



VIKAS VIDYA EDUCATION TRUST'S
Lords Universal College
Department of Information Technology

CERTIFICATE

Class: TYBSc.IT

Year: 2024-2025

This is to certify that the work of Fundamentals of GIS practical entered in this Journal is the work of Shree / Kumari _____

Of _____ TYIT Roll no: _____

University Exam No: _____ has satisfactorily completed the required number of practical and worked for the 6th term the term of the year 2024 2025 in the college laboratory as laid down by the university.

Internal Examiner

External Examiner

Head of the Department

Date: / / 2025

Department of Bsc.IT

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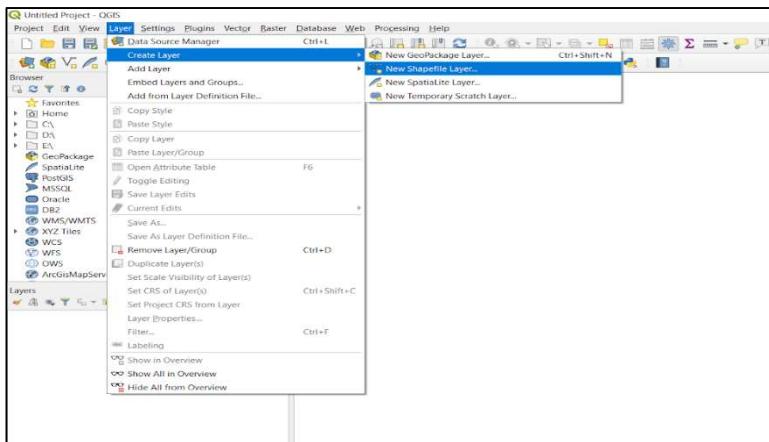
Practical No	Details	Date	Signature
1	Creating and Managing Vector Data: Adding vector layers, setting properties, formatting, calculating line lengths and statistics		
2	Exploring and Managing Raster data: Adding raster layers, raster styling and analysis, raster mosaicking and clipping		
3	Making a Map, Working with Attributes, Importing Spreadsheets or CSV files Using Plugins, Searching and Downloading OpenStreetMap Data		
4	Working with attributes, terrain Data		
6	Georeferencing Topo Sheets and Scanned Maps Georeferencing Aerial Imagery Digitizing Map Data		
7	Managing Data Tables and Saptial data Sets: Table joins, spatial joins, points in polygon analysis, performing spatial queries		
8	Advanced GIS Operations 1: Nearest Neighbor Analysis, Sampling Raster Data using Points or Polygons, Interpolating Point Data		
9	Advance GIS Operations 2: Batch Processing using Processing Framework Automating Complex Workflows using Processing Modeler Automating Map Creation with Print Composer Atlas Validating Map data		

Practical no:-1

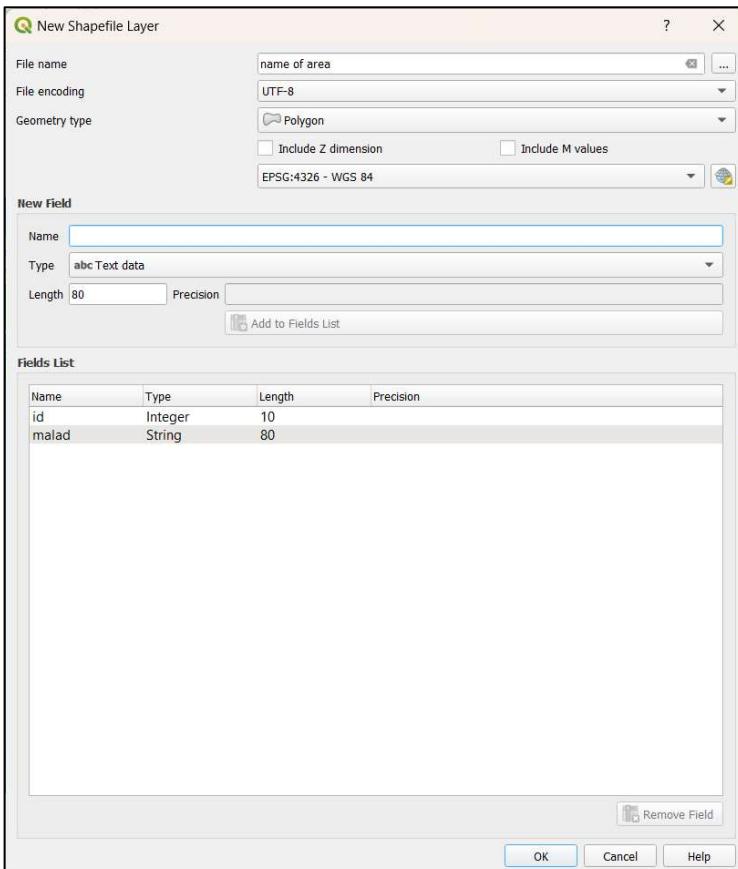
Aim: Creating and Managing vector data: Adding vector layers, setting properties, formatting, calculating Line length and statistics.

Part-I: Adding vectors layers, setting properties, formatting.

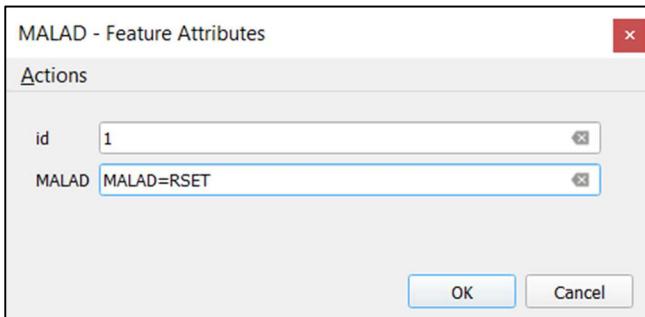
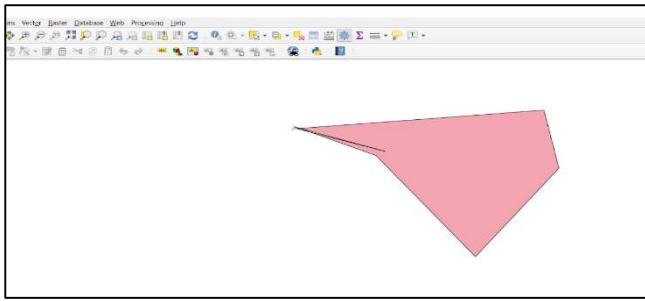
Step-1: Open QGIS → Go to layers from toolbox → Create layers → New shape file layers.



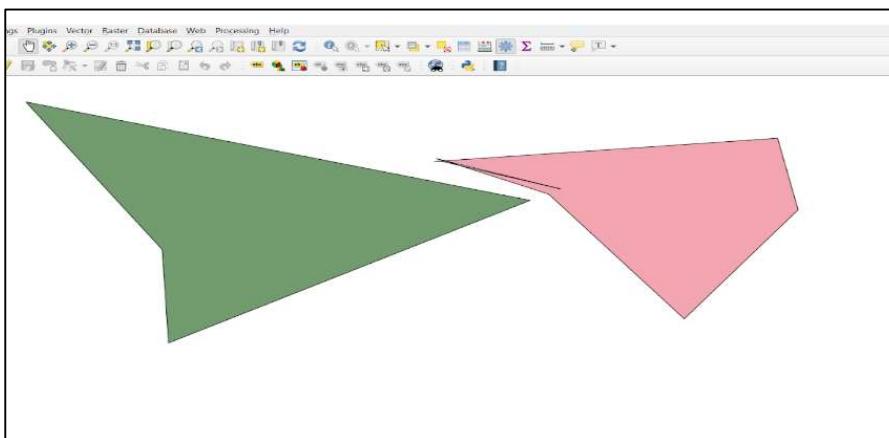
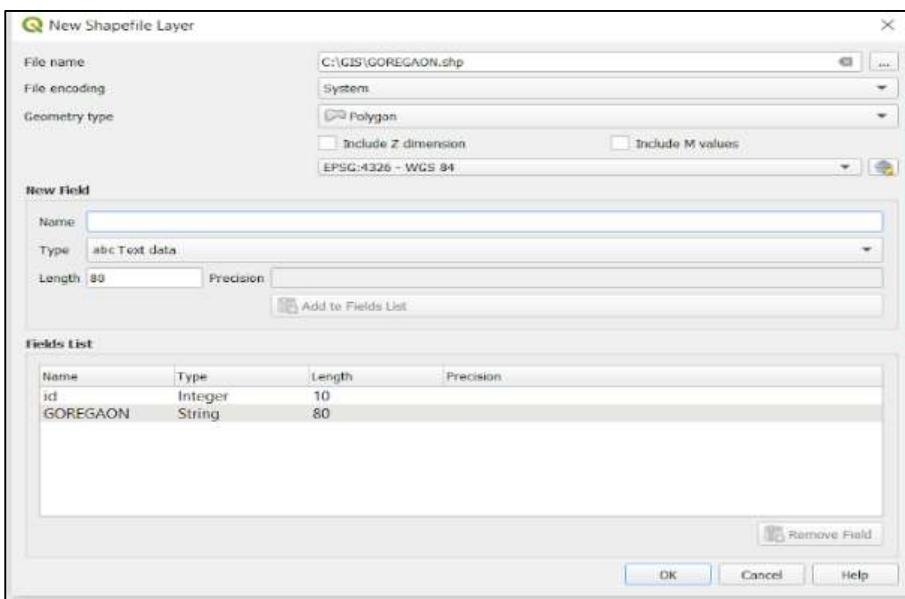
Step-2: New shape file layers → File name = **NAME OF AREA**, Encoding system = **SYSTEM** or **UTS**, geometry type= **POLYGON**, Name=**MALAD**, Type =**TEXT**→ Add to field list → OK.

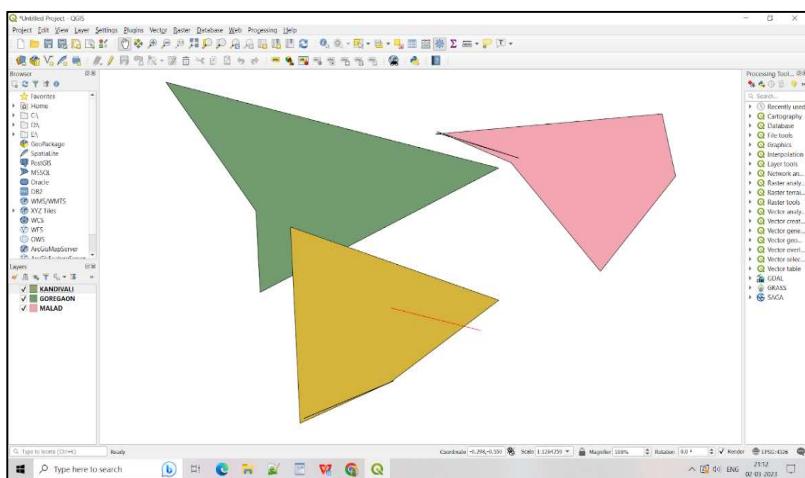
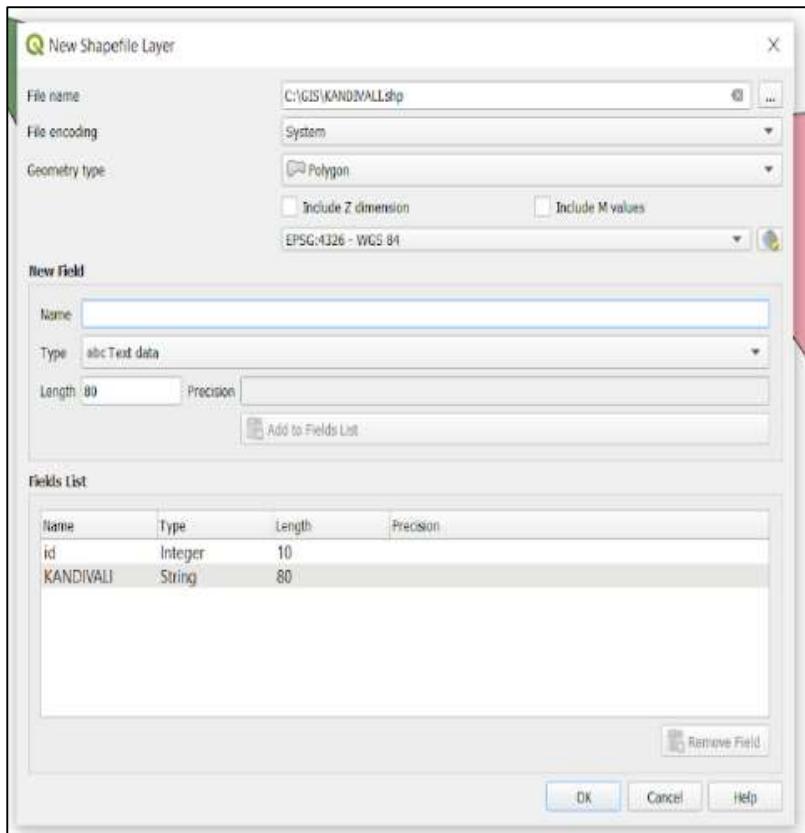


Step-3: Click on Toggle Editing→ Click Polygon →Draw on display window→ Right click on it to give Name → Malad =**RSET**→ OK.

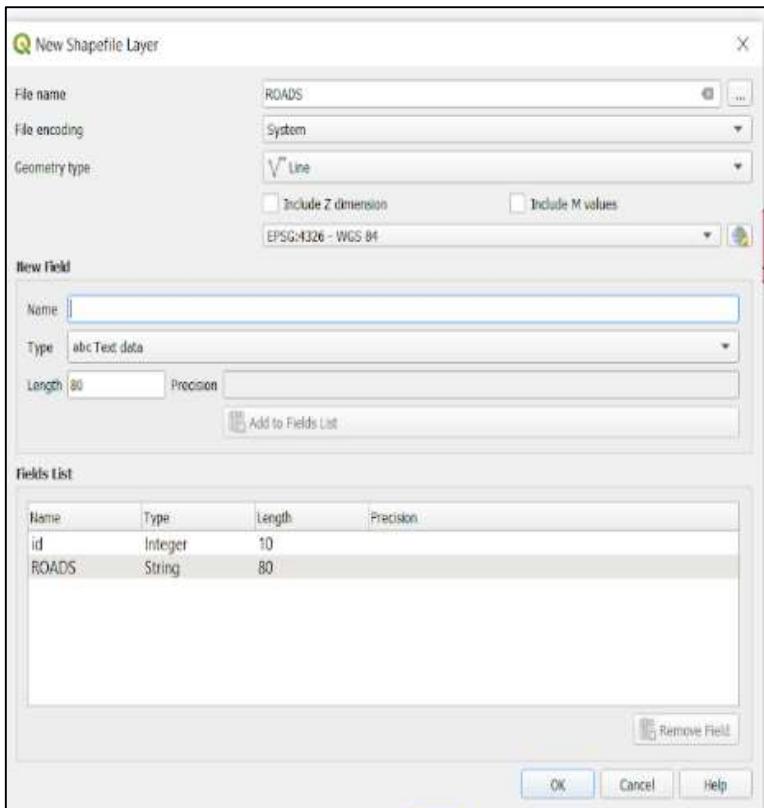


Step-4: Draw two more polygons and give them name.

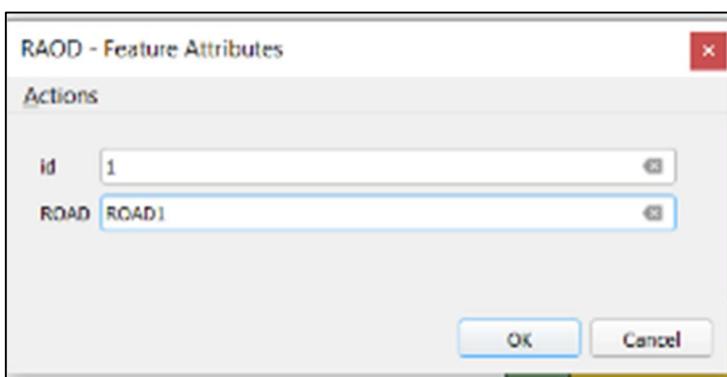




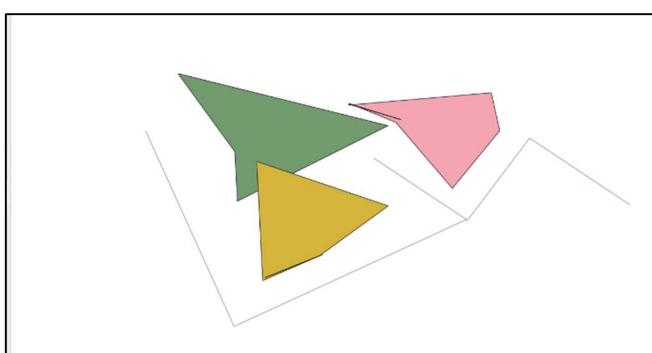
Step-5: Create layers → new shape file layers → File Name= **ROADS**, Geometry type=LINE Name **ROADNAME** → Add to field list → OK.



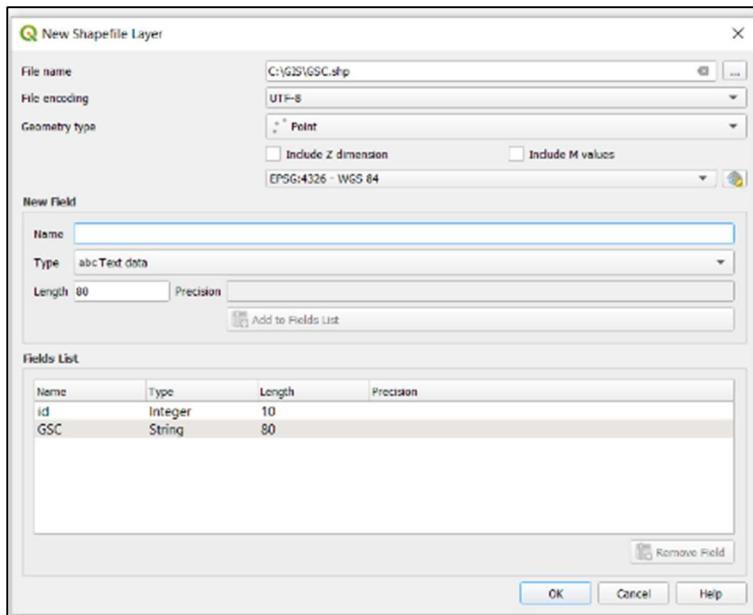
Step-6: click on toggle editing → click line → Draw on display window→ right click on it to give name→ road name= **ROAD 1**



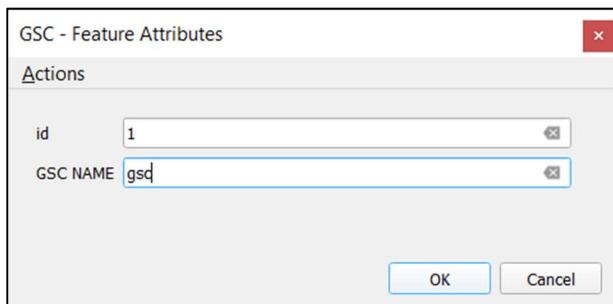
Step-7: Draw two three roads.



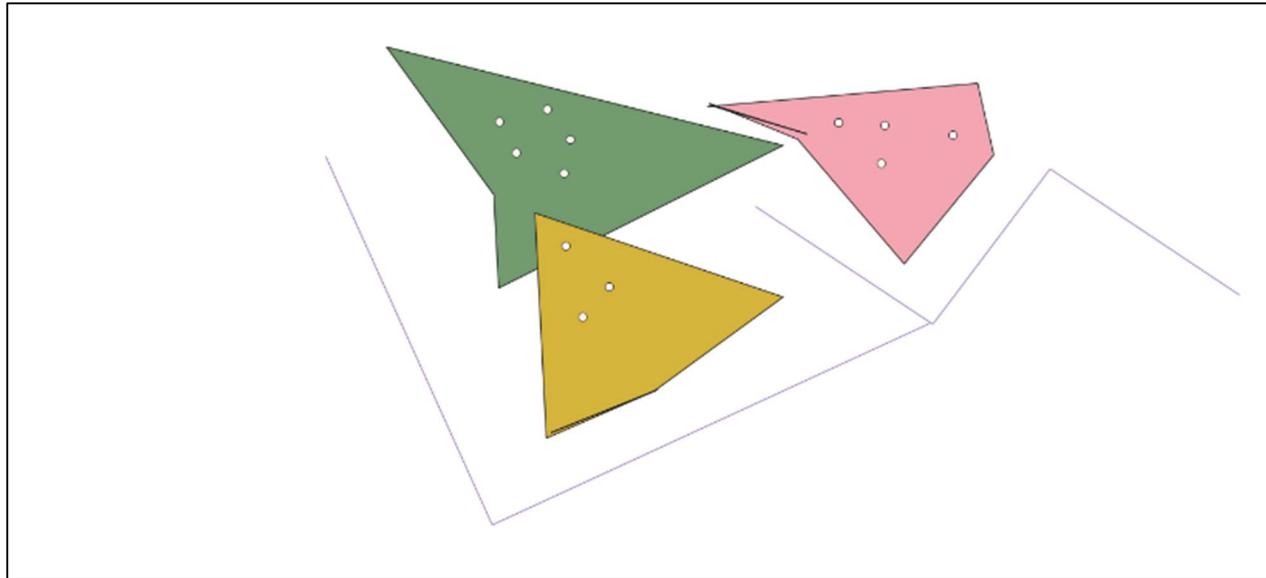
Step-8: Create layers→ New shape file→ Layers → file name= GSC, Geometry type= **POINT** ,Name: **GSC NAME** → Add to filed list→ OK.



Step-9: Right click on it and give A Name → Add two three buildings

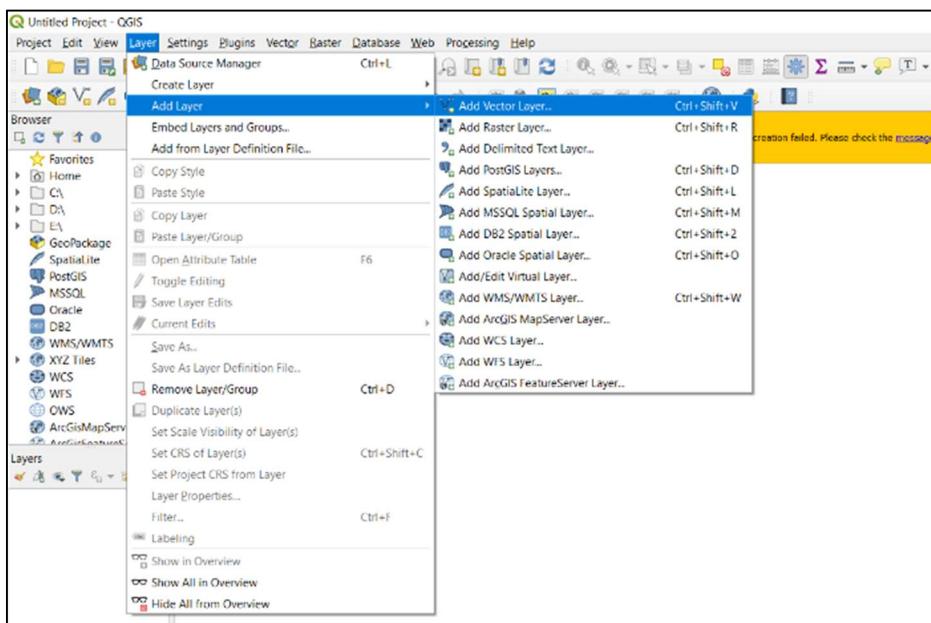
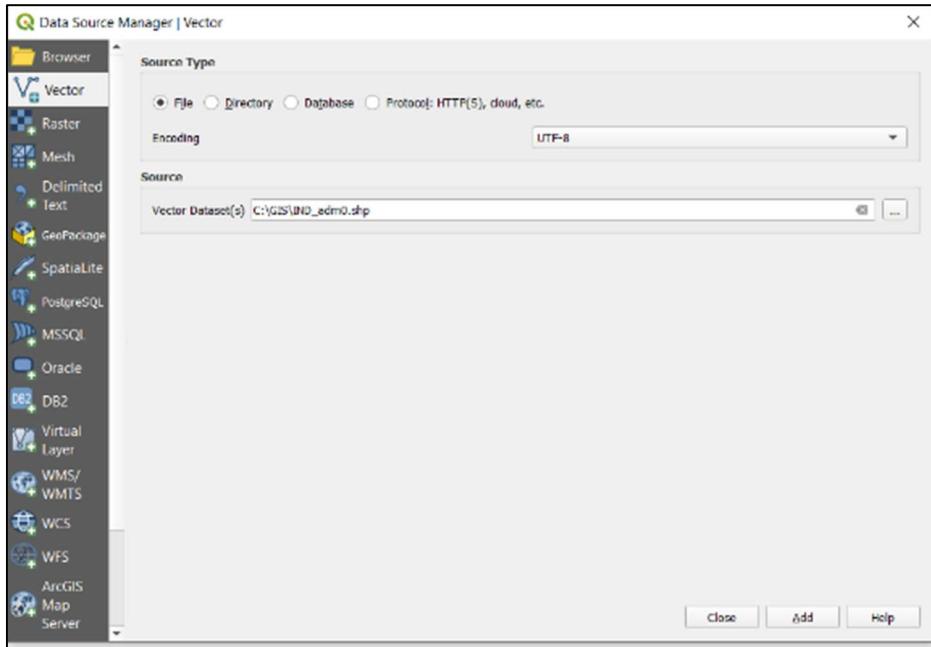


OUTPUT:-



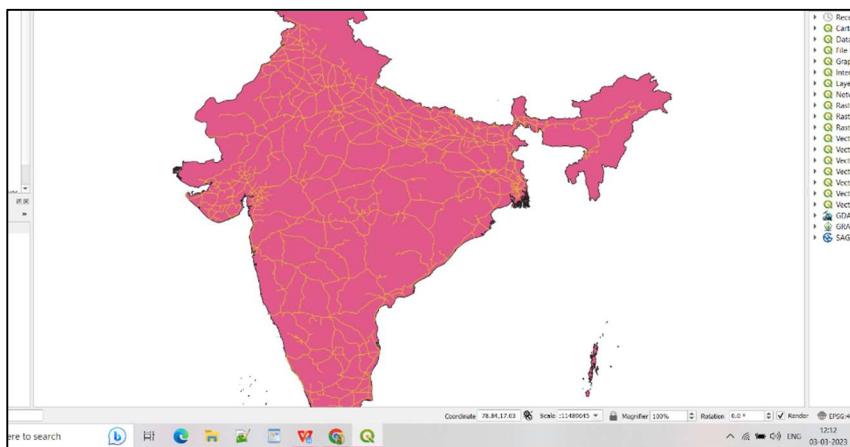
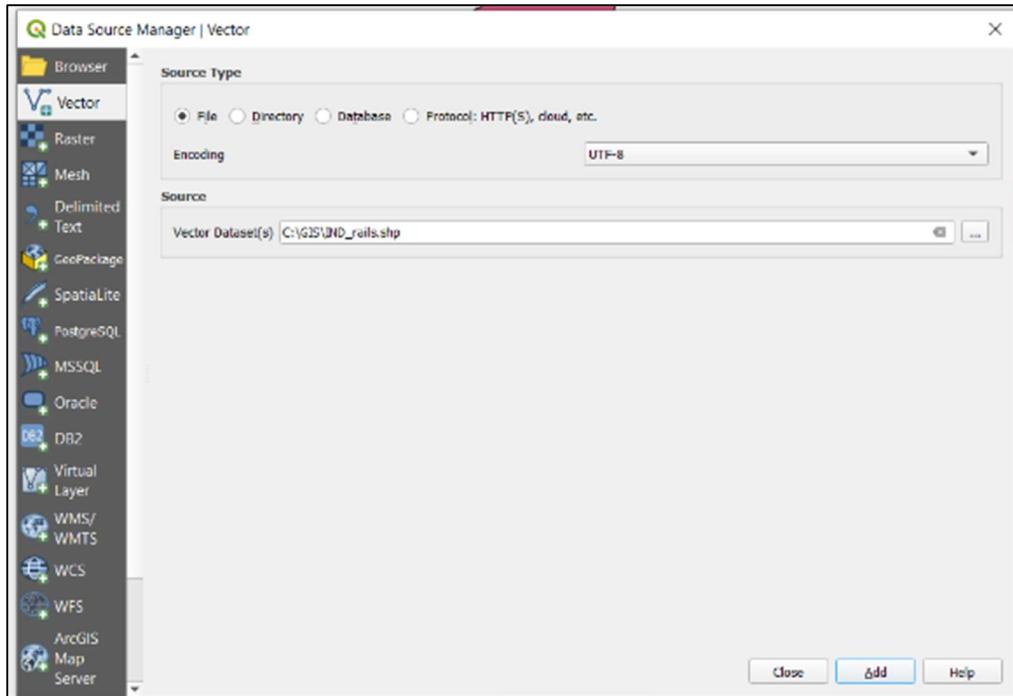
Part-II: Calculating Line length and statistics.

Step 1: Open QGIS → Go to layers → Add layers → Add Vector layer → Source-vector dataset [...] click on 3 dots → browse the file → open Practical1_IND_adm folder → Select IND_adm0.shpfile → Add → Close (India outline map will be added).



Step 2: Add another layer.

Add layer → Add vector layer → [...] click on three dots → Browse the file → Open IND_rails.shp file → Add → close



Step 3: Right click on IND_rails → Open attribute table (We have to add one more attribute in thing table)

IND_rails :: Features Total: 2012, Filtered: 2012, Selected: 0

	FID_rail_d	F_CODE_DES	EXS_DESCRI	FCO_DESCRI	FID_countr	ISO	ISO_COUNTRY	Track_Lei
1	169650	Railroad	Operational	Single	102	IND	INDIA	58.715
2	169712	Railroad	Unexamined/U...	Unknown	102	IND	INDIA	86.051
3	169711	Railroad	Unexamined/U...	Unknown	102	IND	INDIA	133.879
4	169729	Railroad	Operational	Single	102	IND	INDIA	59.731
5	169726	Railroad	Operational	Single	102	IND	INDIA	62.587
6	169797	Railroad	Operational	Single	102	IND	INDIA	74.308
7	169796	Railroad	Operational	Single	102	IND	INDIA	26.302
8	169573	Railroad	Operational	Single	102	IND	INDIA	14.842
9	169571	Railroad	Operational	Single	102	IND	INDIA	1.076
10	169592	Railroad	Operational	Multiple	102	IND	INDIA	113.922
11	169580	Railroad	Operational	Single	102	IND	INDIA	9.421
12	169641	Railroad	Operational	Single	102	IND	INDIA	50.057
13	169603	Railroad	Operational	Multiple	102	IND	INDIA	4.482

Step 4: Click on Toggle Editing button.

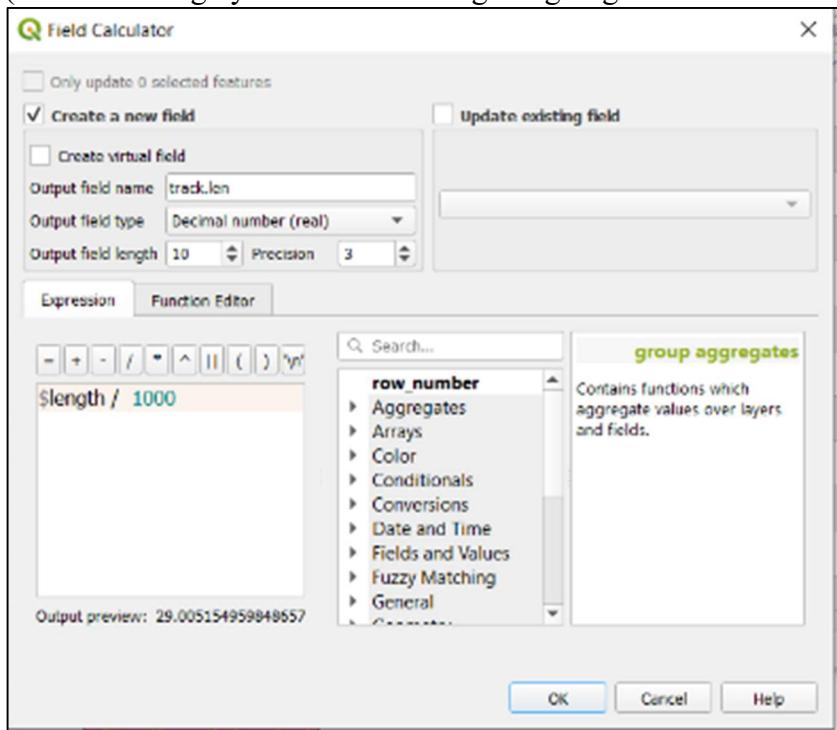
Step 5: Click on open field calculator

field name: [Track.lenz]

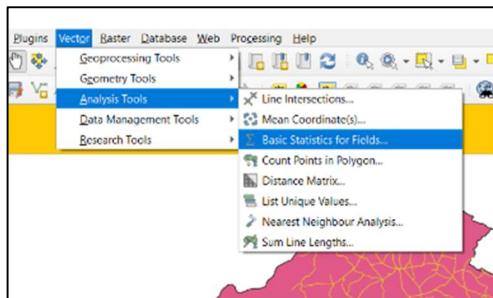
field type: [Decimal number (real)]

Write formula → Click on OK button

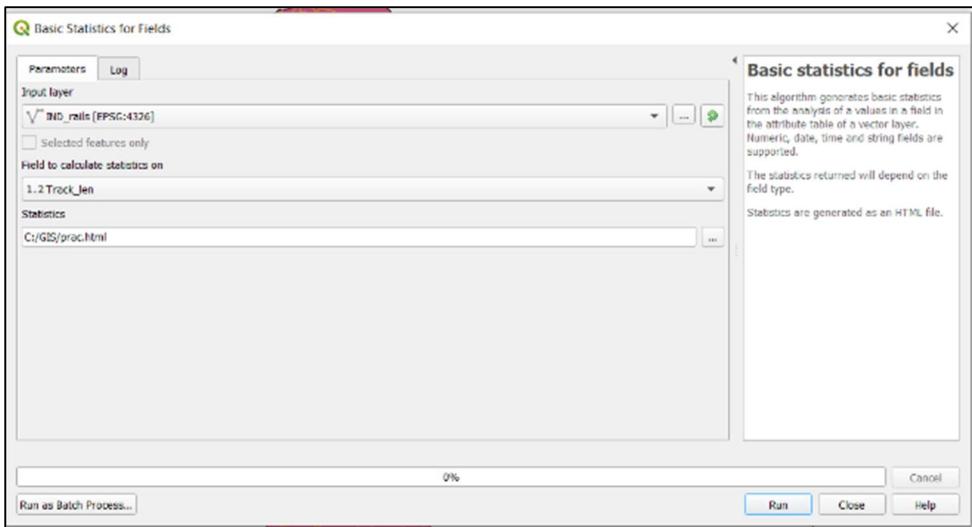
(We are finding by /1000 As we are getting larger Value. So we convert from M to KM.)



Step 6: Vector → Analysis tools → Basic statistics for fields. (Note: If you want to perform statistics on rail map. By default we are getting rail_map)



Field to calculate statistics on = Track_len2



Step 7: Click on Run

Step 8: Close it

Step 9: Select the link (.html file) from Right bottom corner

OUTPUT:-

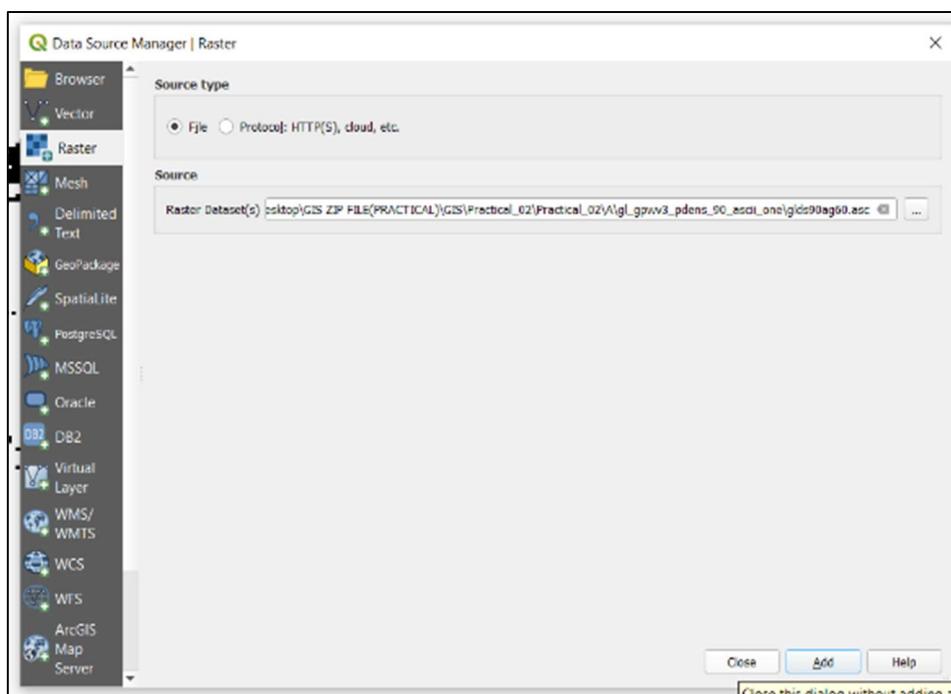
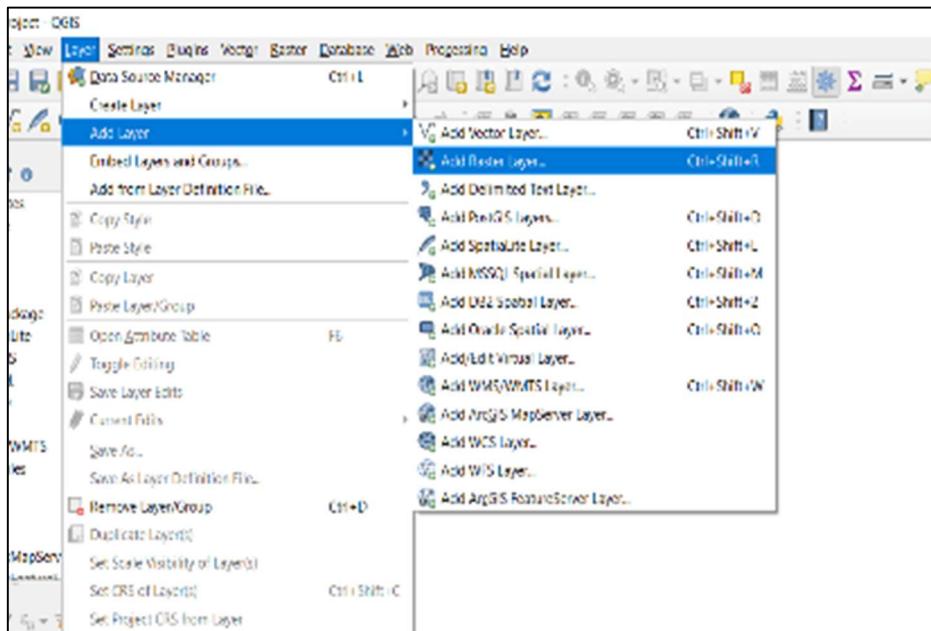
```
Analyzed field: Track_len
Count: 2012
Unique values: 1962
NULL (missing) values: 0
Minimum value: 0.0
Maximum value: 400.482
Range: 400.482
Sum: 60479.45200000002
Mean value: 30.059369781312135
Median value: 14.043
Standard deviation: 39.48318060399638
Coefficient of Variation: 1.3135066001464546
Minority (rarest occurring value): 0.033
Majority (most frequently occurring value): 0.0
First quartile: 3.349
Third quartile: 42.854
Interquartile Range (IQR): 39.504999999999995
```

Practical no :- 2

Aim: Exploring and Managing Raster data: Adding raster layers, raster styling and analysis, raster mosaicking and clipping.

Part (A):- Adding Raster Layer

Step-1: Layer→ Add layers→ Add raster layer→ [...] →(A→ gl_gpwv3_pdens_90_ascii_one → glds90ag60.asc) →Add →close.



Layer→ Add layers→ Add raster layer→ [...] →(A→ gl_gpwv3_pdens_00_ascii_one → glds00ag60.asc).

