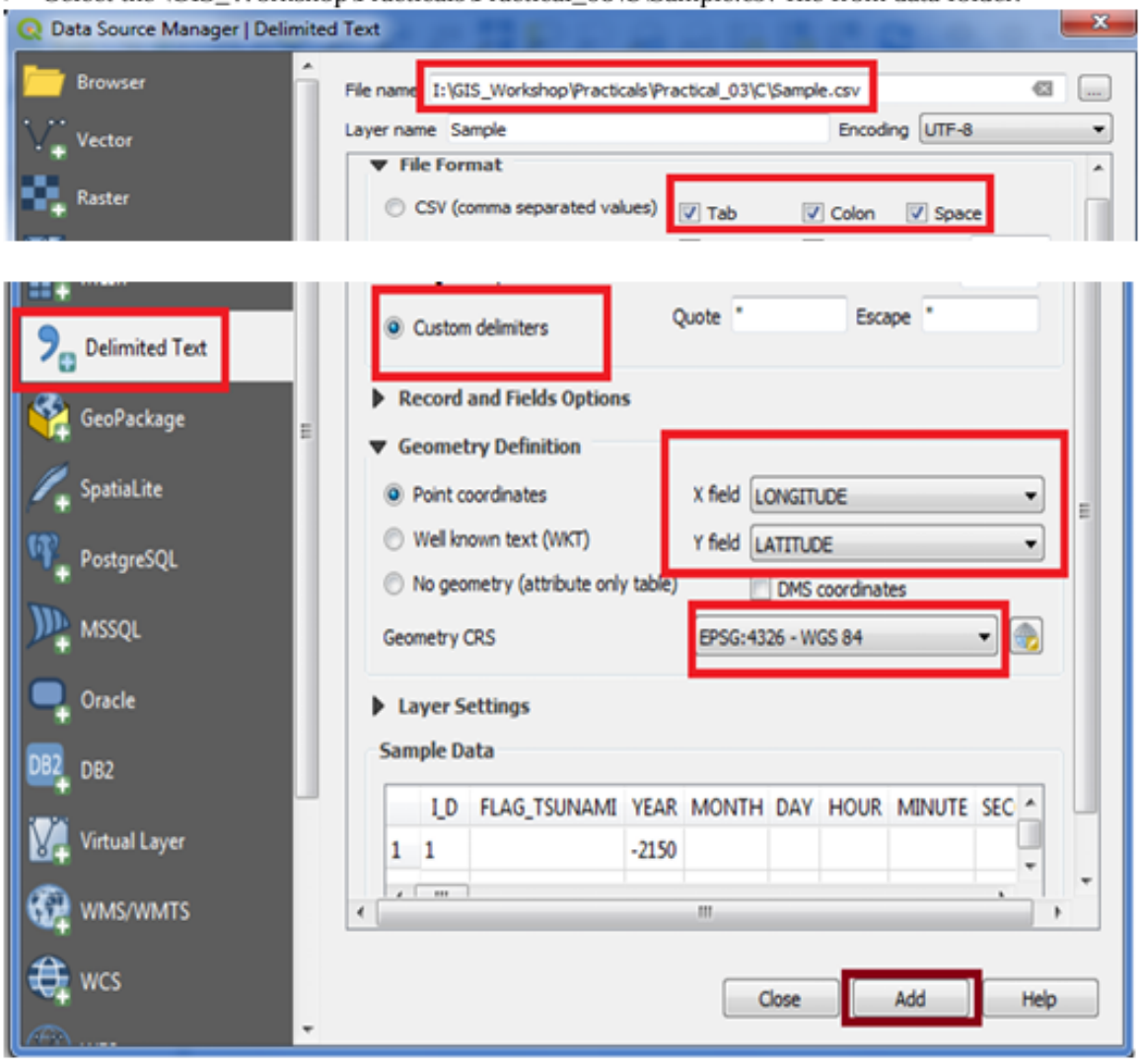
- Add Item → Add Label

b) Importing Spreadsheets or CSV files

- Many times the GIS data comes in a table or an Excel spreadsheet or a list lat/long coordinates, therefore it has to be imported in a GIS project.
- Sample file for Earthquake data will be used in this practical.
- Go to Layer → Add Layer → Add Delimited text Layer



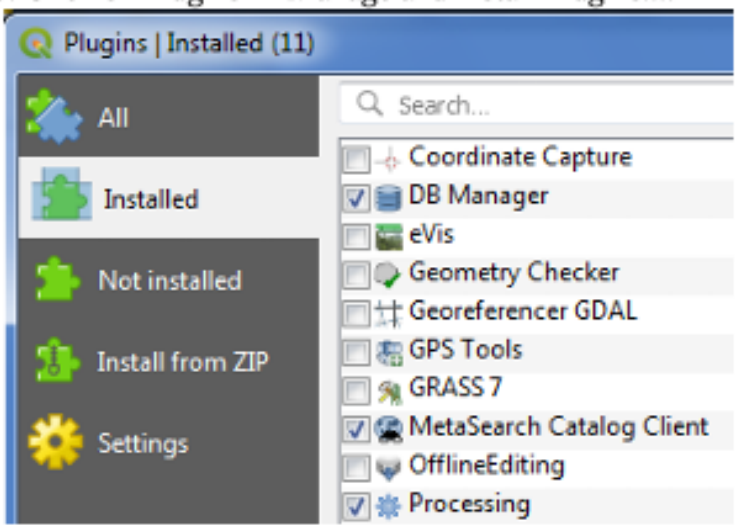
- Data Source Manager | Delimited Text window will appear
- Select the \GIS_Workshop\Practicals\Practical_03\C\Sample.csv file from data folder.



- Press ADD and close the window.
- Output:

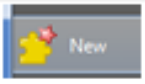
c) Using Plugins

- Core plugins are already part of the standard QGIS installation. To use these, just enable them.
- Open QGIS. Click on Plugins → Manage and Install Plugins....



- **To enable a plugin**, check on the checkbox next to Plugin. This will enable the plugin to use it.
- **External plugins** are available in the QGIS Plugins Repository and need to be installed by the users before using them.
- Click on Not Installed or Install from ZIP.
- Once the plugin is downloaded and installed, you will see a confirmation dialog.
- Click on Plugins → <<new Plugin Name>>
- The Plugin if marked **Experimental plugin** can be installed, from Setting→ check on

or

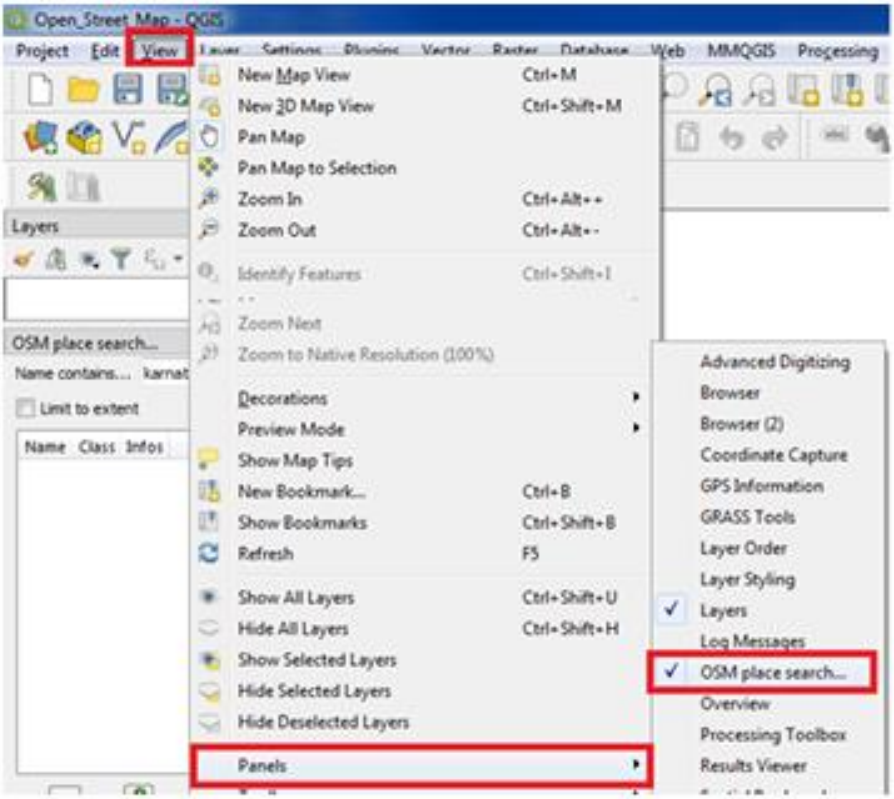
- A 

tab will be added to Plugin Manager Window.
- Click on a plugin name and Click Install.

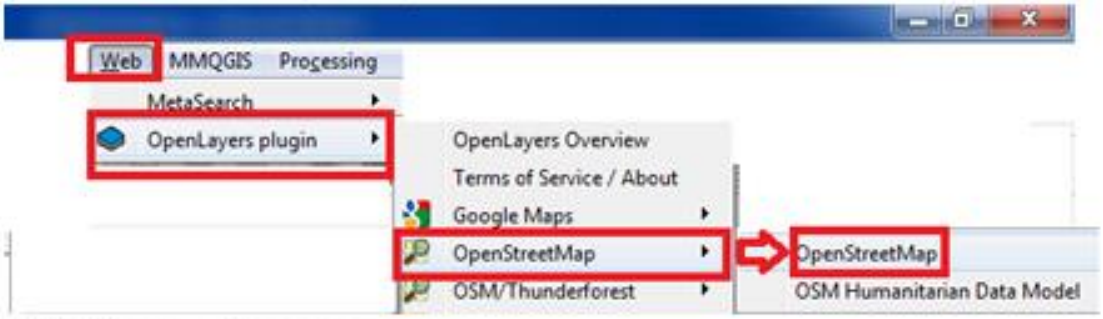
d) Searching and Downloading OpenStreetMap Data

OpenStreetMap (**OSM**) created by Steve Coast in the UK in 2004 is a collaborative project t create a free editable map of the world. Rather than the map itself, the data generated by the projec is considered its primary output. The creation and growth of OSM has been motivated b restrictions on use or availability of map information across much of the world, and the advent o inexpensive portable satellite navigation devices.

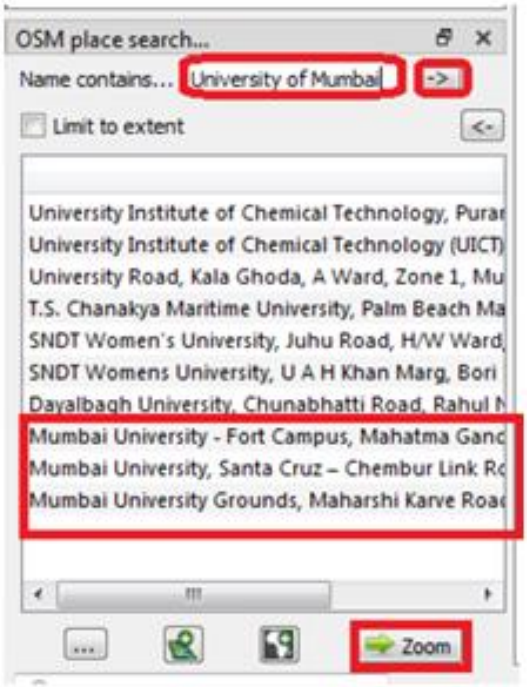
- Add "**Open Layer"** and "**OSM Search"** Plugin from Not Installed option from Plugin Manager Dialog Box.
- The **OSM Place Search** plugin will install itself as a *Panel* in QGIS, if not go to View → Panels → select OSM Place Search.

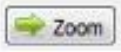


- Go to Web → OpenLayer Plugin and select Open Street Map

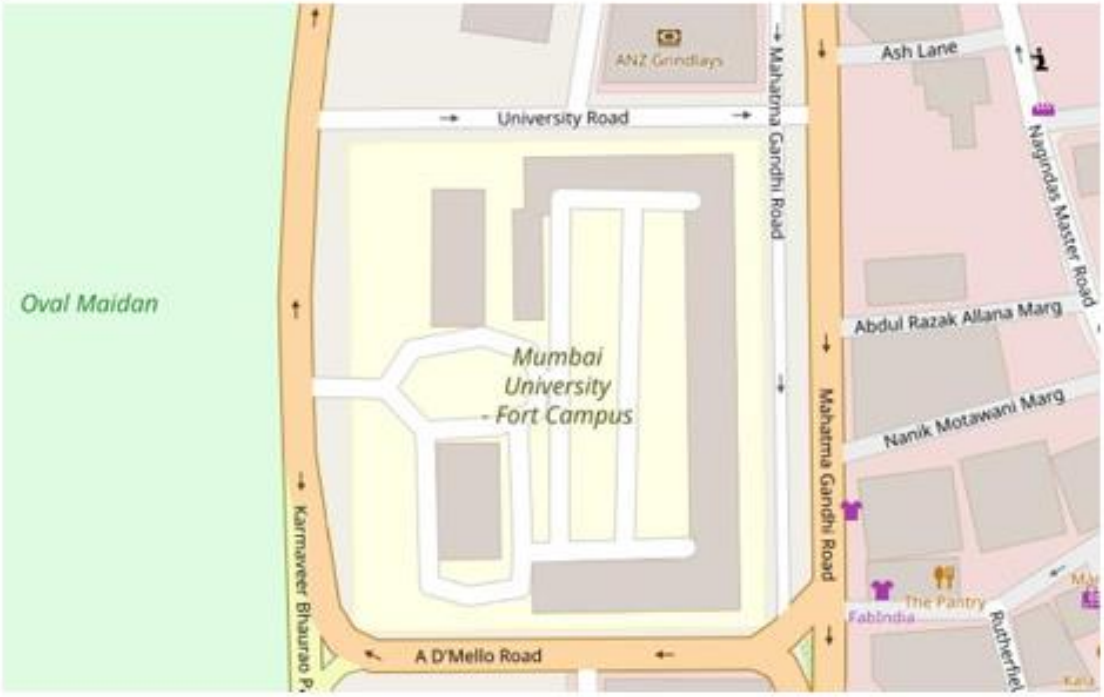


- A World map will appear on screen.
- If an error occurs in loading maps, go to project properties → CRS →



- In OSM Place search Pane → Enter Mumbai or any place name to search
- Double click on the desired place in OSM Place search Panel or Click and press 

Output:



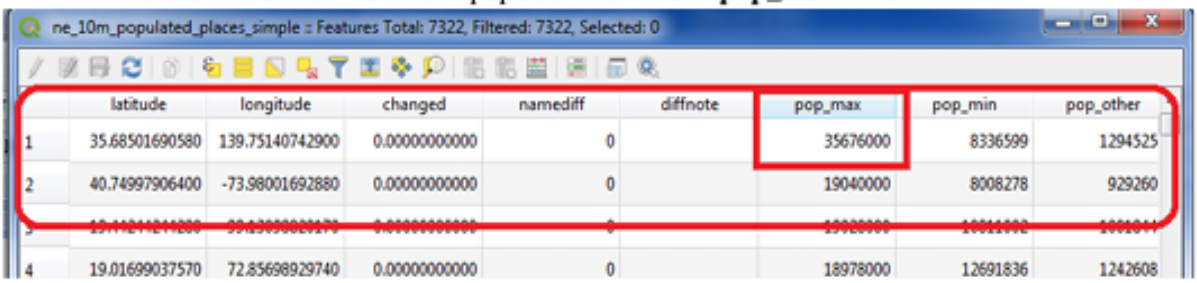
PRACTICAL 5

Practical 5 - Working with attributes, terrain Dat

A. Working with attributes

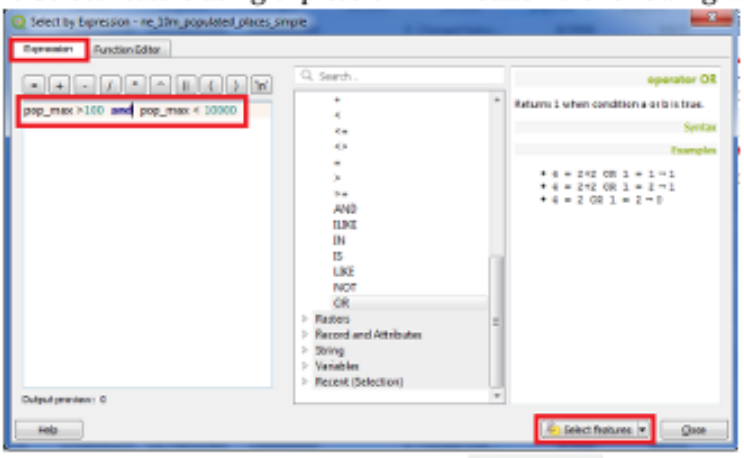
- Start a new project.
- Go to Layer → Add Layer → Add Vector Layer
- Select "\GIS_Workshop\Practicals\Practical_04\A\Data\ne_10m_populated_places_simple.zip"

- Right click on Layer in Layer Panel → Open Attribute Table.
- Explore various attributes and their values in the Attribute table.
- To find the Place with maximum population click on "**pop_max**" file



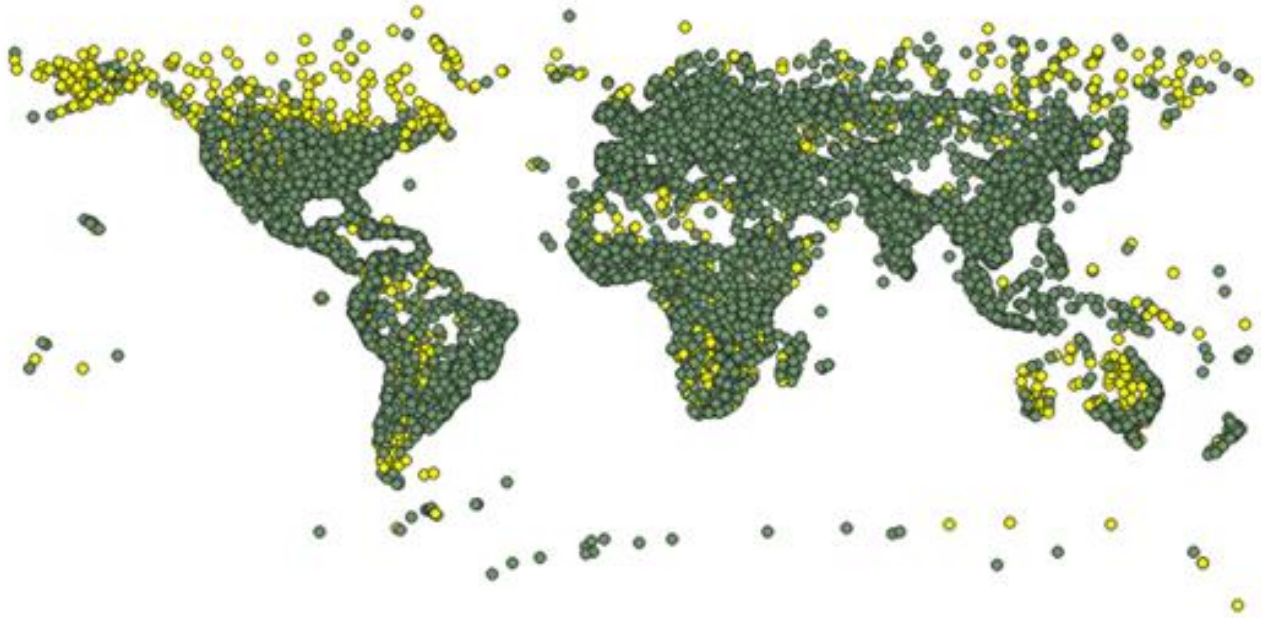
	latitude	longitude	changed	namediff	diffnote	pop_max	pop_min	pop_other
1	35.68501690580	139.75140742900	0.00000000000	0		35676000	8336599	1294525
2	40.74997906400	-73.98001692880	0.00000000000	0		19040000	8008278	929260
4	19.01699037570	72.85698929740	0.00000000000	0		18978000	12691836	1242608

- On clicking the Select feature using expression  button the following window will appear.

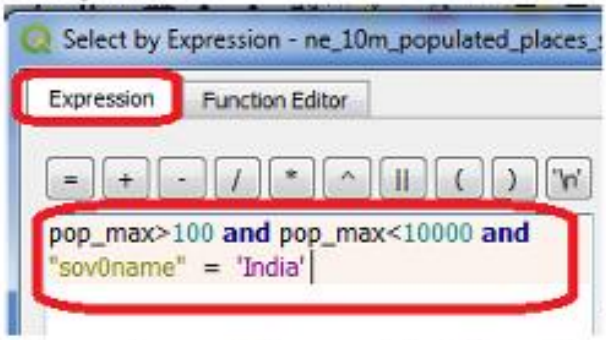


- Enter pop_max>100 and pop_max<10000 and click  button to get all the places with population between 100 and 10000.

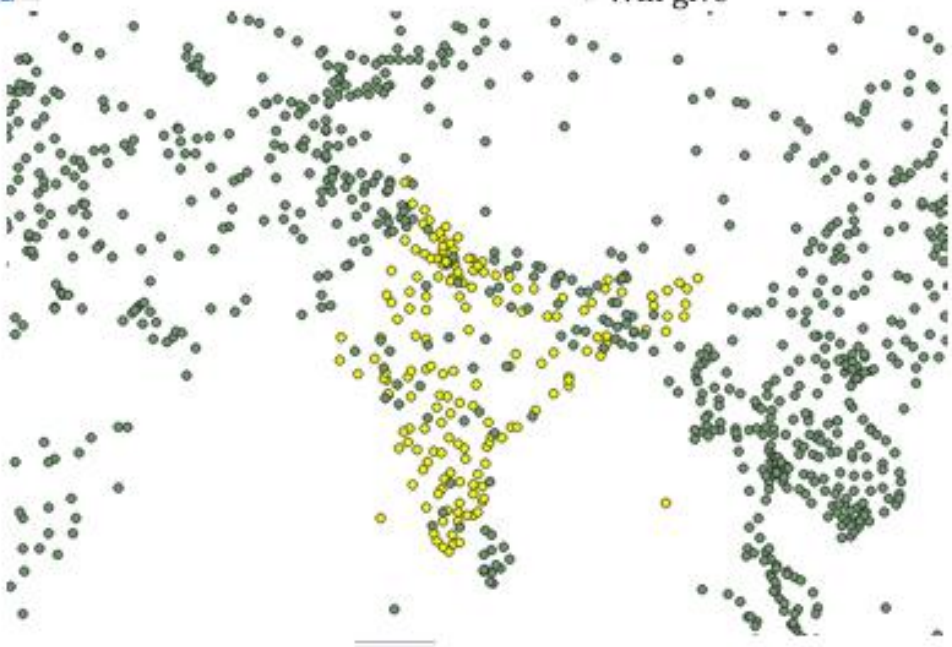
- The places matching the criteria will appear in different color.



- Different queries can be performed using the dataset.
- Try this



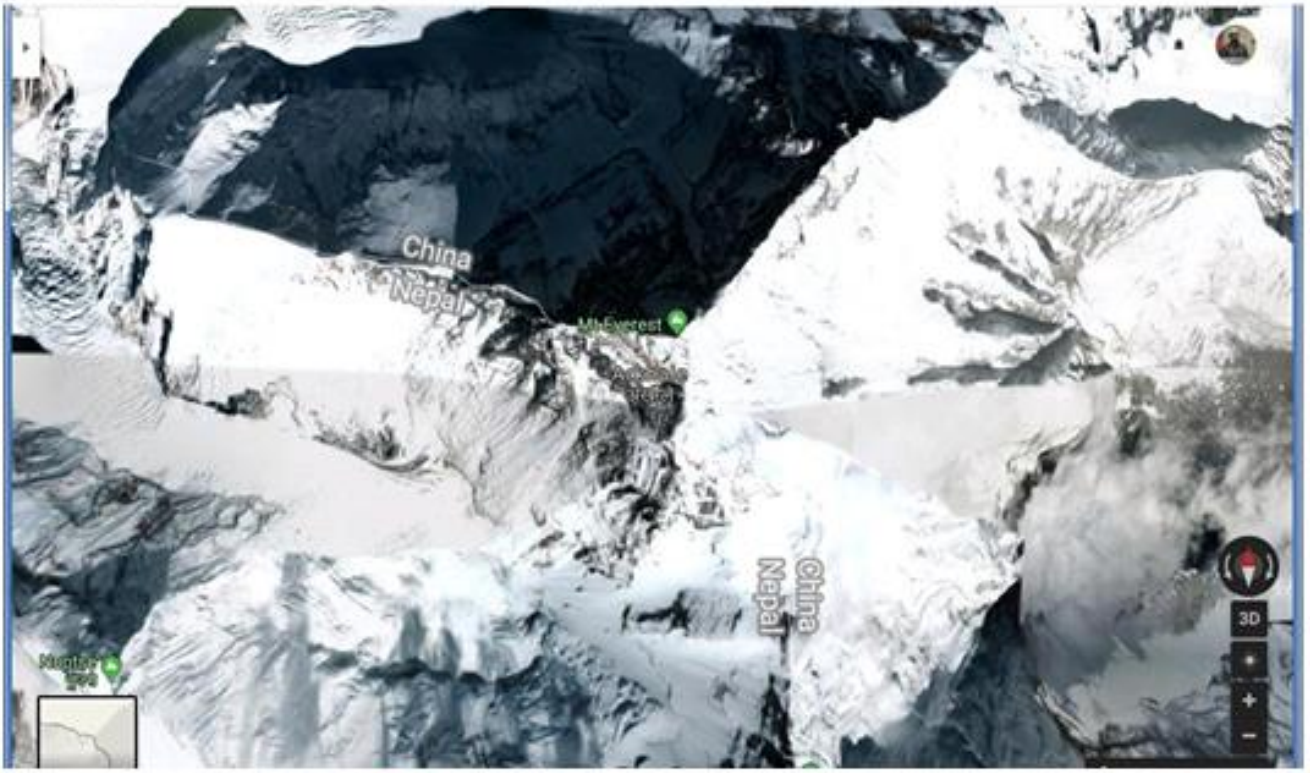
Will give

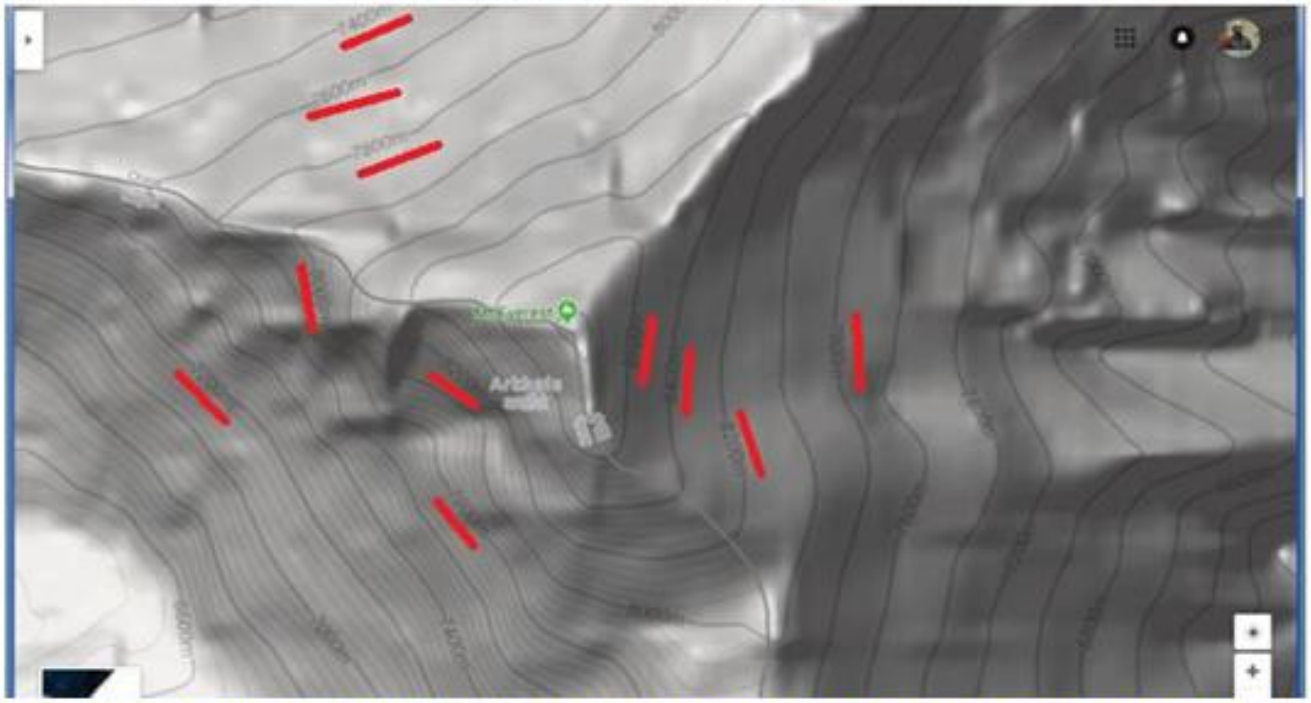


- Use the deselect button  to deselect the feature to be rendered in original color.

b) Terrain Data and Hill shade analysis

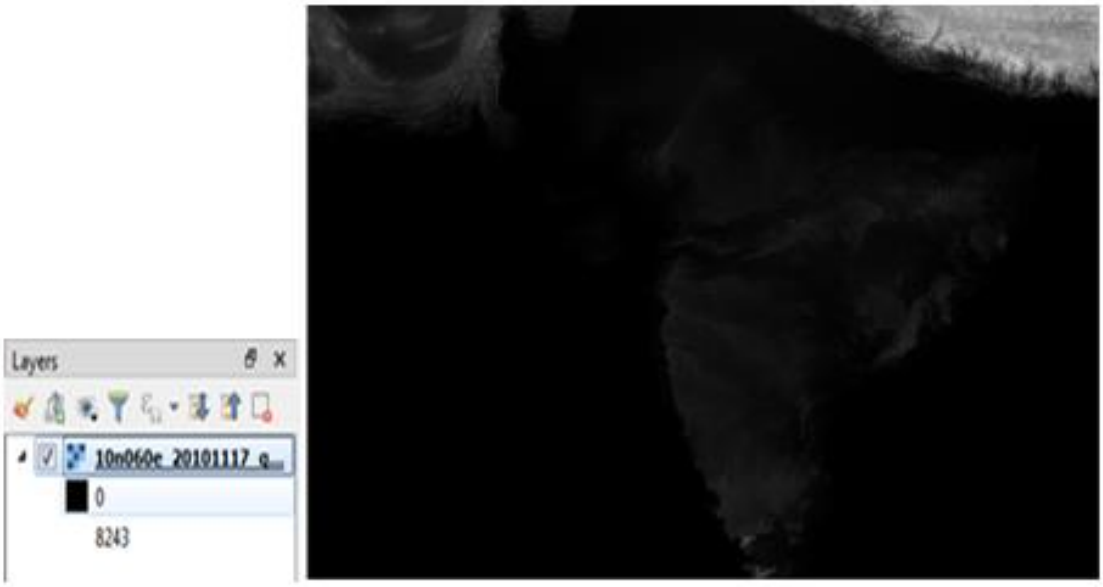
A terrain dataset is a multiresolution, TIN-based surface built from measurements stored as features in a geodatabase. Terrain or elevation data is useful for many GIS Analysis like, to generate various products from elevation data such as contours, hillshade etc.