Note: It's in gray scale (pixel format)

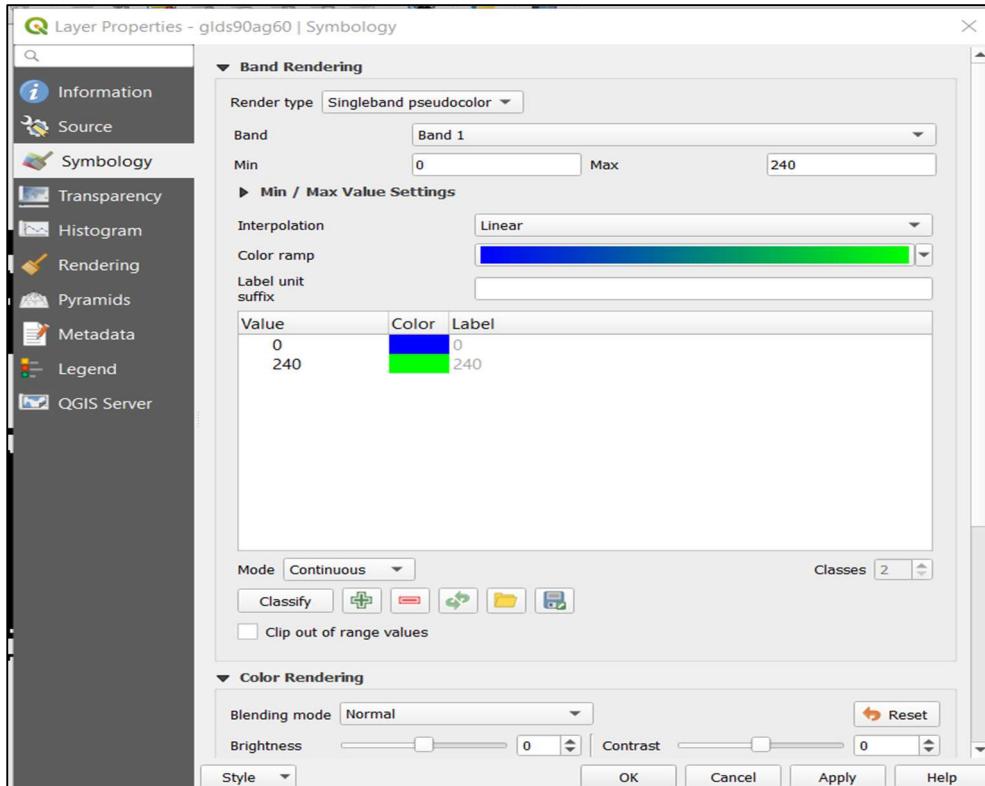
Coordinate Reference System	Authority ID
WGS 84	EPSG:4326
WGS72	IGNF:WGS72G
WGS_1984_(G1150)	EPSG:104013
WGS_1001_(G167A)	EPSG:104014
Selected CRS	WGS 84

(B) Raster Styling

(Eg: We have to find an area where population has been changed between year 1990 to 2000)
 (Largest Population Change)

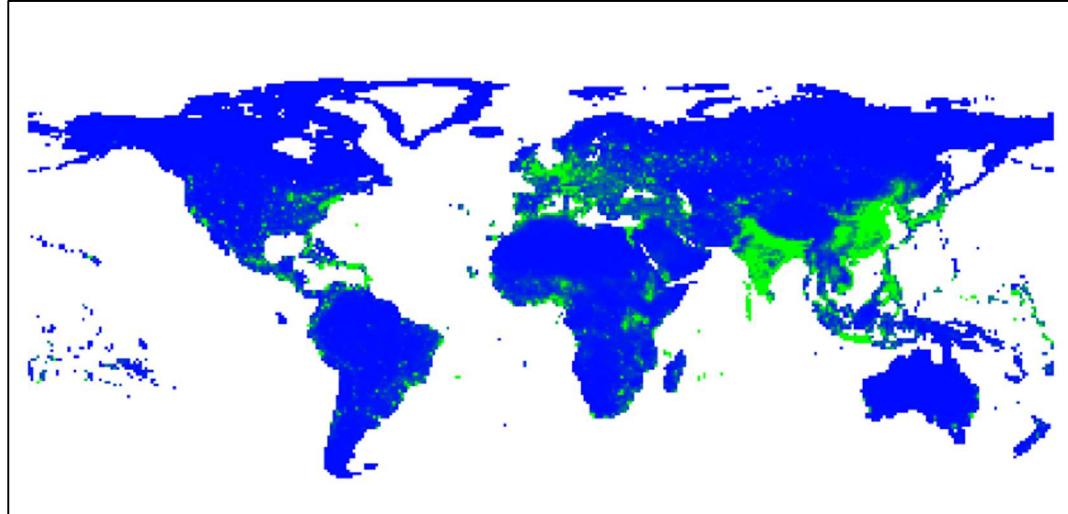
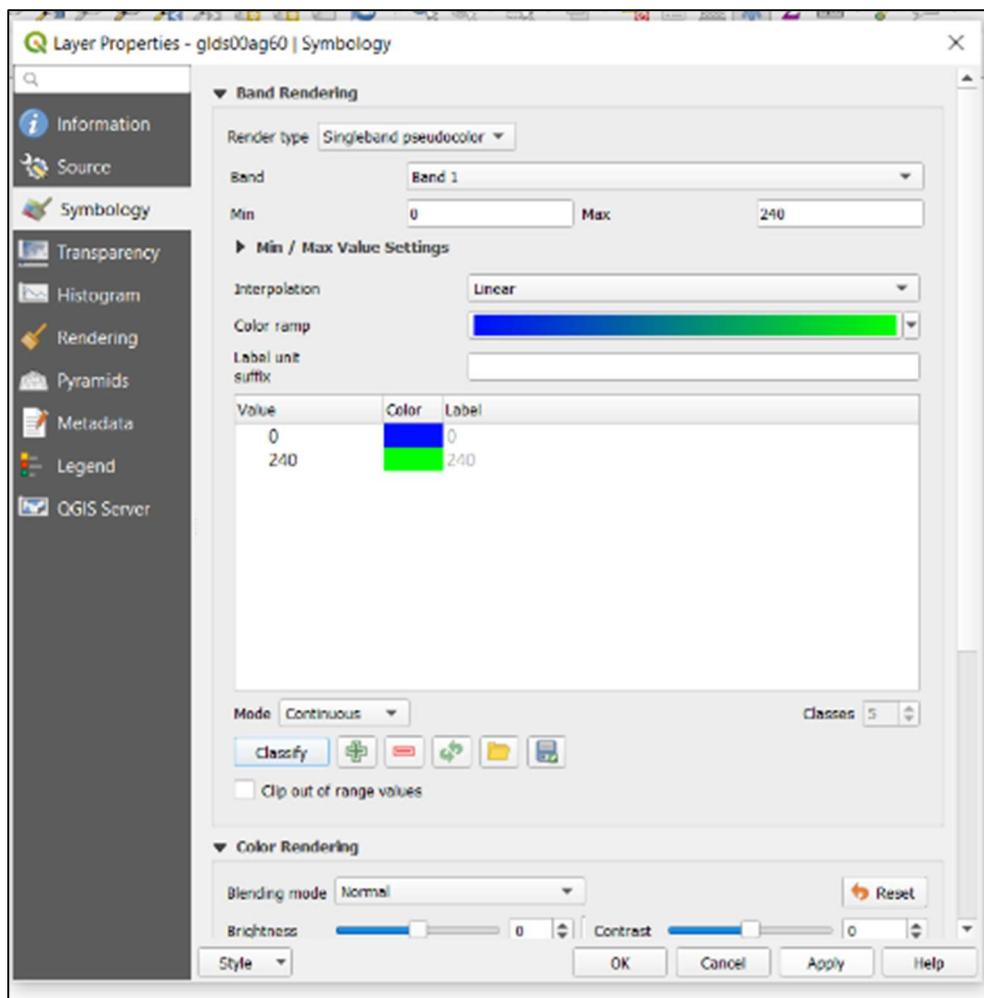
Now we have to convert gray scale image into colour format.

Step 1: Right click on glds90ag60 → properties → Render type :- Singleband pseudocolor
 Min 0 , Max 240 mode Continuos → Classify → Apply → OK.



Step 1: Right click on glds00ag60 → properties-- Render type:- Singleband pseudocolor

Min :- 0 Max :- 240 , mode :- Continuous → classify → Apply → OK.

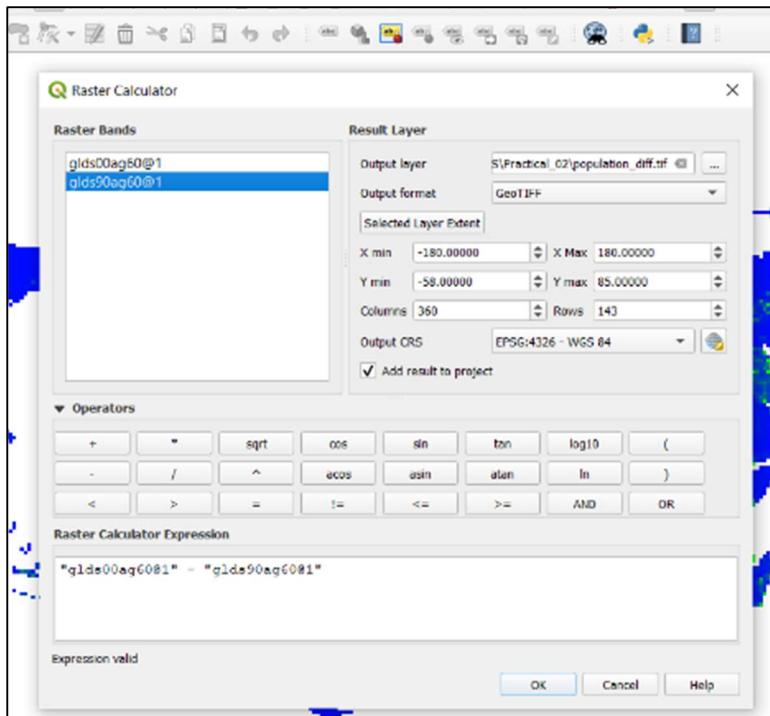


(c) Analysis.

Step 1: Menu → Raster → Raster Calculator.

Output layer
Output Format:

Click On [...] to save layer (C:\GIS \ pract2\Population_Difference)



Step 2: Select the first layer (glds00gs60@1) and — select the second layer (glds90gs60@1)

Raster Calculator Expression :- glds00ag60@1 - glds90ag60@1

Output CRS: - Project CRS : EPSG: 4326 - WGS84 → OK.



Step 3: Select population difference → Right click on point → properties.

Render type : ,min max , Interpolation ,

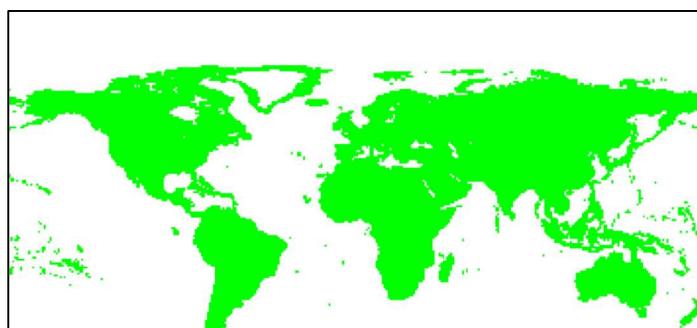
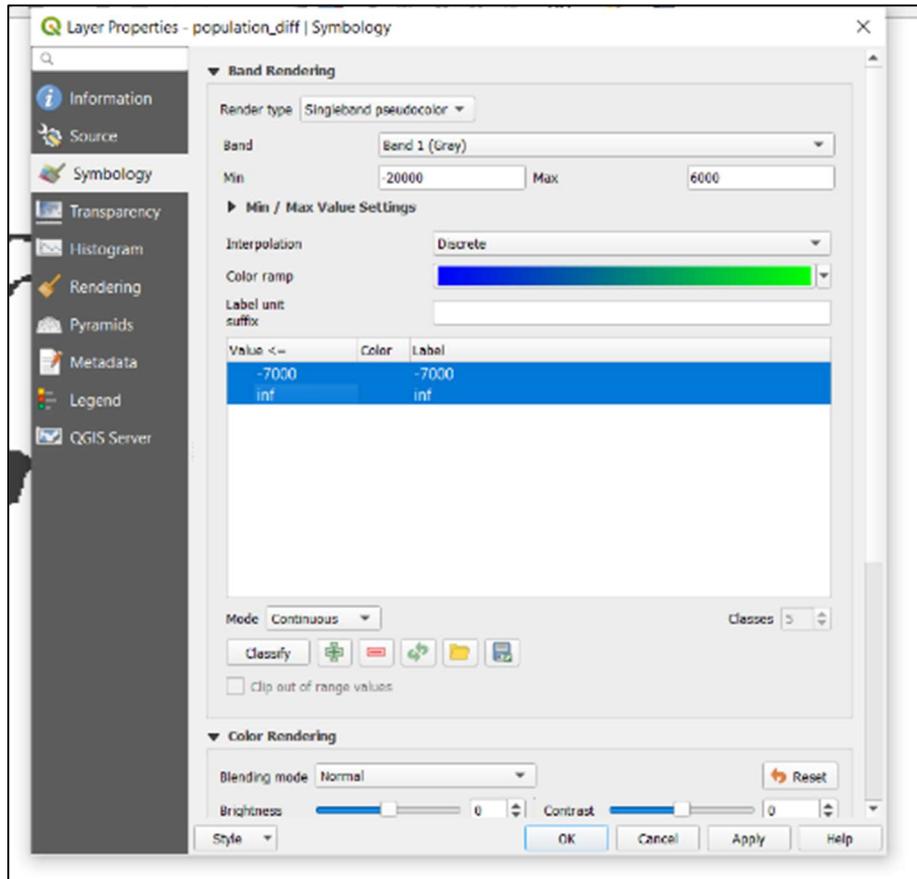
Colour Ramp and color label using shift and then click on

Click on

13

-20000 No Data
 -10 Negative
 10 Neutral
 6000 Positive
 Color ramp

→ Apply → OK



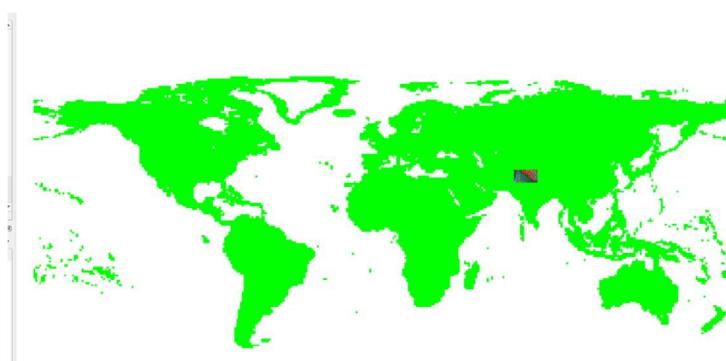
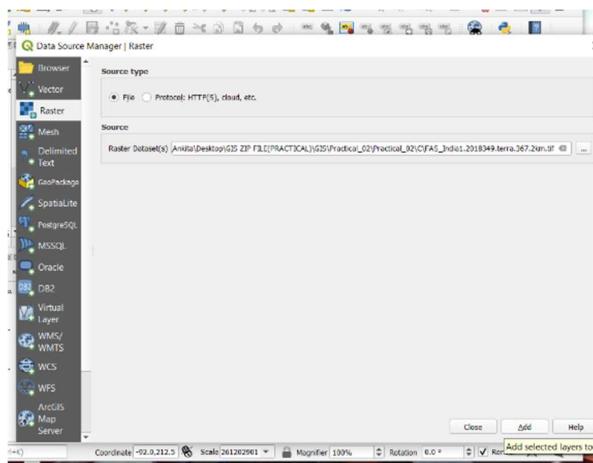
Step 4: Click on **(1)** from menu (we can verify classification)

(D) Raster Mosaicking and Clipping

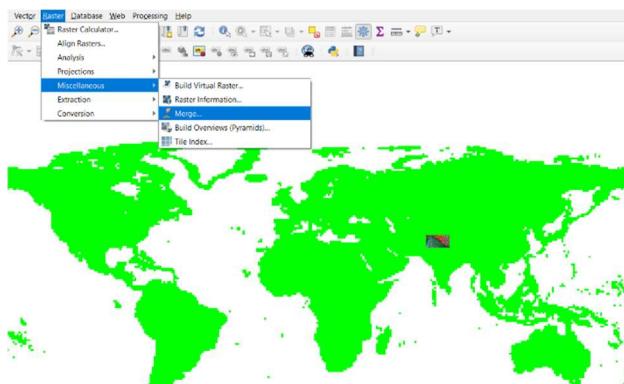
A mosaic is a combination or merge of two or more images. In GIS, a single raster datasheet can be created from multiple raster datasheet by mosaicking them together.

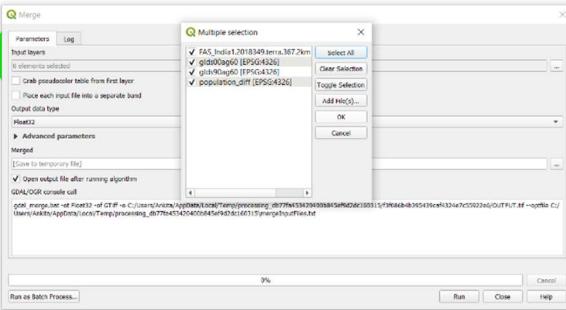
(we are combining two raster, datasheet – Mosaicking we are creating)

Step-1: Layer → Add layers → Add Raster layers → [...] → A → (FAS_India1.2018349.terra.367.2km, FAS_India2.2018349.terra.367.2km, FAS_India3.2018349.terra.367.2km, FAS_India4.2018349.terra.367.2km) → open → add → close.

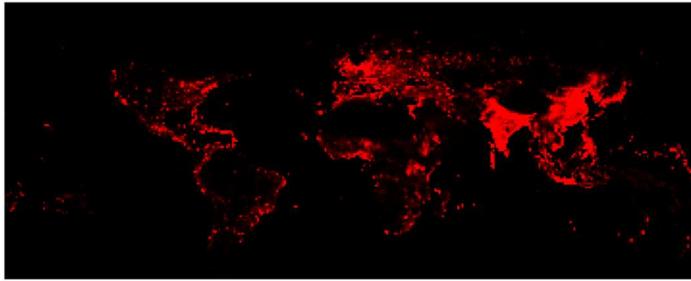


Step-2: Raster → Miscellaneous → Merge Input layer → Check all images click on **Select All** → Run → close.



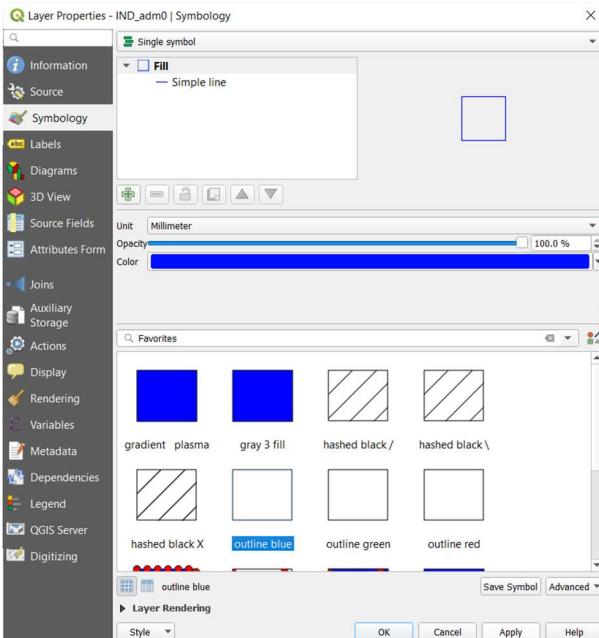


Step-3: Disselect All the layers (uncheck) select only merger from layers panel.



Step-4: Layers → add Layers → Add vector layers [...] (pract02 → C → India AdminBoundary → IND_adm0.shp) → Add → Close.

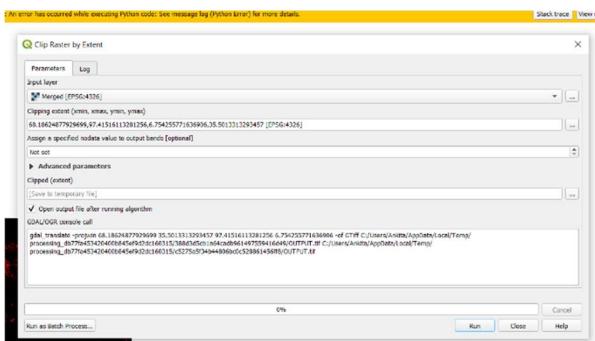
Step-5: Double click on the IND_adm0 (should be checked) → Symbology → Outline Blue → Apply → OK.



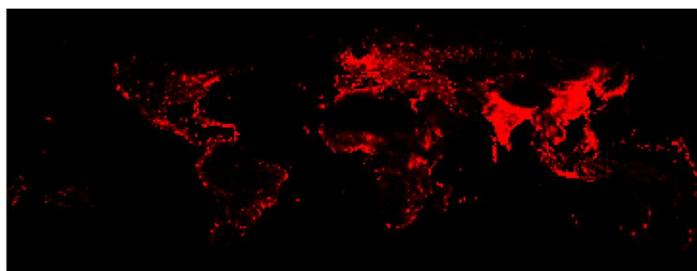
Step-6: Raster → Extraction → clip Raster by Mask layer.

Input layer : MERGED(EPSG:4326)

Mask layer : IND-adm0(EPSG:4326) → Run → CLOSE.



OUTPUT:

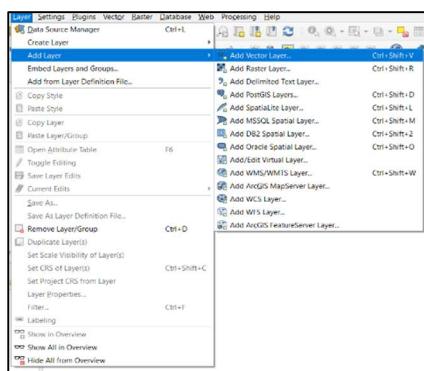


Practical no:-3

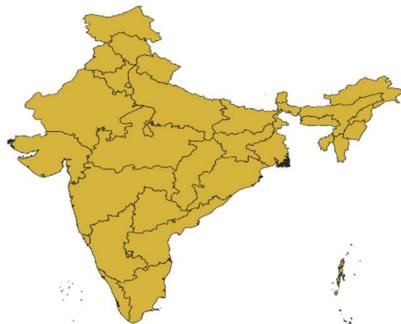
Aim: Making a Map, Working with Attributes, Importing Spreadsheets or CSV files
Using Plugins, Searching and Downloading OpenStreetMap Data

A) Making a thematic map using print layout

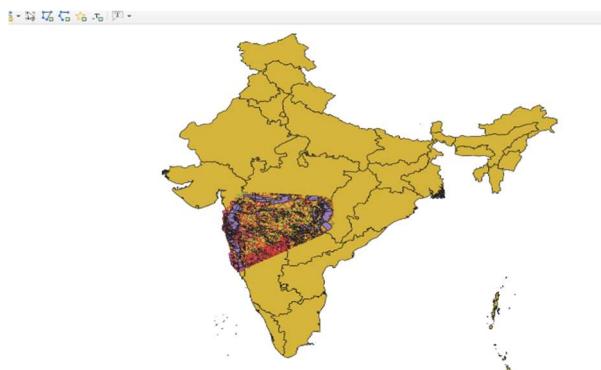
Step I: Layer -> Add Layer -> Add vector layer



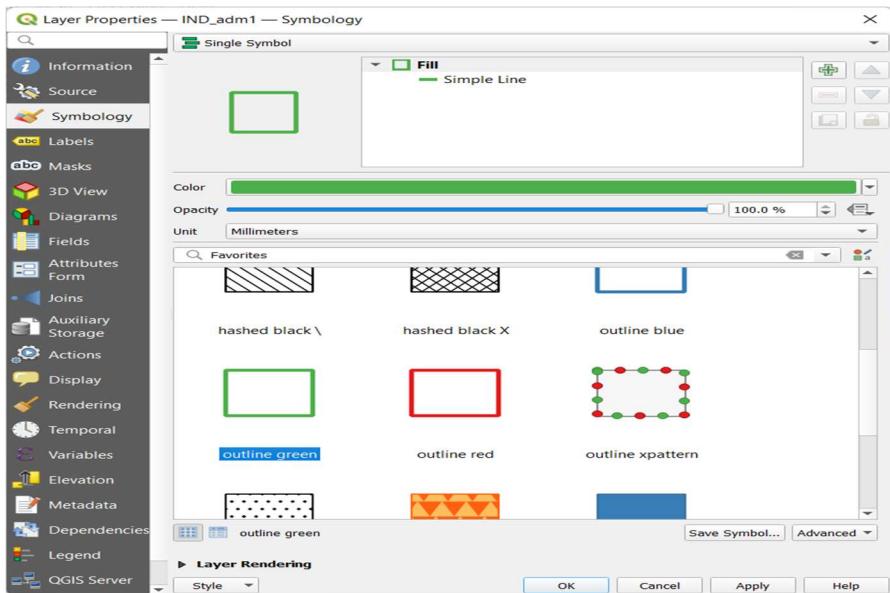
1: (Practical 03-> A -> India_State_Admin -> IND_admi.shp) -> Add



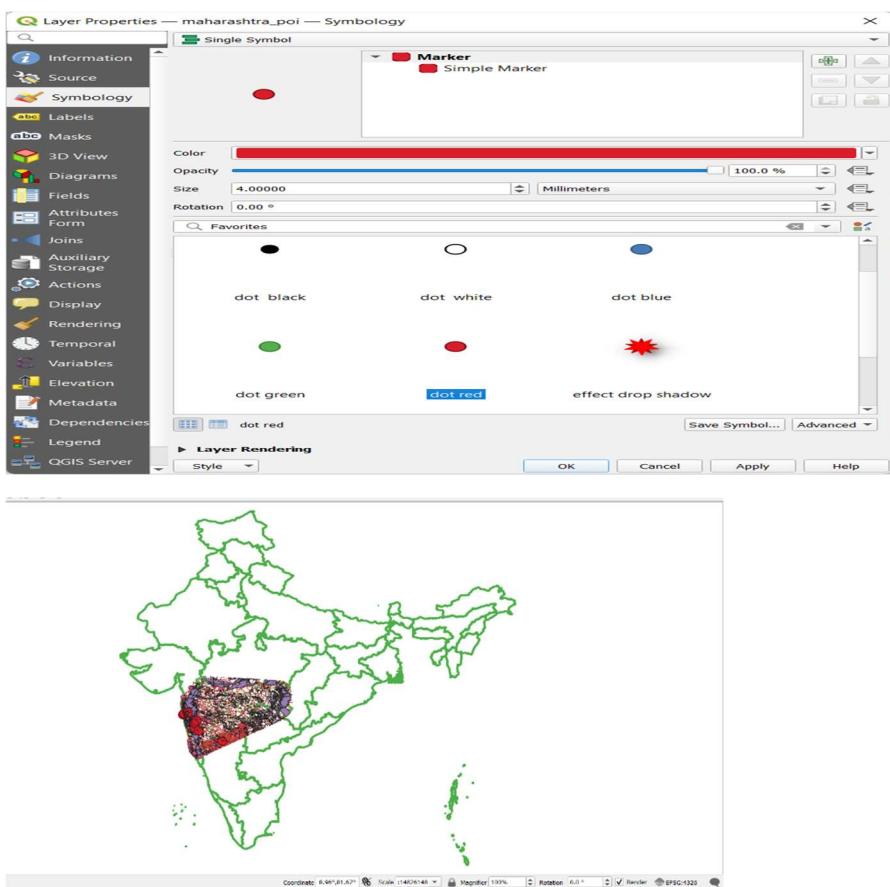
- 2: ("A -> maharashtra_administrative -> maharashtra_administrative.shp) -> Add
- 3: ("A -> maharashtra_coastline -> maharashtra_coastline.shp) -> Add
- 4: ("A -> maharashtra_highway -> maharashtra_highway.shp) -> Add
- 5: ("A -> maharashtra_location -> maharashtra_location.shp) -> Add
- 6: ("A -> maharashtra_natural -> maharashtra_natural.shp) -> Add
- 7: ("A -> maharashtra_poi -> maharashtra_poi.shp) -> Add
- 8: ("A -> maharashtra_water -> maharashtra_water.shp) -> Add



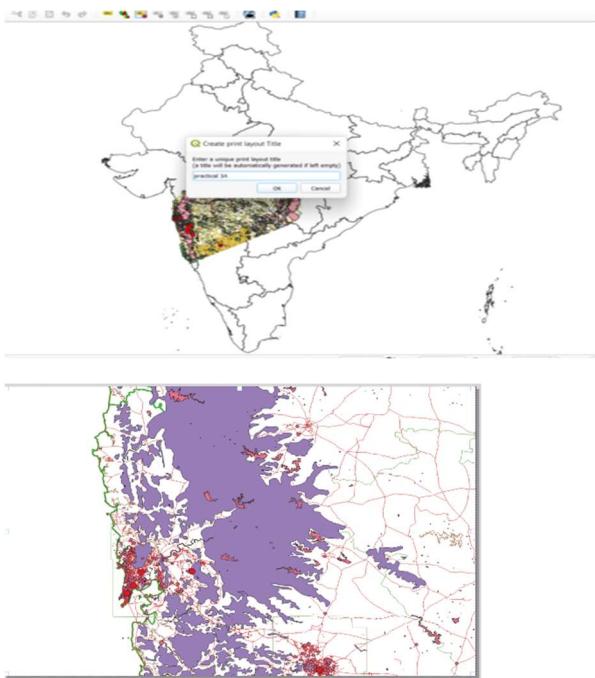
Step 2: select IND_adm1.shp from layer panel -> right click ->properties -> colour -> outline green



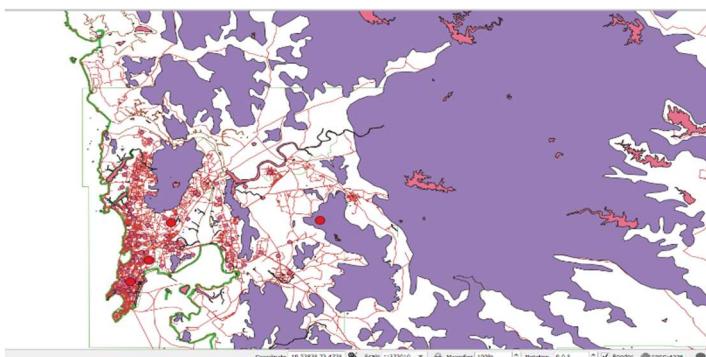
Step 3: select maharashtra_poi.shp from layer panel -> right click -> properties -> colour -> dot red



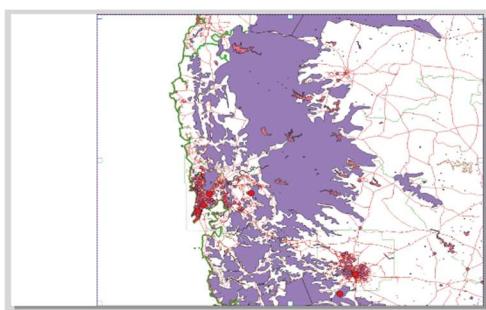
Step 4: Project -> new print layout ->(Practical 3a)-> ok-> add item->add map-> (select the white area -> drag & drop (map will appear Right side of the window) item properties -> check the lock Styles for Layers)



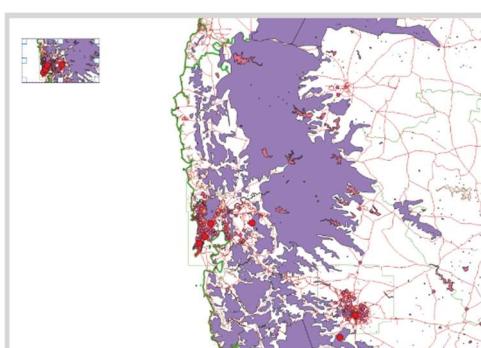
Step 5: go to the main window(Don't close the back window) -> zoom it & focus on Mumbai region



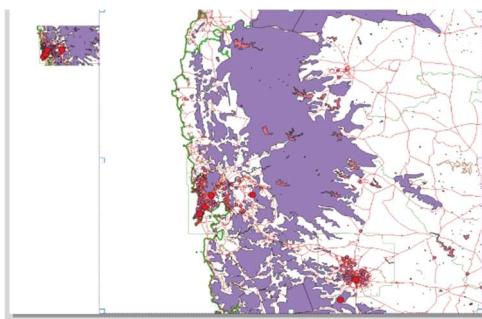
Step 6: Go back to the back window(Practical 3A). ADJUST THE POSITION



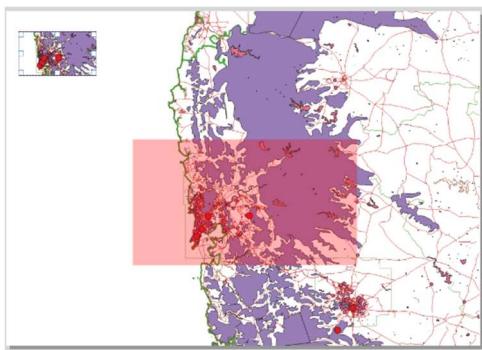
Step 7: add item -> Add Map



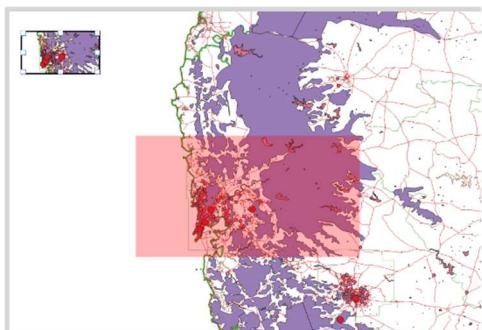
Step 8: right side of the window-> select map1 from Items-> right click properties



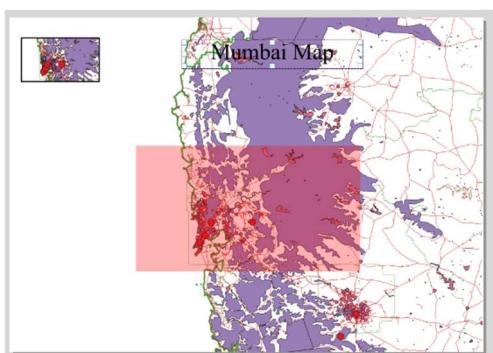
Step 9: go to the Item properties-> Overviews-> click on + -> select Overviews 1 -> select Map Frame (map 2)



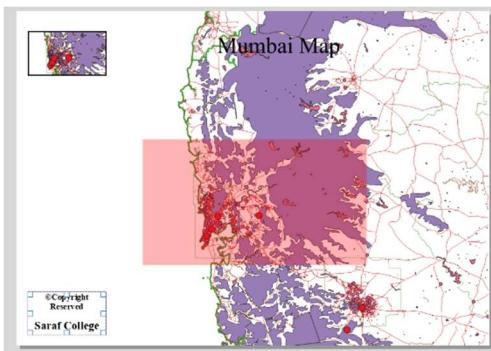
Step 10: select map2 from items-> right click on properties-> Frame (✓)-> colour black-> Thickness 0.70



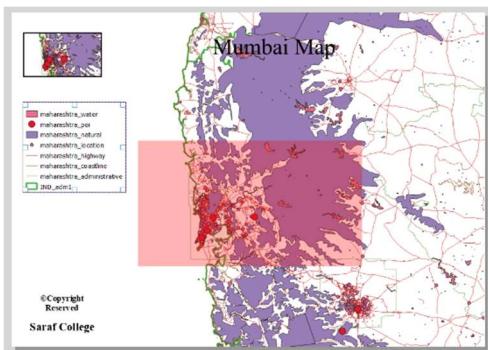
Step 11: add item-> Add label-> select the region-> go to the right side of Item properties-> give name as Mumbai map-> we can change the font, color, alignment, rotation,etc.



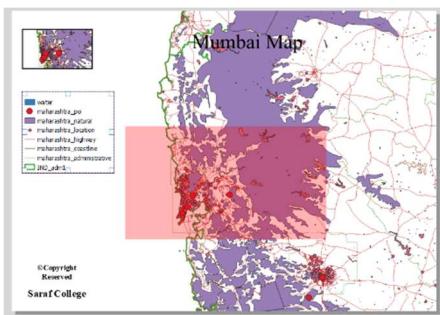
Step 12: add item-> Add label(now we are adding copyright symbol) So we will right some html code -> go to item properties-> <h2>© Copyright Reserved </h2> <h1>Saraf college</h1>
Check the Render as HTML
You can change the color, font , alignment



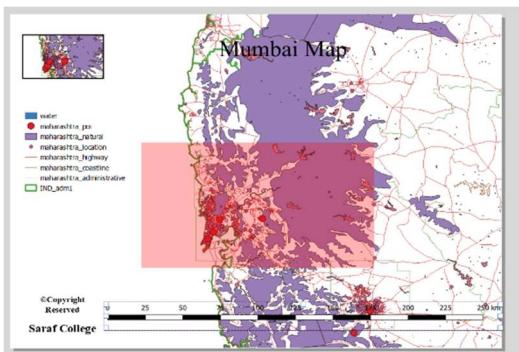
Step 13: add item-> Add legends-> (all layer will appear in the window)-> go to the properties-> item properties-> legend items-> auto update (deselect it)



Step 14: double click on maharashtra_water from auto update-> change it to [water]. You can change the colour-> custom symbol (check it) -> change it to blue colour (same way we change other layer)

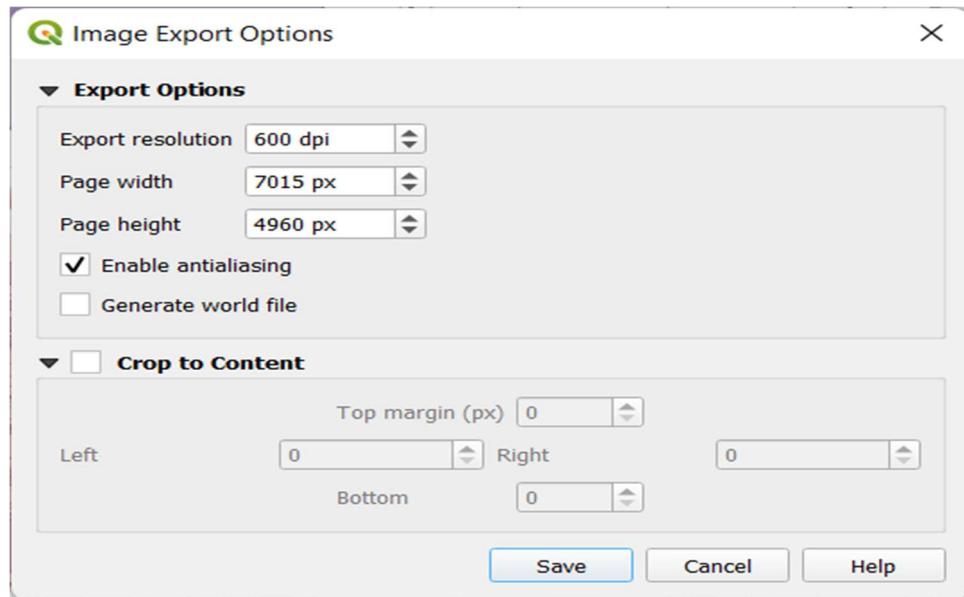


Step 15: add item-> Add scale bar-> Item properties-> Segments-> right 10(from where to start)

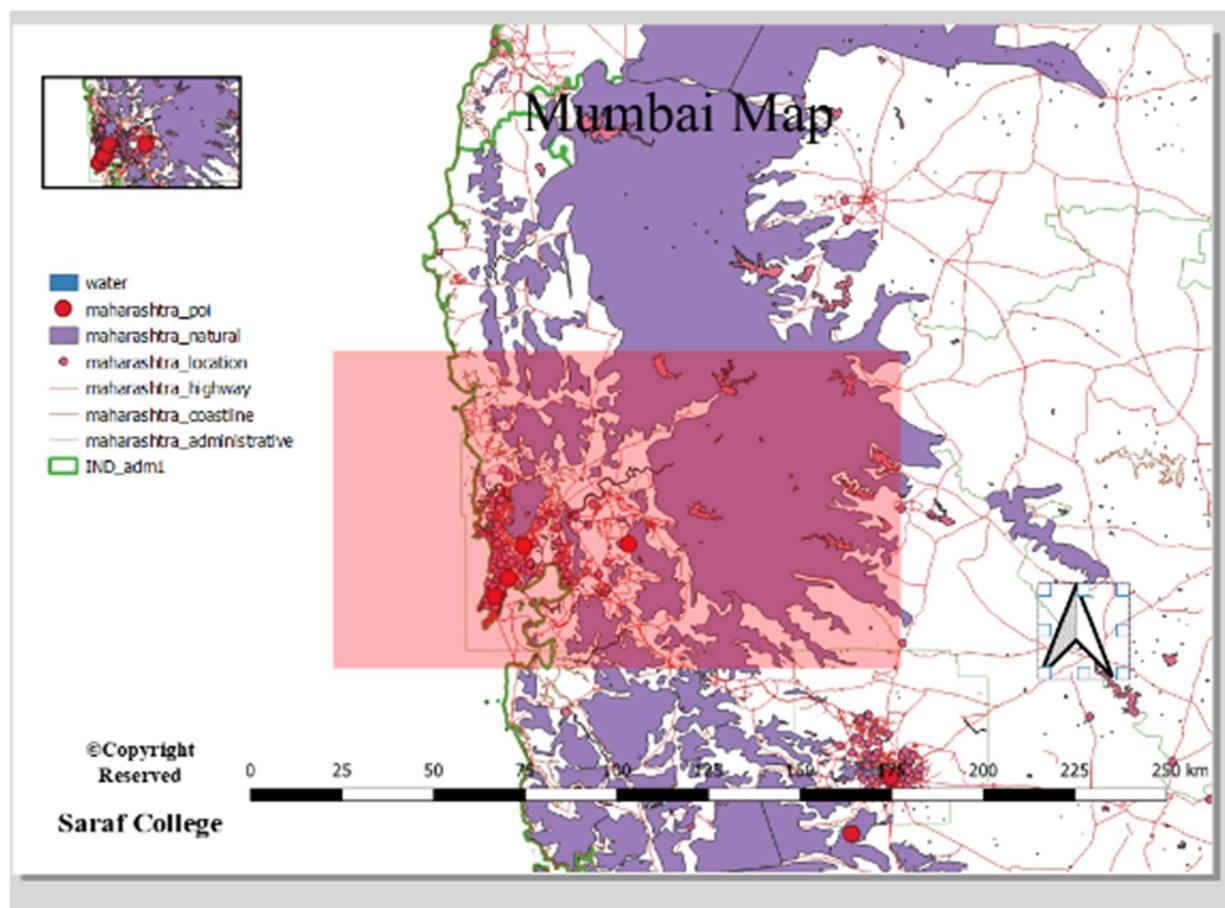


Step 16: add item-> Add North arrow(we can show the orientation)-> item properties-> svg images

Step 17:layout -> Export as image(.jpeg)-> file name prac 3a (already given)-> Save resolution [600 dpi] -> save.

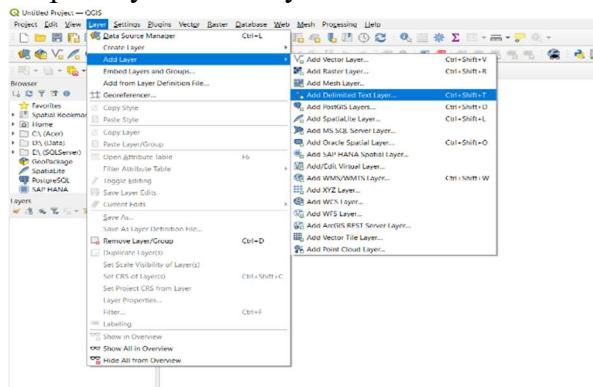


OUTPUT:-



B) importing spreadsheets or csv file

Step 1: layer-> add layer-> add delimited text layer



File name: (practical_03-> data -> sample.csv-> open)

File format (✓ tab)

Check for longitude & latitude value

X field longitude

Y field latitude

Geometry CRS– EPSG:4326-WGS 84-> add -> close

The screenshot displays the QGIS interface with the 'Data Source Manager | Delimited Text' dialog open. The dialog shows the following settings:

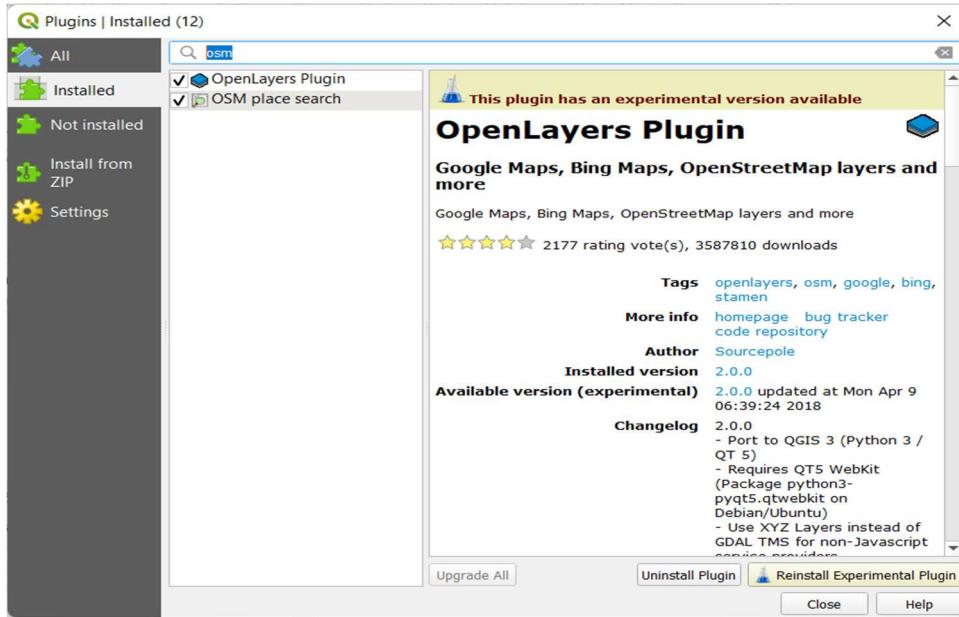
- File name:** C:\Users\Sankeet\Desktop\Practicals\SEM 6\GIS\Practical_03\DATA\Sample.csv
- Layer name:** Sample
- Encoding:** UTF-8
- File Format:**
 - CSV (comma separated values) (radio button)
 - Regular expression delimiter (radio button)
 - Custom delimiters (radio button selected)
 - Tab (checkbox checked)
 - Colon (checkbox)
 - Space (checkbox)
 - Tab character is one of the delimiters (text input: comma)
 - Others (text input:)
 - Quote (text input: ")
 - Escape (text input: ")
- Record and Fields Options:**
 - Point coordinates (radio button selected)
 - Well known text (WKT) (radio button)
 - No geometry (attribute only table) (radio button)
- Geometry Definition:**
 - Point coordinates (radio button selected)
 - X field: LONGITUDE
 - Y field: LATITUDE
 - Z field: (dropdown)
 - M field: (dropdown)
 - DMS coordinates (checkbox)
 - Geometry CRS: EPSG:4326 - WGS 84
- Layer Settings:**
 - Sample Data

I_D	FLAG_TSUNAMI	YEAR	MONTH	DAY
1	1	-2150		
2	3	-2000		

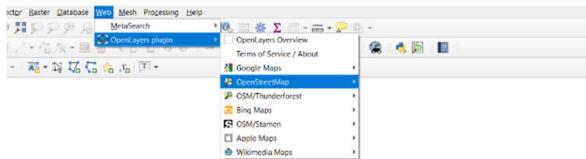
C) using plugins

D) searching amd downloading openStreetMap date

Step 1: take a new file-> plugins-> manage and install plugins-> search for [OSM place search] -> select osm place search-> click on install plugins -> search for openLayer plugins -> click on install experimental plugin. (We can see in plugin options -> osm place search & web -> open layers plugin)



Step 2:web-> open layers plugins -> openStreetMap-> openStreetMap



Step 3: go to the left side of the panel-> name contains-> university of mumbai-> click on (->) -> select bharti vidyapeeth deemed university department from the list-> click on zoom.

OUTPUT:-



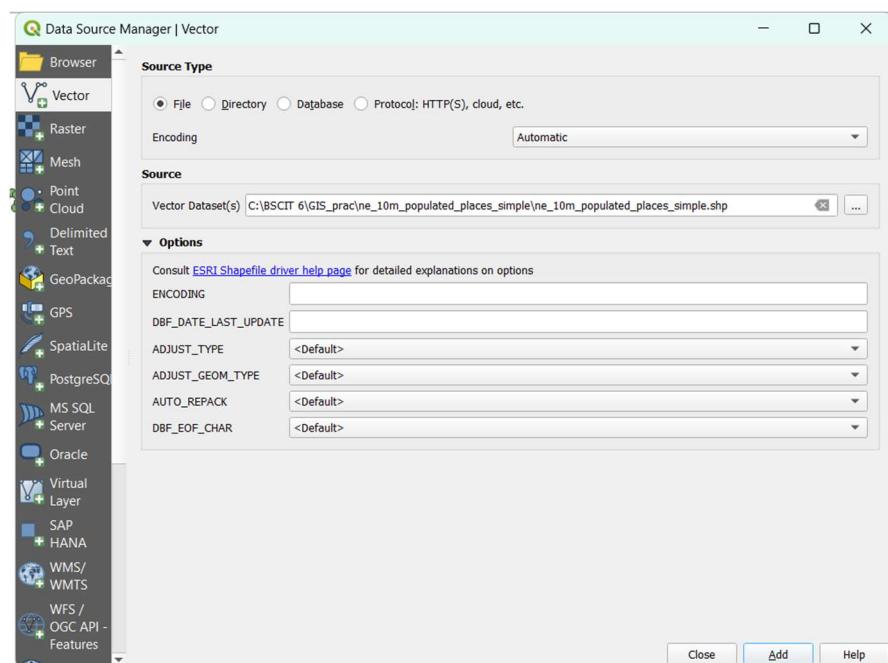
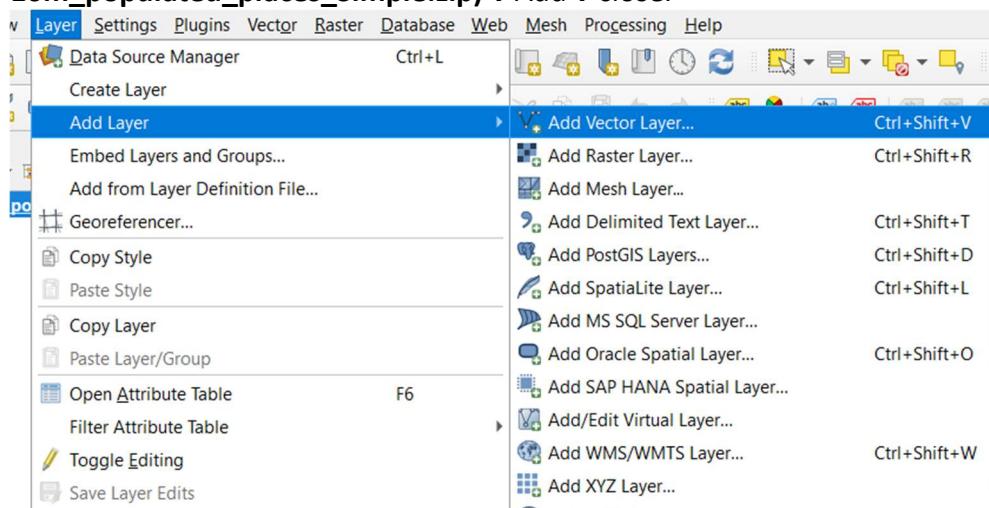
Practical no :- 4

working with terrain Data

(a) working with attributes.

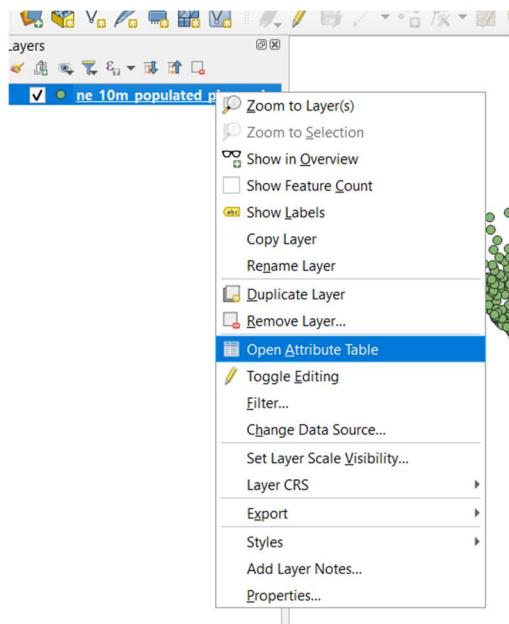
Step I:

Layer → Add Layer → Add vector Layer → Select (**Practical_04→A→ne-10m_populated_places_Simple.zip**) → Add → close.



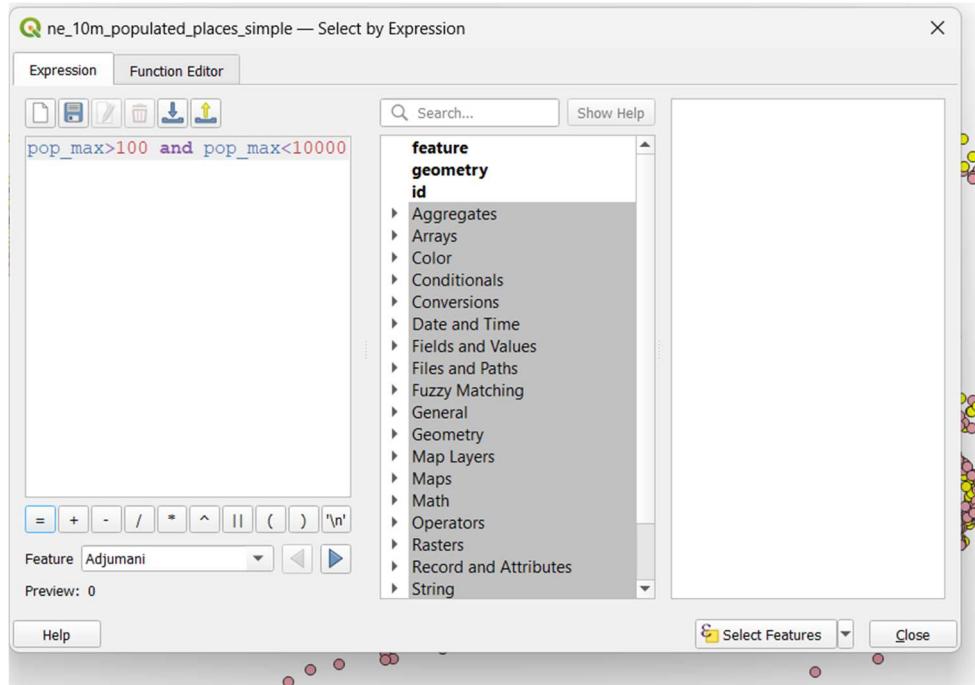
Step II:

Right click on layer ne-10m-populated_places_Simple → Open attributes tables (**search for pop_max column**) click on first value of pop_max → Select → Select [E.] select features using an expression (you will get a new window) → Type Expression pop_max > 100 and pop_max <1000 (**so we are searching for places which have population between 100 & 1000**) → Click on select features button → click on close button → close the window.

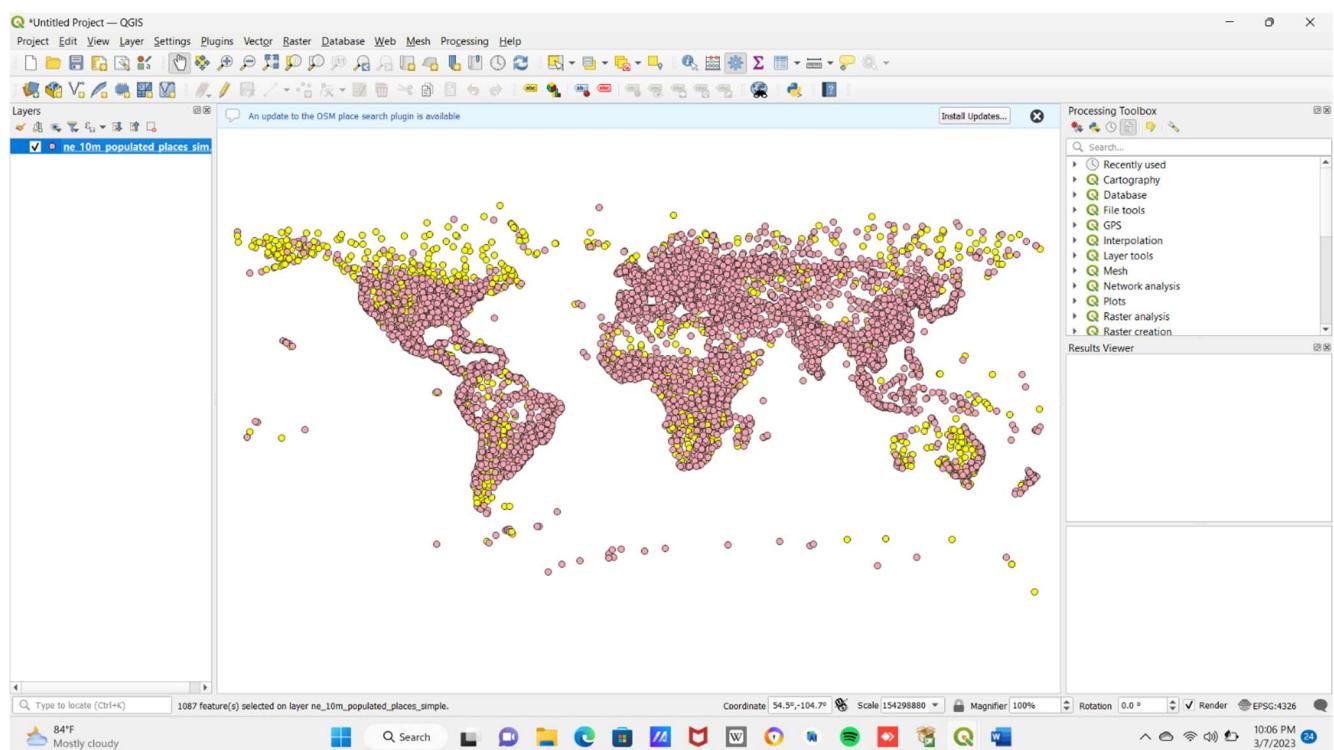


ne_10m_populated_places_simple — Features Total: 7322, Filtered: 7322, Selected: 0

latitude	longitude	changed	namediff	diffnote	pop_max	pop_min	pop.
34.47999900540	-57.84000247340	4.000000000000	1	Added missing ...	21714	21714	
33.54399893740	-56.90099656020	4.000000000000	1	Added missing ...	21093	21093	
33.13899902880	-58.30399747190	4.000000000000	1	Added missing ...	23279	23279	
34.53800400670	-56.28400149320	4.000000000000	1	Added missing ...	19698	19698	
34.09900200520	-56.21499844800	4.000000000000	1	Added missing ...	32234	32234	
9.26100006832	0.78900357378	4.000000000000	1	Added missing ...	61845	61845	
8.55700213306	0.98499646233	4.000000000000	1	Added missing ...	21054	21054	
33.200000000000	10.416600000000	4.000000000000	1	Added missing ...	61705	61705	



OUTPUT:



(b) Terrain Data & Hill shade Analysis (Geographical Surface)

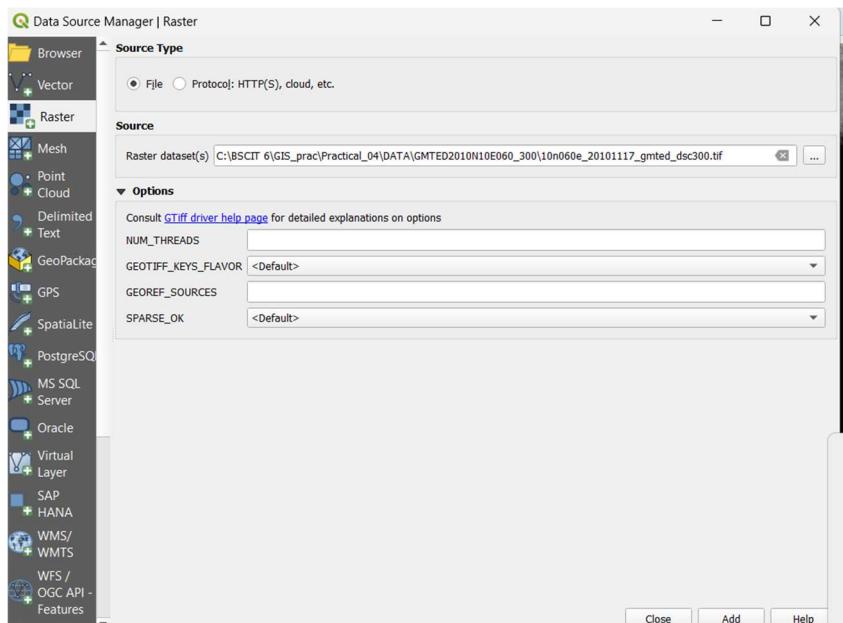
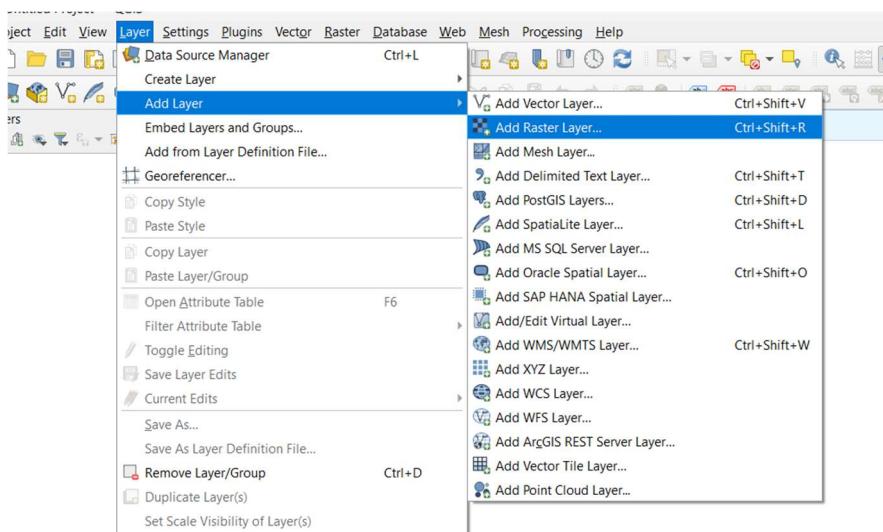
A terrain dataset is multiresolution, TIN-based Surface built from measurements stored as features in a geodatabase. Terrain or elevation data is useful for many GIS analysis like to generate various products from elevation date such as contours, will shades etc.

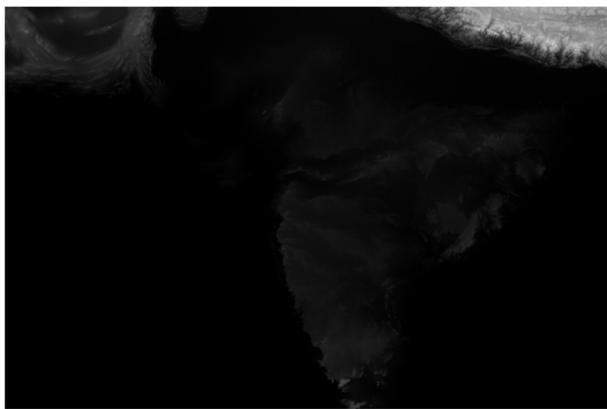
(We represent high / extreme low) elevation, mountains, slops TIN- Triangular Irregular Network (It's vector based. geographic data) we use Series of number to represent TIN

Hill shade is a gray scale 3D representation of the surface, showing the topographical shape of hills & mountains using shading (levels of gray) on map, just to indicate relative slopes, mountains ridges, not absolute height. Eg. upper regions indicated by light shader & lower region indicated by dark shade.

Step 1:

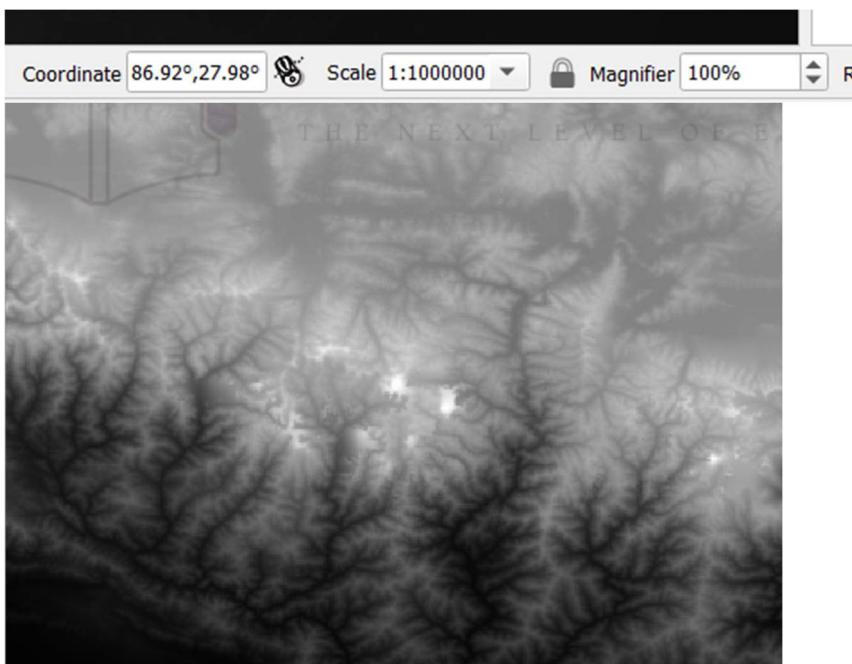
Layer → Add layer → Add raster Layer → [...] (Practical_04_Data → GMTED 2010N10E060_300 → 10n060e-2010 1117_gmted-me300.tif) → Add → close (lower region is dark & upper region is light).





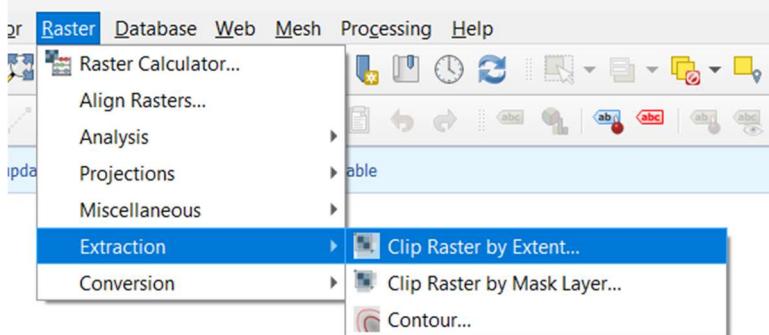
Step 2:

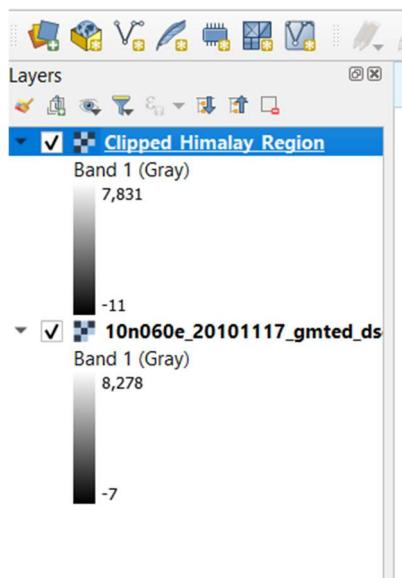
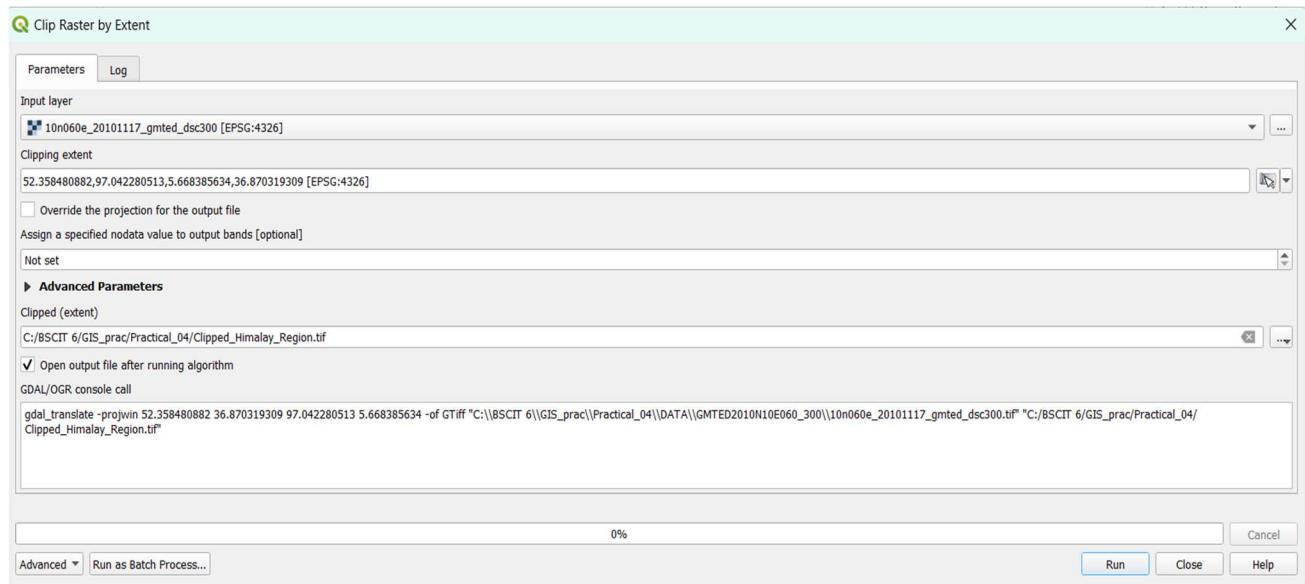
Change the coordinate. We have to set the co-ordinate of Mt. Everest. change it to 86.92, 27. 98. Change the scale to 1:900000 magnifier is 100 % .



Step 3:

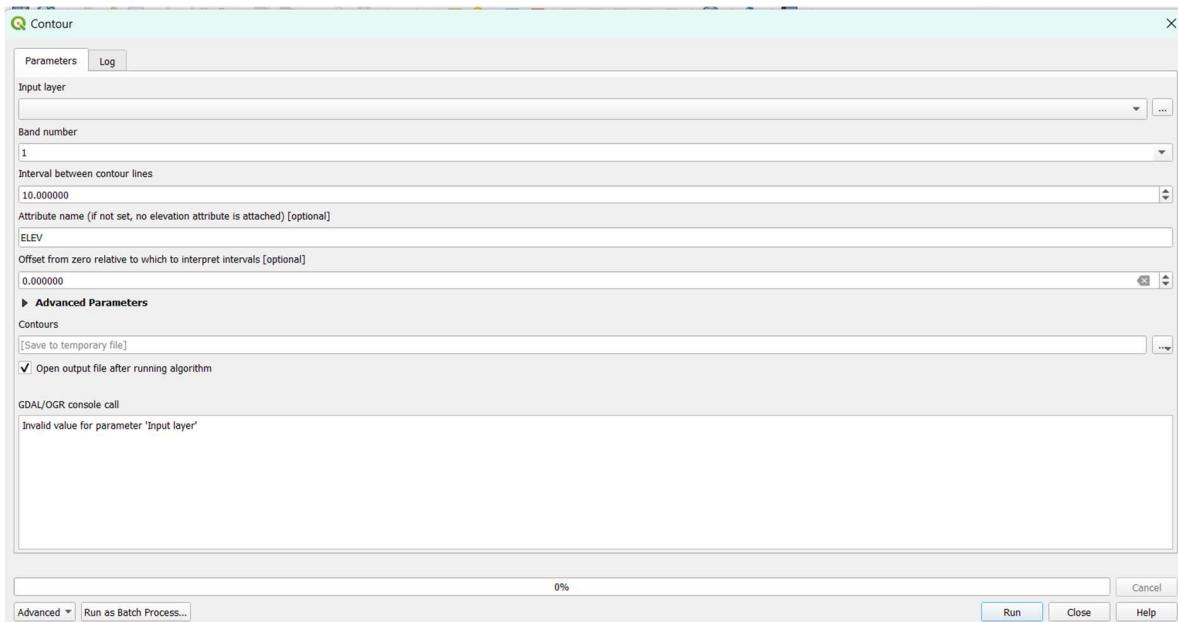
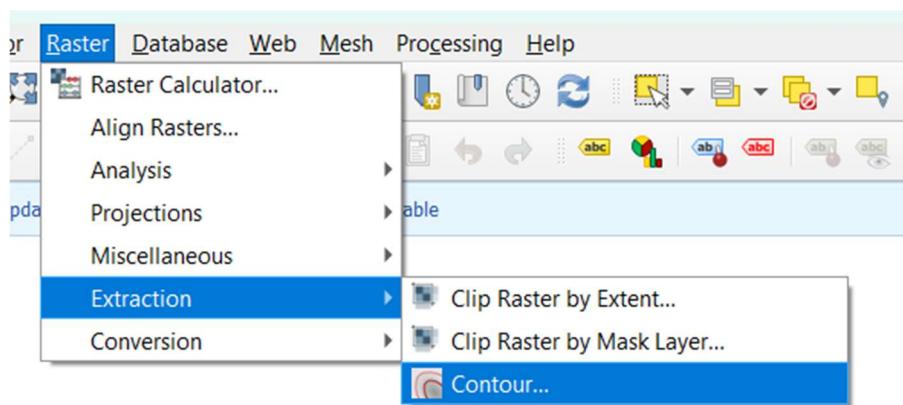
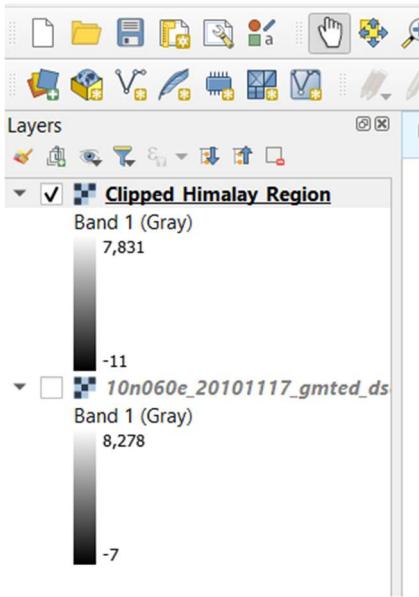
Raster → Extraction → clip Raster by Extent (As we are interested Mt. Everest area) → [Input Layer][10 n060e - 20101117_grited_me 300.][EPSG: 4326] → Clipping extent: [...] [Use deep Canvas Extent] → Clipped [...] [Save to file] [clippedhimalaya) .tif (type) → save → Run → Close.

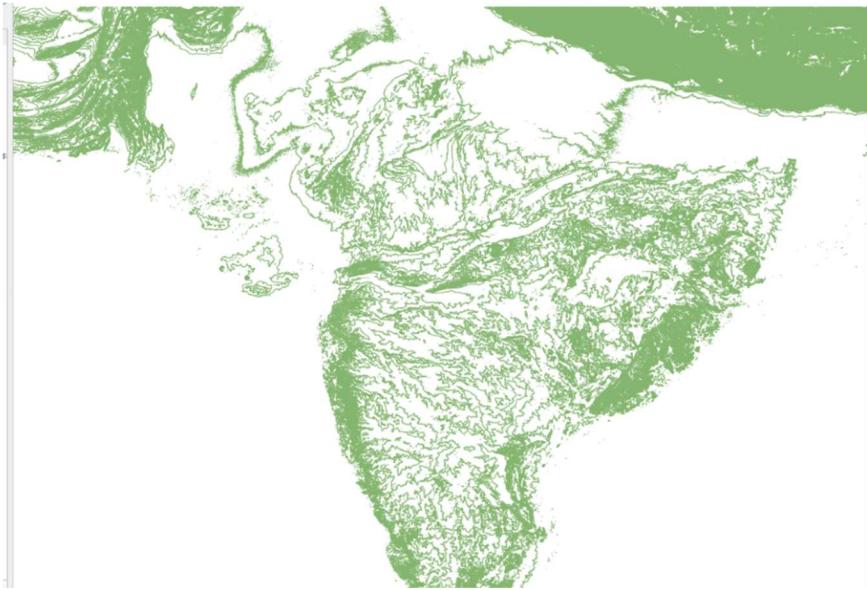




Step 4:

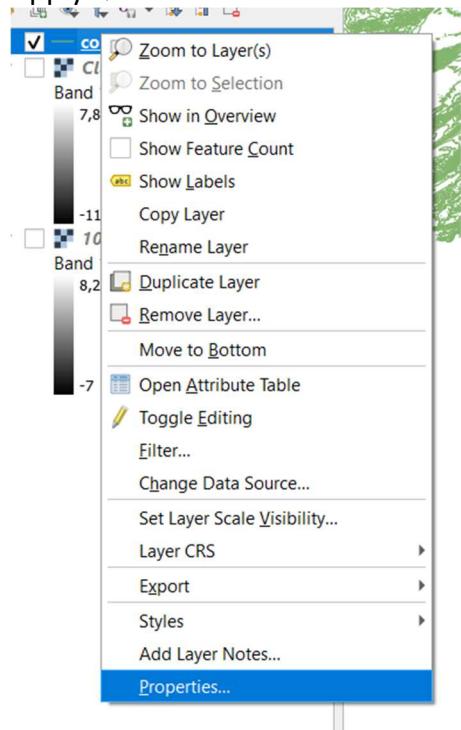
Disselect the 10n060e-2010111-7-gmted_me300.tif Raster → Extraction → Contour → Interval [100.0000000] → Contours [...] save to file [Contourhimalaya].gpkg [type] → save → Run → close (Input layer should be clippedhimalaya [EPSG: 4326])

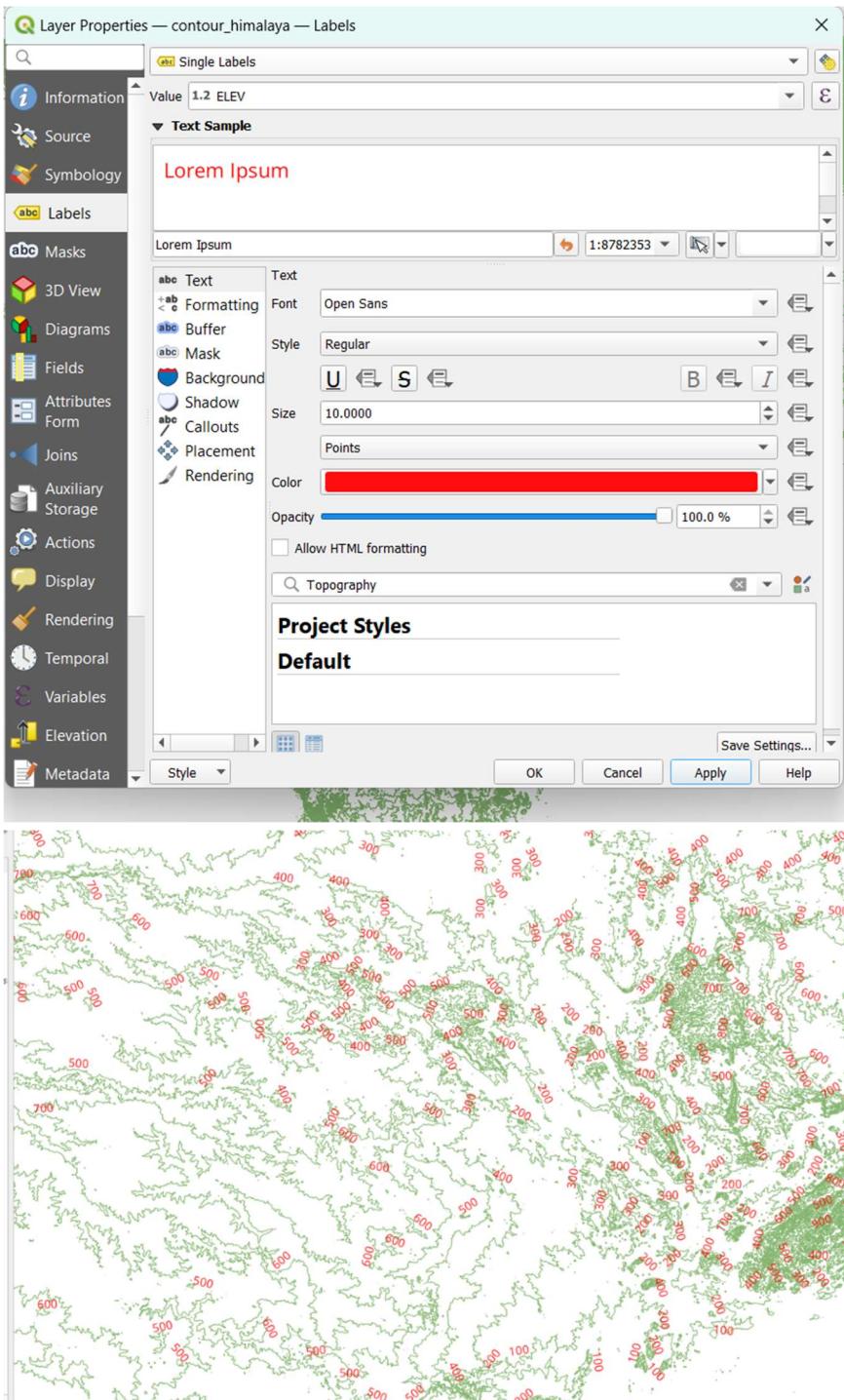




Step 5: Now we are going to show (elevation)

Right click on contourhimalaya → properties → Labels → [Single Labels] → value [1.2 ELEV] → color [red] → Apply → ok.