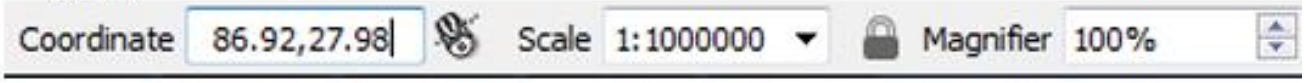


https://www.google.com/maps/@27.9857765,86.9285378,14.75z/data=!5m1!1e4?hl=en-US

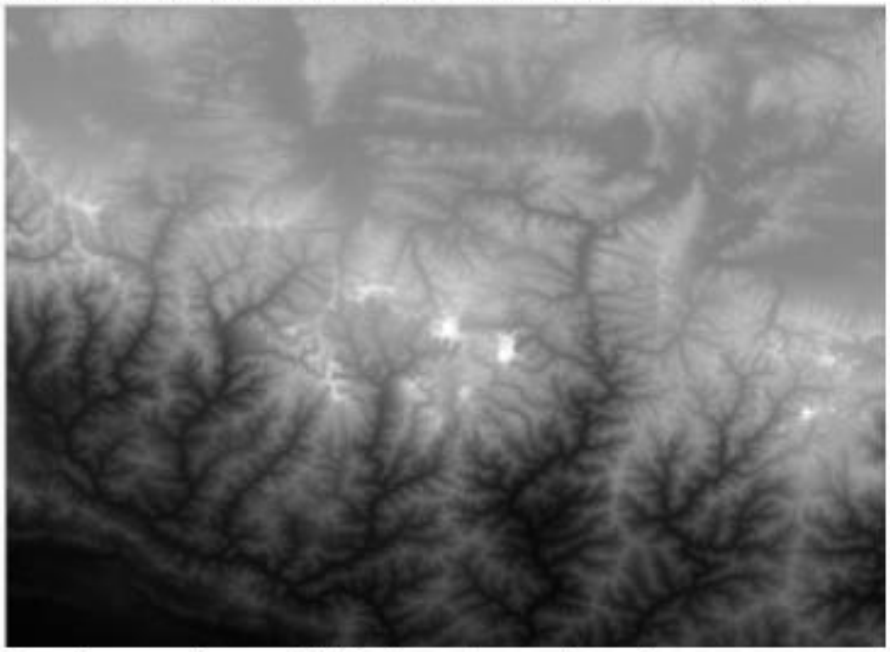
- Go to Layer → Add Raster Layer → select "10n060e_20101117_gmted_mea300.tif", from Data folder



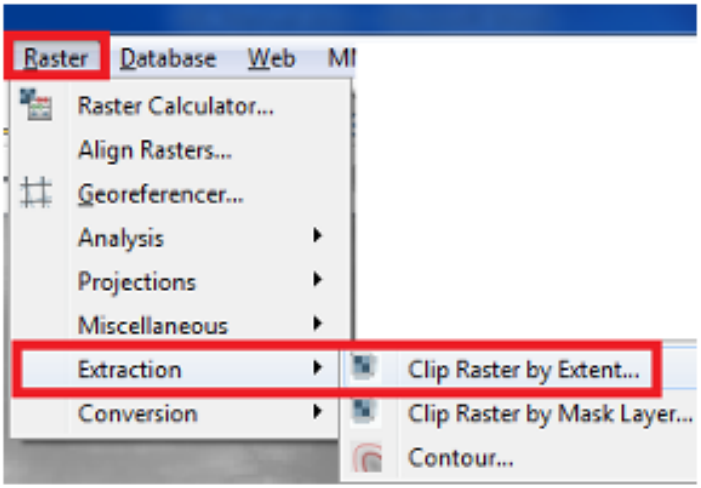
- The Lower altitude regions are shown using dark color and higher using light shade as seen on top region containing Himalaya and Mt Everest.
- Mt. Everest - is located at the coordinates 27.9881° N, 86.9253° E.
- Enter 86.92, 27.98 in the coordinate field, Scale 900000 and Magnifier 100% at the bottom of QGIS.

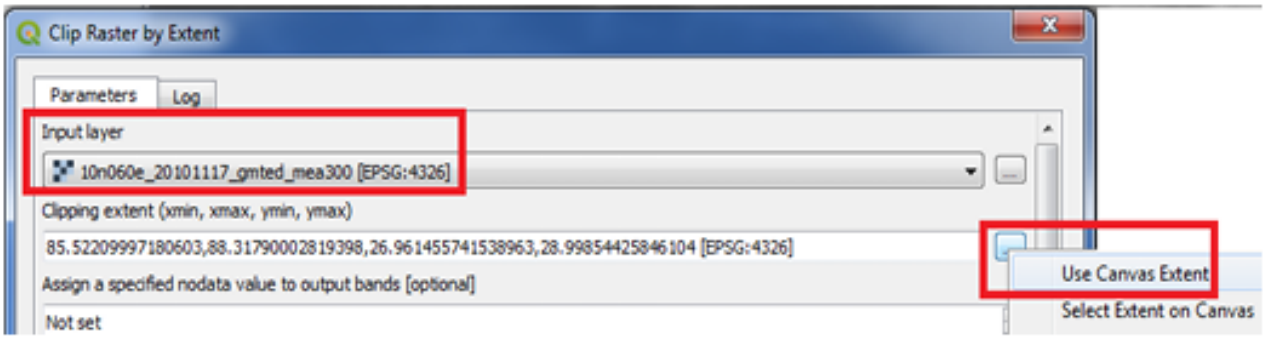


- Press enter the view port will be centered on Himalaya Region.

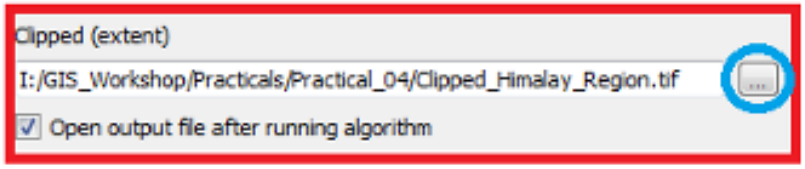


- Crop the raster layer only for the region under study.
- Go to Raster → Extraction→ Clip Raster by Extent

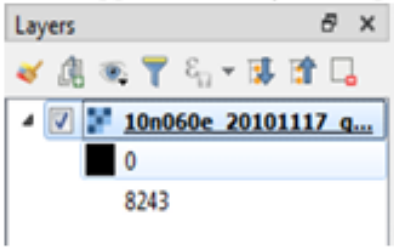




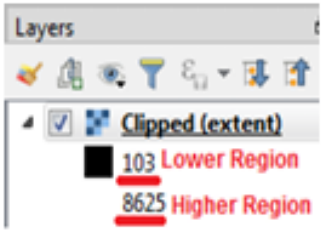
- Select the raster layer *(if project contains multiple layers).*
- Select the clipping area by selecting the option **Use Canvas Extends** if the visible part of map is to be selected or manually select an area on canvas by using **Select Extent on Canvas**.
- Select the location and file name for storing clipped raster layer.



- Press RUN.
- Deselect the original layer and keep the clipped one.
- The Clipped raster layer is representing altitude are from 103 Meters.



Original Raster



Clipped Raster

- Counter lines are the lines on a map joining points of equal height above or below sea level. A **contour interval** in surveying is the vertical distance or the difference in the elevation between the two **contour** lines in a topographical map.
- To derive counter lines from given raster.
- Go to Raster → Extraction→ Contour

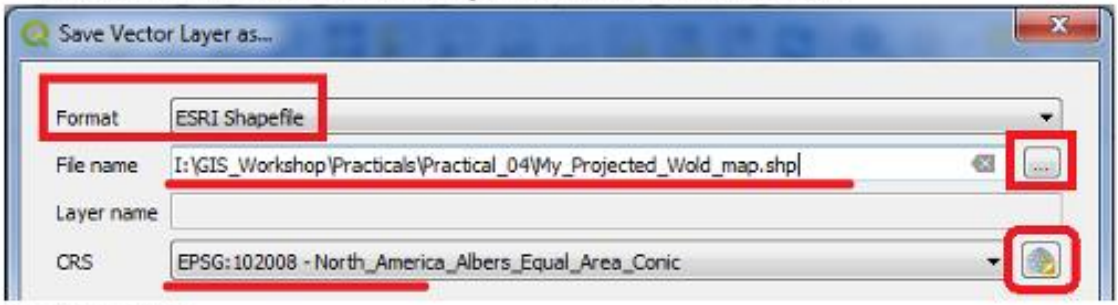
PRACTICAL 6

Practical 6 - Working with Projections and WMS Data

Working with Projections and WMS Data

A **Web Map Service** (**WMS**) is a standard protocol developed by the Open Geospatial Consortium in 1999 for serving georeferenced map images over the Internet. These images are typically produced by a map server from data provided by a GIS database

- Start a new Project.
- Layer → Add Layer →Vector Layer
- Select "ne_10m_admin_0_countries.zip" Layer from data folder.
- Go to Layer → Save As
  Select format as ESRI Shape File
  Select folder location and file name
  Set CRS North_America_Albers_Equal_Area_Conic EPSG: 102008

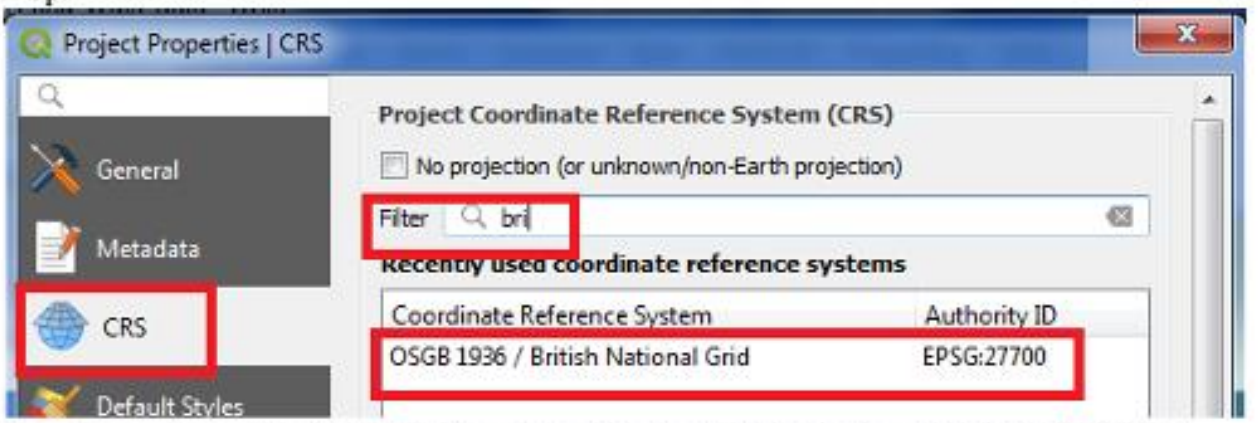


- Press "OK".
- Deselect the original Image and keep the projected layer visible.

- Select Layer → Add Layer → Add Raster Layer → Select MiniScale_(standard)_R17.tif from Location

"GIS_Workshop\Practicals\Practical_05\DATA\minisc_gb\minisc_gb\data\RGB_TIF_compressed\MiniScale_(standard)_R17.tif"

- The Layer appears on a different location than the location where Great Britain is shown on Map.



- Open Layer Properties→CRS → Search bri → select British National Grid EPSG 27700.
- Processing may take some time.
- Locate United Kingdom on Layer; the vector layer exactly coincides by the raster layer covering United Kingdom.

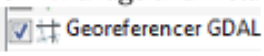
PRACTICAL 7

Practical 7 - Georeferencing Topo Sheets and Scanned Maps Georeferencing Aerial Imagery Digitizing Map Data

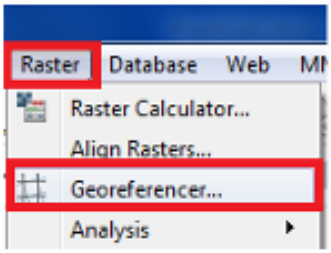
- **Georeferencing**

A. Georeferencing Topo Sheets and Scanned Maps

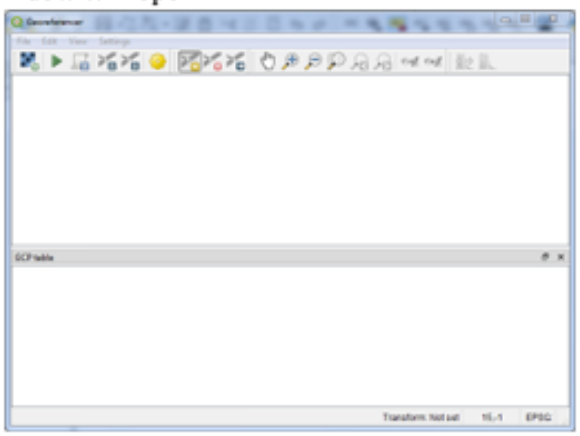
- Start a new project
- Go to Layers → Add Layer → Add vector Layer
- Select GIS_Workshop\Manual\Prac06\IND_adm0.shp
- Zoom in to Mumbai region in the layer.