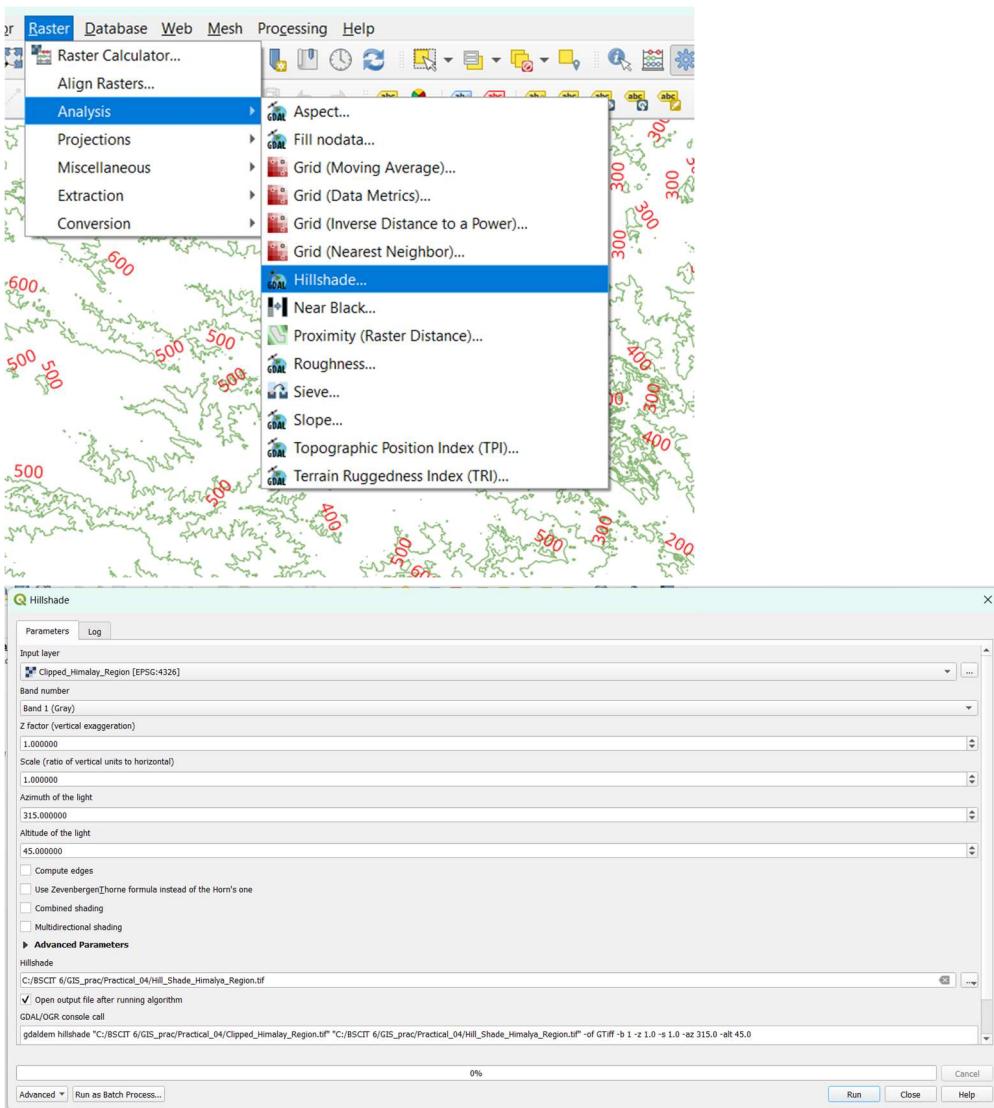
Step 6:

Now we are going to show hill shades.

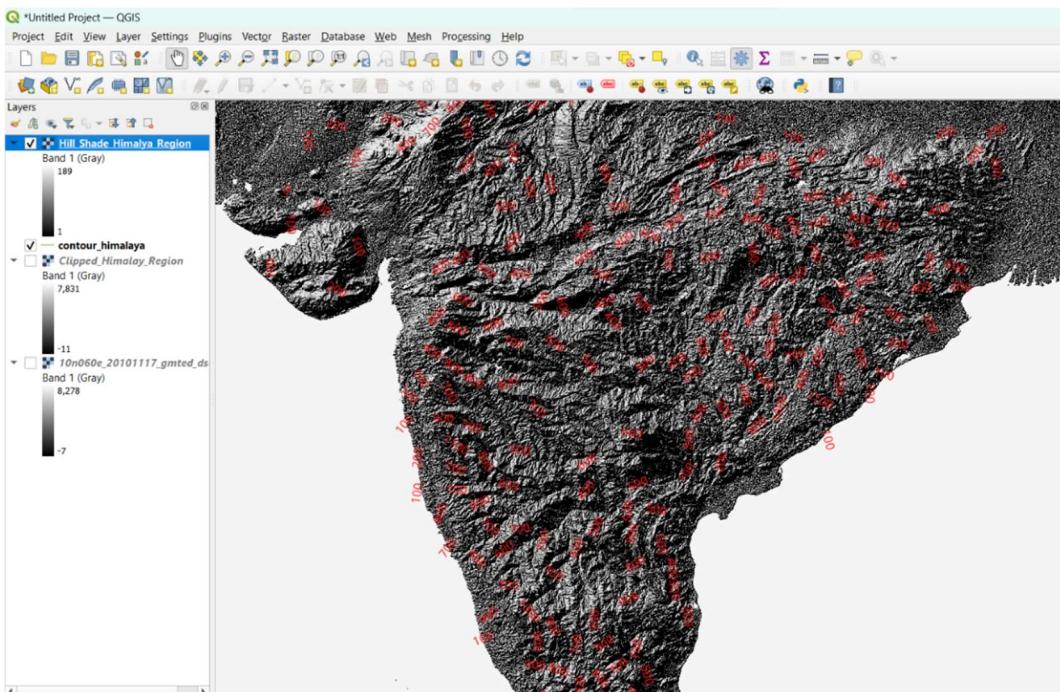
Raster → Analysis → Hillshade

Input Layer: [clipped himalaya [EPSG: 4326]]

Hillshade: [...] → [save to file] → [Hillshade].tif (type) → save → Run → Close



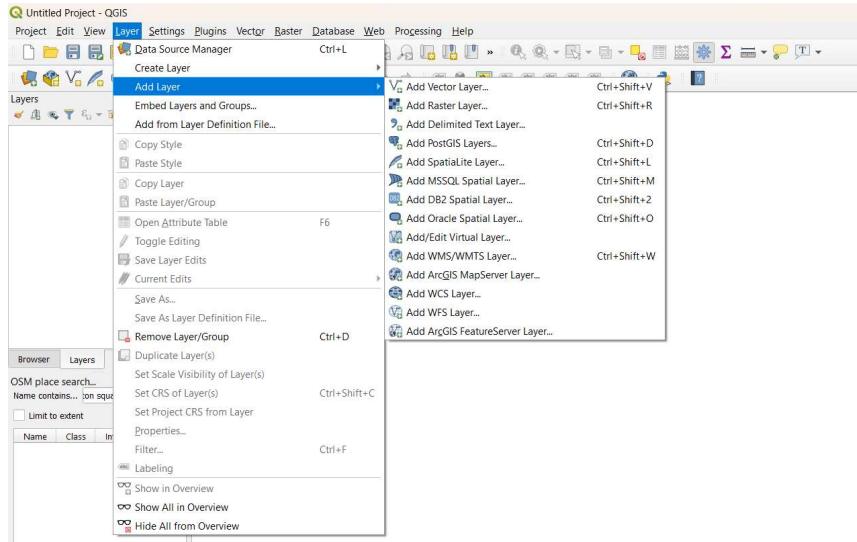
OUTPUT:



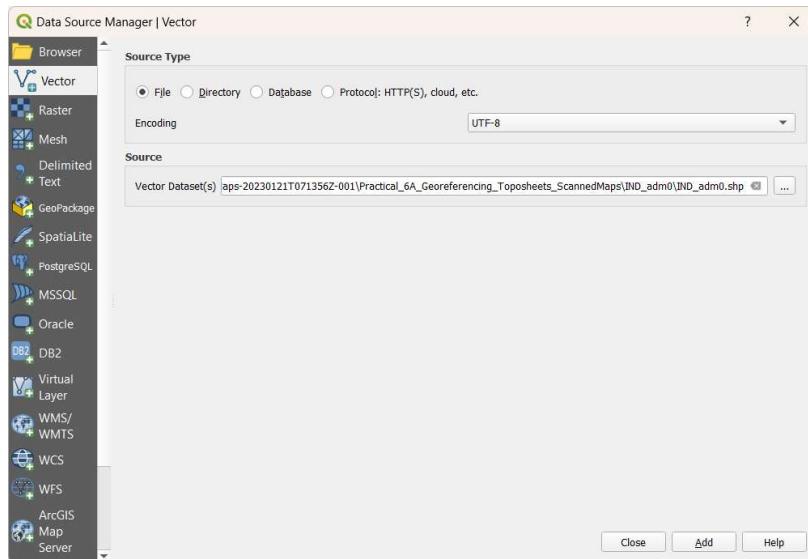
Practical no :- 6

A) Georeferencing Topo Sheets and Scanned Maps

Step 1: Layer -> Add Layer →Add vector Layer ->

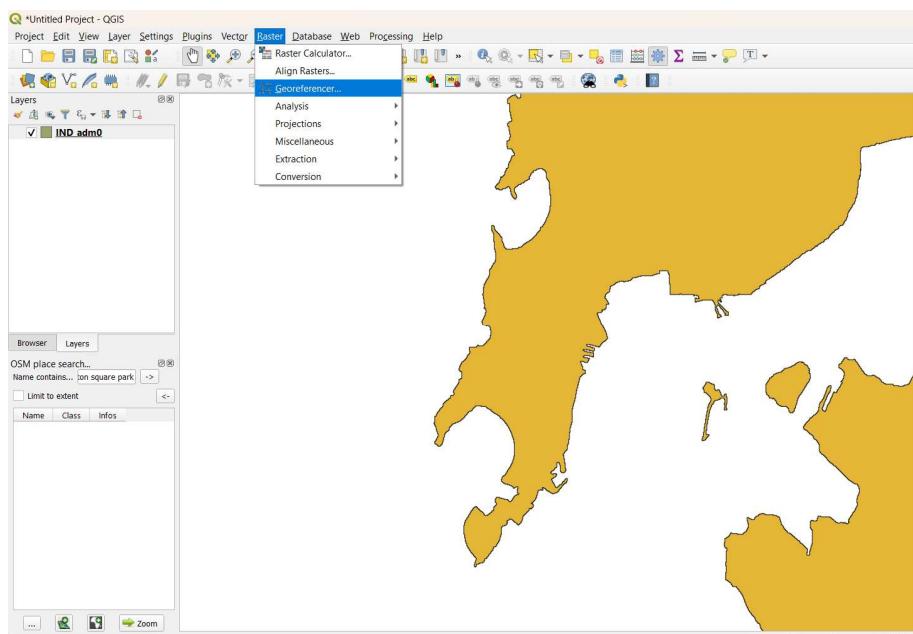


(Practical_6A_
Georeferencing_Toposheet->IND_admo→INDadm0.shp) → Add → close [Focus on Mumbai →zoom it out]

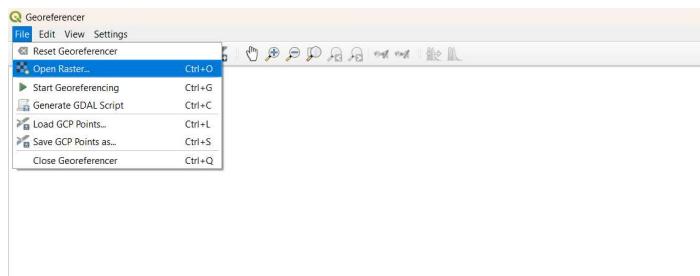


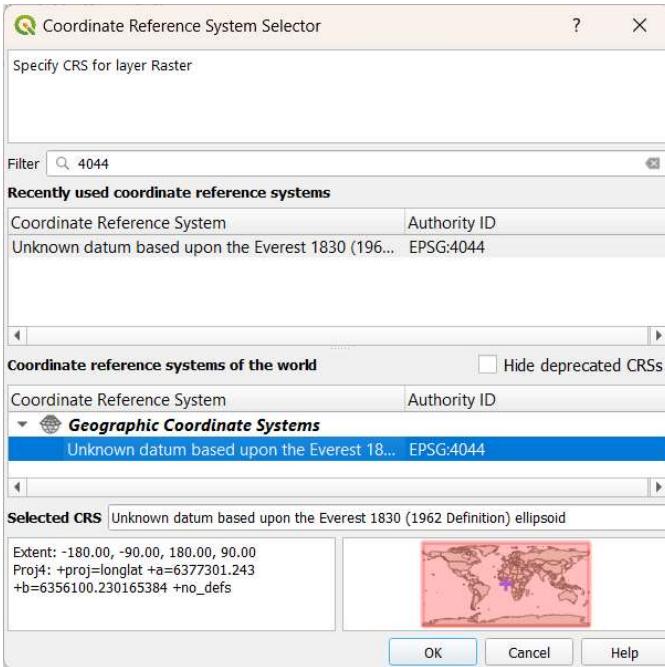


Step 2: Raster -> Georeferencer

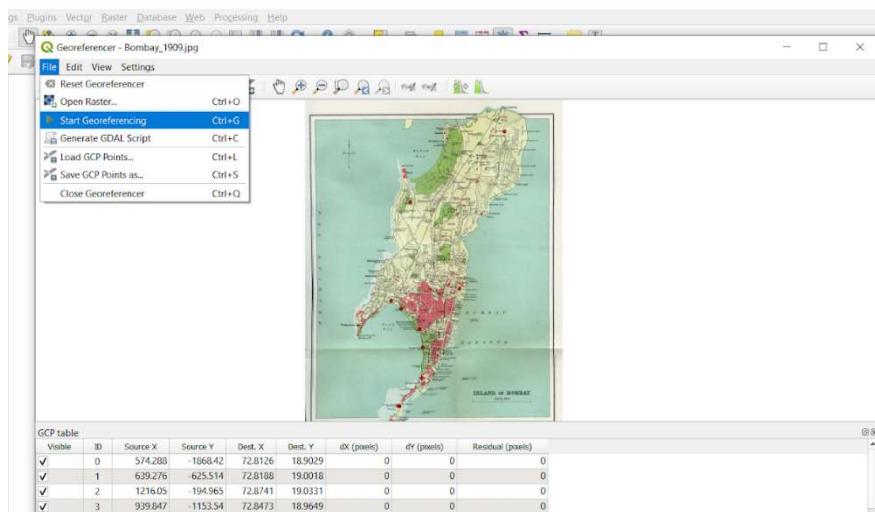


[File > Open Raster -> Bombay_1909.jpg] We have add co-ordinates. We are adding Three co-ordinates.





Enter map co-ordinates [put the point on original map] -> From map canvas. → Click on original map → ok.



File -> start Georeferencing

Settings -> Transformation settings

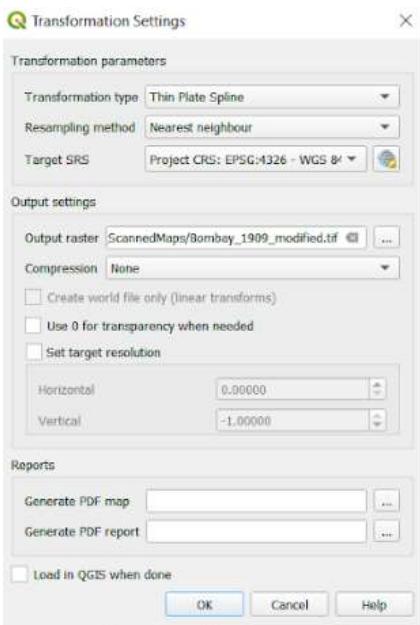
Transformation type [Thin Plate spline]

Resampling method [Nearest neighbor]

Target SRS [EPSG:4044-unknown datum based upon the Everest 1830 EPSG:4044] ->OK

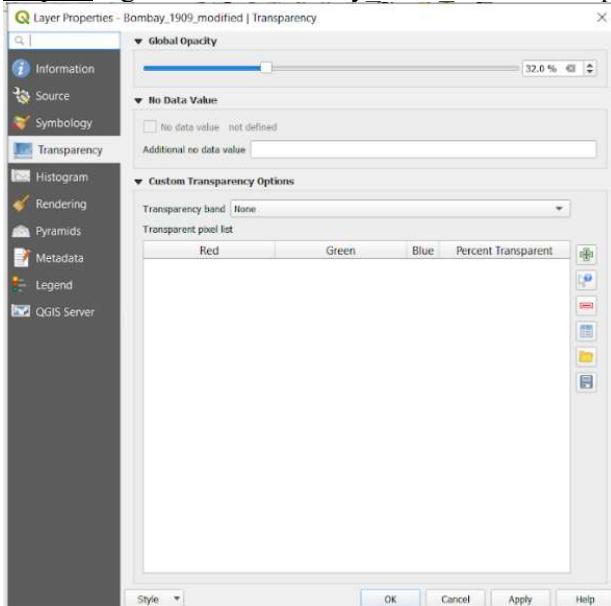
⇒✓ load in QGIS when done (select it) ->ok File -> Start

Georeferencing.



Step3: close the Georeferencer → save → replace it yes

Step 4: Right click on Bombay_1909_modified -> properties -> Transparency -> Global opacity 32.0 %



[Output: we have mapped the image on a vector layer which is called georeferencing]

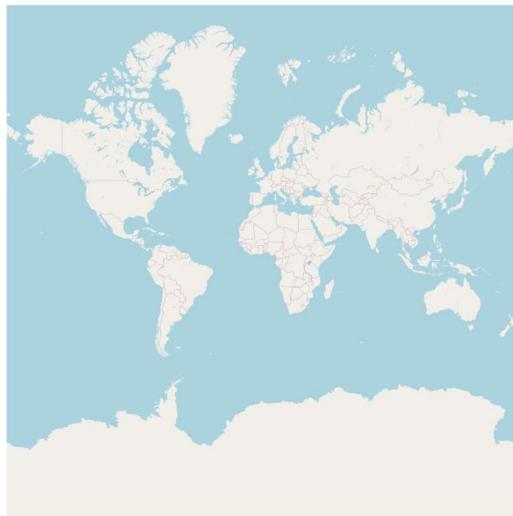
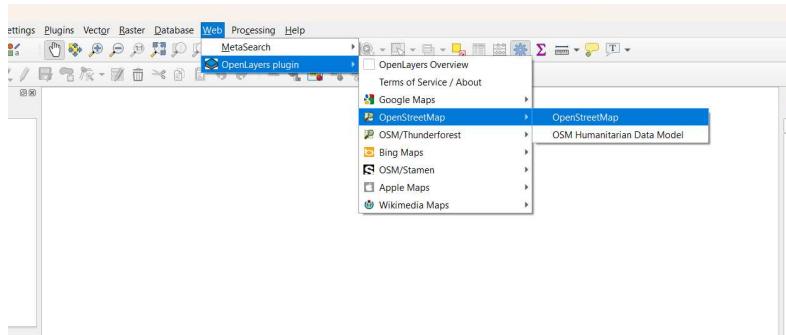
OUTPUT:



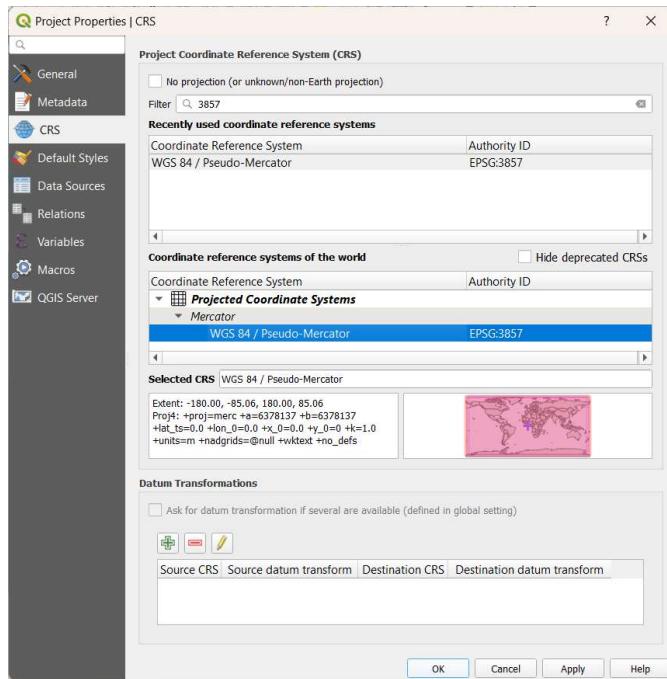
B) Georeferencing Aerial Imagery

[Check for openlayers plugin & openstreetmap]

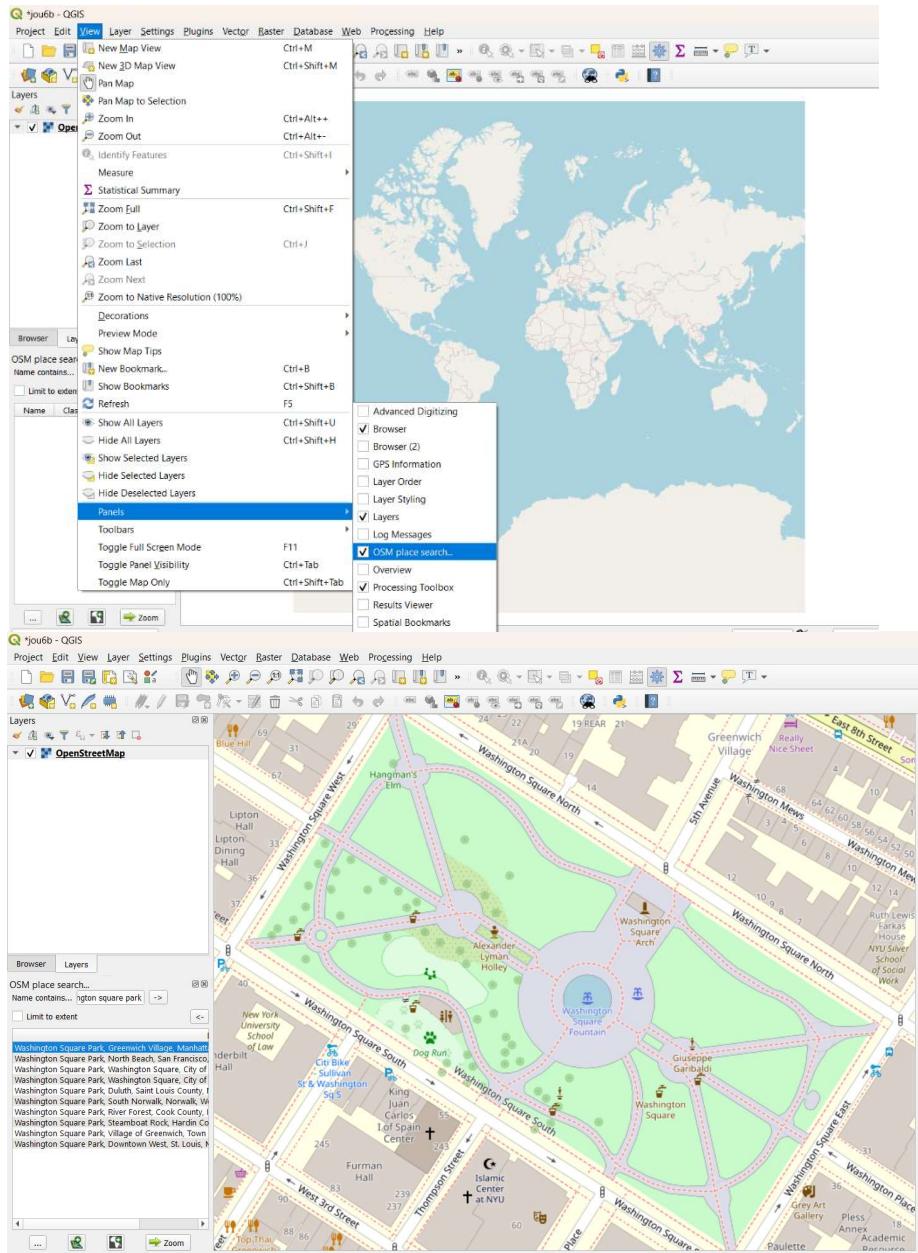
Step 1: Web -> openLayers plugin -> OpenStreetMap -> OpenStreetMap



Step 2: Project -> Properties -> CRS -> [WGS 84/Pseudo Mercator EPSG:3857]-> Apply-> OK

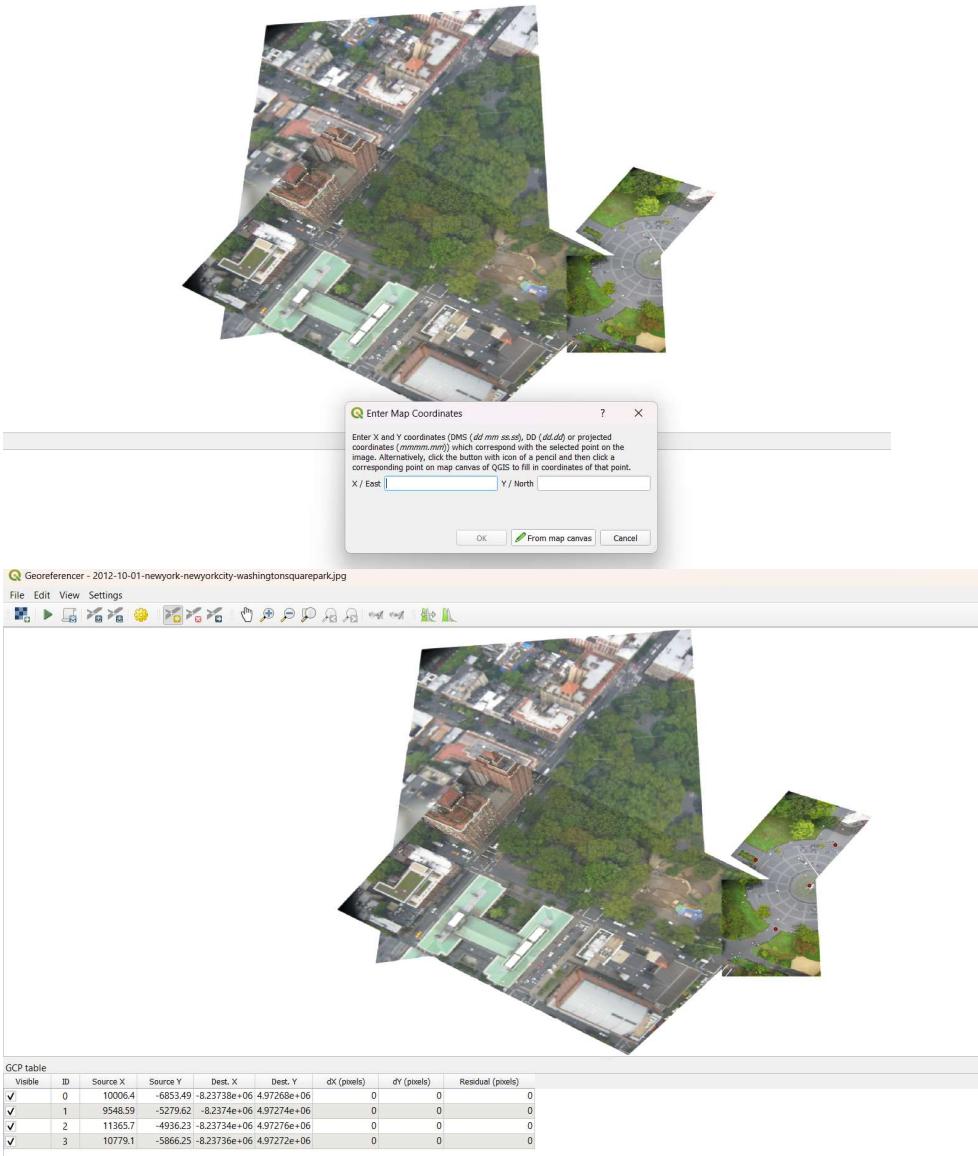


Step 3: View-> Panels-> OSM Place Search [✓](select it) OSM place search -> Name contains [Washington Square Park] zoom

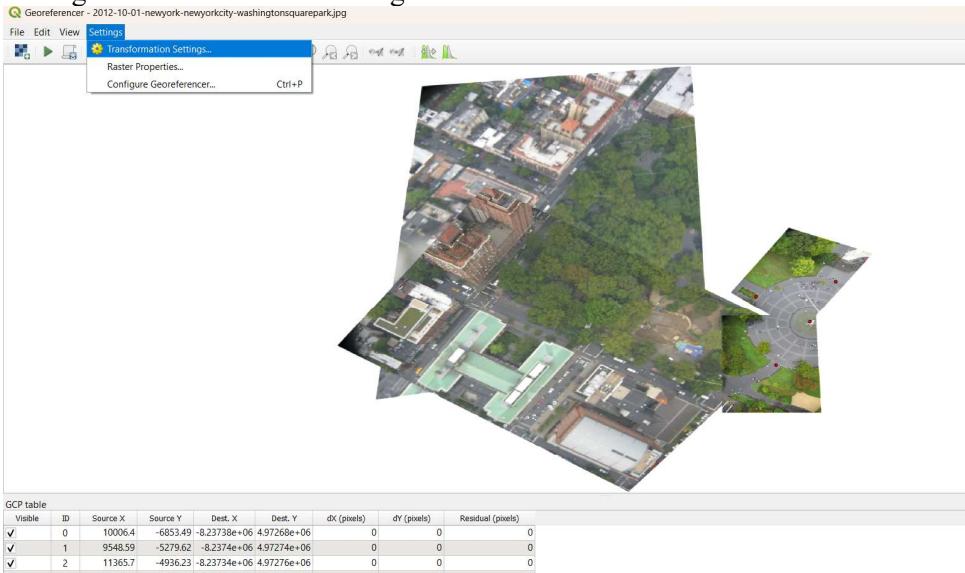


Step 4: Raster-> Georeferencer ->File-> Open Raster -> [NewYork_Washington]

Edit ->Add point (Click on image) From MapCanvas Take a point in the original image ->OK (Take Four points in all the corners)

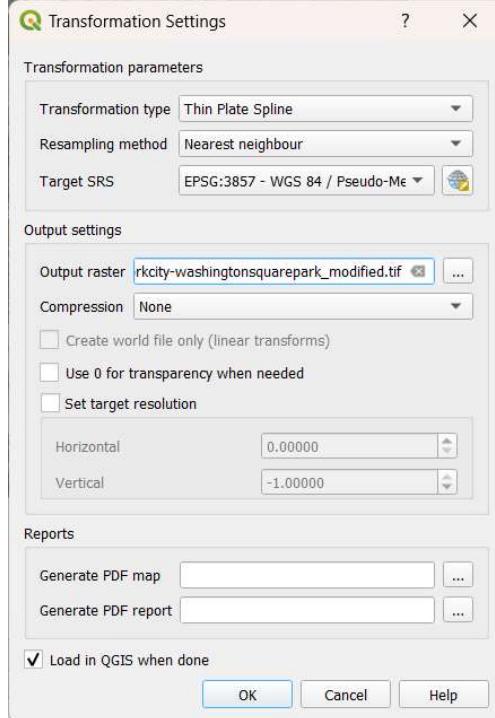


Settings-> Transformation Settings ->



Transformation Type [This plate spline]
 Resampling method [nearest Neighbour]
 Target SRS (EPSG:3857-WGS 84/Pseudo-me)

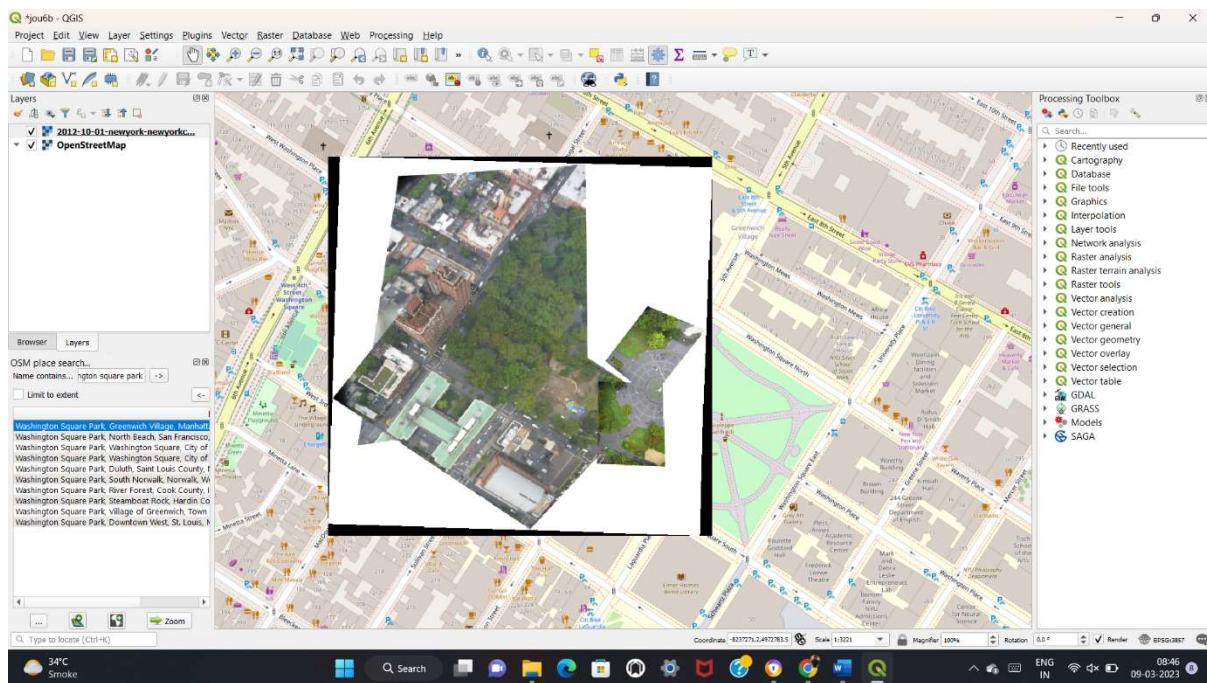
Output - raster (gateway_Aenial_Imagery_modified.tif) Load in QGIS when done (select) ok



File-> start georeferencing

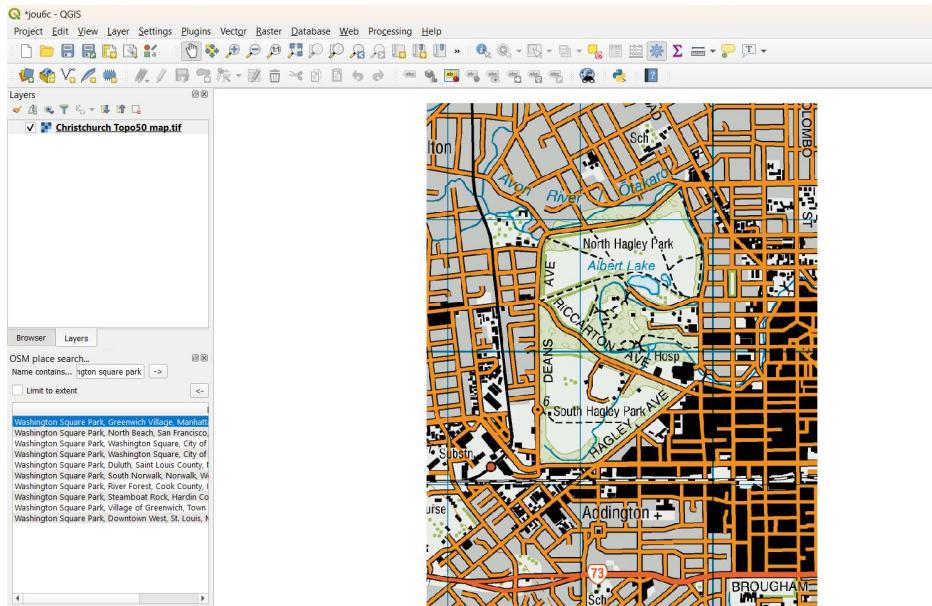
Close the window -> save-> save

Output:

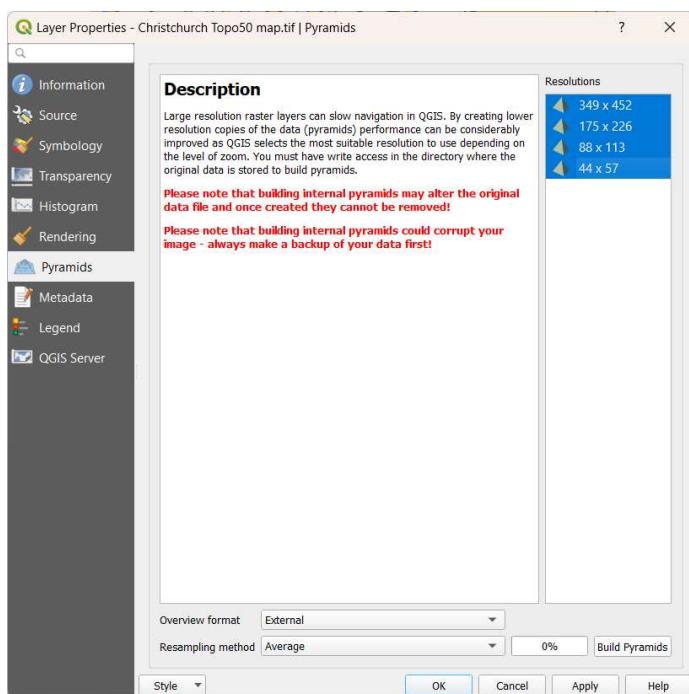


C) Digitizing Map Data

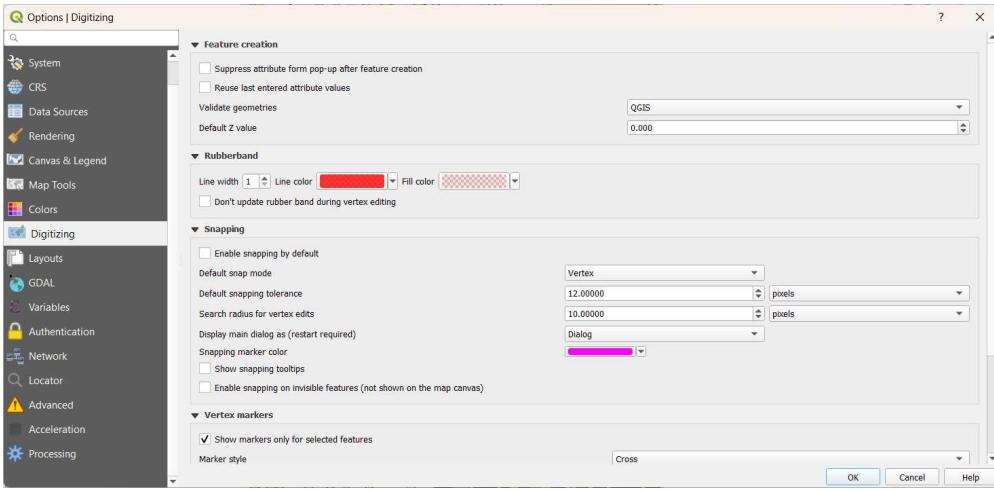
Step 1: layer ->add layer-> add raster layer->
(Practical_6c -> Christchurch topo50 map.tif)-> add-> ok