- Go to Plugins→ Manage and Install Plugins
- Ensure that 

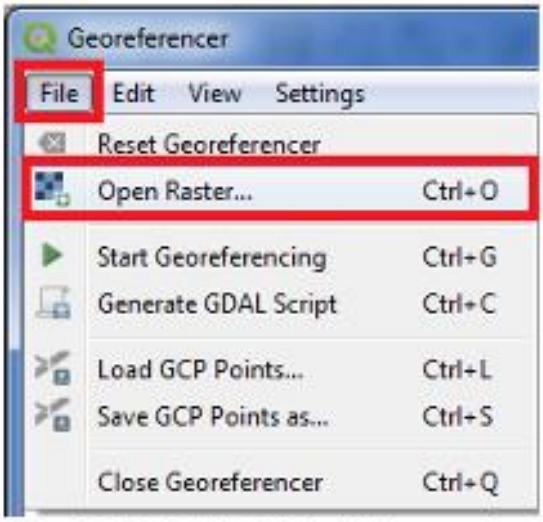
is checked, if not install Georeferencer GDAL plugin.
- Go to Raster → Georefrencer



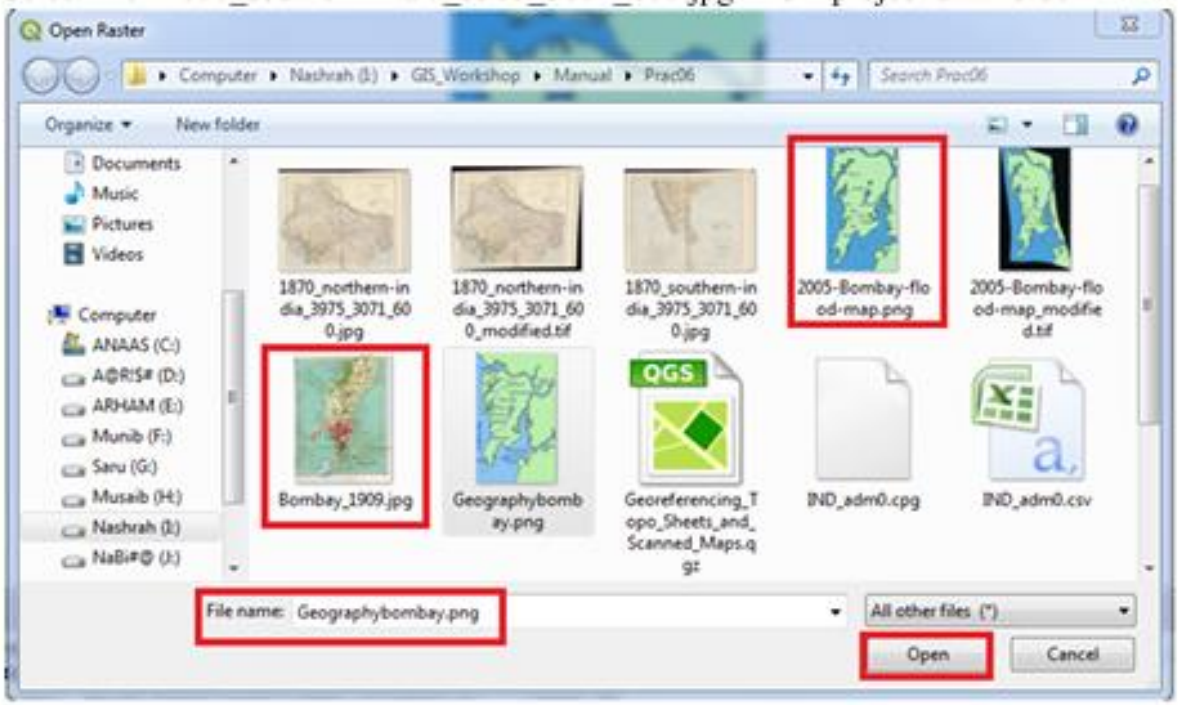
- A new Georeferencer window will open



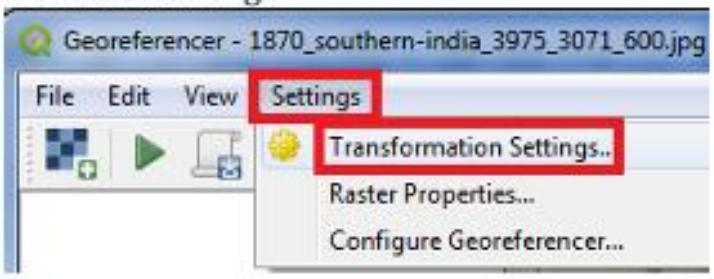
- File → Open Raster



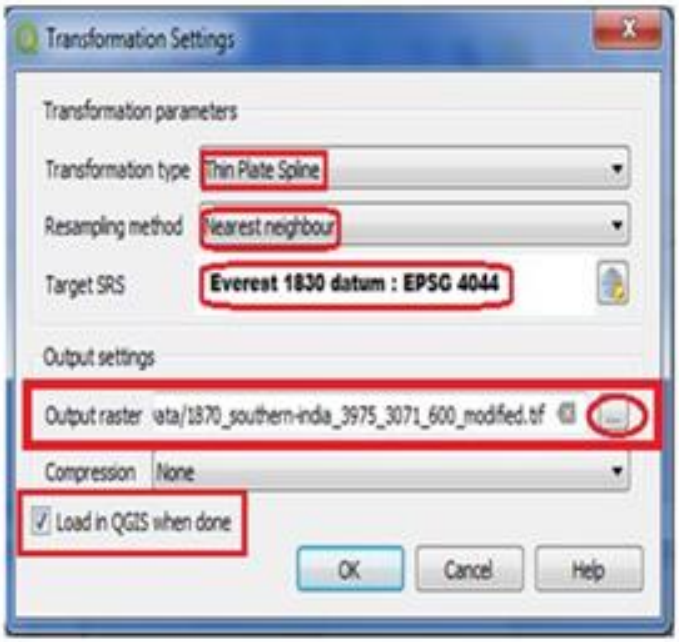
- Select file "1870_southern-india_3975_3071_600.jpg" from project data folder



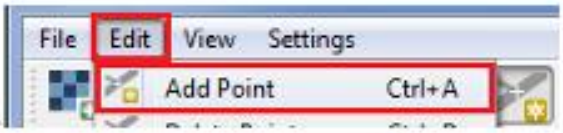
- Go to Settings →Transformation Settings



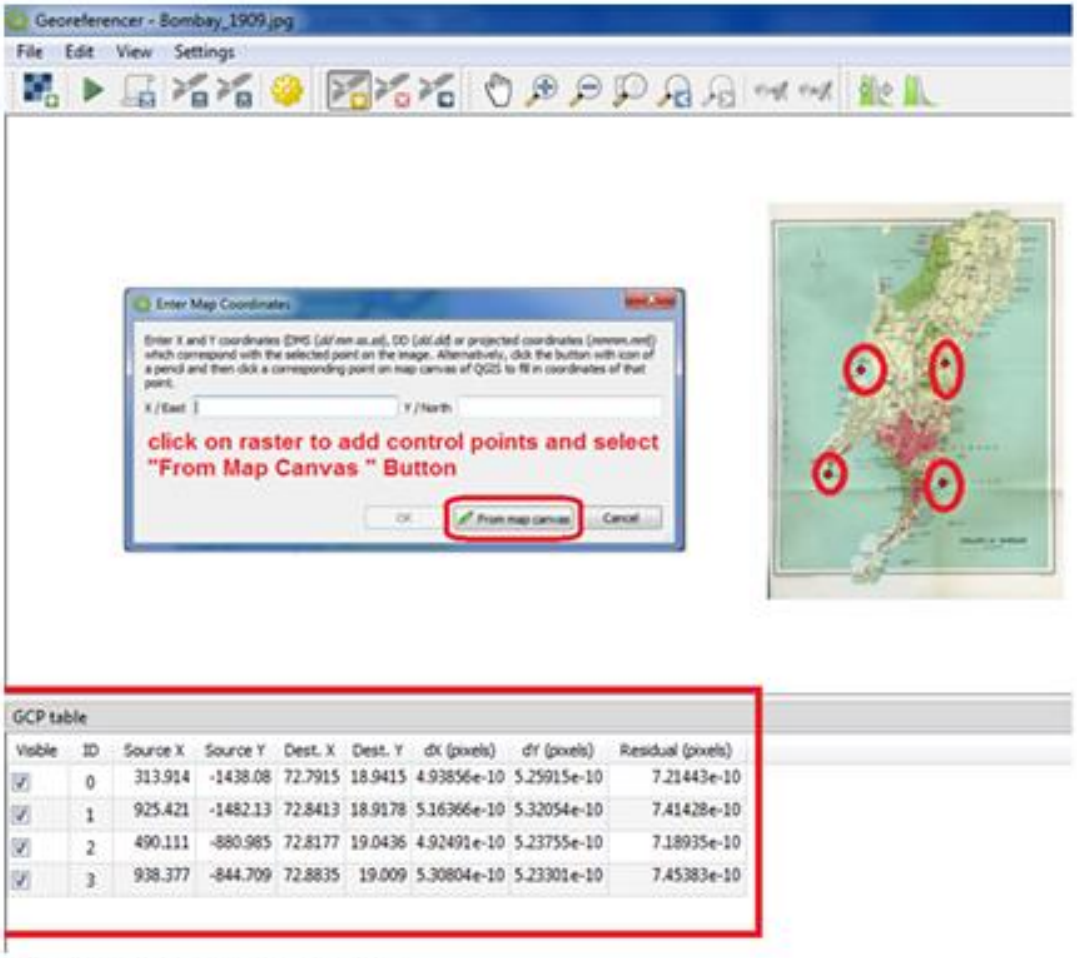
- In the Transformation Settings window



- Select Transformation type → Thin Plate Spline
- Re-sampling Method → Nearest Neighbour
- Target TRS → Everest 1830 datum: EPSG 4044
- Select Output Raster Name and Location
- Check the Load in QGIS When Done Option
- Press "OK".

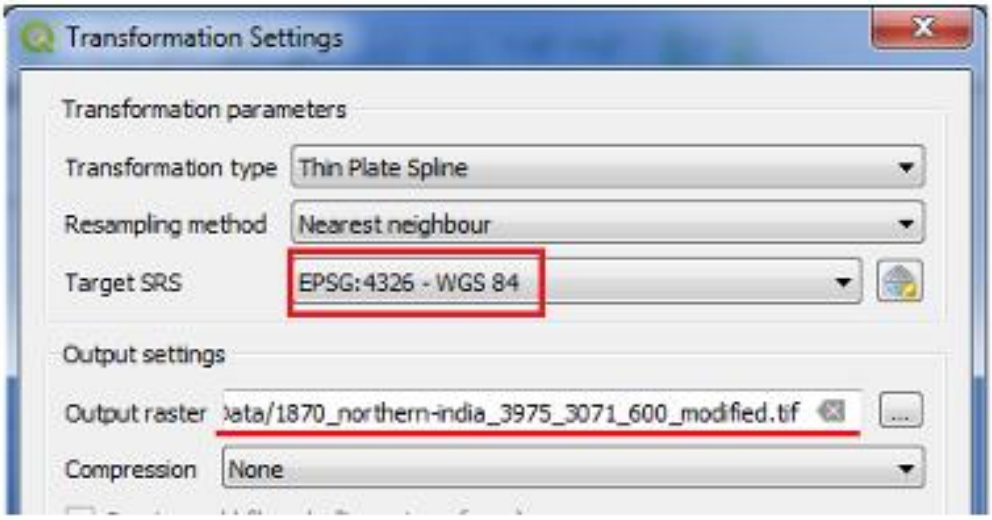


➢ In Georeferencer window Go to Edit → Add Points



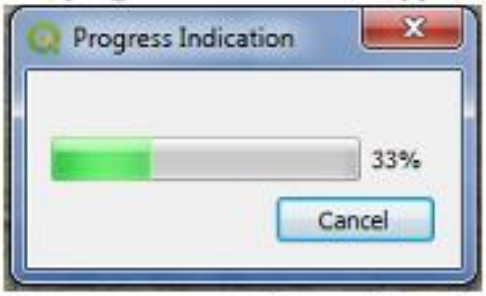
➢ Select the set of control points.

➢ Go to, Setting → transformation settings.

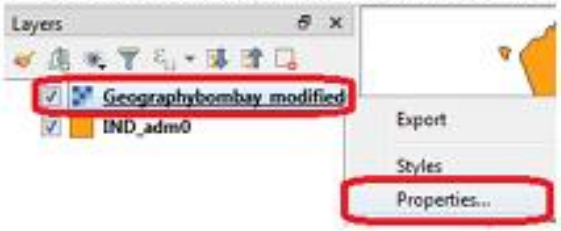


- Press "RUN"
- In Georeferencing window go to → File → Start Georeferencing

- The progress indicator will appear



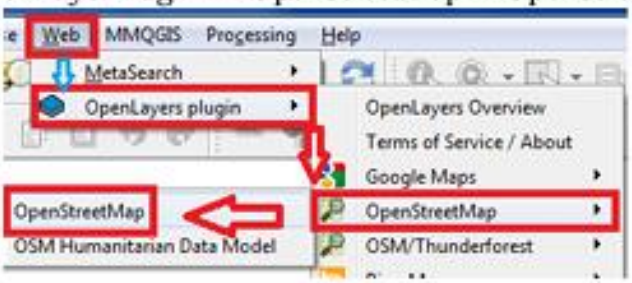
- The canvas area will now have the scanned map of Mumbai referenced with control points.
- Select the newly added layer in Layer Panel Right click and go to property.



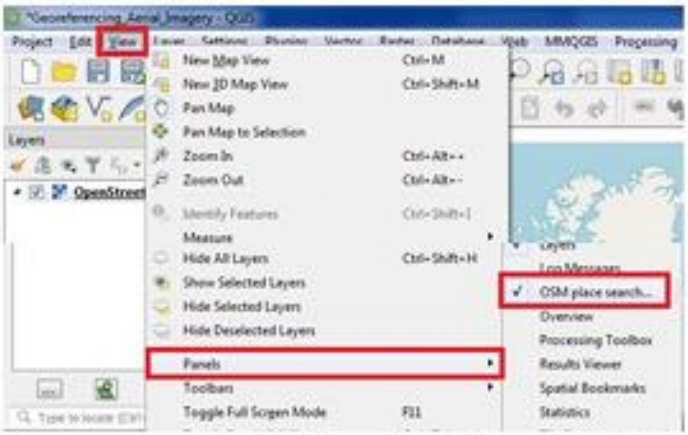
- Set Transparency level of raster layer to appropriate level.

B. Georeferencing Aerial Imagery

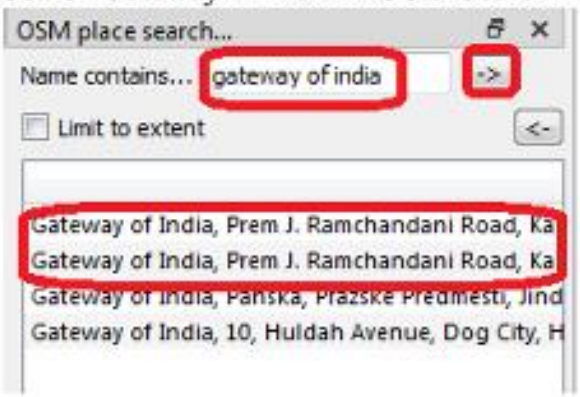
- Install plugin OpenStreetMap
- Go to Web Menu → OpenLayerPlugin → OpenStreetMap→ OpenStreetMap



- Go to Project → Properties → Set CRS to EPSG 3857
- Go to View → Panels → select OSM Place search

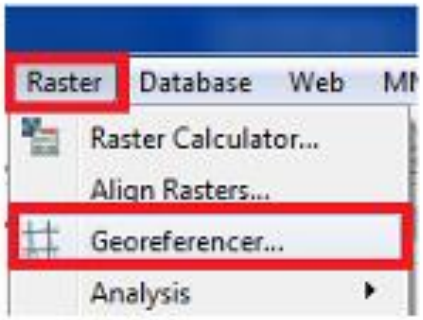


- The Gateway of India, Mumbai is located at 18.92°N 72.83°E
- Search Gateway of India in OSM Search Panel

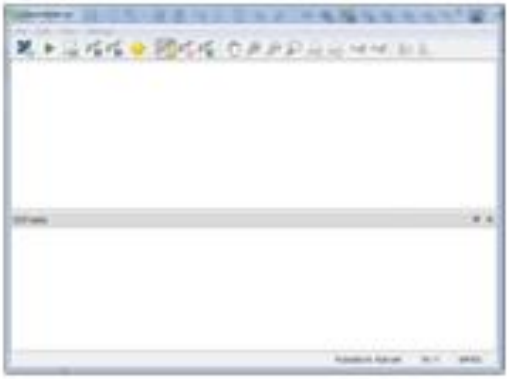


- Zoom in to appropriate level.
- The map will appear like this

- Go to Raster → Georefrencer

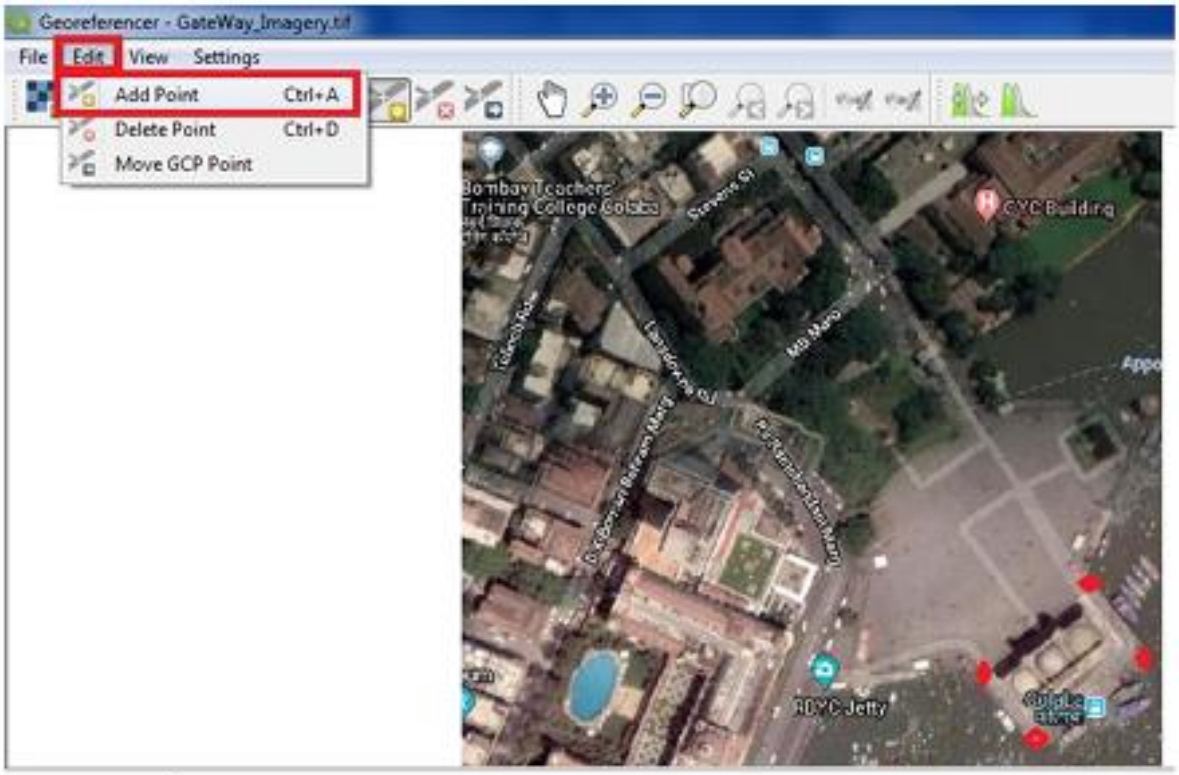


- A new Georeferencer window will open



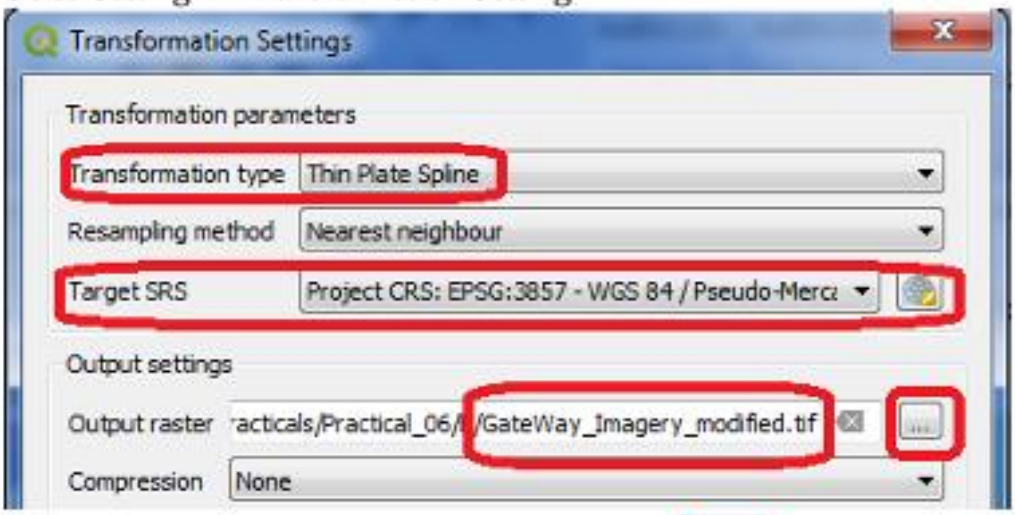
- File → Open Raster

- Select file "Gateway_Imagery.tif" from project data folder

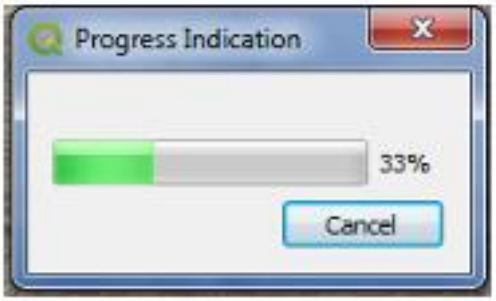


- Go to Edit → Add Point
- Select control points from map (Indicated in red color).

- Go to Setting → Transformation Setting



- Go to File → Start Georeferencing or Press the  button in Georegerencing Window.
- The progress indicator will appear

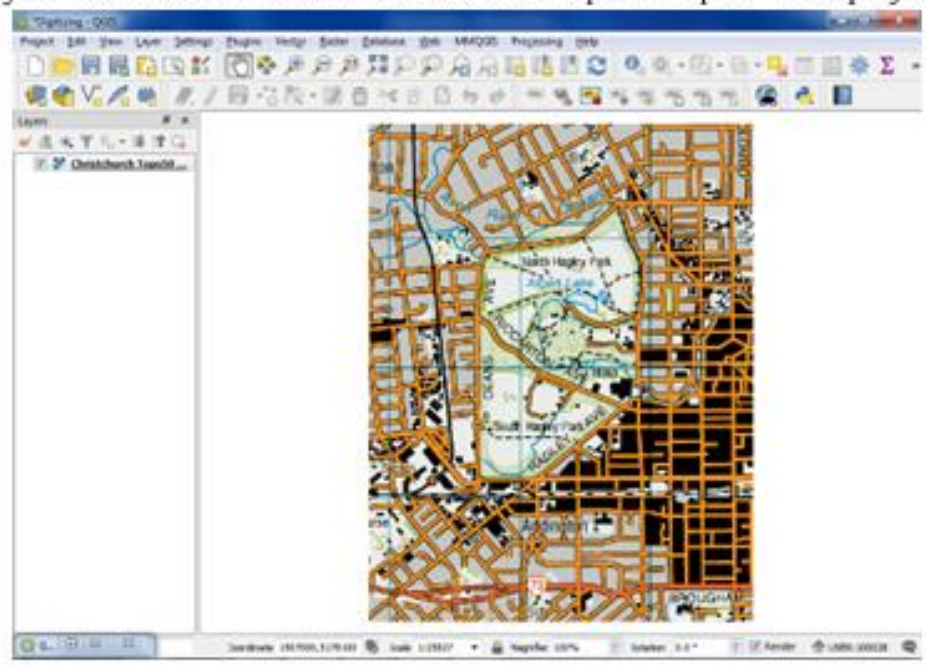


C. Digitizing Map Data

Spatialite is an open database format similar to ESRI's geodatabase format. Spatialite database is contained within a single file on your hard drive and can contain diferent types of spatial (point line, polygon) as well as non-spatial layers. This makes is much easier to move it around instead c a bunch of shapefiles.

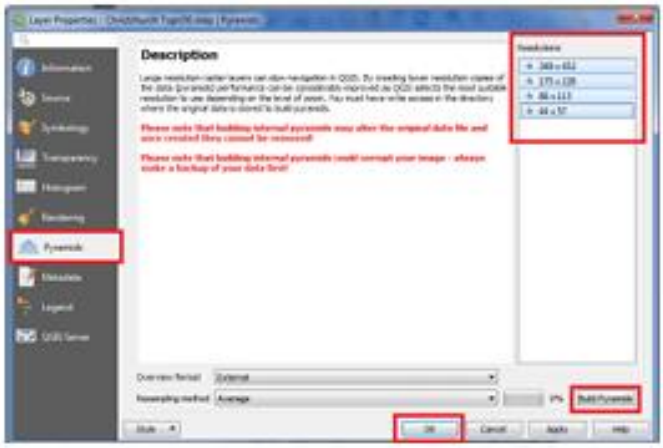
Digitizing Map Data

- Go to Layer ‣ Add Raster→ Select "Christchurch Topo50 map.tif" from project Folder.

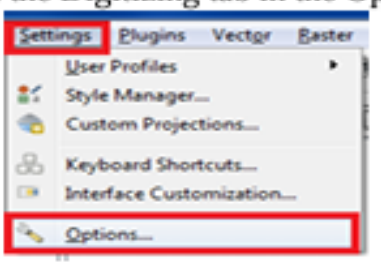


- QGIS offers a simple solution to make raster load much faster by using **Image Pyramids**.
- Right-click the Christchurch Topo50 map.tif layer and select Properties.

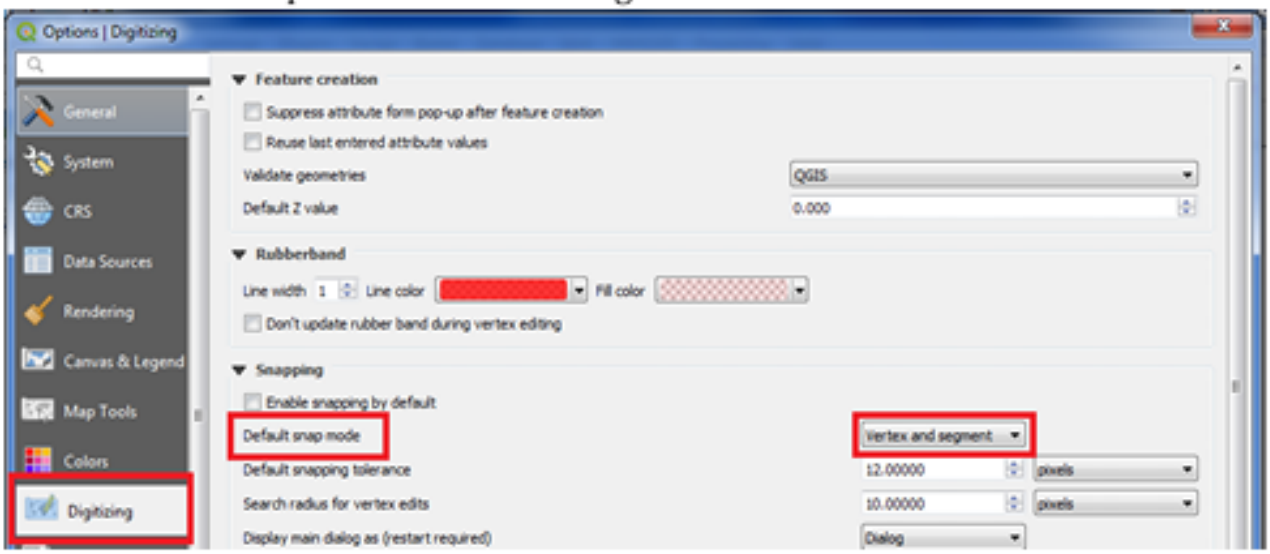
- Choose the Pyramids tab. Hold the Ctrl key and select all the resolutions offered in the Resolutions panel.



- Click Build pyramids. Then click OK.
- Go to Settings →Options.... Select the Digitizing tab in the Options dialog.

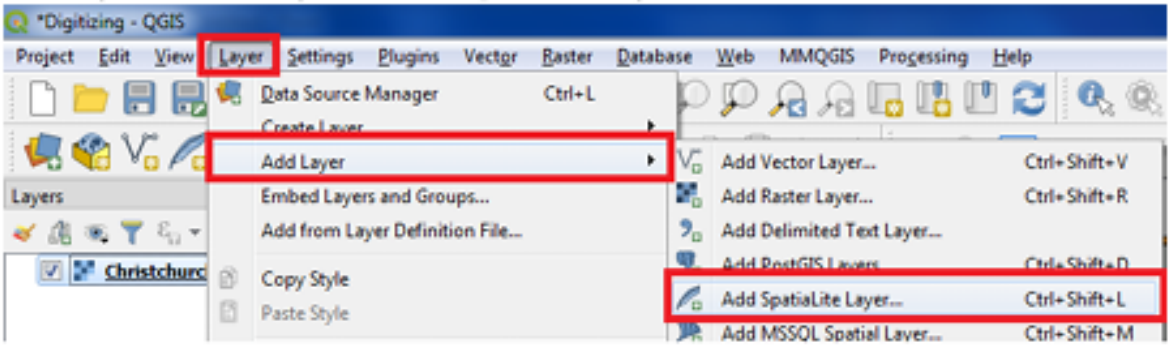


- Set the Default snap mode to vertex and segment.