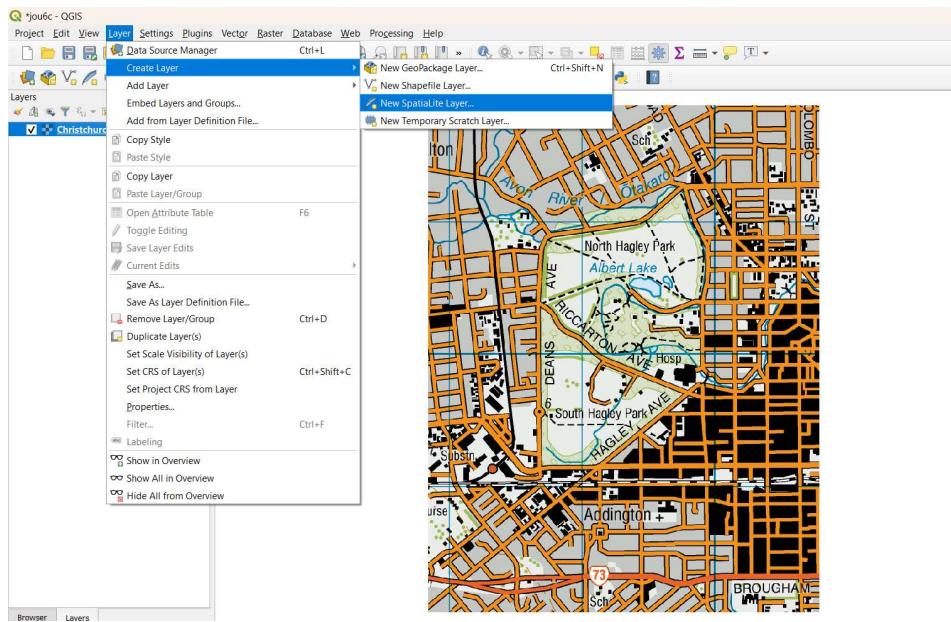
Step 2: right click on the layer ->properties ->pyramids ->select all the resolution from right hand side.-> Build pyramid ->ok



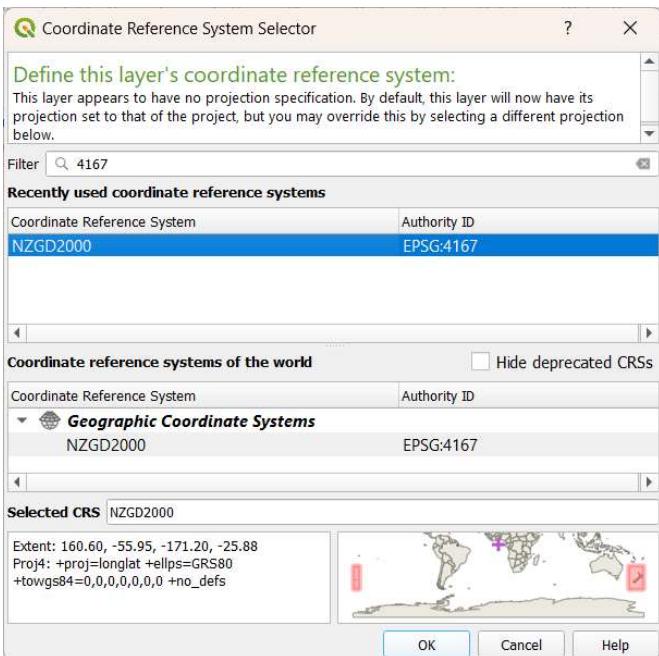
Step 3: settings-> options ->digitizing-> snapping ->deselect the enable snapping by default ->ok



Step 4: layer ->create layer ->new spatialite layer



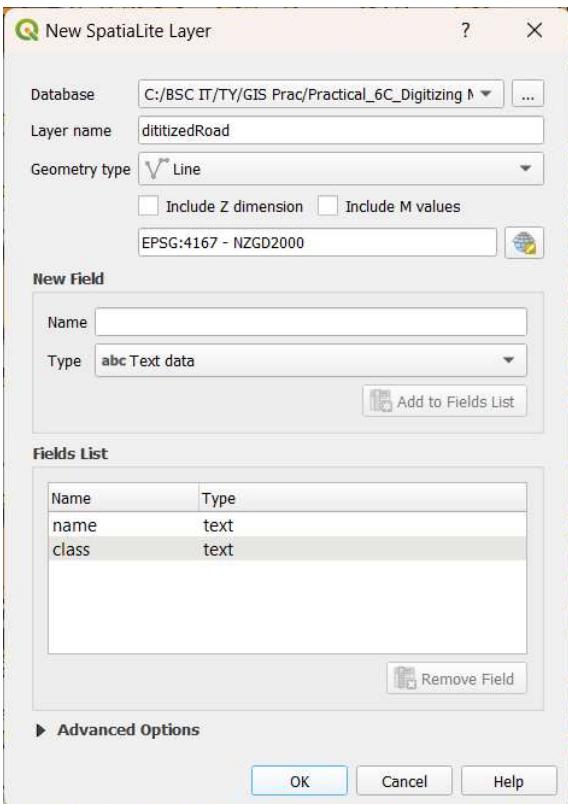
Database (digitization sqlite) layer name (digitized road) Geometry type (line string)
EPSG:4167-NZGD2000



Name(name) text -> Add to field list

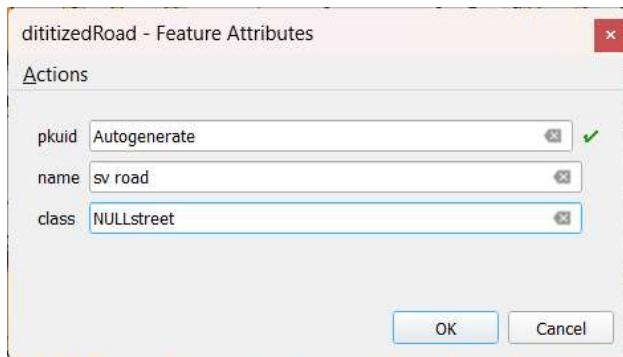
Name(class) text -> Add to field list

Ok

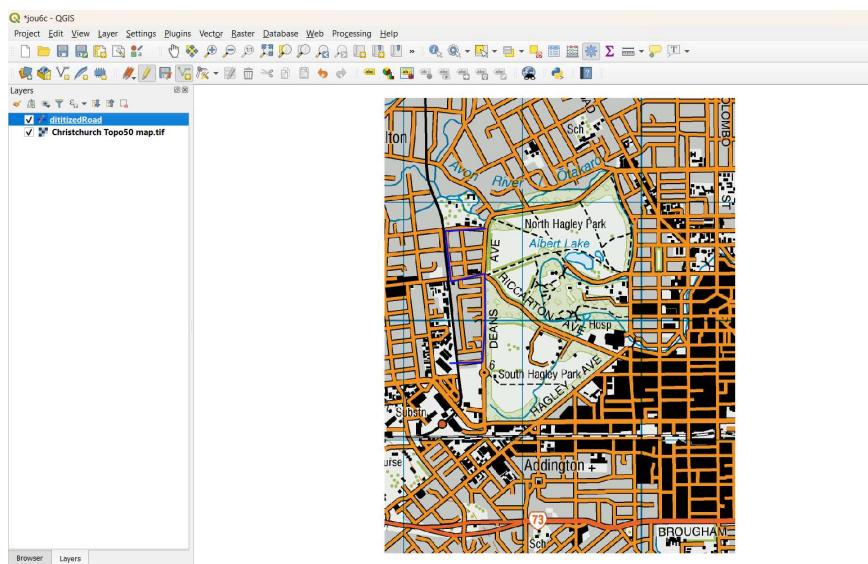


Step 5: toggle(draw the line) Name -sv road.

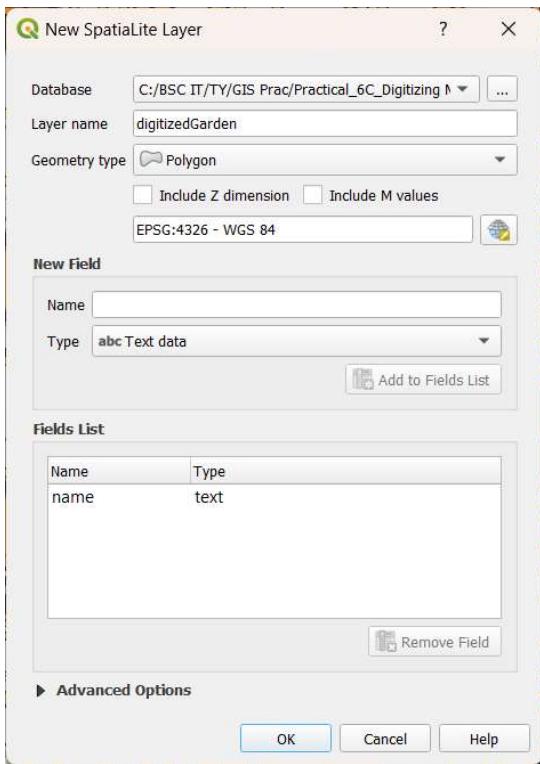
Class- street



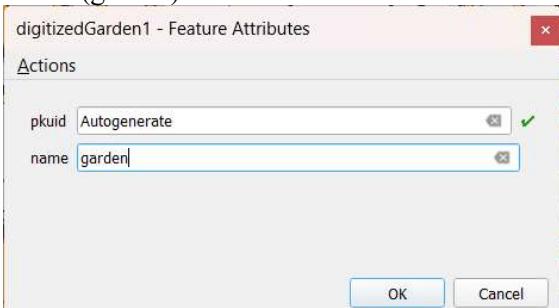
Step 6: right click on digitized road ->properties ->symbology-> colour red (we can clearly see the road)



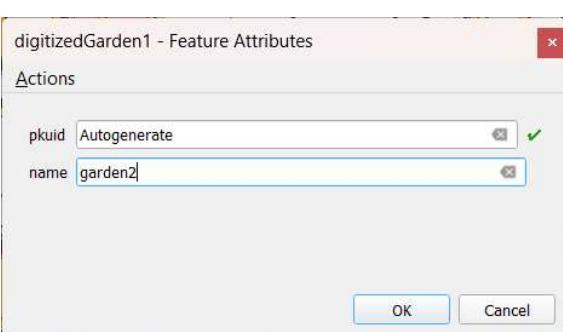
Step 7: layer->create layer-> new spatialite layer -> database (digitization sqlite) (save name) layer name (digitized_garden) geometry type(polygon)
EPSG:4326-WSG 84
Name(name) ->add to field list ->ok



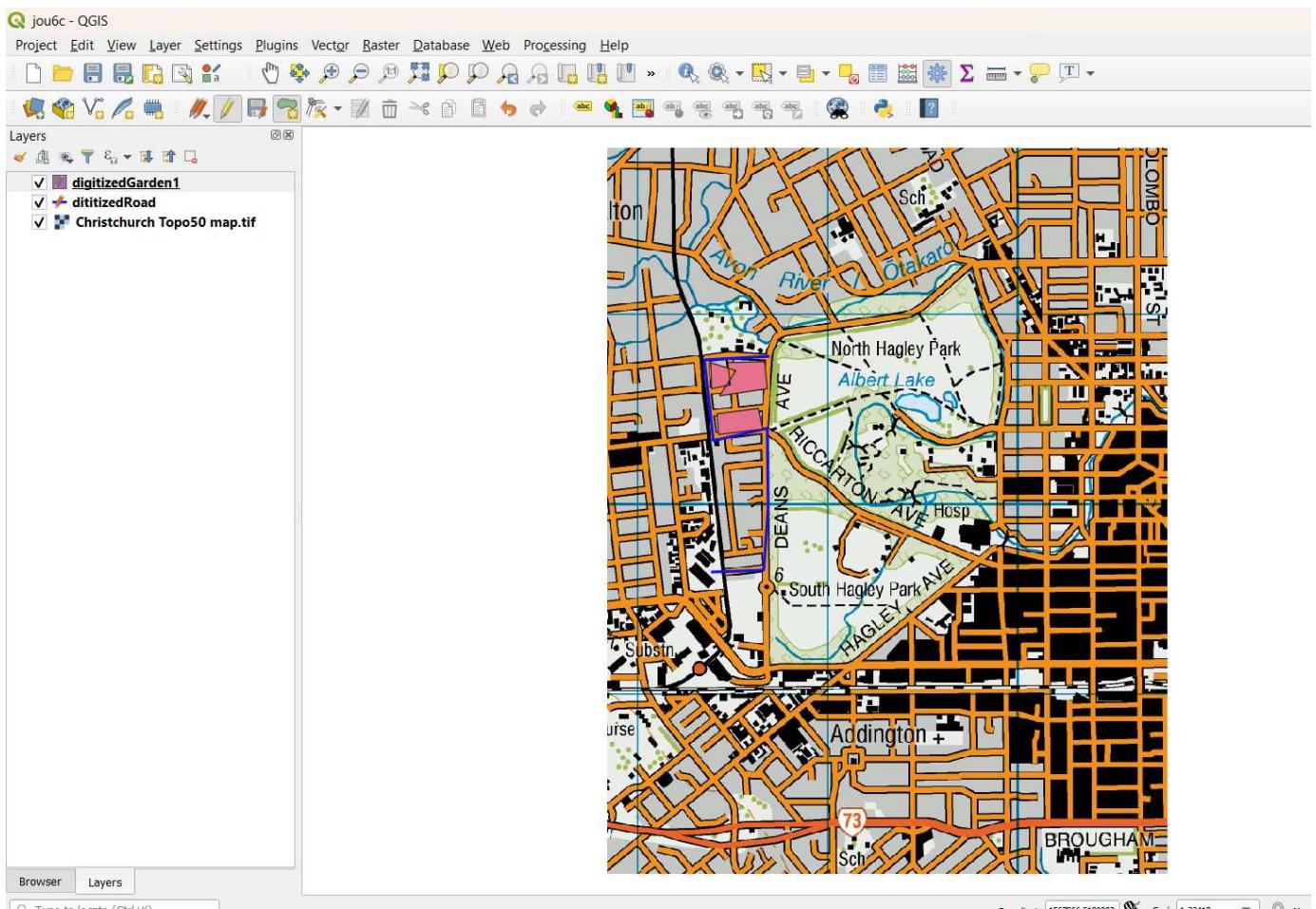
8: toggle-> draw the polygon inside red road
 Name (garden)-> ok



Toggle-> ""
 Name (garden2)-> ok



OUTPUT:

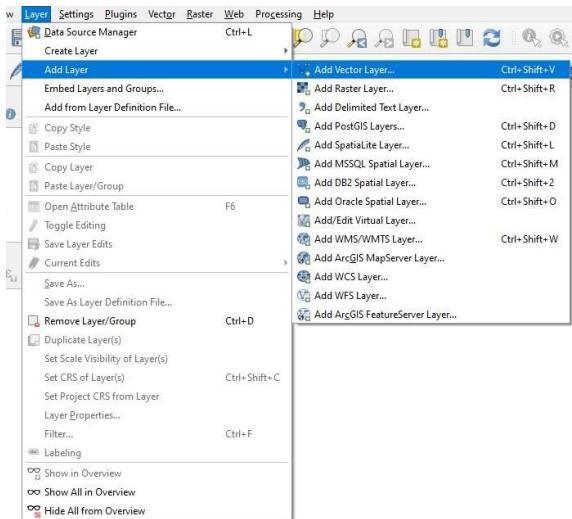


Practical no:- 7

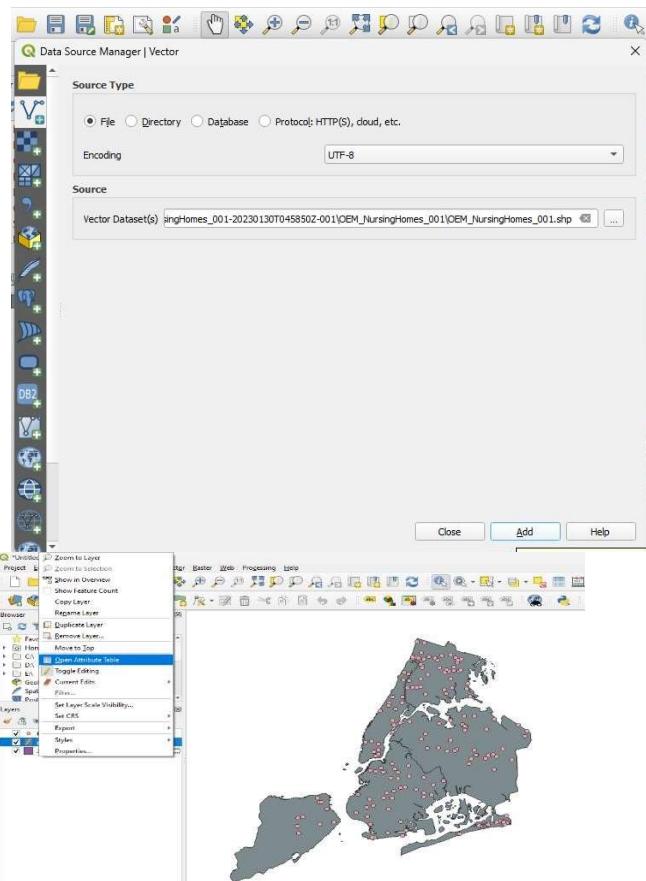
Aim: Managing Data Tables and Spatial data Sets: Table joins, spatial joins, points in polygon analysis, performing spatial queries.

A) Table joins

Step-1: Layer → Add layers → Add vector layer → [...] → (A → nybb.shp → Add → close.



Step-2: Layer → Add layers → Add vector layer → [...] → (A → OEM_NursingHomes_001.shp → Add → close.



Step-3: (Check the attributes of both the layers) right click on layer properties

open attributes table (check for another layer)

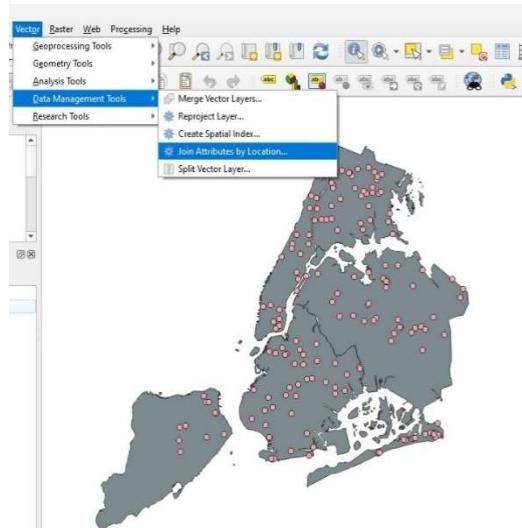
BroCode

	BoroCode	BoroName	Shape_Leng	Shape_Area
1	1	Staten Island	83042.867990...	162702081.950...
2	2	Brooklyn	73945.474210...	197566944.259...
3	1	Manhattan	35957.997128...	63653240.2970...
4	2	Bronx	46298.187759...	106612476.899...
5	4	Queens	89528.948920...	304771532.610...

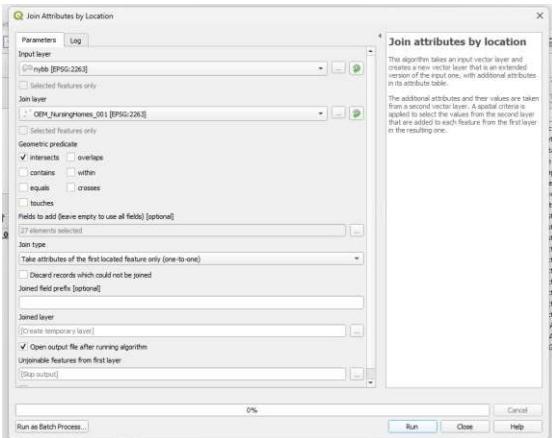
OEM_NursingHomes_001

Label	Name	Address	City	Zipcode	PFI	OpCert	Capacity	Baseline	AIDS
1	UNIVERSITY	2305 GRAND AVE	BRONX	10468	1244.0000000000	700337.000000...	46	1	0
2	PELHAM PARK...	2401 LACONA...	BRONX	10469	1245.0000000000	700338.000000...	200	1	0
3	REGIS	REGIS CARE C...	BRONX	10475	1342.0000000000	700356.000000...	236	1	0
4	JAMAICA HOS...	JAMAICA HOS...	JAMAICA	11418	1710.0000000000	700346.000000...	224	1	0
5	MEADOW PARK	MEADOW PAR...	FLUSHING	11366	1687.0000000000	700398.000000...	143	1	0
6	ISABELLA	ISABELLA GERI...	NEW YORK	10040	1569.0000000000	700352.000000...	705	1	0
7	NEW GOVERN...	227 MADISON...	NEW YORK	10002	1606.0000000000	700343.000000...	210	1	0
8	NEW SURFSIDE	NEW SURFSIDE...	FAR ROCKAWAY	11691	1948.0000000000	700371.000000...	183	1	0
9	NYS VETERANS	NYS VETERANS...	JAMAICA	11434	4815.0000000000	700383.000000...	250	1	0
10	MIDWAY	MIDWAY NURSL...	69-95 QUEENS...	11378	1704.0000000000	700340.000000...	200	1	0
11	NEW GLEN OAKS	NEW GLEN OA...	GLEN OAKS	11004	1697.0000000000	700391.000000...	60	1	0
12	PARK TERRACE	PARK TERRACE...	59-20 VAN DORN...	11368	1698.0000000000	700374.000000...	200	1	0
13	PARKER JEWISH	PARKER JEWISH...	NEW HYDE PARK	11040	1671.0000000000	700307.000000...	527	1	0
14	OCEANVIEW	OCEANVIEW NL...	FAR ROCKAWAY	11691	1688.0000000000	700354.000000...	102	1	0
15	PARK NURSING	PARK NURSING...	ROCKAWAY PA...	11694	1689.0000000000	700364.000000...	196	1	0
16	HOLLISWOOD	HOLLISWOOD ...	HOLLIS	11423	1712.0000000000	700348.000000...	314	1	0

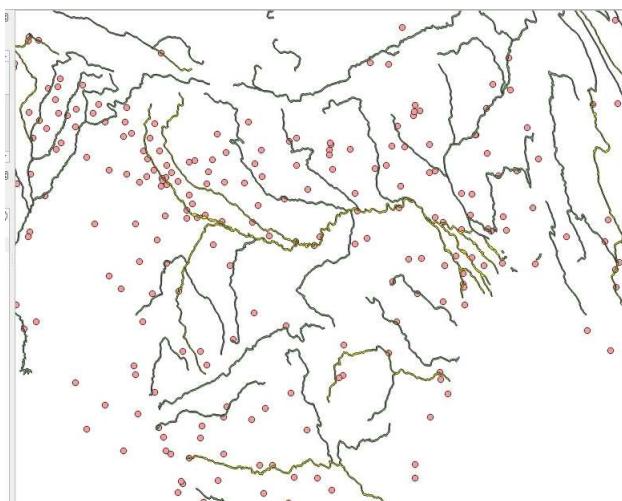
Step-4: vector Data management Tools join attributes by location



Base layers (nybb [EPSG 2263]) Join layer (OEM-NursingHomes-001[EPSG:2263]) Geometric predicate [select intersects] Fields to add (click on [...]) Parameters (Select All) [click on select all] Ok Join type (Table attributers of the first matching feature only [one-to one]) Open output file after running algorithm [select] (should be check)



Run →



Step-5: Deselect the nybb and OEM layer from layer panel



Step-6: click on [i] from menu bar

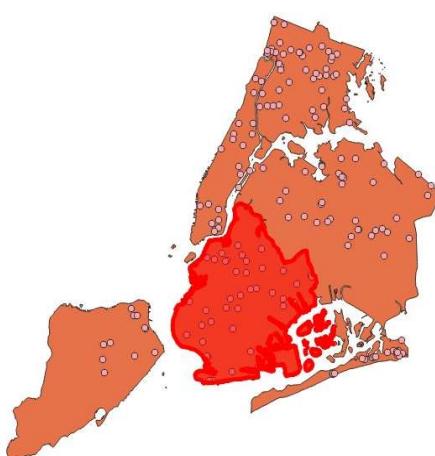


select OEM layer from layer panel [select] ⑦



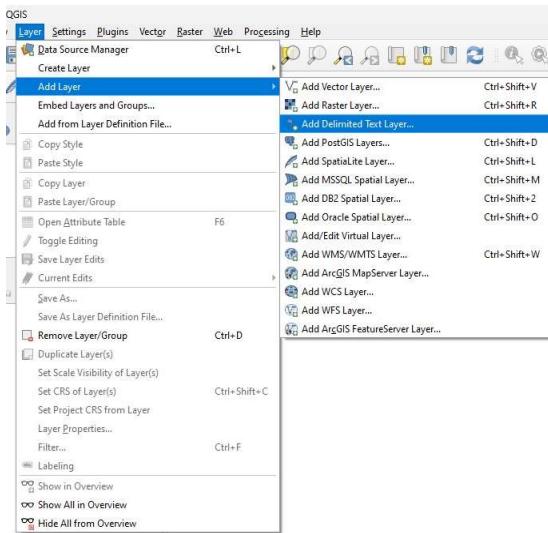
Click on map and see the identity result ⑧ We have added one attribute in polygon to find out earthquake prone area.

OUTPUT:

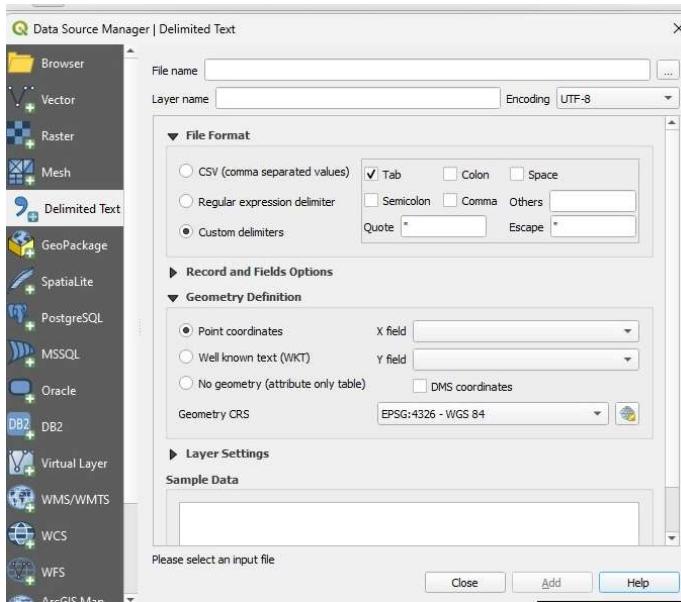


C) points in polygon analysis

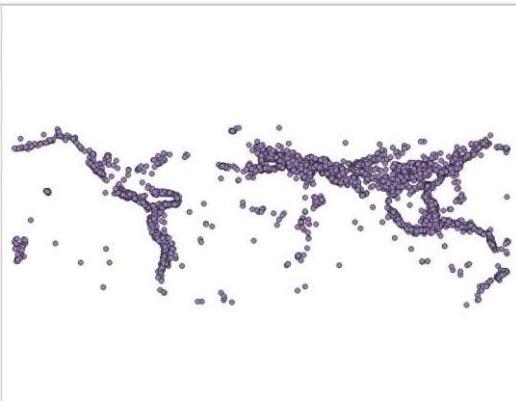
Step-1: Layer ⑦ Add layer ⑦ Add Delimited Text Layer



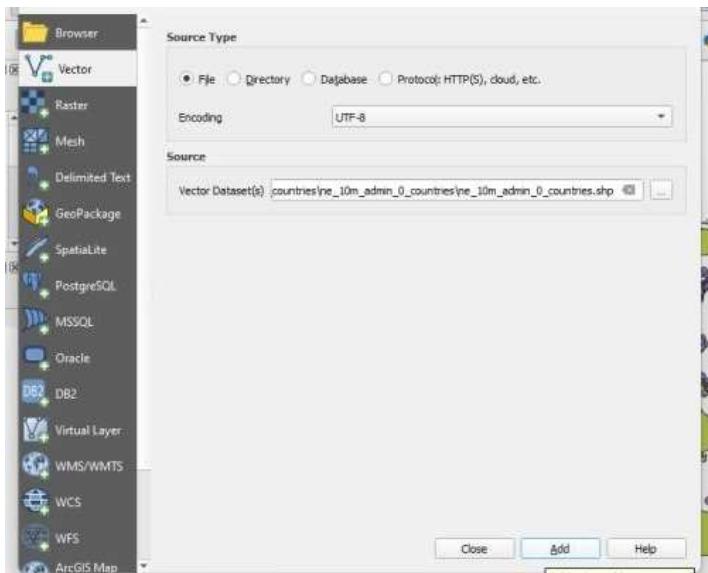
⑦ File Name (----EarthQuakeDatabase.txt) ⑦ Layer Name (Earthquake Database) Encoding (UTF-8) File format [select] Table choose custom delimiters ⑦ Reload and Fields options [select] First record has field names ⑦ [select] Detect field types ⑦ Geometry definition X Field (Longitude) Y Field (Latitude) ⑦ Geometry CRS (EPSG: 4326.WGS 84) ⑦ Add



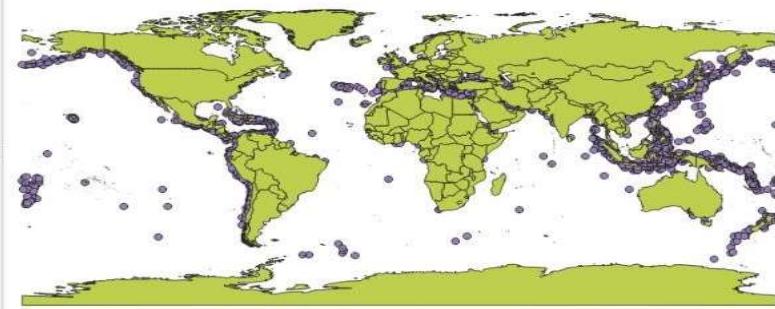
⑦ close (we can see the layer in layer panel)



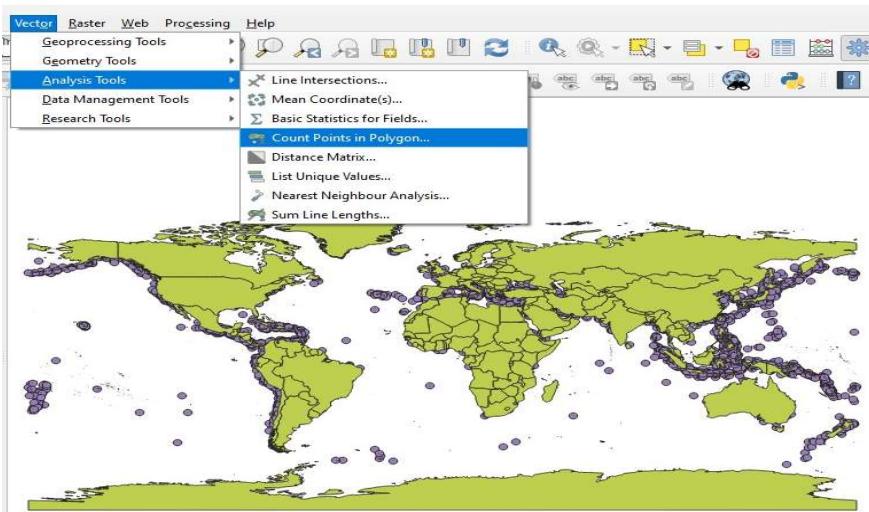
Step-2: Layer Add Layer Add vector layer [...] (ne_10m_admin_0_countries.zip)



Add close

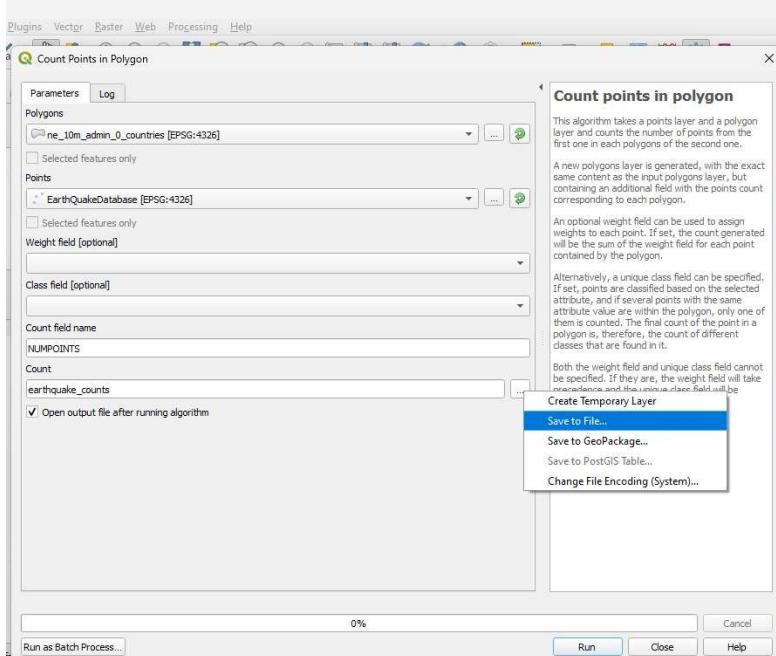


Step-3: Vector Analysis Tools Count point in polygons



⑦ polygon(ne_10m_admin_0_countries) ⑦ Points (EarthquakeDatabase [Earthquake Database [EPSG:432])

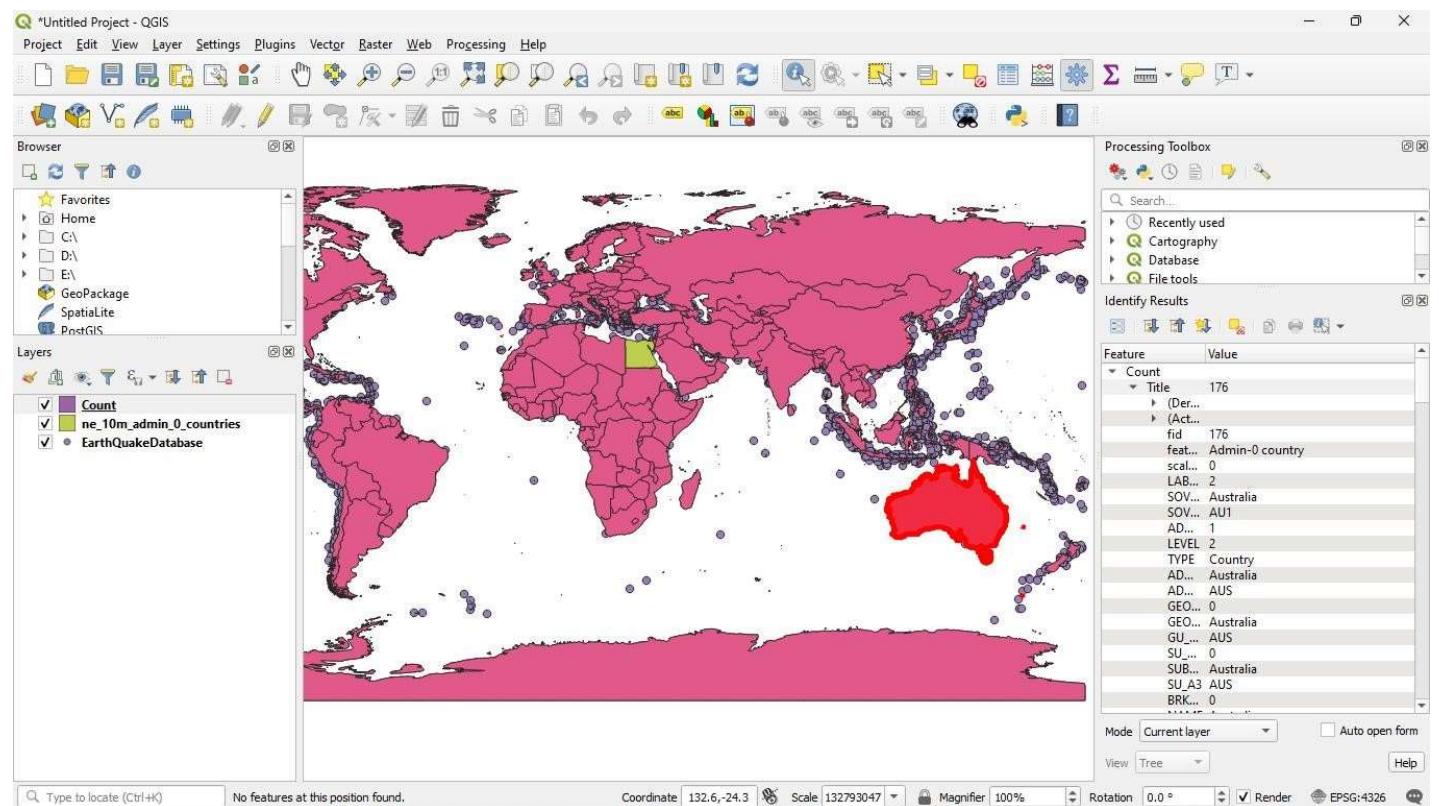
⑦ Count field name (Nonpoint) ⑦ Count (earthquake_count) [...] click on three dots ⑦ save to file (practical_07⑦ c(earthquake_count)⑦ (check extension should be gpkg) ⑦ Open output file after running algorithm [select] ⑦



Run (it takes time) ⑦ → close (zoom original image, focus on map)

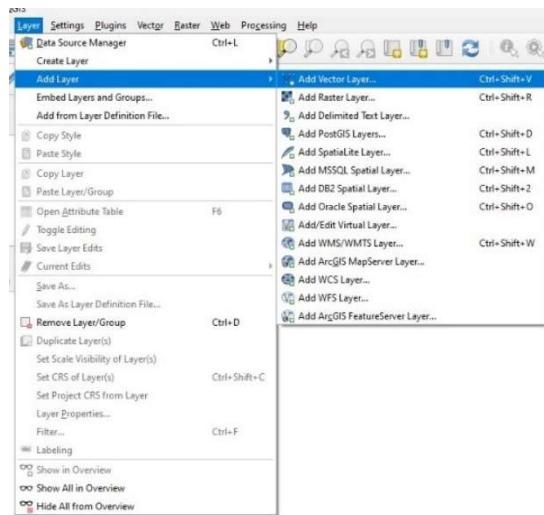
Step-4: -Select [i] ⑦ select from map (we can see the earthquake points in every country we can see numpoint from identify result on right hand side)

OUTPUT:

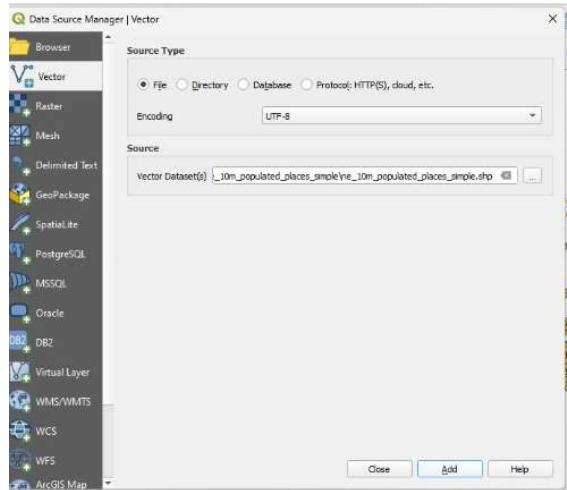


D) performing spatial queries

Step-1: -Layer Add Layer Add vector Layer



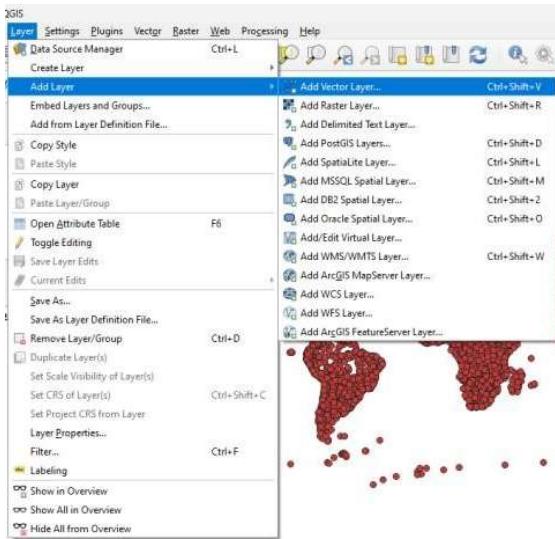
ne_10m_populated_place_simple_shp



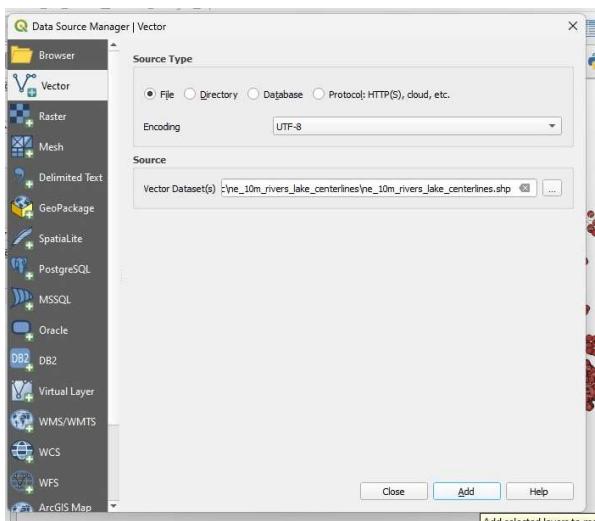
Add close



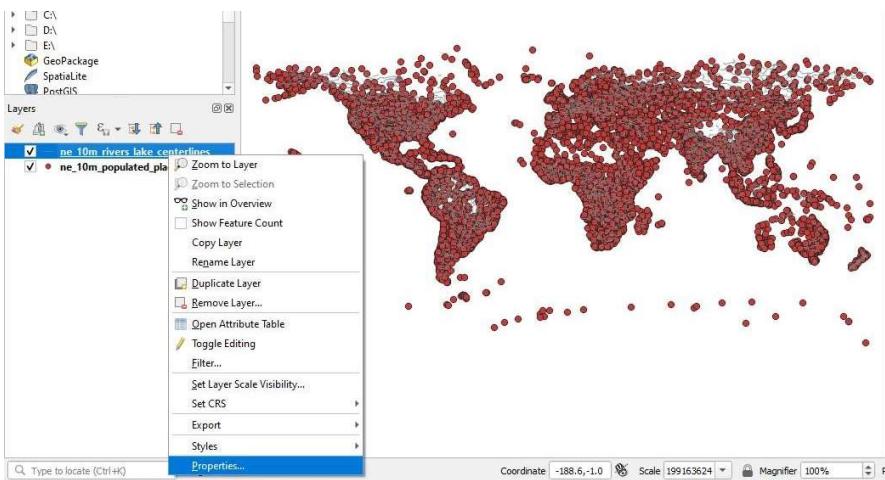
Step-2: -Layer Add Layer Add vector layer