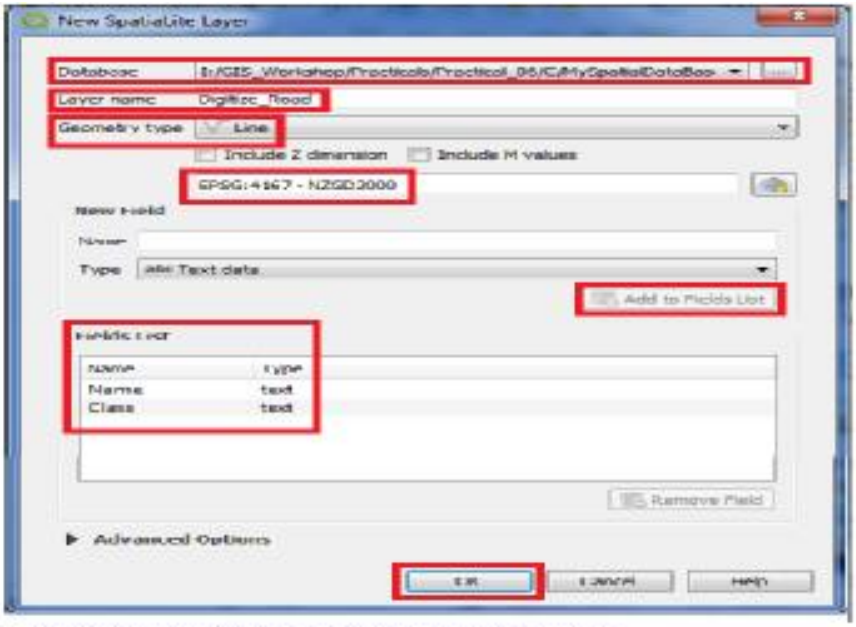


- Press OK.

- Go to Layer → Add Layer → Add Spatialite Layer.



- Select the name and location for Spatial database eg: "GIS_Workshop\Practicals\Practical_06\C\MySpatialDataBase.sqlite".
- Name the Layer as "Digitized_Road
- Set Geometry type as "Line"
- Set CRS EPSG:4167 – NZGD2000

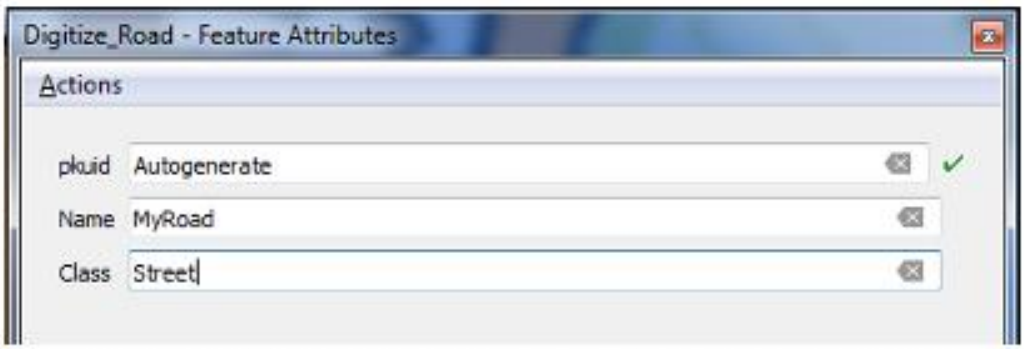


- Add "Name" and "Class" fields using "Add to Fields List".

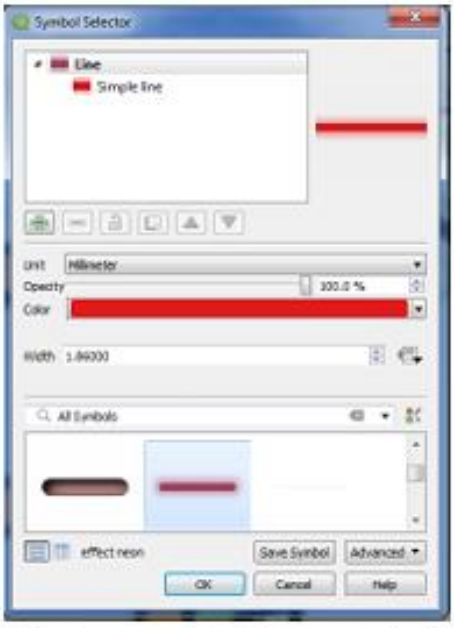
- Once the layer is loaded, click the Toggle Editing button to put the layer in editing mode.

- Click the 

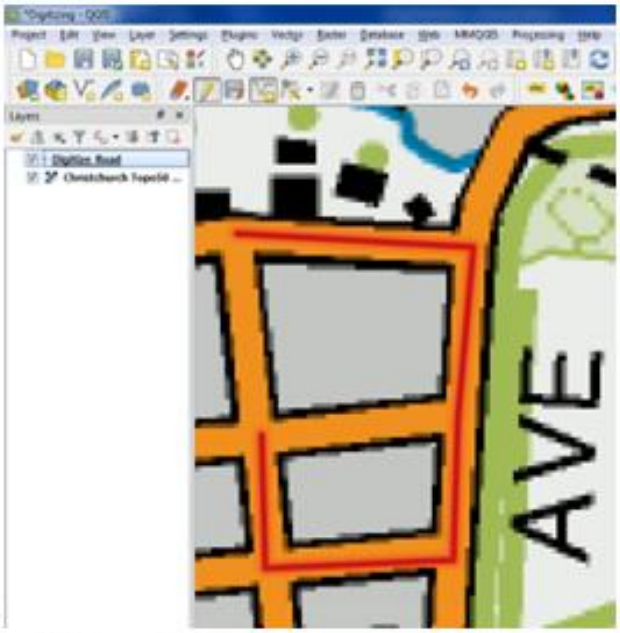
Add feature button. Click on the map canvas to add a new vertex. Add new vertices along the road feature. Once you have digitized a road segment, right-click to end the feature.



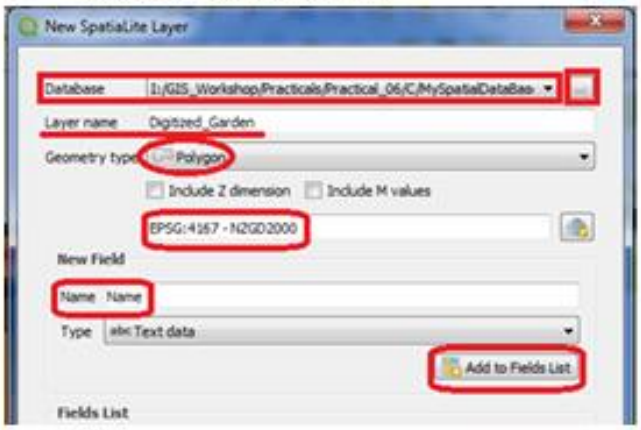
- On Layer Panel Right Click on Digitze_Road, Select the Style tab in the Layer Properties dialog.



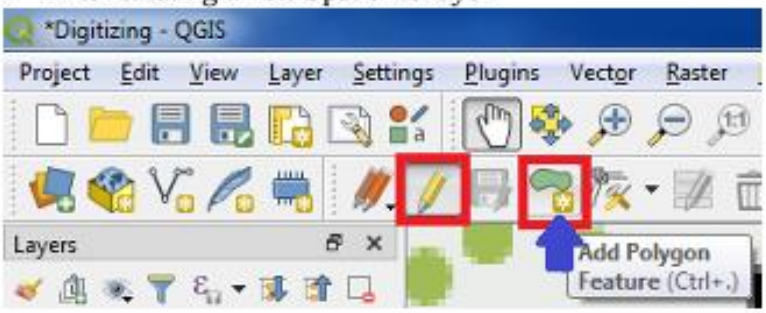
Result



- Select appropriate style to see the digitized road feature clearly.



- After creating a new Spatialite layer



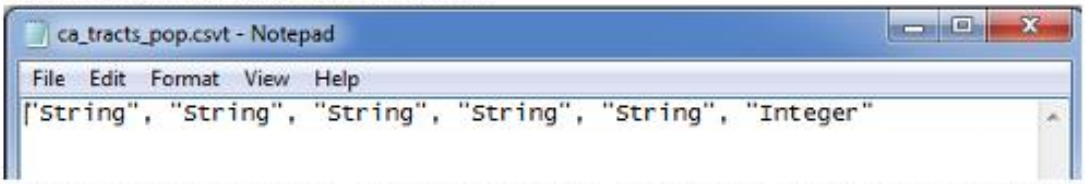
PRACTICAL 8

Practical 8 - Managing Data Tables and Saptial data Sets: Table joins, spatial joins, points in polygon analysis, performing spatial queries

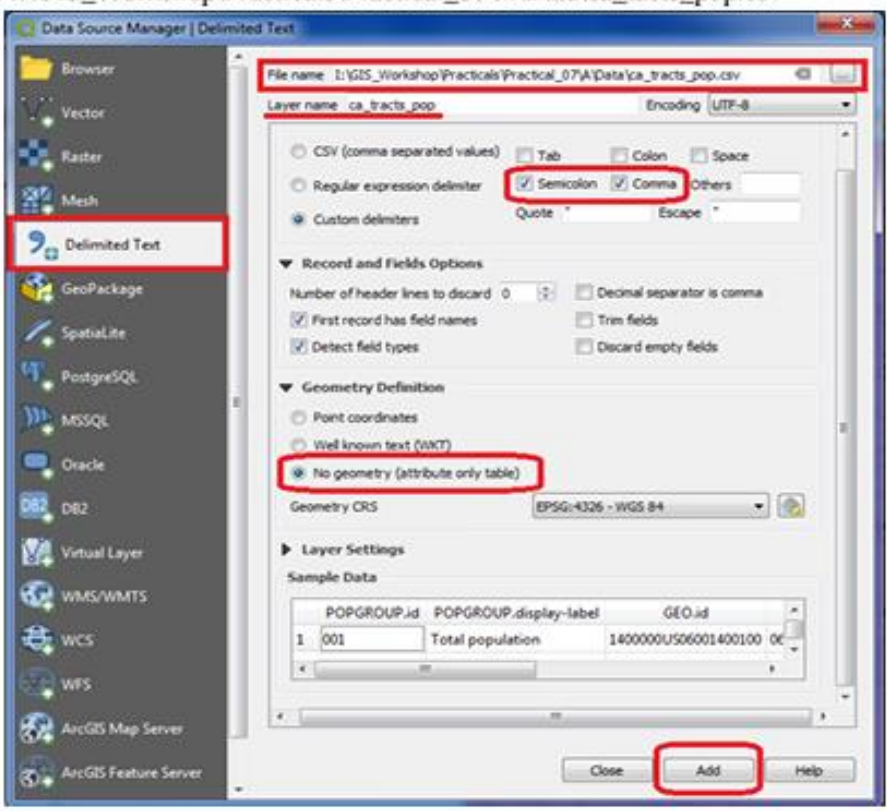
Managing Data Tables and Saptial data Sets:

a) Table joins

- Start a new project
- Go to Layer → Add Layer → Add new Vector Layer
  "I:\GIS_Workshop\Practicals\Practical_07\A\Data\tl_2013_06_tract.zip"
- We could import this csv file without any further action and it would be imported. But, the default type of each column would be a *String* (text). That is ok except for the *D001* field which contains numbers for the population. Having those imported as text would not allow us to run any mathematical operations on this column. To tell QGIS to import the field as a number, we need to create a *sidecar* file with a *.csvt* extension.



- This file will have only 1 row specifying data types for each column. Save this file as ca_tracts_pop.csvt in the same directory as the original *.csv* file.
- Go to Layer → Add Layer → Add Delimited Text Layer
  And add I:\GIS_Workshop\Practicals\Practical_07\A\Data\ca_tacts_pop.csv"

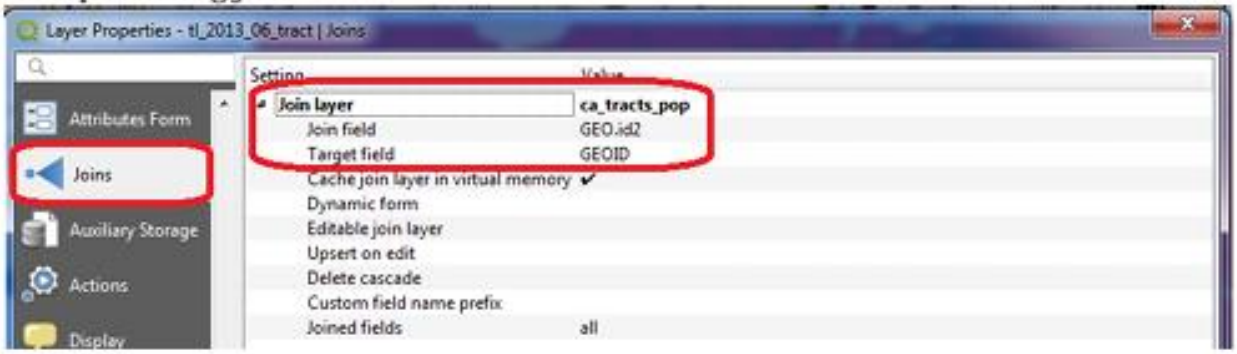


- In the layer panel, Right click on "tl_2013_06_tract", layer and select Properties

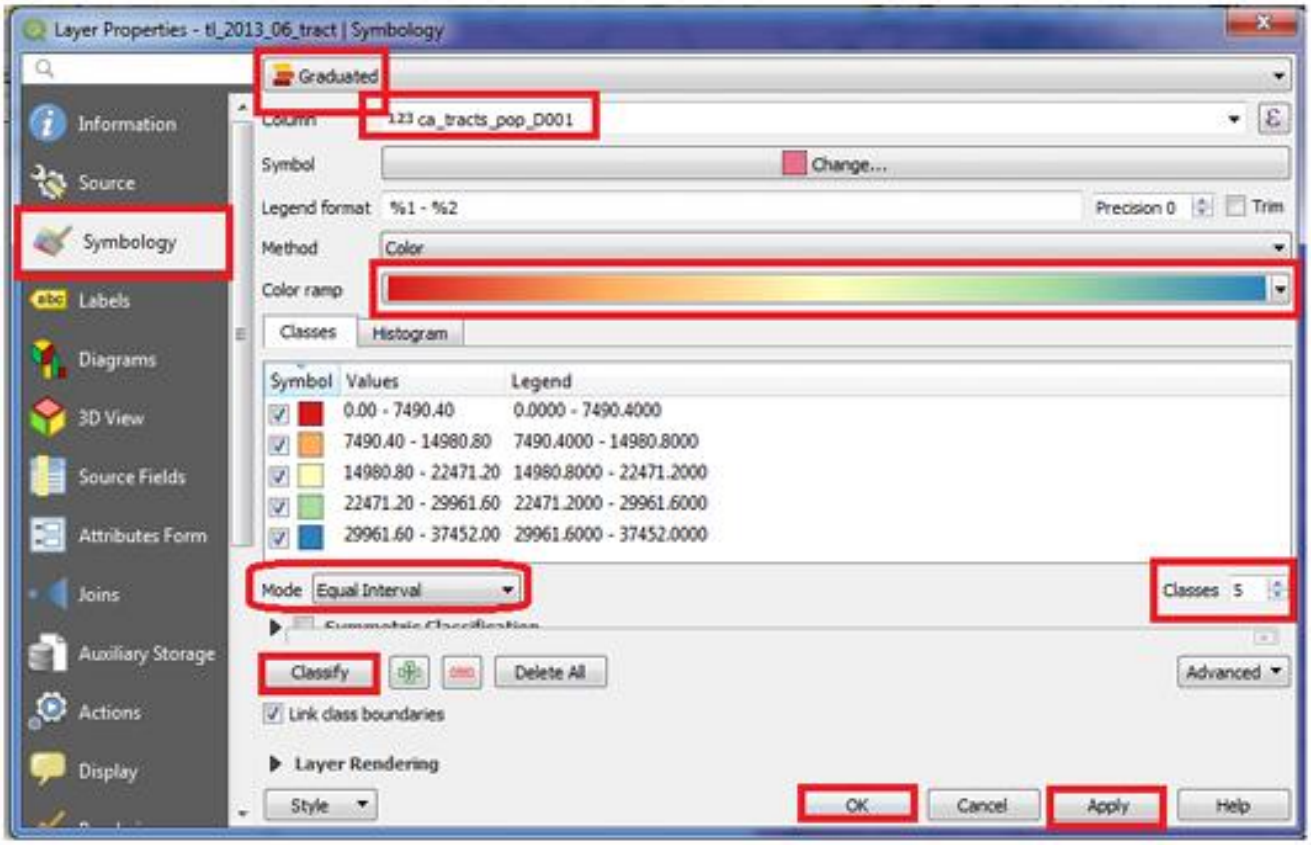
- Select the 

option in Properties, and click on  button to add new table join.
- In the Add Vector Join window set the following properties and click OK.

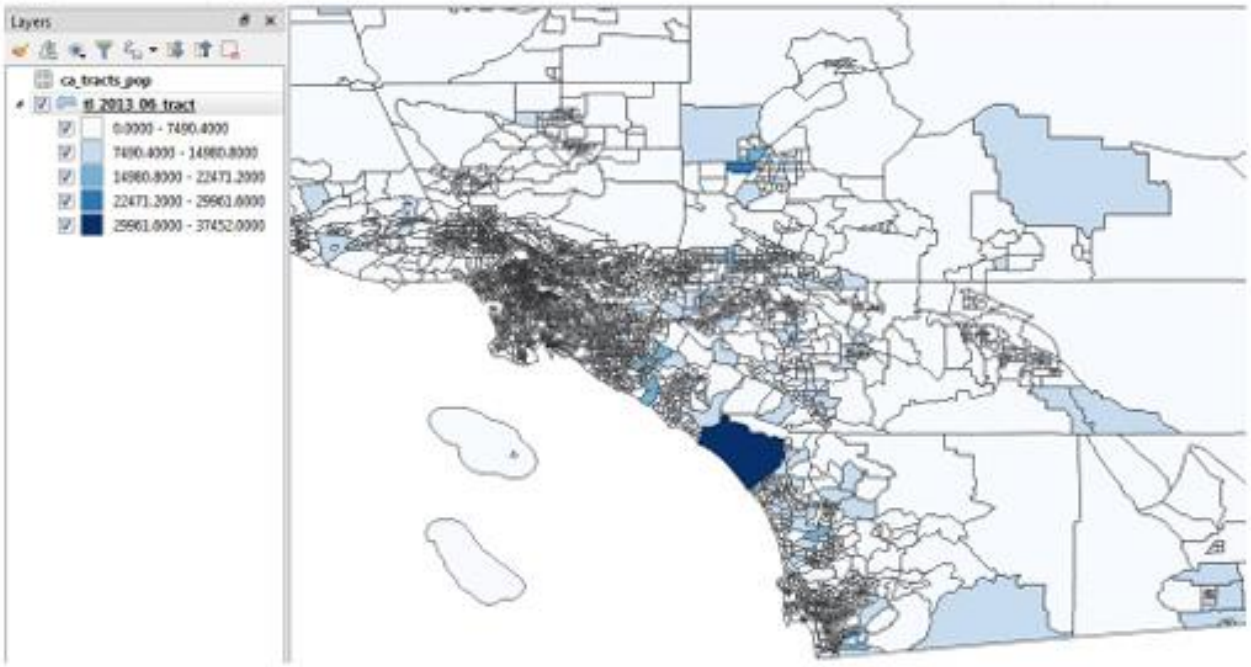
- After performing join



- For more clear output, select "tl_2013_06_tact" from Layer Panel, right click and select properties. Go to Symbology and set the following properties.

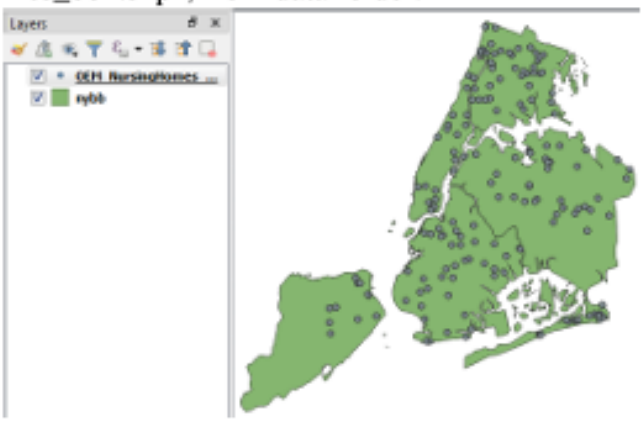


- A detailed and accurate population map of California can be seen as the result. Same technique can be used to create maps based on variety of census data.

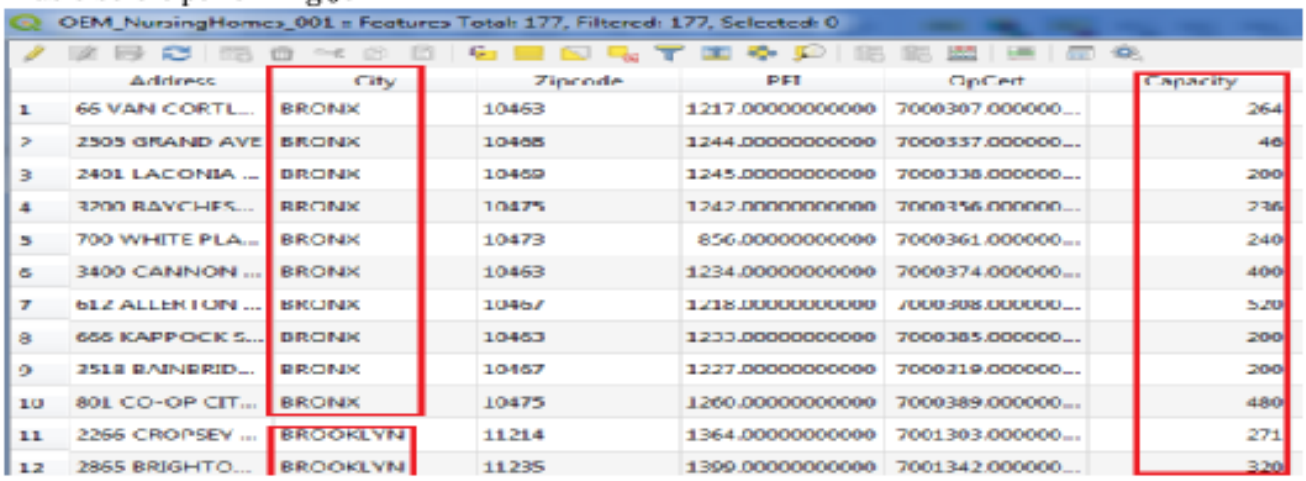


b) spatial joins

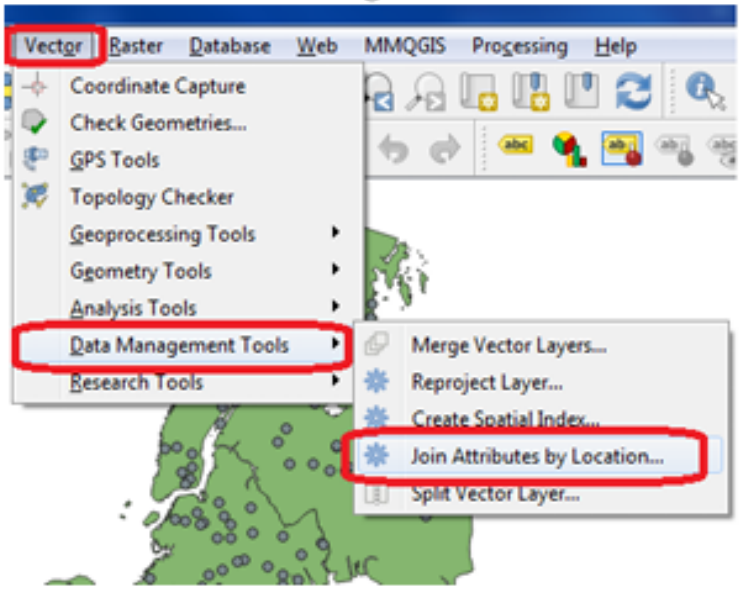
- Go to Layer → Add Layer → Add Vector Layer → Select "I:\GIS_Workshop\Practicals\Practical_07\B\Data\nybb_12c\nybb_13c_av\nybb.shp" and "I:\GIS_Workshop\Practicals\Practical_07\B\Data\OEM_NursingHomes_001\OEM_NursingHomes_001.shp", from data folder.

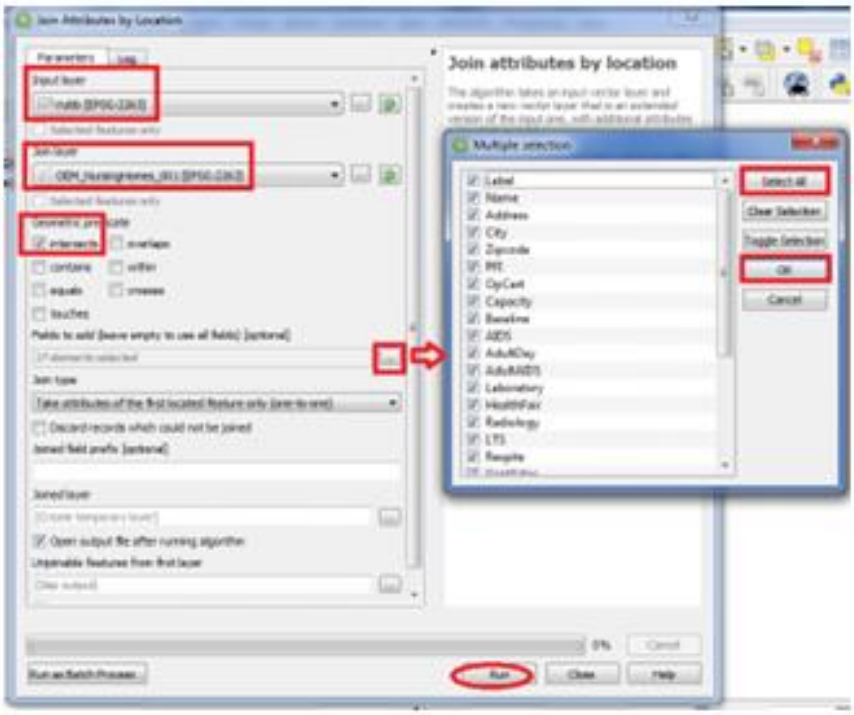


- Go to attribute table and observe the data.
- Table before performing Join



- Go to Vector → Data Management Tools → Join Attributes by Location

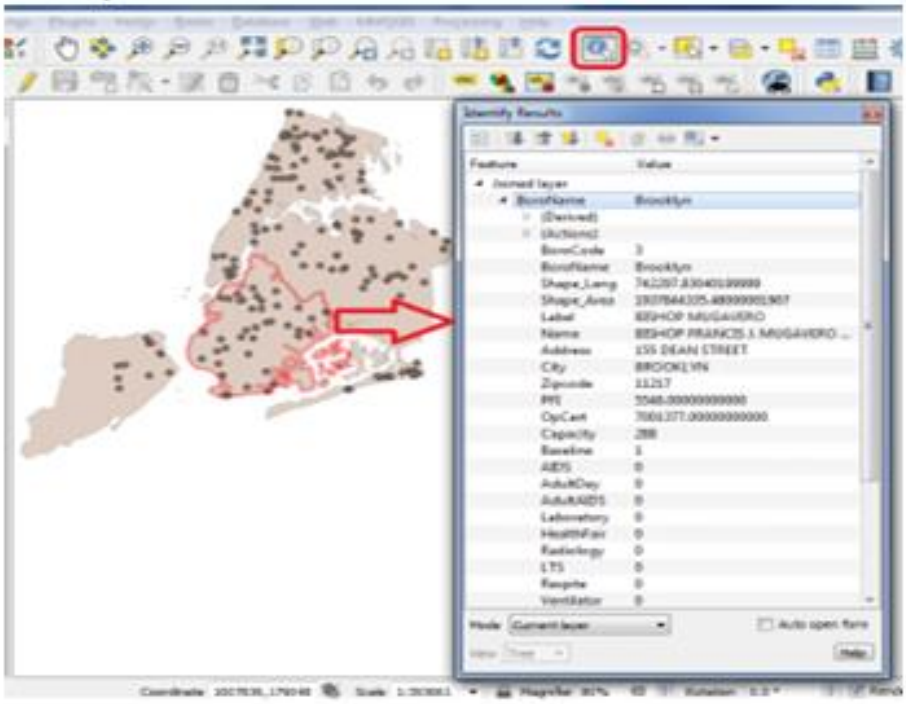




- Attribute table after join

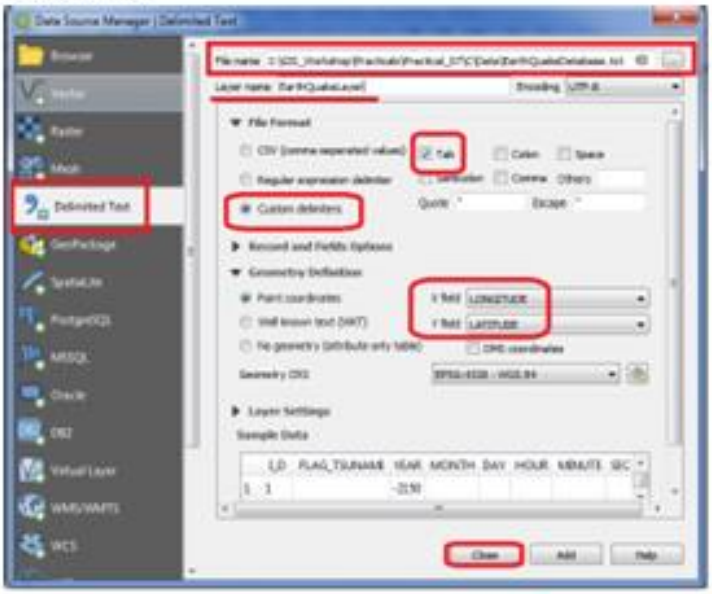
City	Zipcode	PFI	OpCert	Capacity
ASTORIA	11102	6384.000000000000	7003405.000000...	280
BROOKLYN	11217	5546.000000000000	7001377.000000...	288
BRONX	10472	1251.000000000000	7000381.000000...	200
STATEN ISLAND	10304	1755.000000000000	7004310.000000...	300
NEW YORK	10003	4807.000000000000	7002351.000000...	28