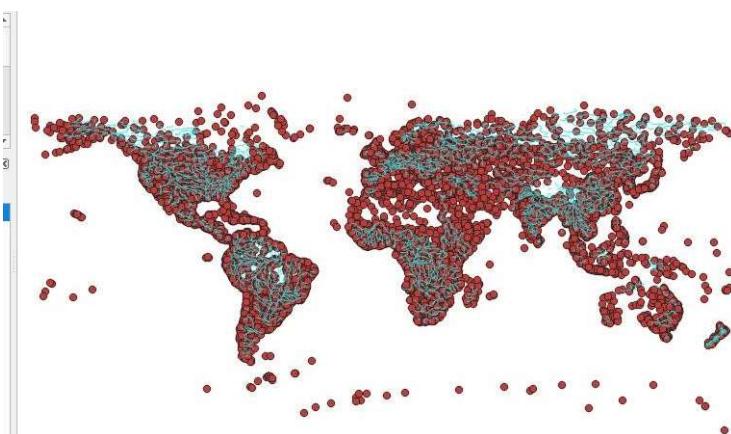
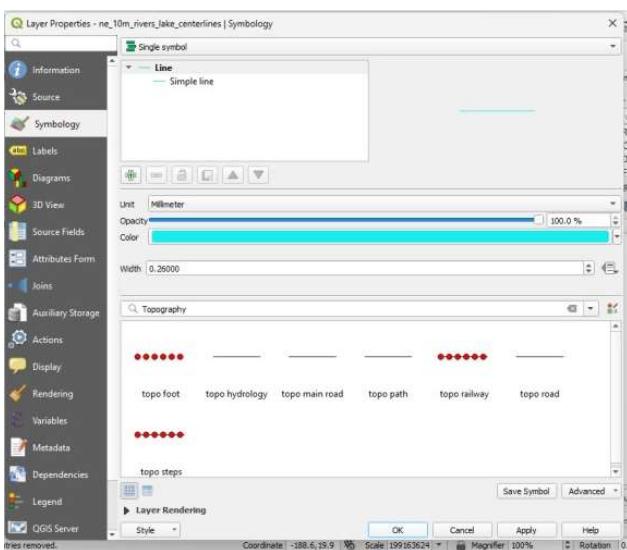
ne_tom_rivers_lake_centerlines.shp Add close



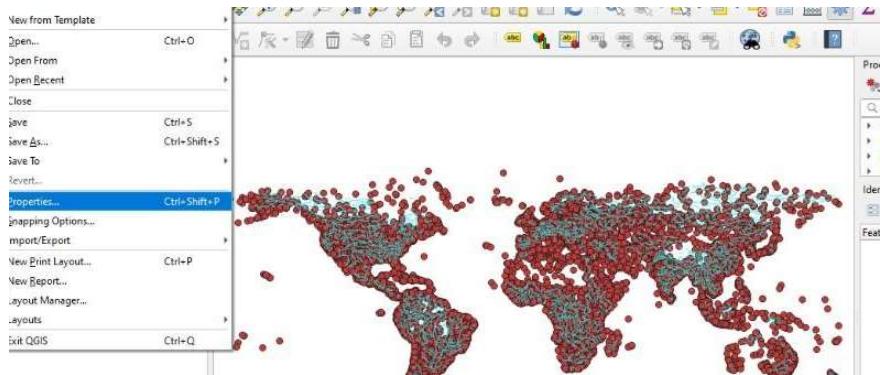
Step-3: -Right click on ne_10m_rivers_lake_contlines.shp properties



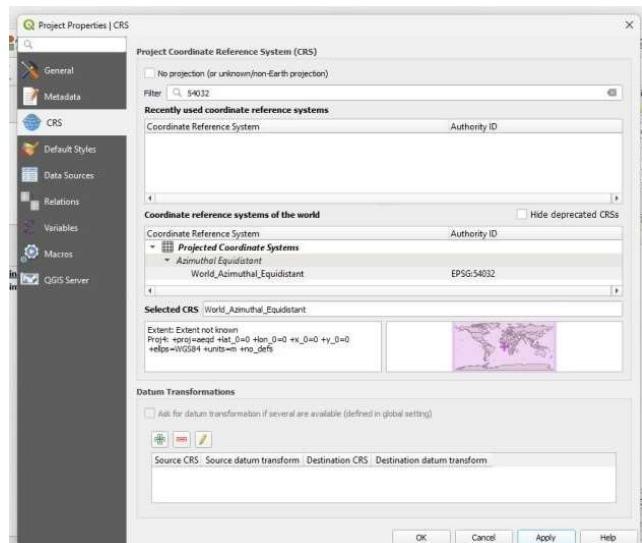
symbology Labels (single labels) Label with (name) Apply OK



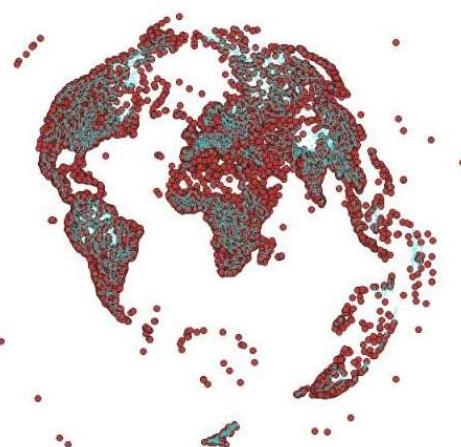
Step-4: -we need to change its CRS (coordinate reference system) project properties



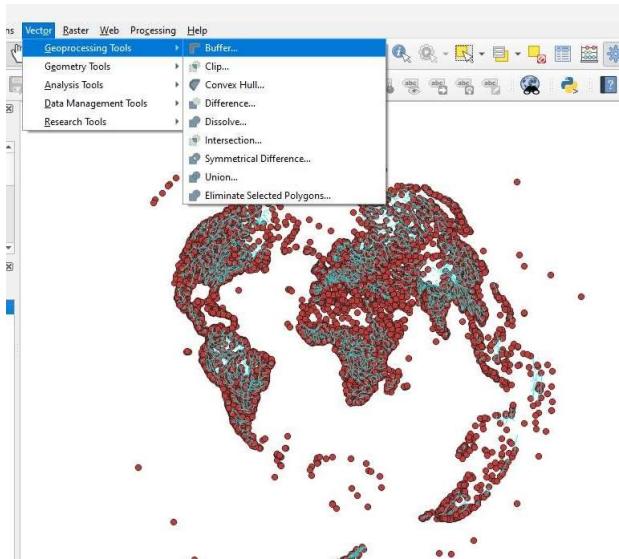
CRS secret for 54032(world_Azimuthal_Equidistant [ESRI 54032])



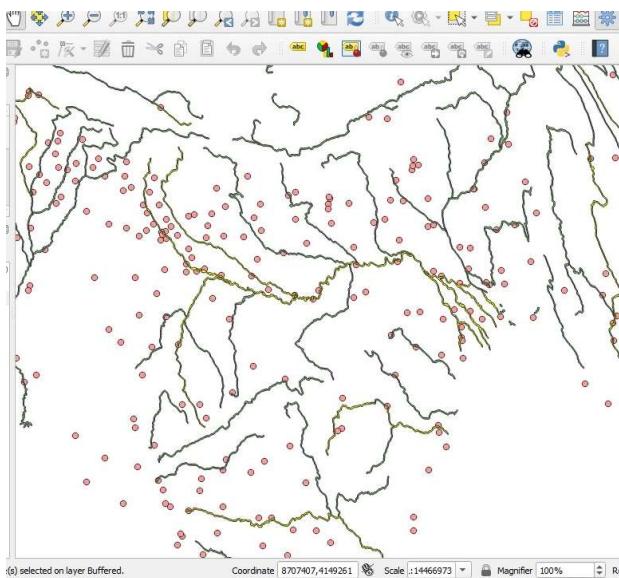
OK (we can see 3D Globe map we have converted 2D into 3D format)



Step-5: -Vector Geoprocessing Tools Buffer

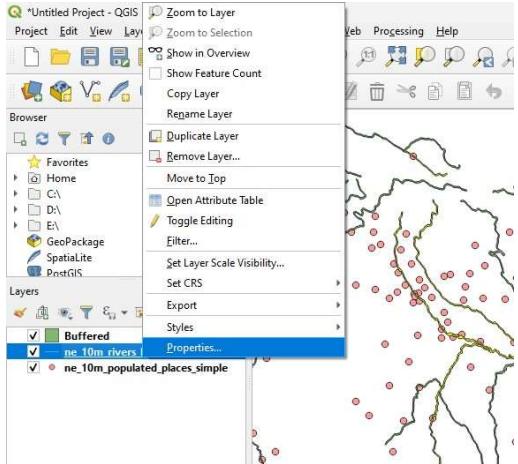


input layer(ne_10n_rivers_lake_centerlines) **7** Distance [0.020000] (we are concentrating on rivers which are in 2km distanced) **7** segment (5) **7** End cap style (Round) **7** Join style (Round) **7** Miter limit (2.000000) **7** [Select] open output file after running algorithm (we are not saving this file we are creating temporary file) **7** Run **7** **7** close

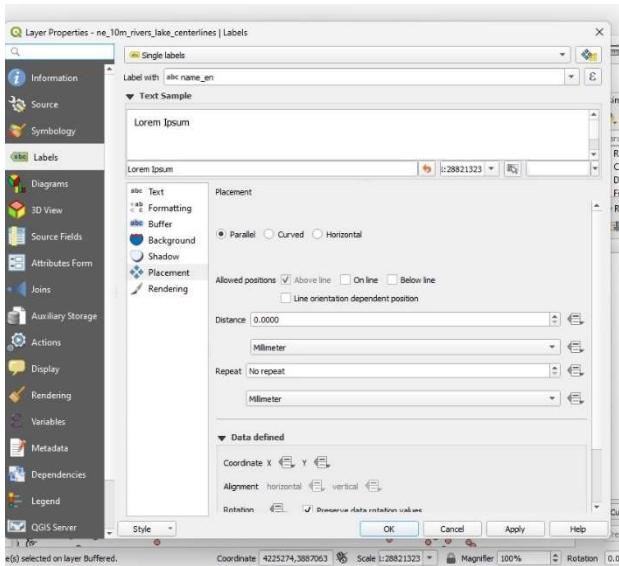


Step-6: -Rivers are not clearly seen so we will change the color of population places

Right click on ne_10n_populaed_place_simple **7** properties **7**

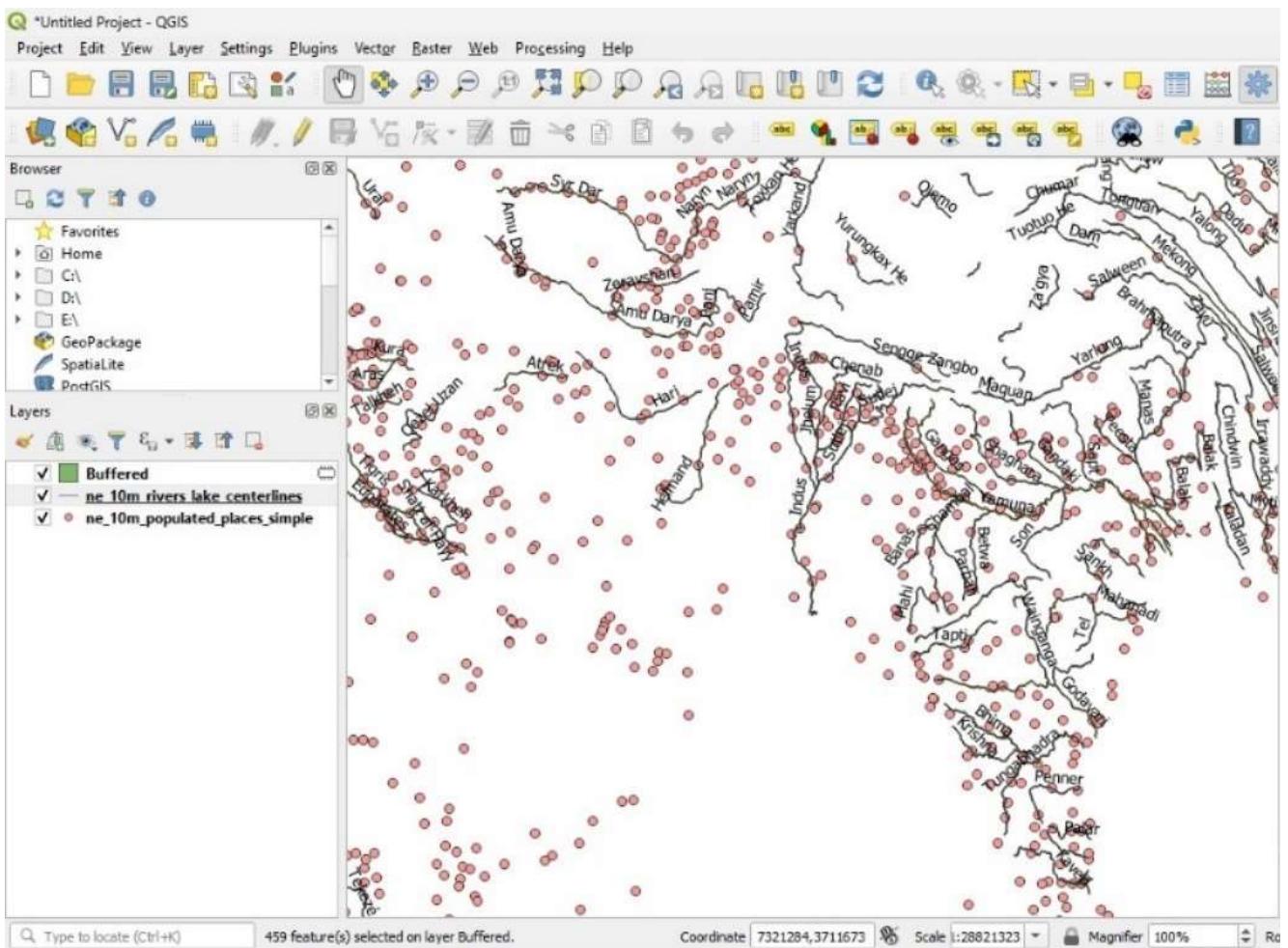


Labels (single labels) **7** Labels with (name) **7** Apply



7OK (we have highlighted those rivers which area near to the populated areas in 2 kms)

OUTPUT:-



Practical no:- 8

Aim: Advanced GIS Operations 1: Nearest Neighbor Analysis, Sampling Raster.

Data using Points or Polygons, Interpolating Point Data

A)Nearest Neighbor Analysis

GIS is very useful in analyzing spatial relationship between features one such analysis is finding out which features are closest to a given feature.

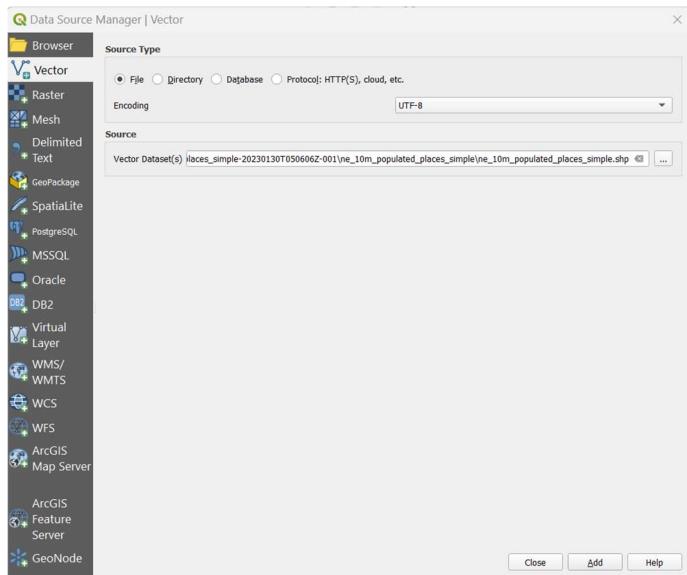
QGIS has a tool called Distance Matrix which helps with such analysis.

In this practical, our goal is to find out the nearest point from the populated places layer for each of the points in the earthquake layers.

We will explore a tool ‘Distance’ to nearest hub from the processing toolbox that are not only not only to find the distance to the closest feature but join it with a line to it for visualizing the results.

Step I:

Layer → Add Layer → Add Vector layer(ne_10m_populated_places-simple.shp) → Add → Close



Step II:

Layer → Add Layer → Add Delimited text layer

File name: [earthquakes_2021_11_25_14_31_59_+0530.tsv]

Layer name: earthquakes_2021_11_25_14_31_59_+0530

Encoding: UTF-8

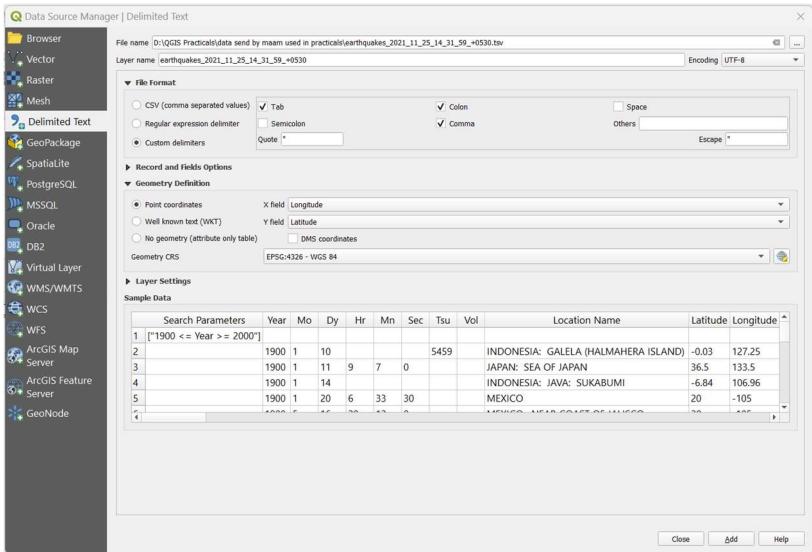
File format: Custom delimiters[checked] tab

Point co-ordinates x longitude

y latitude

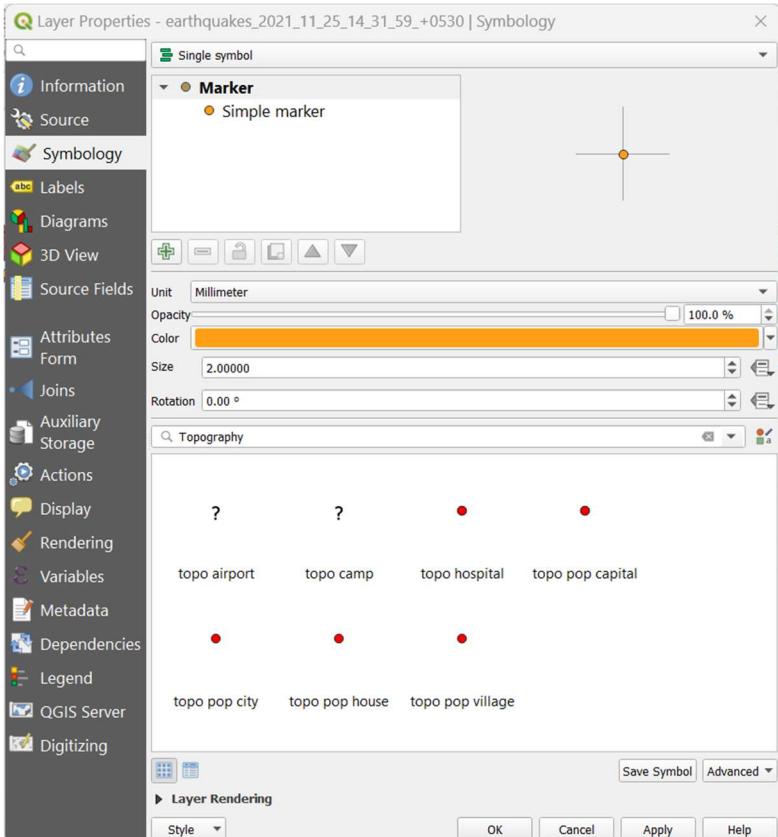
CRS: EPSG:4326-WGS-84

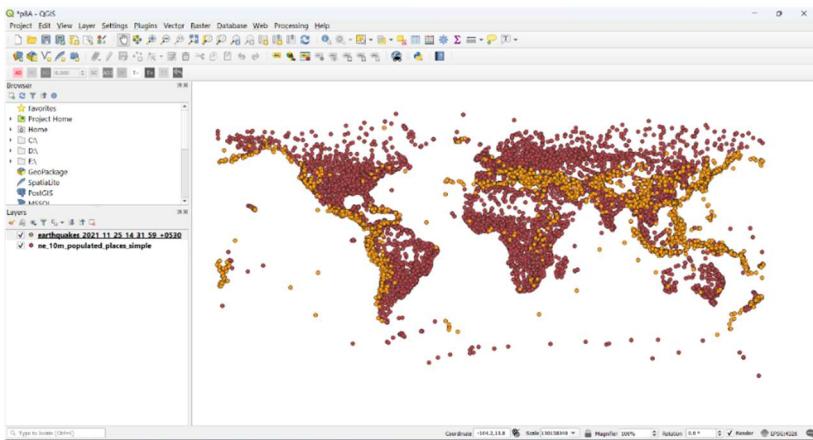
→Add → Close



Step III:

We can change the color using symbology





Step IV:

Right click on earthquakes_2021 → open attributes table (we can see multiple null values & longitude & latitude values are missing) we have to remove null values

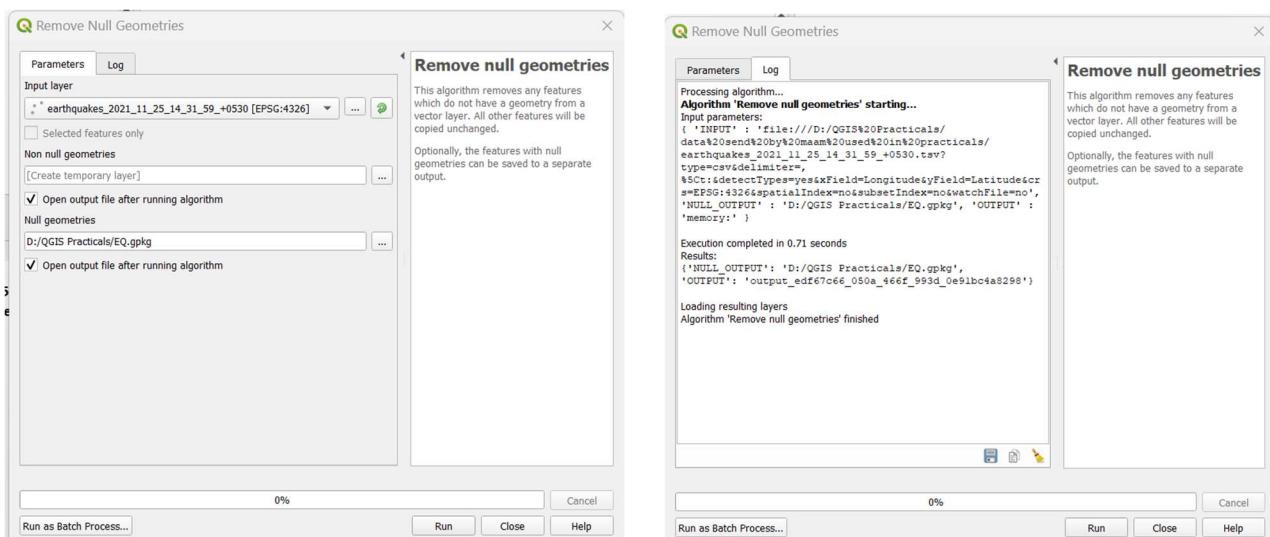
Year	Mo	Dy	Hr	Mn	Sec	Tsu	Vol	Location Name	Latitude	Longitude	Local Depth (km)	Mag	MMI Int	Deaths
1	1998	7	9	5	19	7.3	NULL	NULL AZORES: FAI...	38.65	-28.626	10	6.2	NULL	
2	1998	6	27	13	55	52	NULL	NULL TURKEY: AD...	36.878	35.307	33	6.3	8	14
3	1998	5	30	18	18	15	5742	NULL SANRIKU JAP...	39.027	143.441	33	6.2	NULL	NU...
4	1998	5	30	6	22	28.9	NULL	NULL AFGHANISTAN...	37.106	70.11	33	6.6	NULL	471
5	1998	5	28	21	11	44.1	NULL	NULL CHINA: SOU...	37.388	78.843	33	5.6	NULL	NU...
6	1998	5	22	4	48	50.4	NULL	NULL BOLIVIA: CE...	-17.731	-65.431	24	6.6	NULL	11
7	1998	5	3	23	30	21.9	2280	NULL TAIWAN	22.306	125.308	33	7.5	NULL	NU...
8	2000	5	7	23	10	54.1	NULL	NULL TURKEY: DO...	38.164	38.777	5	4.1	NULL	NU...
9	2000	5	4	4	21	16.2	2338	NULL INDONESIA: ...	-1.105	123.573	26	7.6	NULL	4
10	2000	4	5	4	36	58.8	2922	NULL GREECE: CRE...	34.22	25.69	38	5.5	NULL	NU...
11	2000	3	28	11	0	22.5	NULL	NULL JAPAN: VOL...	22.338	143.73	127	7.6	NULL	NU...
12	2000	2	7	19	34	57	NULL	NULL SOUTH AFRIC...	-26.288	30.888	5	4.5	NULL	NU...
13	2000	2	2	22	58	1.5	NULL	NULL IRAN: BARD...	35.288	58.218	33	5.3	NULL	NU...
14	2000	1	14	23	37	7.8	NULL	NULL CHINA: YUN...	25.607	101.063	33	5.9	NULL	NU...
15	2000	1	11	23	43	56.4	NULL	NULL CHINA: IAO...	40.498	122.994	10	5.1	NULL	NU...
16	2000	1	3	22	34	12.6	NULL	NULL INDIA: BANG...	22.132	92.771	33	4.6	NULL	NU...
17	1999	12	22	17	36	56.2	NULL	NULL ALGERIA: NO...	35.321	-1.281	10	5.6	7	2
18	1999	12	21	14	14	57.6	NULL	NULL INDONESIA: ...	-6.845	105.555	56	6.5	NULL	NU...
19	1999	12	11	18	3	36.4	NULL	NULL PHILIPPINES: ...	15.766	119.74	33	7.3	7	NU...
20	1999	12	3	17	6	54.7	NULL	NULL TURKEY: GO...	40.358	42.346	19	5.7	NULL	NU...
21	1999	11	29	4	10	40.9	NULL	NULL CHINA: NOR...	40.459	122.889	10	5	NULL	NU...
22	1999	11	26	13	21	15.5	2339	NULL VANUATU ISL...	-16.423	168.214	33	7.5	NULL	NU...
23	1999	11	26	4	27	24.7	NULL	NULL IRAN: GORG...	36.92	54.9	33	5.3	NULL	NU...
24	1999	11	24	16	40	21.2	NULL	NULL CHINA: YUN...	24.589	102.872	33	4.6	NULL	NU...

Step V:

Processing → Toolbox → Vector Geometry → Remove null geometries input layer [earthquakes_2021_11_25_14_31_59_+0530]

Also remove empty geometries

Open output file after running algorithm → Run → Close.

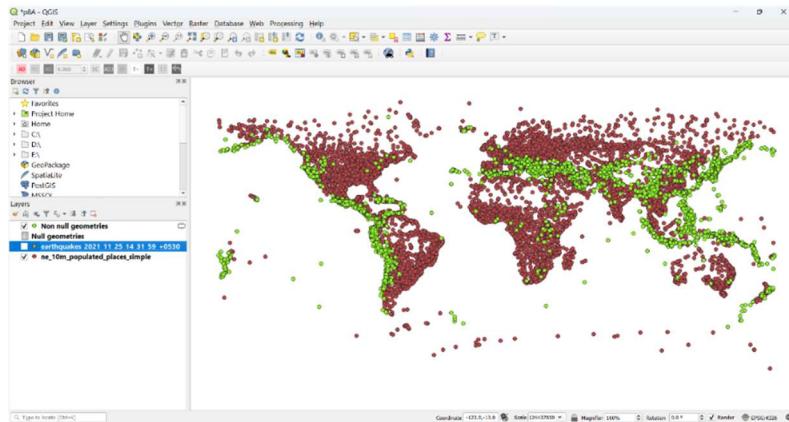


Step VI:

Disselect earthquake_2021_11_25_14_31_59_+0530 from layer panel.

Step VII:

Right click on not null geometries → properties → symbology -> color: [Green]



Step VIII:

Right click on not null geometries → open attribute table (check for latitude & longitude columns are filled with values)

	Year	Mo	Dy	Hr	Mn	Sec	Tsu	Vol	Location Name	Latitude	Longitude	Local Depth (km)	Mag	MMI Int	Deaths
1	1900	1	10	NULL	NULL	NULL	5459	NULL	INDONESIA: ...	-0.03000	127.25000	NULL	NULL	NULL	NULL
2	1900	1	11	9	7	0.00000	NULL	NULL	JAPAN: SEA ...	36.50000	133.50000	NULL	7.80000	NULL	NULL
3	1900	1	14	NULL	NULL	NULL	NULL	NULL	INDONESIA: ...	-6.84000	106.96000	NULL	NULL	7	NULL
4	1900	1	20	6	33	30.00000	NULL	NULL	MEXICO	20.00000	-105.00000	10	7.40000	NULL	NULL
5	1900	5	16	20	12	0.00000	NULL	NULL	MEXICO: NE...	20.00000	-105.00000	60	7.80000	NULL	NULL
6	1900	6	7	22	NULL	0.00000	NULL	NULL	VENEZUELA: ...	10.30000	-63.30000	NULL	NULL	NULL	NULL
7	1900	6	21	20	52	NULL	NULL	NULL	COSTA RICA	10.00000	-85.50000	60	7.50000	NULL	NULL
8	1900	7	12	6	25	0.00000	NULL	NULL	TURKEY: KAR...	40.30000	43.10000	NULL	5.90000	8	14
9	1900	7	29	6	59	NULL	NULL	NULL	SOLOMON IS...	-10.00000	165.00000	33	7.60000	NULL	NULL
10	1900	8	11	4	40	0.00000	2812	NULL	ALASKA: SE...	58.60000	-137.50000	NULL	NULL	NULL	NULL
11	1900	9	10	21	30	NULL	1272	NULL	PAPUA NEW...	-4.00000	152.00000	NULL	6.80000	NULL	NULL
12	1900	9	17	21	45	NULL	1274	NULL	PAPUA NEW...	-5.00000	148.00000	NULL	7.10000	NULL	NULL
13	1900	9	18	NULL	NULL	NULL	NULL	NULL	COLOMBIA	4.60000	-74.00000	NULL	7.90000	NULL	NULL
14	1900	10	7	21	4	NULL	1275	NULL	INDONESIA: ...	-4.00000	140.00000	33	6.90000	NULL	NULL
15	1900	10	9	12	25	NULL	NULL	NULL	ALASKA: KO...	57.09000	-153.48000	NULL	8.30000	8	NULL
16	1900	10	29	9	11	0.00000	1276	NULL	VENEZUELA: ...	11.00000	-66.00000	NULL	7.70000	10	1
17	1900	12	25	5	9	0.00000	NULL	NULL	RUSSIA: KUR...	43.00000	146.00000	40	7.90000	9	NULL
18	1901	1	7	0	29	0.00000	NULL	NULL	ECUADOR: E...	-2.00000	-82.00000	25	7.80000	NULL	NULL
19	1901	2	15	NULL	NULL	NULL	NULL	NULL	CHINA: YUN...	26.00000	100.10000	NULL	6.00000	8	NULL
20	1901	3	3	7	45	NULL	1277	NULL	CALIFORNIA: ...	36.00000	-120.50000	NULL	6.40000	8	NULL
21	1901	3	31	7	11	NULL	NULL	NULL	BULGARIA: B...	43.40000	28.70000	NULL	6.40000	8	NULL
22	1901	3	31	7	12	NULL	3725	NULL	BULGARIA: B...	43.40000	28.50000	NULL	7.20000	10	NULL
23	1901	4	5	22	30	0.00000	NULL	NULL	RUSSIA: KUR...	45.00000	148.00000	30	7.50000	NULL	NULL
24	1901	6	15	NULL	NULL	0.00000	1278	NULL	IWATE: JAPAN	39.00000	143.00000	33	NULL	NULL	NULL

Step IX:

Processing → toolbox → vector Analysis → Distance to nearest hub(line to hub)

Source points layer:- [not null geometries EPSG:4326]

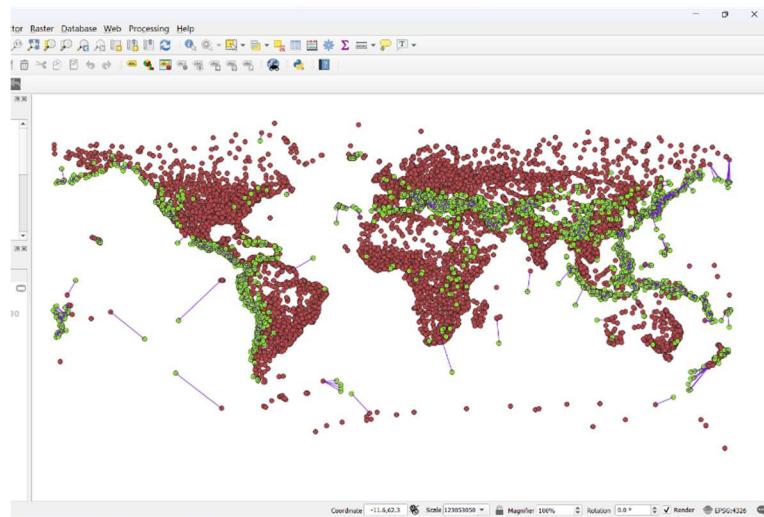
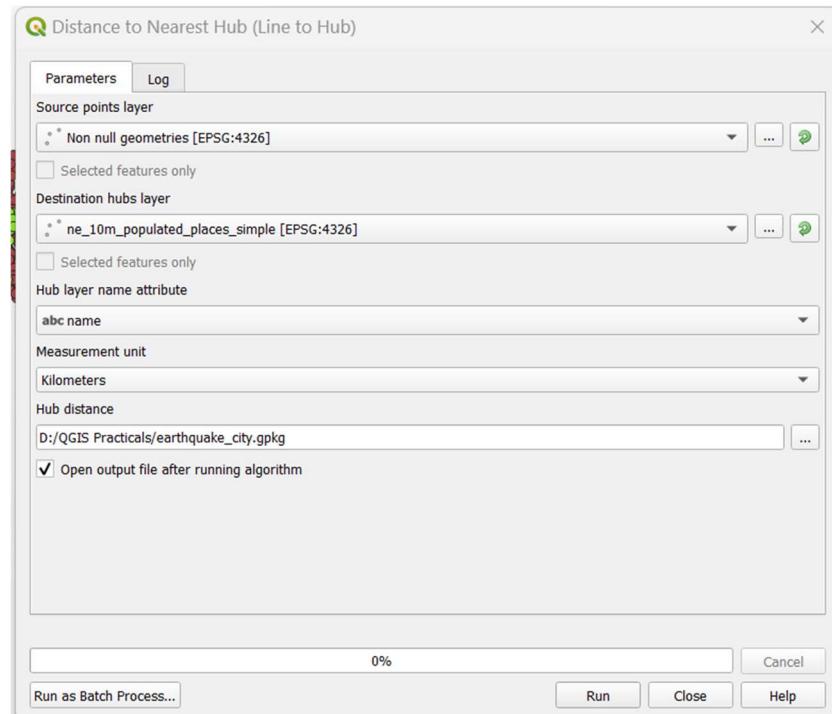
Destination -- layer:- ne_10m_population_place_simple [EPSG:4326]

Hub layer name attribute:- [abc name]

Measurement unit: [kilometer]

Hub distance[Save to file] → earthquake_city.gpkg

Open output file after running → Run → close



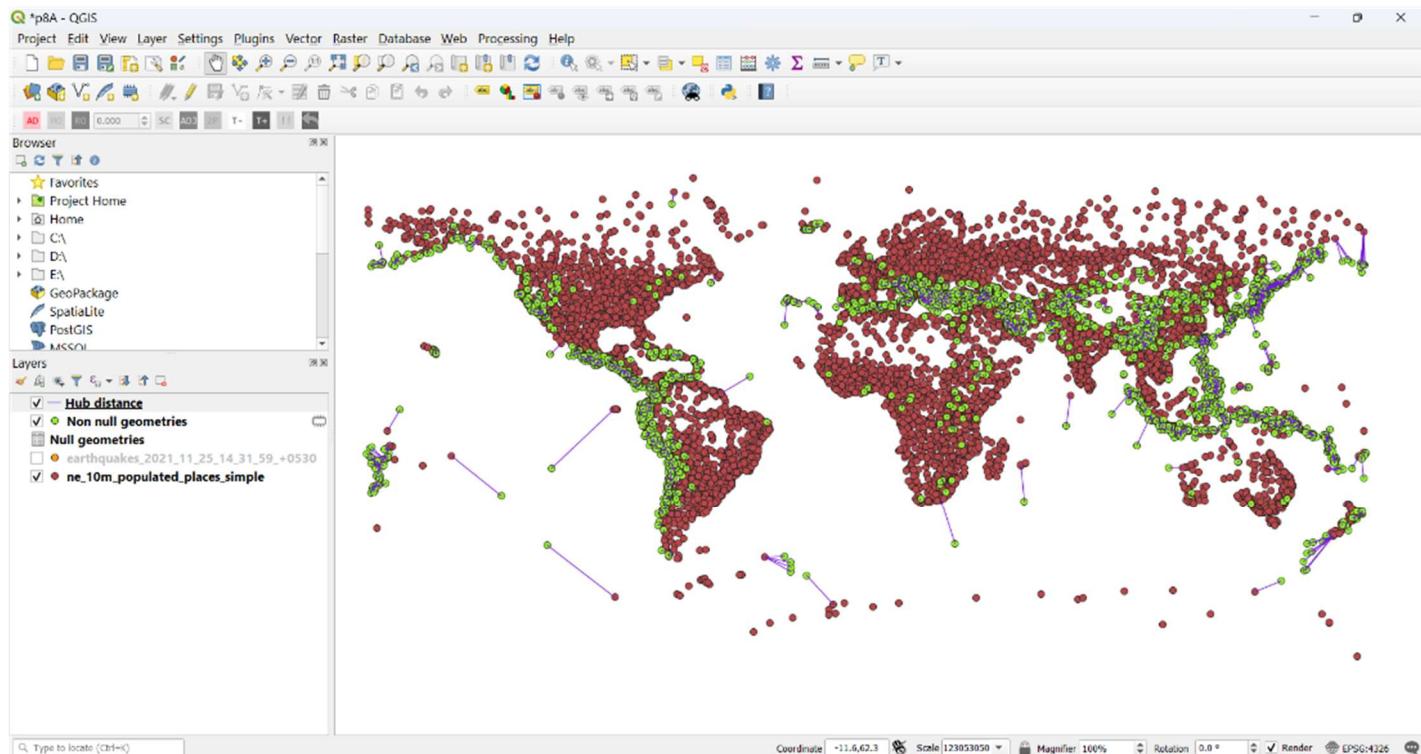
(red dots → populated place, green dots → earthquake , lines → connection between earthquake & populated place & populated place)

Step X:

Right click on Hub distance → open attribute table (Check for Hub_name, HubDist, columns we have added with these two extra columns.

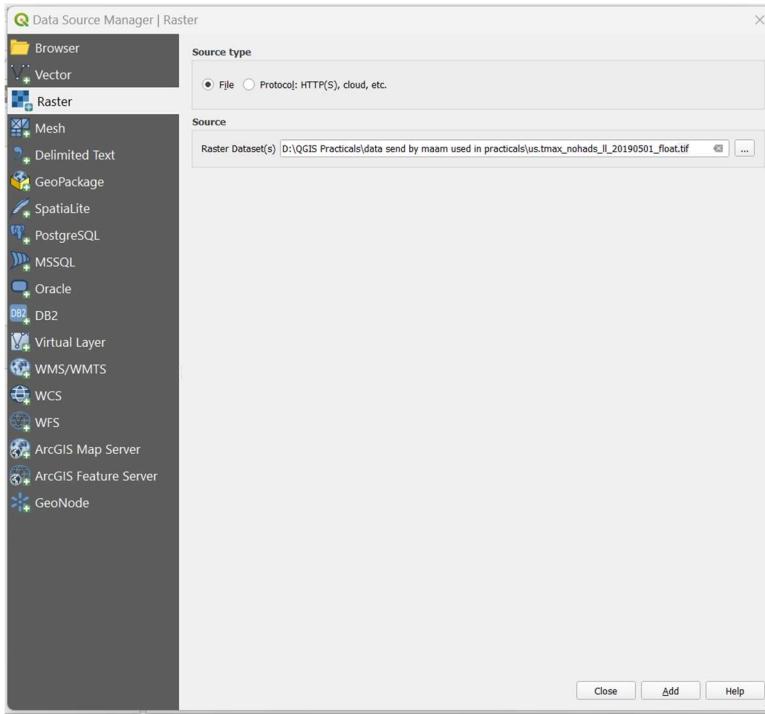
	Damage	Total Deaths	Al Death	Descrip.	Total Missing	I Missing	Descrip.	Total Injuri	I Injuries	Descrip.	tal Damage (\$M)	Damag	Houses Destr	Houses Destr	Damages	Damaged	HubName	HubDist
1	2	NULL	NULL	NULL	NULL	NULL	NULL	NULL	1	NULL	NULL	100	2	İlam	88.074319108..			
2	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	2	700	3	NULL	NULL	Küküs	17.924221375..			
3	NULL	1	1	NULL	NULL	17	1	2	NULL	3	NULL	NULL	Çeçak	40.745684930..				
4	2	1	1	NULL	NULL	NULL	NULL	1	38	1	62	2	Bitar	32.085073556..				
5	4	3	1	NULL	NULL	7	1	3	3600	4	18771	4	Şachte	137.21478946..				
6	3	3	1	NULL	NULL	40	1	2	NULL	NULL	NULL	2	Chone	35.377571067..				
7	NULL	1636	4	NULL	NULL	1000	3	3	NULL	3	NULL	NULL	Wewak	135.26968539..				
8	1	NULL	NULL	NULL	NULL	NULL	NULL	12	3	12	1	NULL	NULL	Sellos	12.809671741..			
9	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	Bengkulu	122.5214500..				
10	1	NULL	NULL	NULL	NULL	1	1	20	3	11	1	19	1	Selfoss	25.259748816..			
11	NULL	2	1	NULL	NULL	36	1	1	NULL	NULL	NULL	NULL	NULL	Huâlien	41.42460991..			
12	3	1	1	NULL	NULL	NULL	NULL	2	NULL	NULL	600	3	Bengkulu	98.506322478..				
13	2	NULL	NULL	NULL	NULL	NULL	NULL	2	1	NULL	2	NULL	NULL	Myitkyina	166.50377293..			
14	NULL	2	1	NULL	NULL	80	2	3	NULL	NULL	4600	4	Çanakk	54.050514131..				
15	NULL	103	3	NULL	NULL	2174	4	6	3	NULL	NULL	NULL	NULL	Bengkulu	103.84602974..			
16	NULL	3	1	NULL	NULL	13	1	1	NULL	NULL	NULL	NULL	NULL	Taichung	39.035415310..			
17	NULL	NULL	NULL	NULL	NULL	1	1	2	NULL	NULL	200	3	Malatya	47.617058954..				
18	NULL	46	1	NULL	NULL	264	3	30	4	10000	4	NULL	NULL	Luwut	89.046338993..			
19	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	Siti	115.02236409..				
20	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	Capitol Hill	817.07423185..				
21	NULL	NULL	NULL	NULL	NULL	1	1	1	NULL	NULL	NULL	NULL	MBabane	24.703902457..				
22	2	1	1	NULL	NULL	15	1	2	100	2	300	3	Kashmar	24.318767752..				
23	NULL	7	1	NULL	NULL	2528	4	73.5	4	41000	4	NULL	NULL	Chuxiong	79.724728787..			
24	4	NULL	NULL	NULL	NULL	30	1	3	3600	4	8800	4	Anshan	68.898161535..				
1																		

Output:-

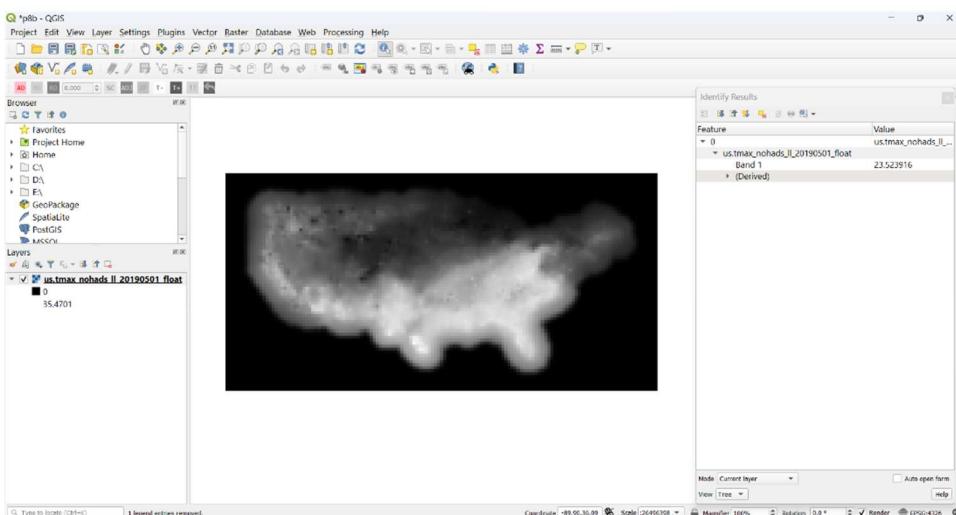


(B):- Sampling Raster Data using Points & Polygon.

Step I: Layer → Add Layer - Add Raster layer →us.tmax_noahds-II-20140525-float.tif



Step II: Click on [i] from the menu bar ,check coordinates. It keeps changing while moving the cursor



Step III: Layer - Add Layer - Add Delimited text Layer

Layer name /2018-Gaz_ua_national)

Encoding [-UTF-8

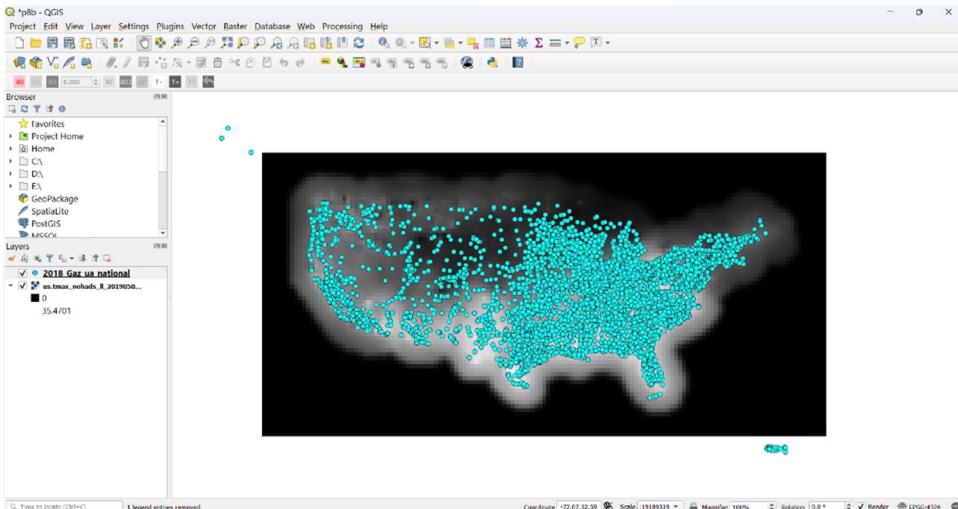
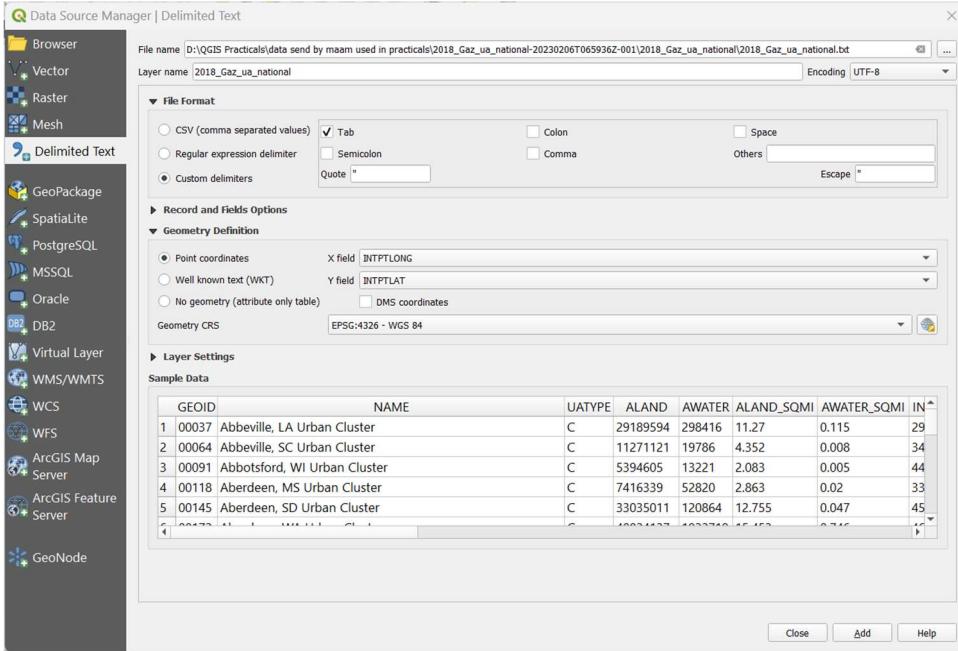
Custom delimiters [v] Tab

Point coordinates x field Longitude

y field Latitude

CRS :-EPSG 4326 WGS 84

Add -> Close

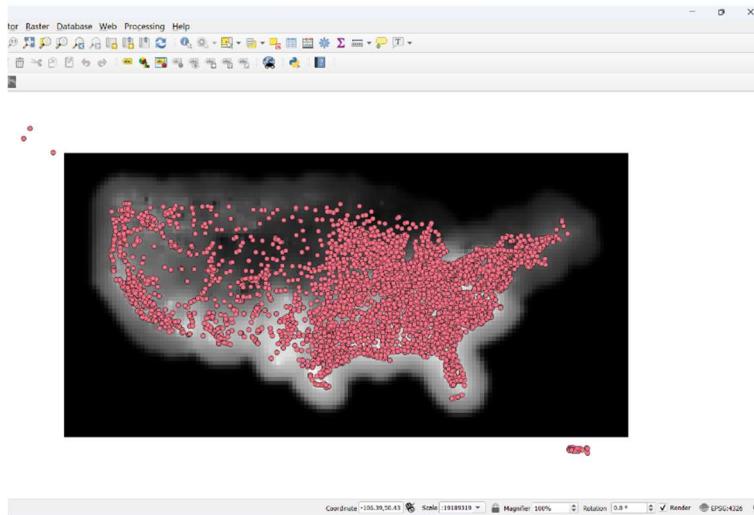
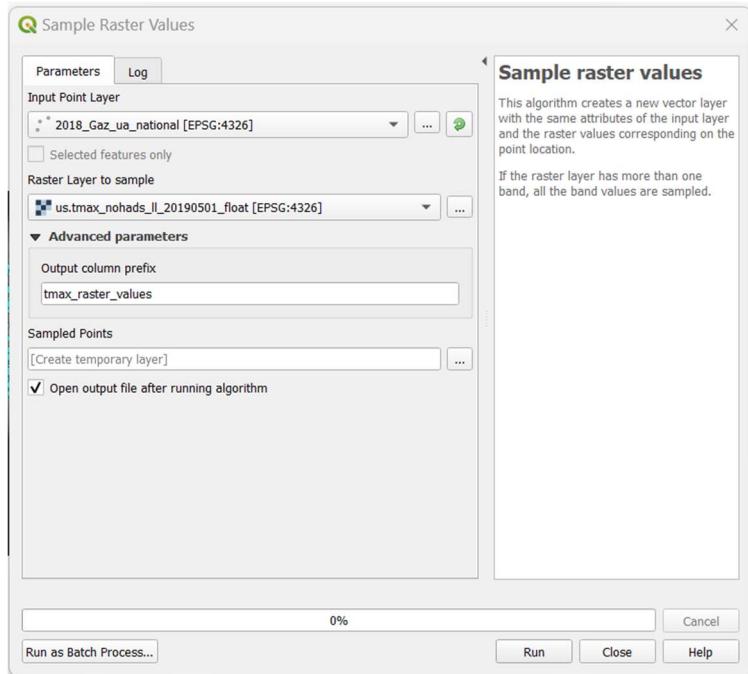


Step IV: Processing → tool box → Raster Analyse -> Sample raster values.

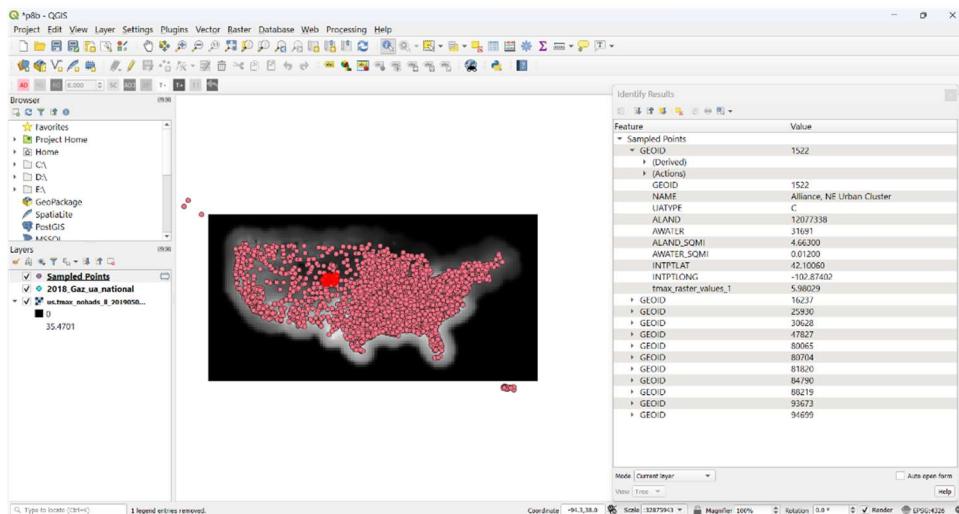
Input layer [2018 Gaz-ua-national [EPSG:4326]

Raster layer [us-tmax-nohads-II-20140525-float [EPSG:4326]

Output column prefix `tmax_`, tick the option - output file after running algorithm. Run->Close



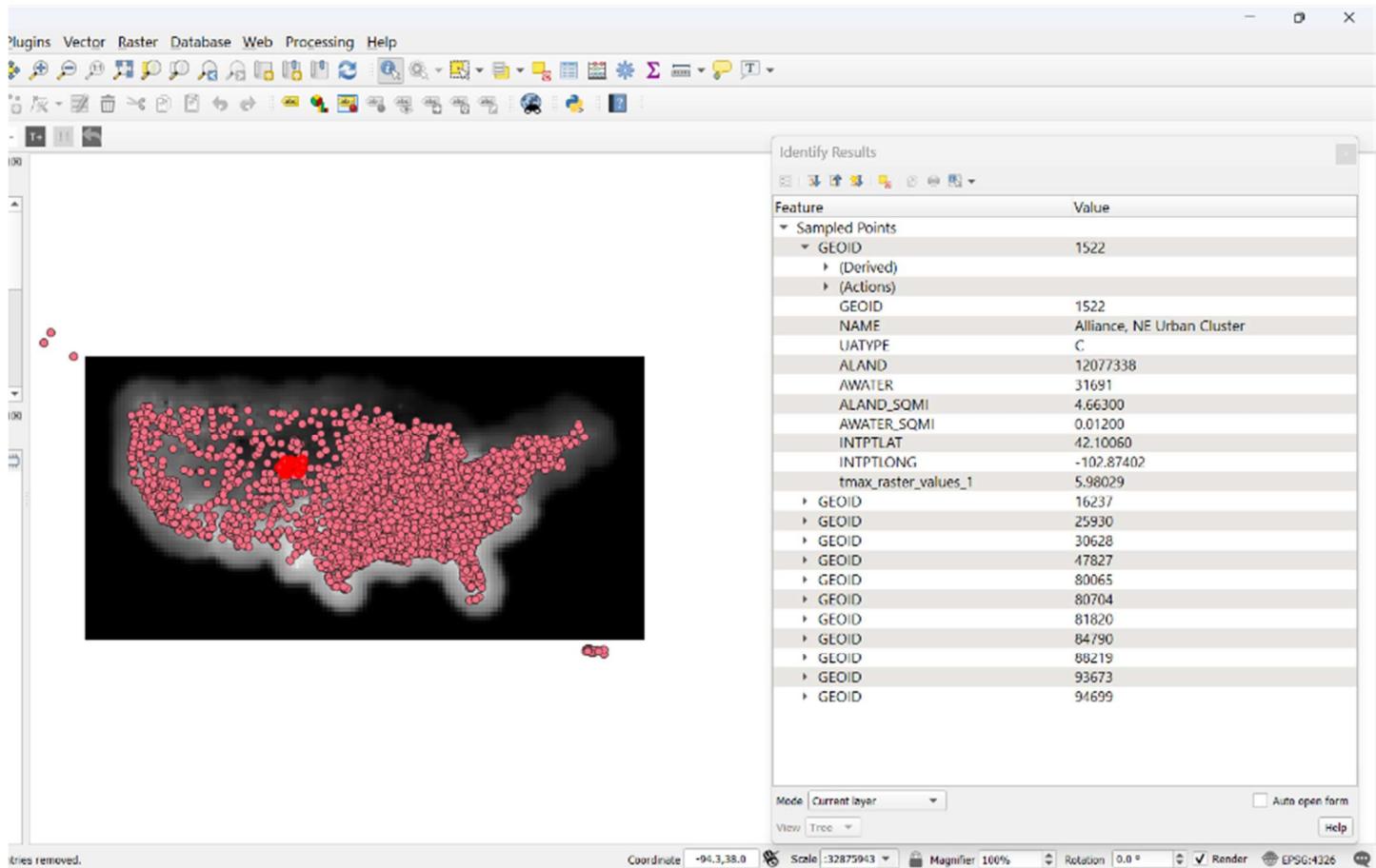
Step V: select [i] from menubar -> click on the window (we can see tmax values right side of identify result)



Step VI: Right-click on Sampled points -> Open attribute table (We can see tmax column which we added)

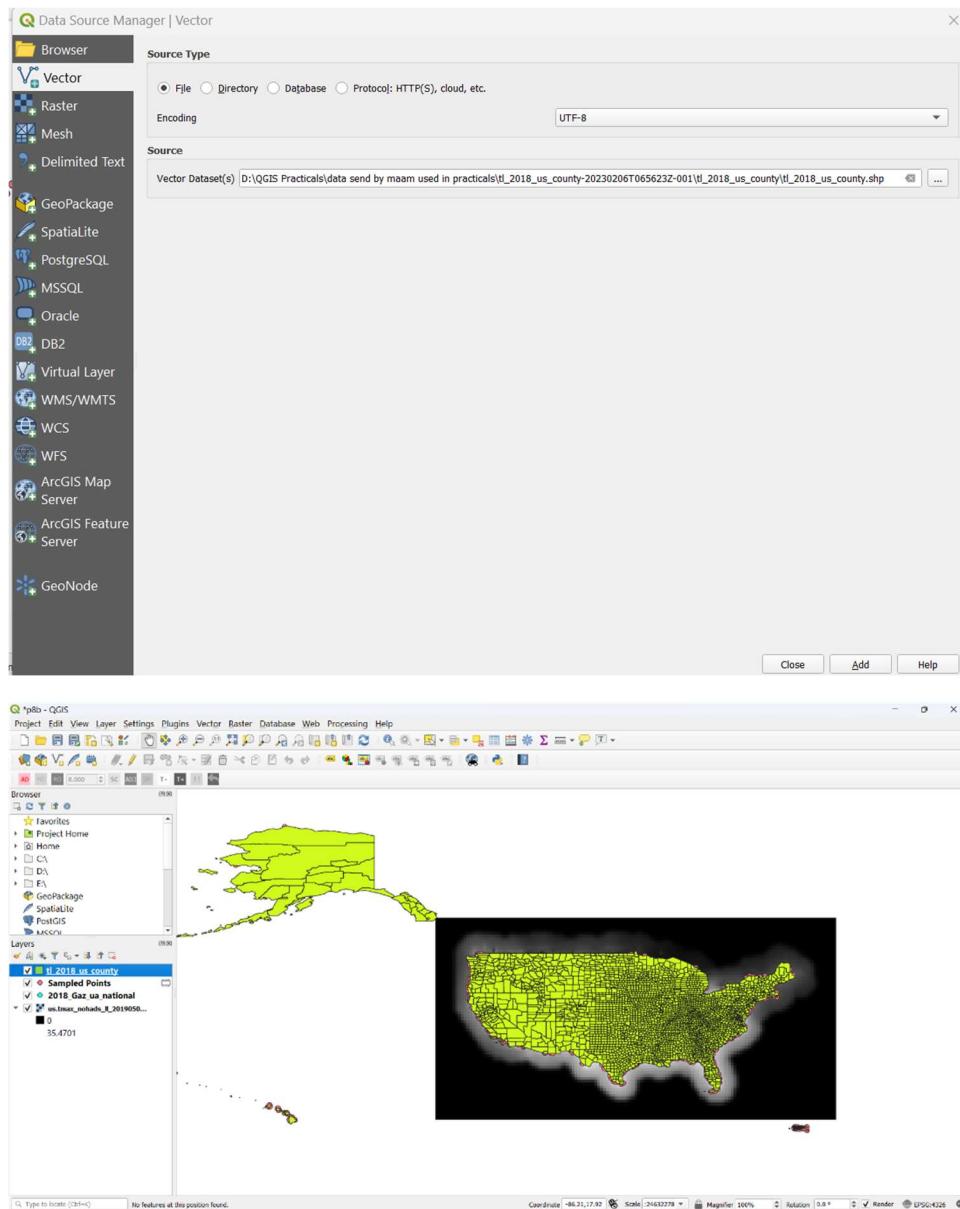
	GEOID	NAME	UATYPE	ALAND	AWATER	ALAND_SQMI	AWATER_SQMI	INTPTLAT	INTPTLONG	tmax_raster_values_1
1	48718	Lebanon, VA ...	C	7889940	1220	3.04600	0.00000	36.90397	-82.07038	28.70032
2	48826	Lee's Summit, ...	U	107171072	4159662	41.37900	1.60600	38.89813	-94.37569	18.00171
3	48853	Leesville, LA ...	C	16141329	56067	6.23200	0.02200	31.13991	-93.26874	30.07346
4	48785	Leesburg, GA...	C	9507396	143776	3.67100	0.05600	31.73769	-84.17249	30.69537
5	48799	Leesburg--Eu...	U	244989796	25493327	94.59100	9.84300	28.81459	-81.77386	31.01291
6	48988	Le Mars, IA U...	C	10216275	0	3.94500	0.00000	42.78458	-96.16721	8.48125
7	49042	Lemoore Stat...	C	5493922	0	2.12100	0.00000	36.26249	-119.88923	24.04088
8	48934	Leitchfield, KY ...	C	13738833	32465	5.30500	0.01300	37.49010	-86.25924	28.01565
9	48961	Leland, MS U...	C	4864828	130595	1.87800	0.05000	33.40644	-90.89367	27.07627
10	49109	Leonardtown,...	C	15369048	1094469	5.93400	0.42300	38.28847	-76.64739	21.51827
11	49123	Le Roy, IL Urb...	C	4046708	25498	1.56200	0.01000	40.34316	-88.76251	21.44502
12	49069	Lena, IL Urba...	C	3550950	0	1.37100	0.00000	42.37985	-89.82695	11.93212
13	49096	Leominster--...	U	168350821	6025187	65.00100	2.32600	42.56886	-71.85116	13.07115
14	48286	Lawrencecebur...	C	23813011	0	9.19400	0.00000	35.24601	-87.33117	27.75151
15	48313	Lawrencecebur...	C	22566840	232605	8.72100	0.09000	39.11811	-84.89992	27.05586
16	48232	Lawrence, KS ...	U	78831403	877772	30.43700	0.33900	38.95580	-95.25964	16.19002
17	48259	Lawrencecebur...	C	1832062	106488	7.07400	0.04100	38.04320	-84.90619	28.11932
18	48394	Lawton, OK U...	U	114170107	0	44.08100	0.00000	34.61835	-98.41647	26.66311
19	48421	Lead, SD Urb...	C	5600315	0	2.16200	0.00000	44.35823	-103.75351	4.51837
20	48340	Lawrenceville...	C	14097025	102518	5.44300	0.04000	38.73165	-87.67886	25.07281
21	48367	Lawrenceville...	C	6733550	0	2.60000	0.00000	36.76642	-77.83251	29.73562
22	48485	Leavenworth,...	C	9622032	205956	3.71500	0.08000	47.59155	-120.65974	15.29655
23	48502	Lebanon, IN ...	C	1684612	0	6.51900	0.00000	40.05177	-86.47232	22.19702
24	48448	Leadville, CO ...	C	8643258	0	3.33700	0.00000	39.25013	-106.29331	5.57409

Output:-



Part 2:- Remove Sample & 2013 Gz layer from layer panel so that we can do the second part.

Step I: Layer -> Add layer -> Add vector layer -> tl_2018_us_country.shp -> Add-> ok-> Close



Processing -> toolbox -> Raster analysis ->zonal statistics->

Input layer: - [tl-2018-us-county]

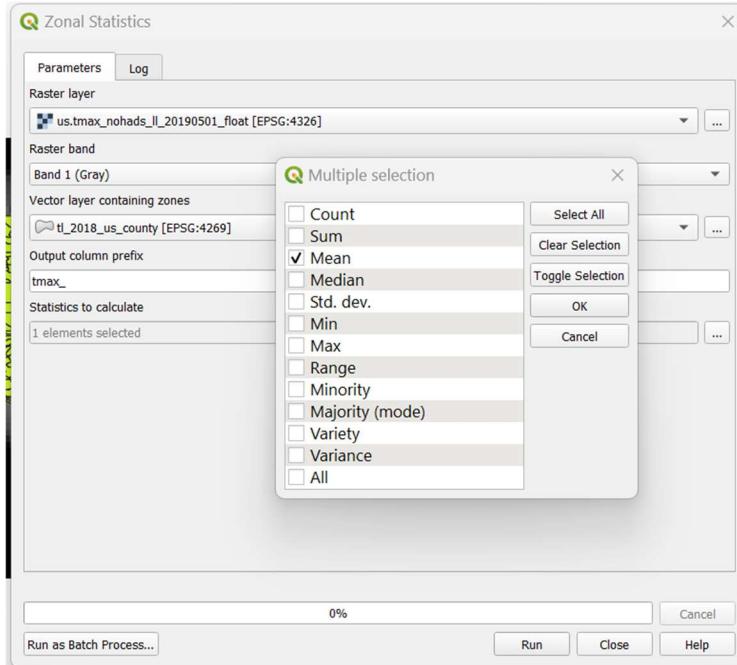
Raster Layer: - us_tmax-hohads_11_20__ [EPSG:4326]

Raster band: -Band 1 (Gray)

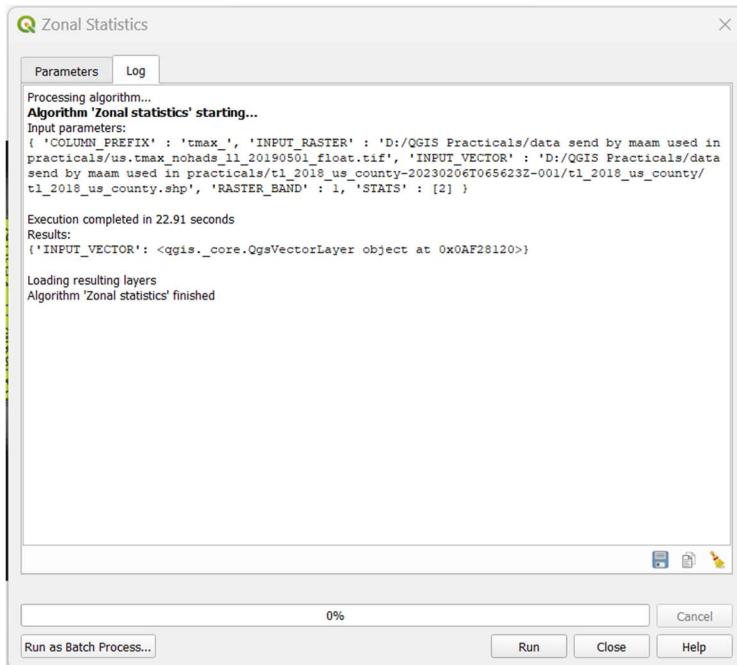
Output column prefix :- `tmax_`

Statistics to calculate [...] click on it

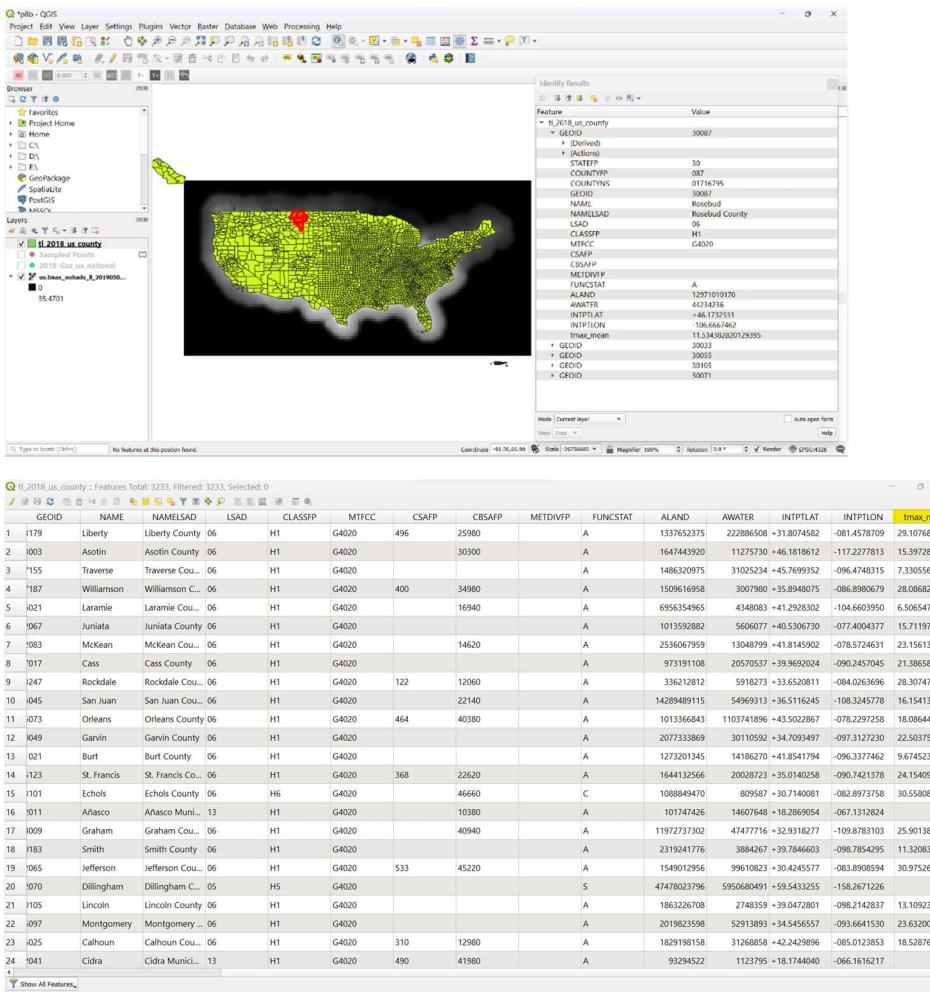
Select only mean -> ok



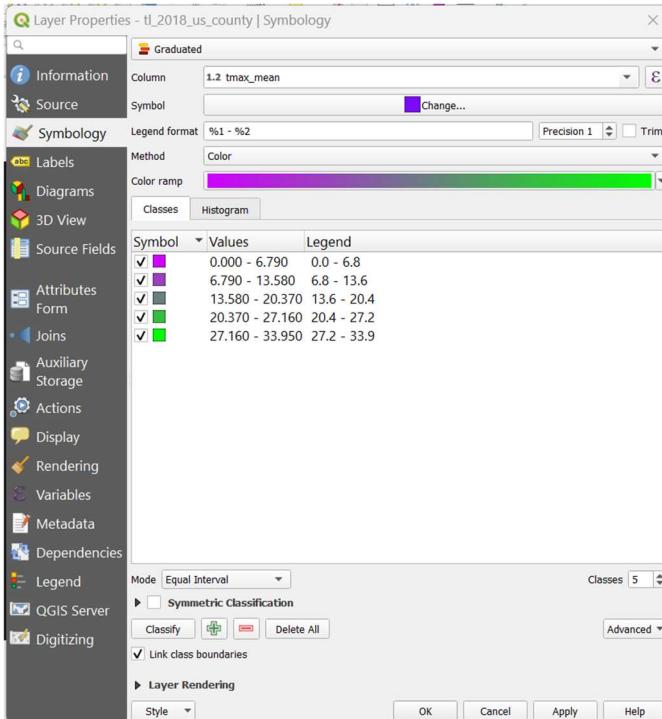
Open output file after running algorithm → run → close.



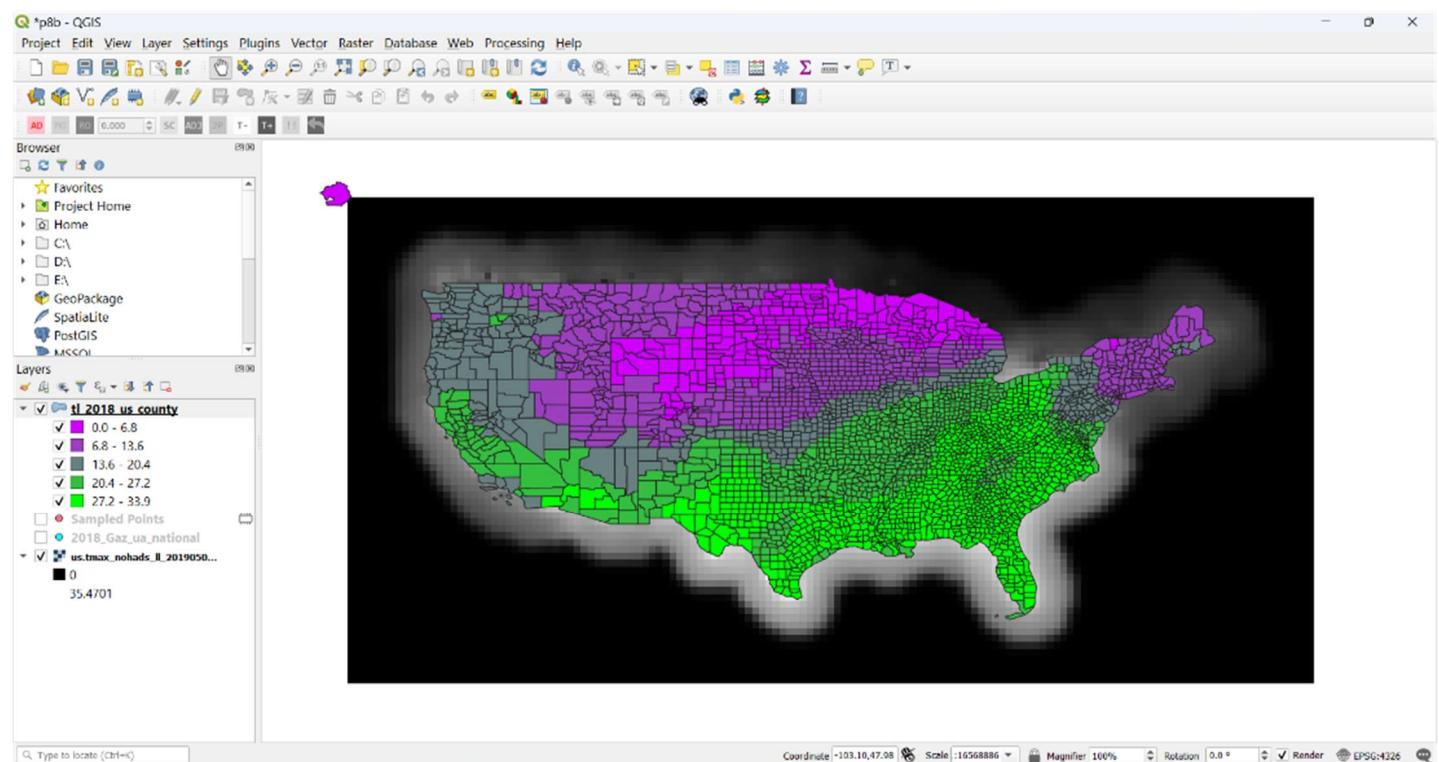
Step II: Select [i] from the menu bar click on the window & check. Open **attribute table & check Column tmax in.**



Step III: Right-click on Zonal Statistics → properties → Symbology → graduated.
Values: tmax-mean, Symbol: purple. Classify → Apply → ok



Output:-



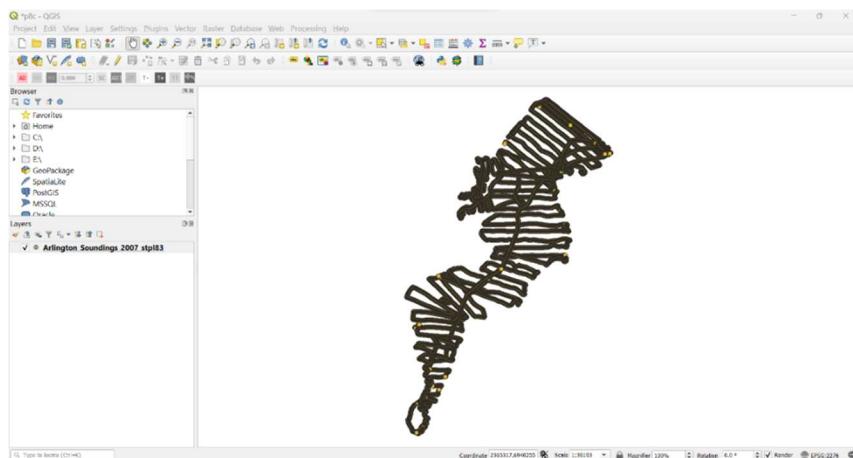
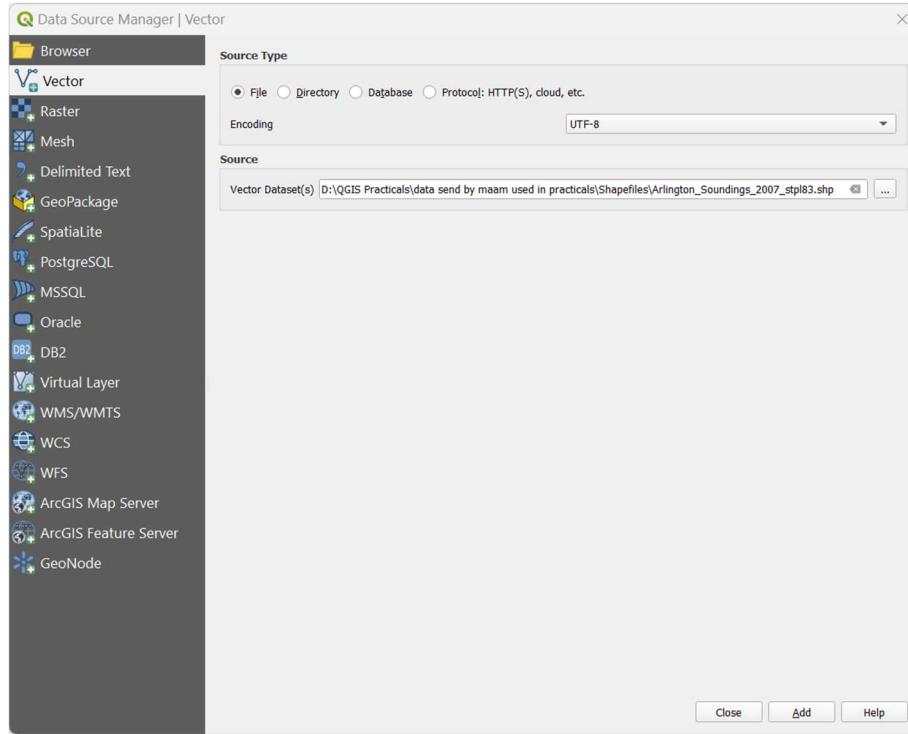
(C) Interpolating Point Data

Interpolation is a commonly used GIS technique to create a continuous surface from discrete points. In QGIS, Interpolation is achieved using the built in Interpolation tools from the processing toolbox.