- Use the Identify Feature  Button to select a region to view join data on map Layer.
- Output

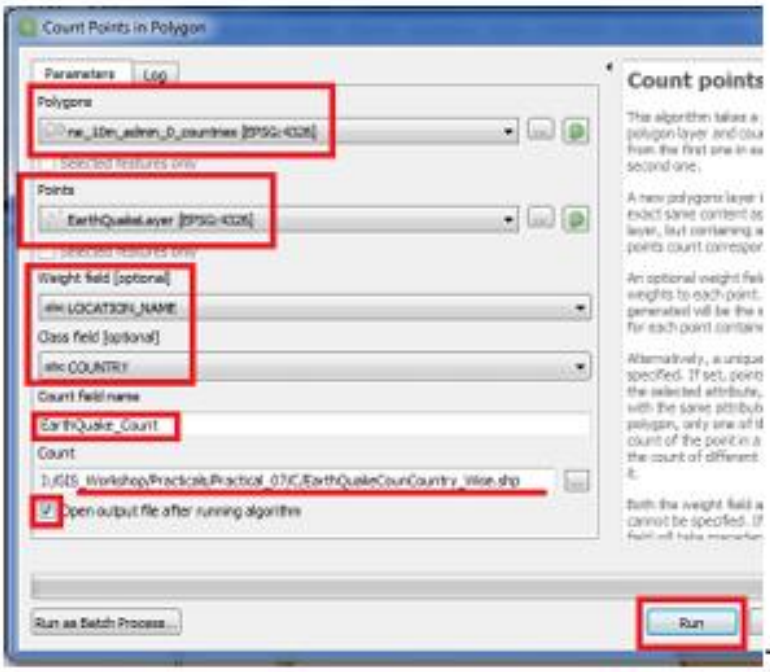


c) Points in polygon analysis

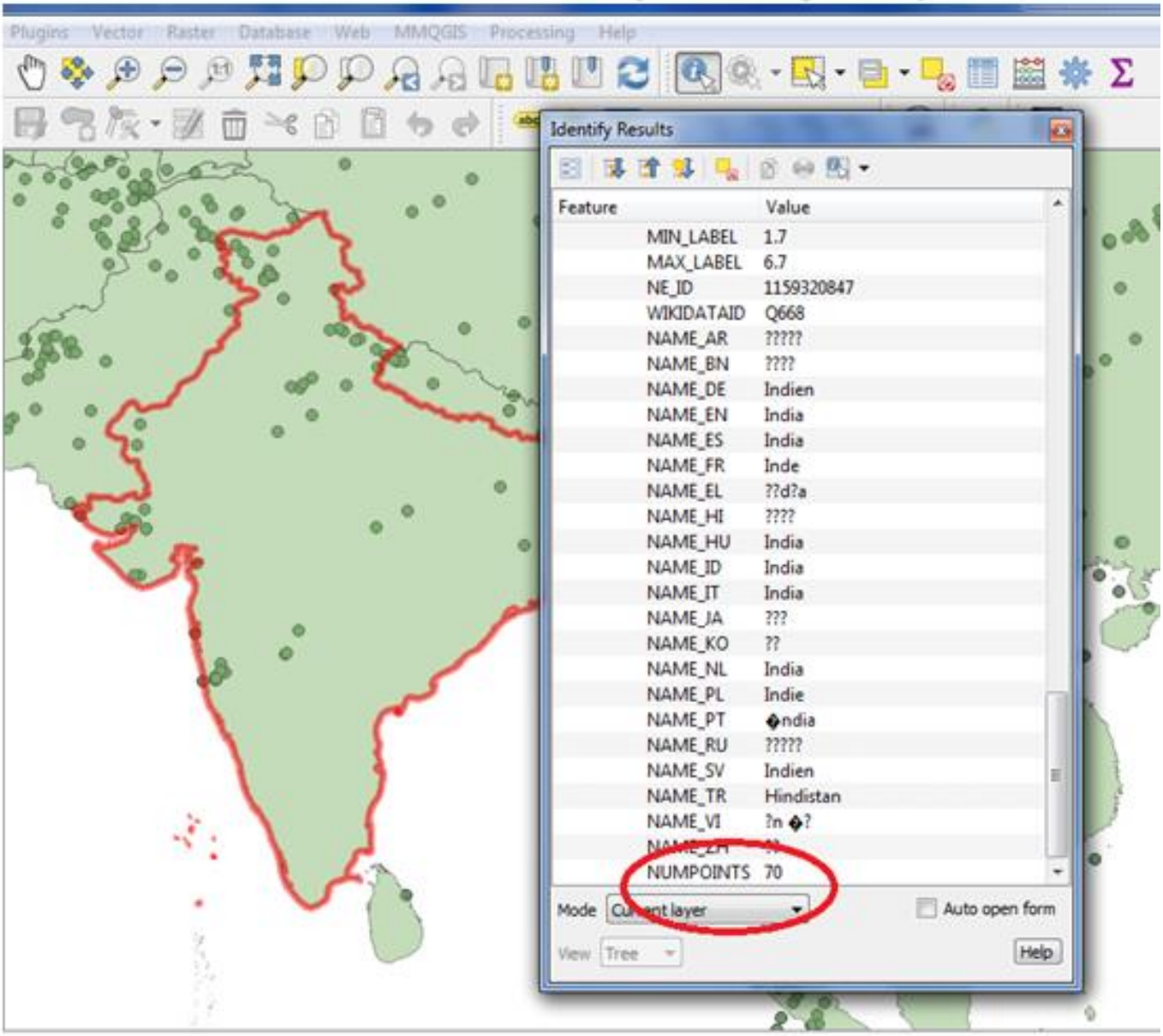
- Go to Layer → Add Layer → Add Delimited Text Layer
  Select "EarthQuakeDatabase.txt"



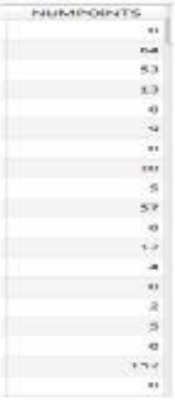
- Go to Layer → Add Layer → Add Delimited Text Layer
  "I:\GIS_Workshop\Practicals\Practical_07\C\Data\ne_10m_admin_0_countries.zip"



- Use the select Feature  button to check country wise counting of Earthquakes.



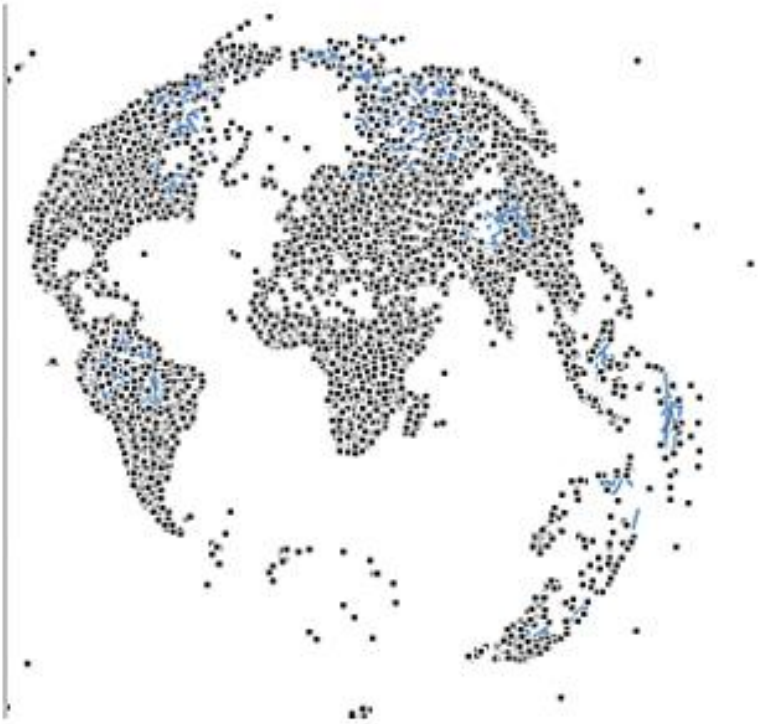
- Also a new column is added to attribute table "NumPoints" indicating number of earth quake points in each country.



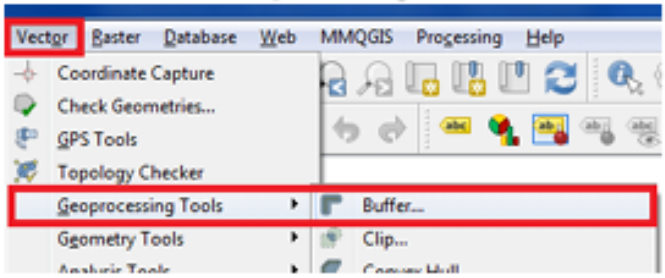
d) Performing spatial queries

- Go to Layer → Add Layer → Add Vector Layer and load "\GIS_Workshop\Practicals\Practical_07\D\Data\ne_10m_populated_places_simple\ne_10m_populated_places_simple.shp" and "I:\GIS_Workshop\Practicals\Practical_07\D\Data\ne_10m_rivers_lake_centerlines\ne_10m_rivers_lake_centerlines.shp" from project data folder.

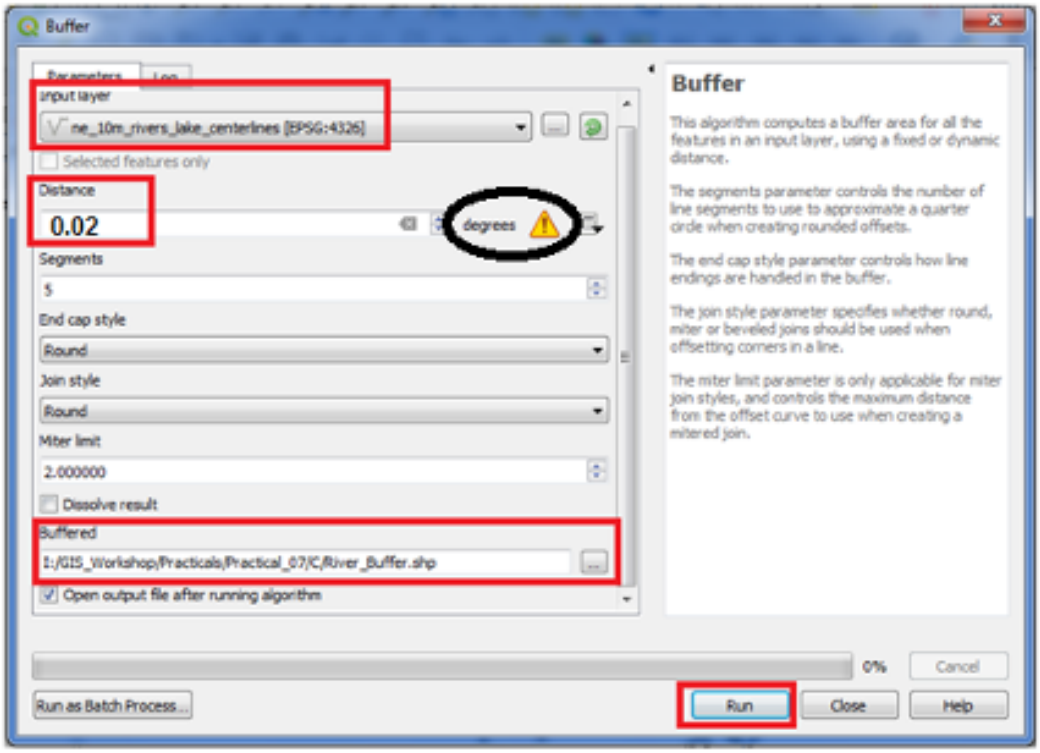
- Open project Properties → Set CRS "World_Azimuthal_Equidistant EPSG 54032" . The map will be re-projected as



- Go to Vector → Geoprocessing Tool → Buffer

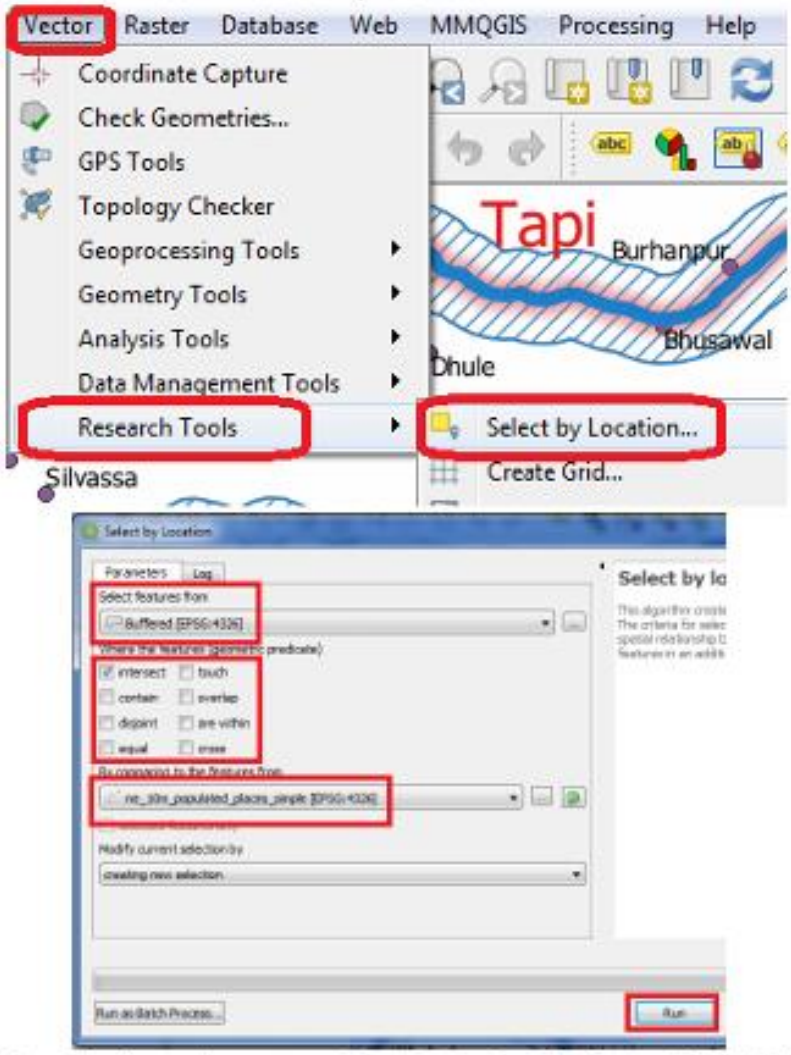


- Repeat the step to create River Buffer



- Create a buffer for River

- Go to Vector → Research Tool → Select By Location



- This will highlight only those rivers containing a populated place within 2 KM