In this practical we will take field depth measurements for Lake Arlington in Texas. & create an elevation relief map & contours from these measurements

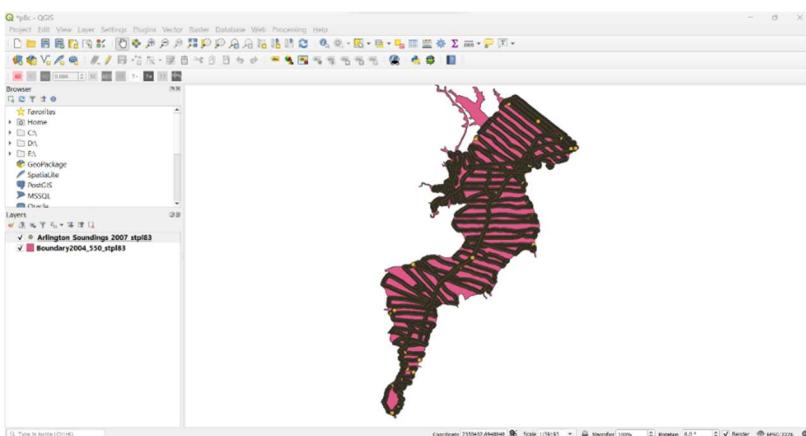
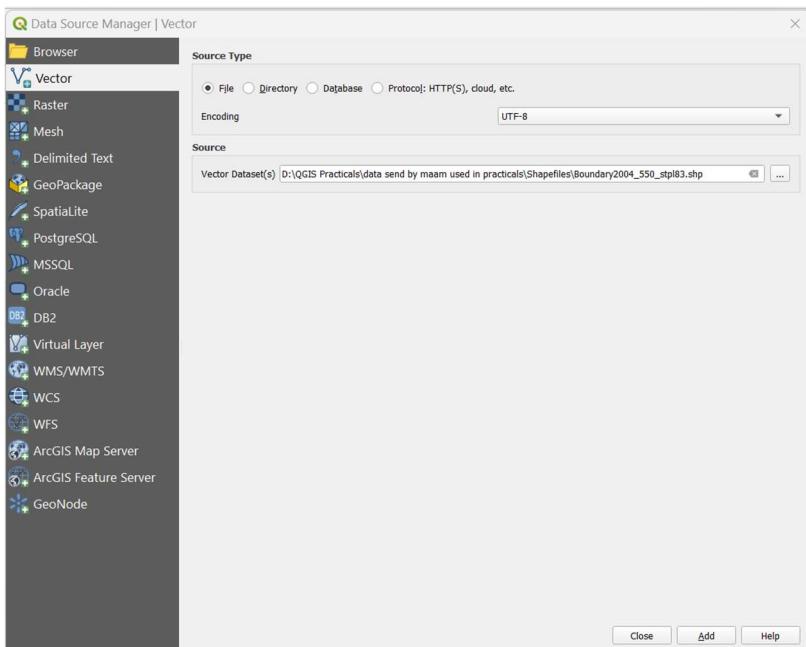
Step I:

Layer → Add Layer → Add Vector Layer → Arlington_Soundings_2007_Stpl83.shp → Add → close.



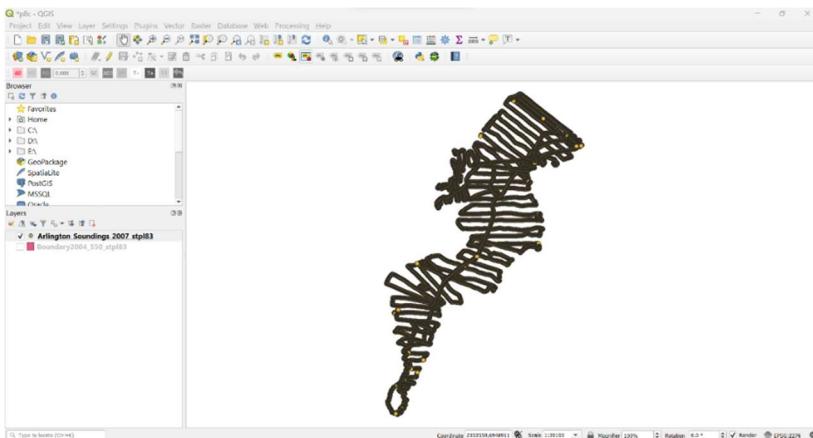
Step II:

Layer → Add Layer → Add Vector Layer → Boundary2004_550_stpl83.shp → Add → Close



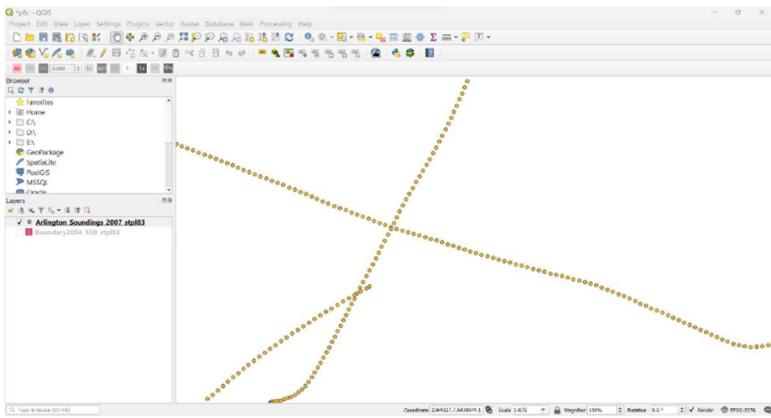
Step III:

Disselect Boundary.shp layer from layer panel



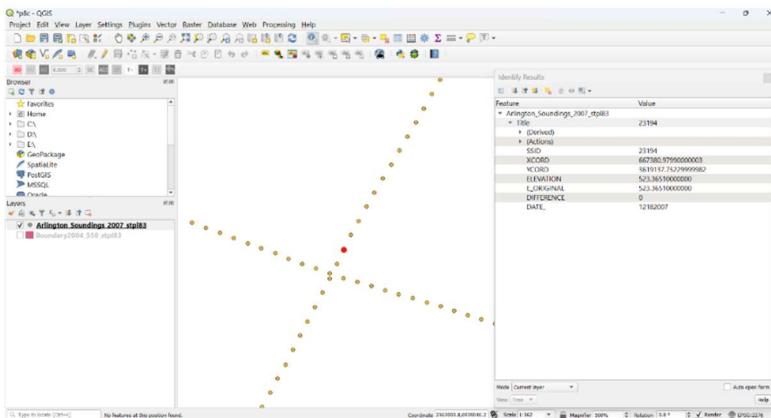
Step IV:

Zoom the window & take the dotted lines



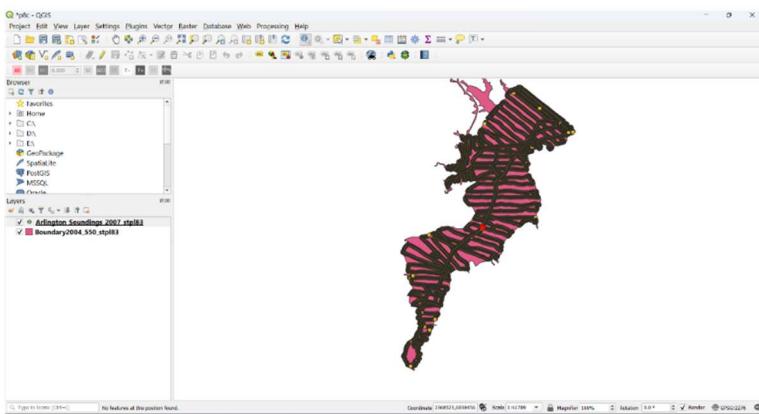
Step V:

Click on identify feature & click on window one dotted.



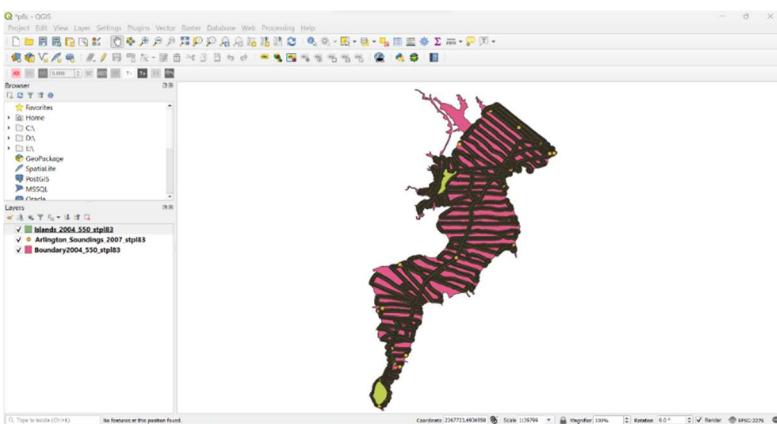
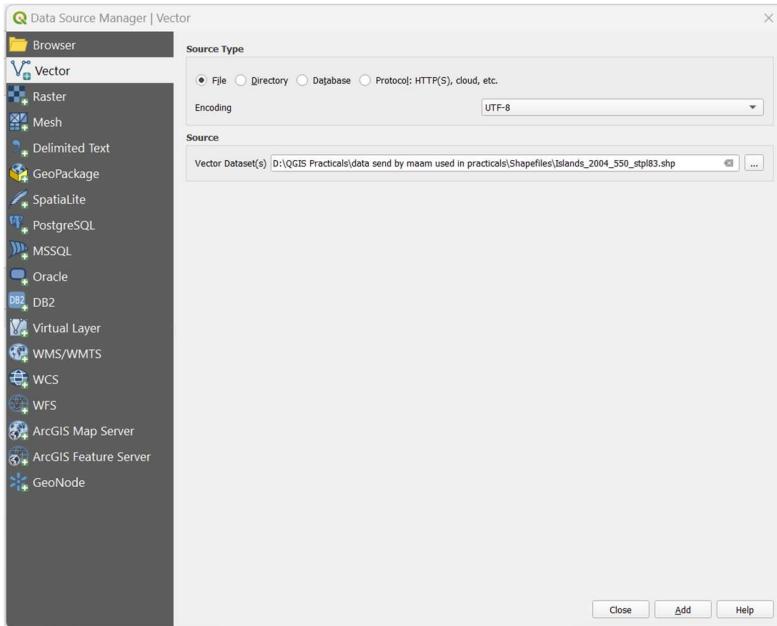
Step VI:

Zoom out click on (hand emoji) will come to original image. & select the boundary.shp



Step VII:

Add layer → Add vector layer → Islands_2004_550_stp183.shp



Processing → ToolBox → Interpolation -> TIN interpolation

Vector layer: Arlington_Soundings_2007_stp183

Interpolation attribute: Elevation

Click on [+] → set Type :- [Points]

Vector layer: Islands_2004_550_stp183

Interpolation attribute: Elevation

Click on [+] → set Type:- [Break lines]

Interpolation method [Linear]

Extent [...] → Calculate from layer → Boundary 2004_550_stp183

Output Raster Data

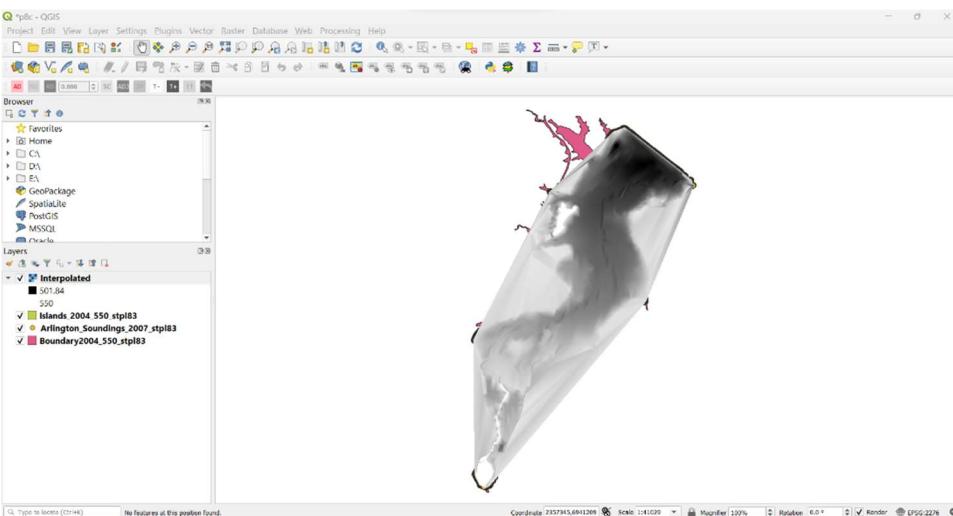
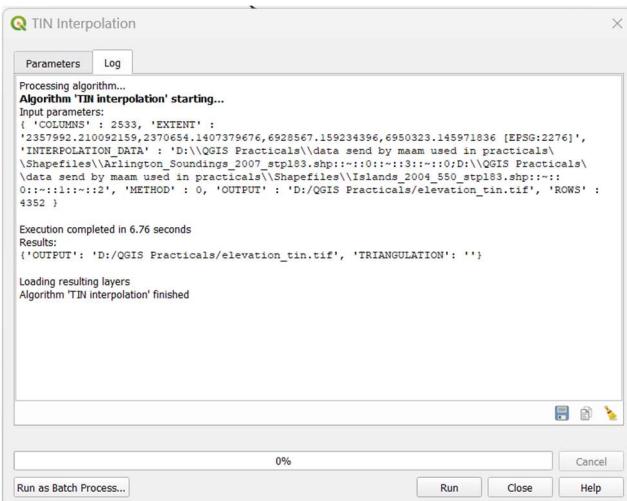
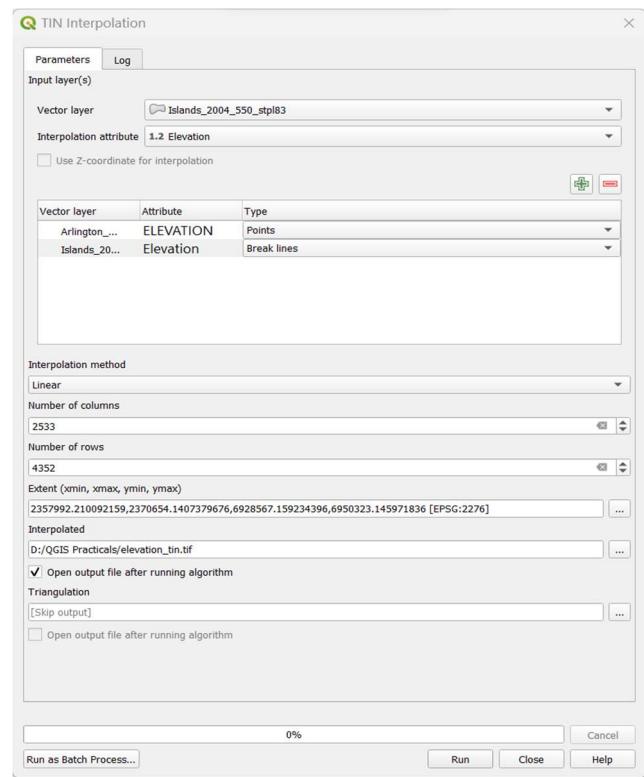
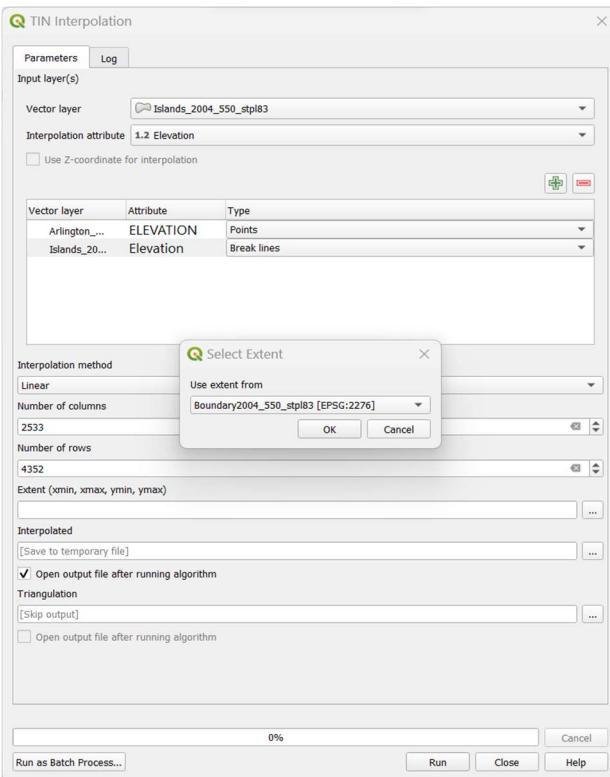
Rows [4352] Columns[2533]

Pixel Size X [5] Pixel Size Y[5]

Interpolated [...] Save to file

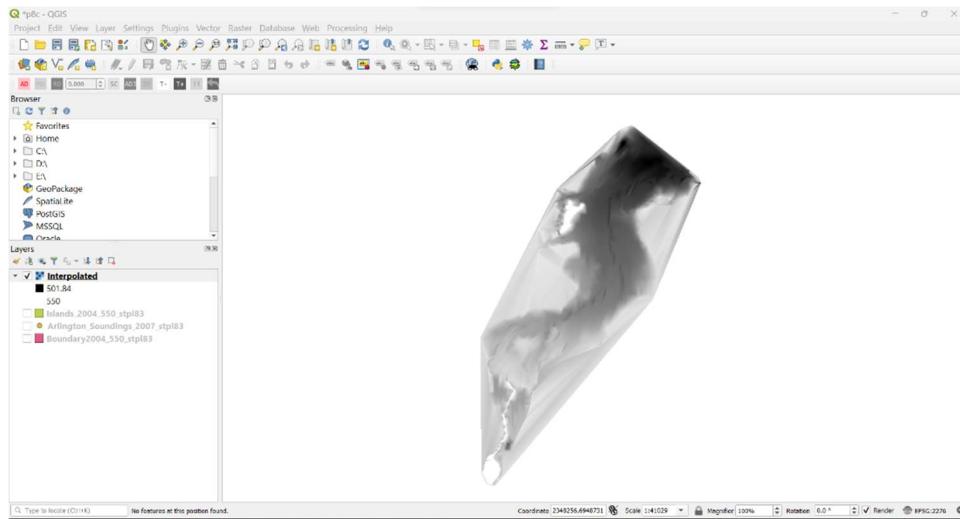
File name [elevation_tin.tif]→ Save

Tic the option:- Open output file after running algorithm → Run → Close



Step VIII:

Disselect all layer. Only keep elevation_tin



Processing → toolbox → GDAL → Raster extraction → clip raster by mask layer

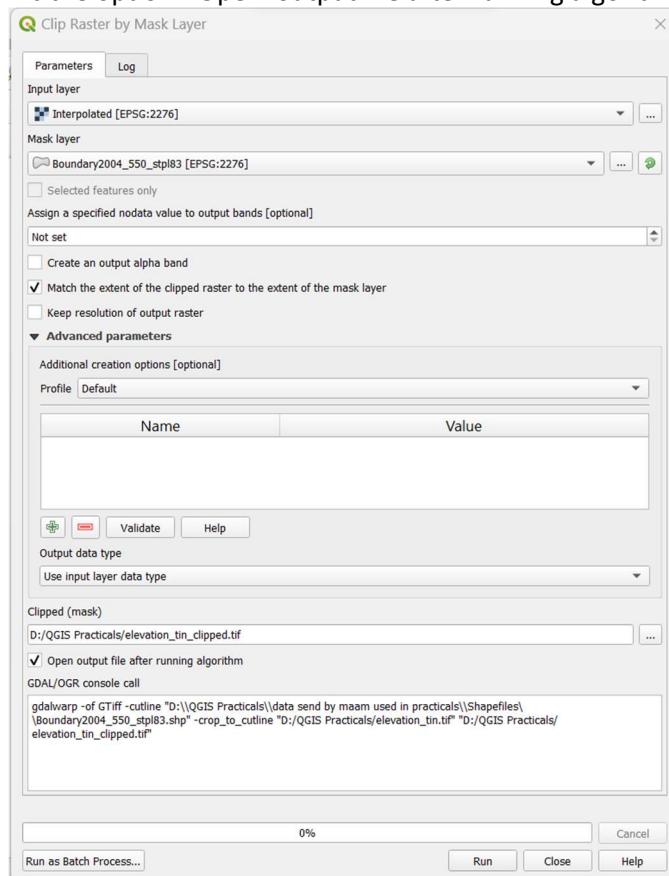
Input layer [Interpolated EPSG:2276]

Mask Layer [Boundary 2004_550_stp183(EPSG:2276)]

Clipped [...] save to file

elevation_tin_clipped.tif

Tic the option:- Open output file after running algorithm → Run → close



```

Processing algorithm...
Algorithm 'Clip raster by mask layer' starting...
Input parameters:
{'ALPHA_BAND': False, 'CROP_TO_CUTLINE': True, 'DATA_TYPE': 0, 'INPUT': 'D:/QGIS Practicals/elevation_tin.tif', 'KEEP_RESOLUTION': False, 'MASK': 'D:\\QGIS Practicals\\data send by maam used in practicals\\Shapefiles\\Boundary2004_550_stpl83.shp', 'NODATA': None, 'OPTIONS': '', 'OUTPUT': 'D:/QGIS Practicals/elevation_tin_clipped.tif'}

GDAL command:
gdalwarp -of GTiff -cutline "D:\\QGIS Practicals\\data send by maam used in practicals\\Shapefiles\\Boundary2004_550_stpl83.shp" -crop_to_cutline "D:/QGIS Practicals/elevation_tin.tif" "D:/QGIS Practicals/elevation_tin_clipped.tif"
GDAL command output:
Creating output file that is 2533P x 4352L.

Processing D:/QGIS Practicals/elevation_tin.tif [1/1] : 0Using internal nodata values (e.g. -9999) for image D:/QGIS Practicals/elevation_tin.tif.

Copying nodata values from source D:/QGIS Practicals/elevation_tin.tif to destination D:/QGIS Practicals/elevation_tin_clipped.tif.

...10...20...30...40...50...60...70...80...90...100 - done.

Execution completed in 6.95 seconds
Results:
{'OUTPUT': <QgsProcessingOutputLayerDefinition ('sink':D:/QGIS Practicals/elevation_tin_clipped.tif, 'createOptions': {'fileEncoding': 'System'})>}

Loading resulting layers
Algorithm 'Clip raster by mask layer' finished

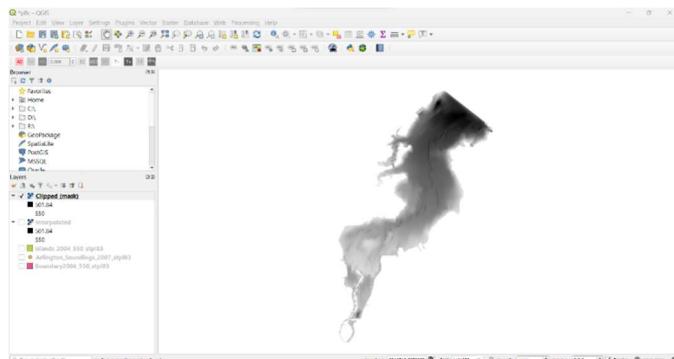
```

Run as Batch Process... 0% Cancel Run Close Help

Step IX:

Disselect the elevation_tin

Only keep elevation_tin_clipped



Step X:

Right click on elevation_tin_clipped → Properties → Symbology

Render type :- Singleband pseudocolor

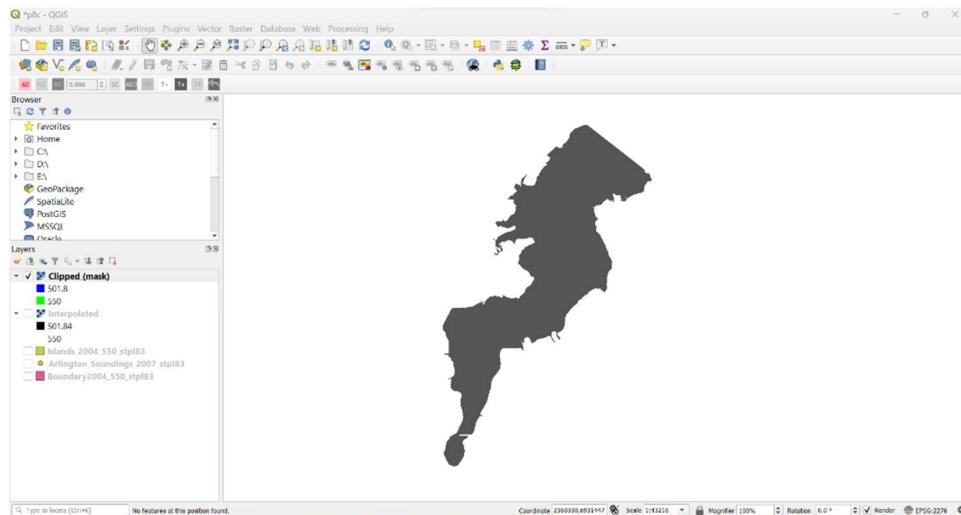
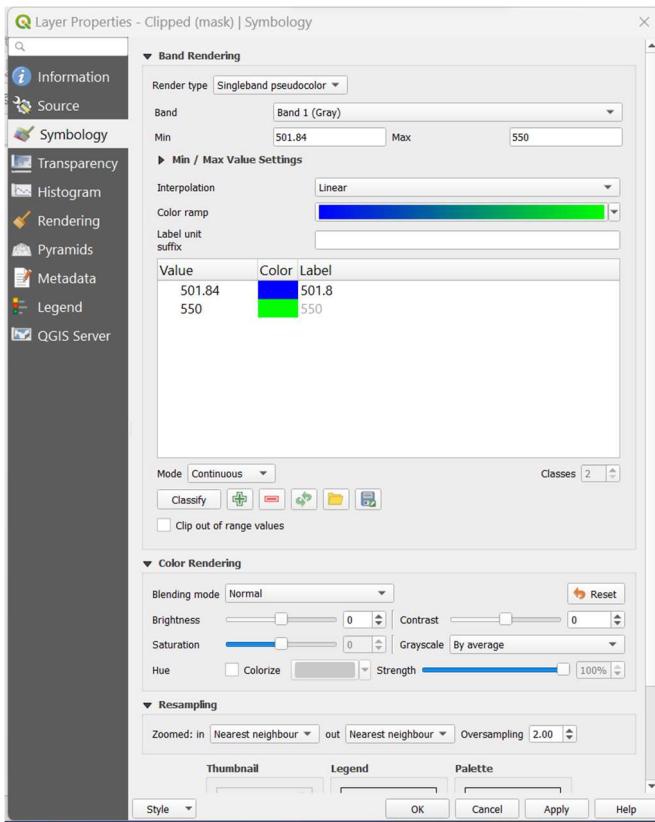
Band Min[501.84] Max[550]

Interpolation[Linear] Label unit static: blank

Color Ramp [Invert color Ramp]

//[maam se puchna padega]Label precision 4

Click on classify → OK



Step XI:

Processing → tool → GDAL -> Raster extraction → contour

Input layer: [clipped (mask)] [EPSG:2276]

Band number: [Band 1 (Gray)]

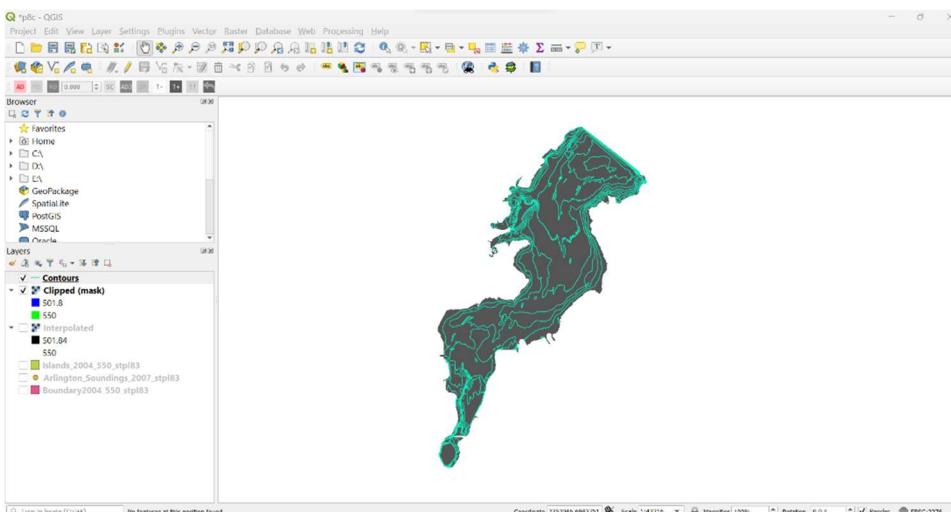
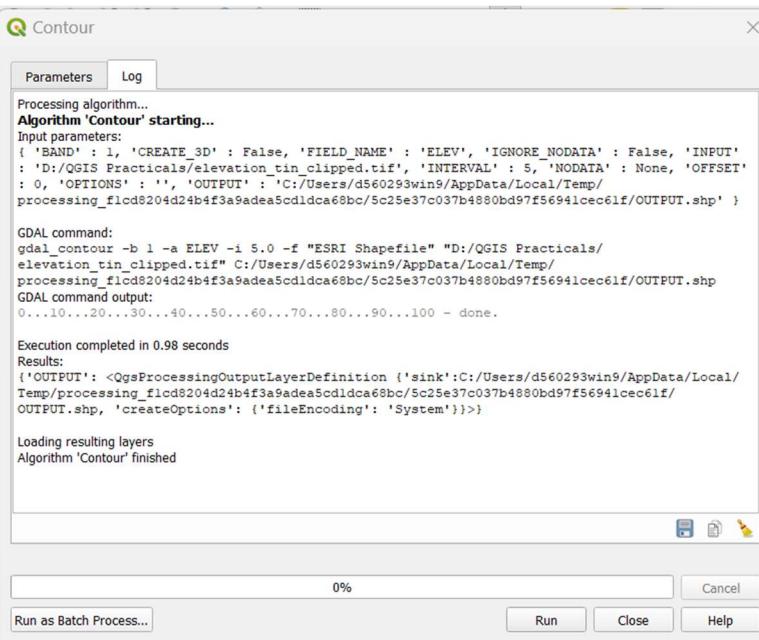
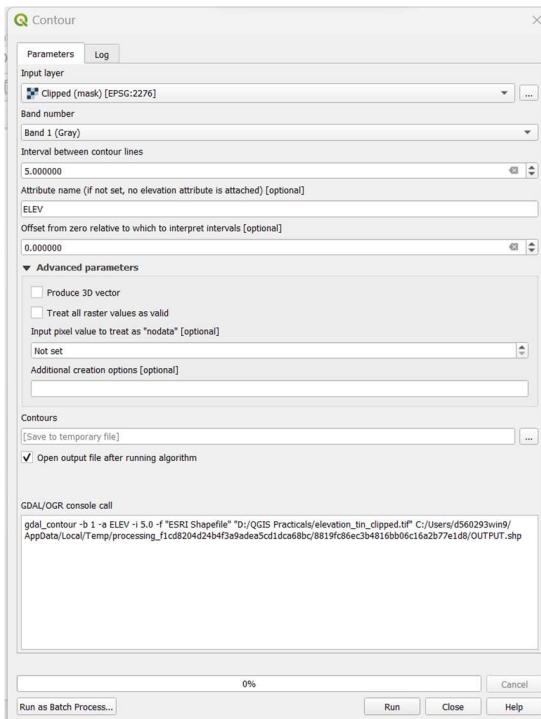
Interval between contour_lines: [5,000,000]

attribute name: [ELEV]

offset from zero 0.000000

Contours[...] save to file → Contour.gpkg

Tic the option :- Open output file ->Run → Close



Step XII:

Right click on contour → properties -> labels → choose single labels

Label with :- value [ELEV]

Select Placement

Mode: [Curved]

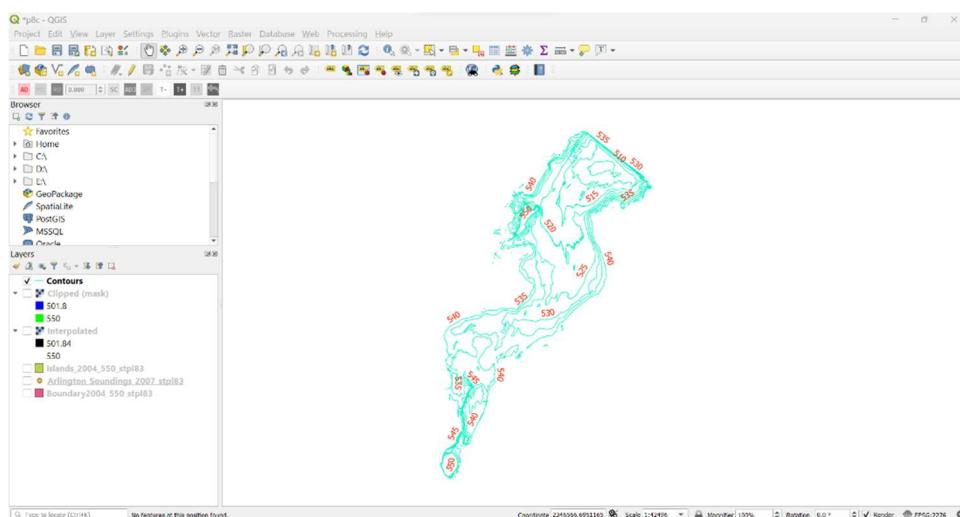
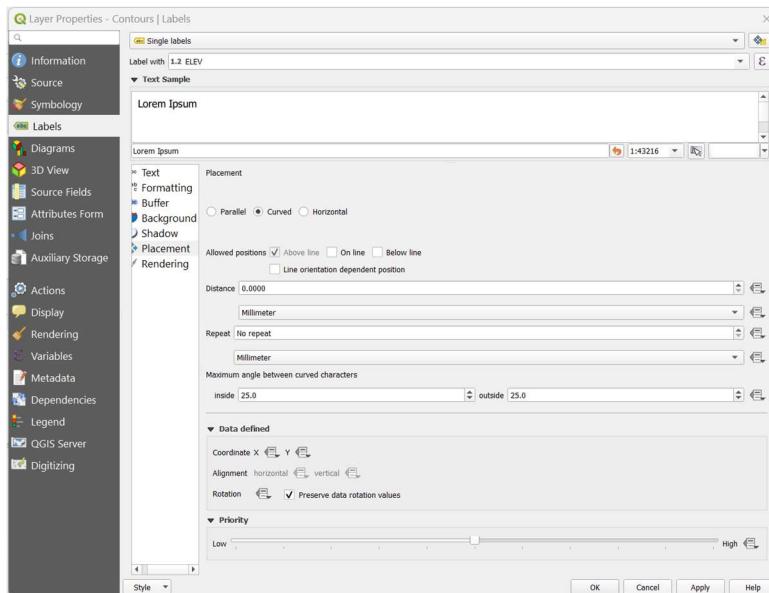
Distance: 0.0000

Millimeter

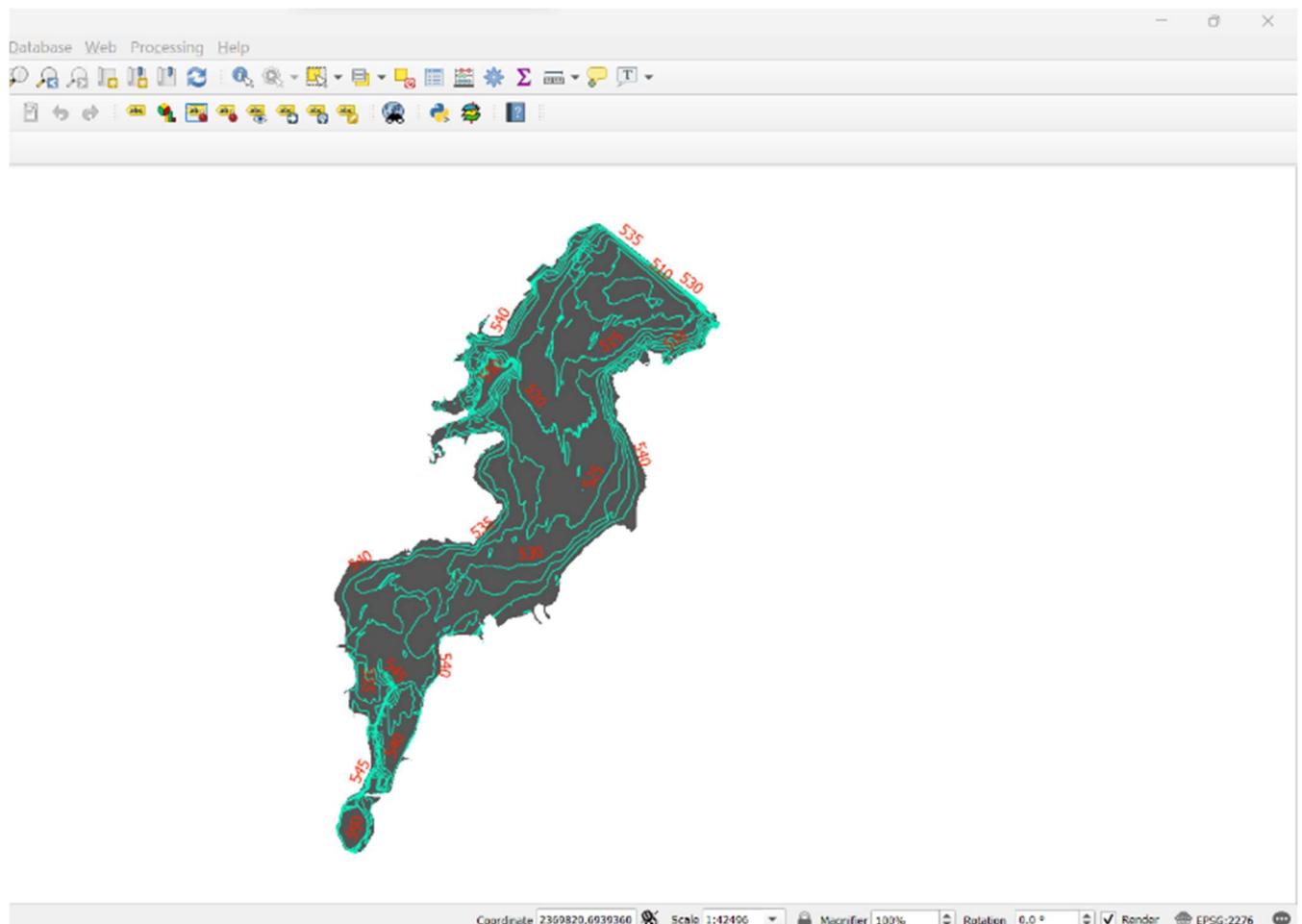
Repeat :- No repeat

Millimeter

Apply → OK



Output:-



Practical no :-9

Aim: Advance GIS Operations 2: Batch Processing using Processing Framework
Automating Complex Workflows using Processing Modeler
Automating Map Creation with Print Composer Atlas

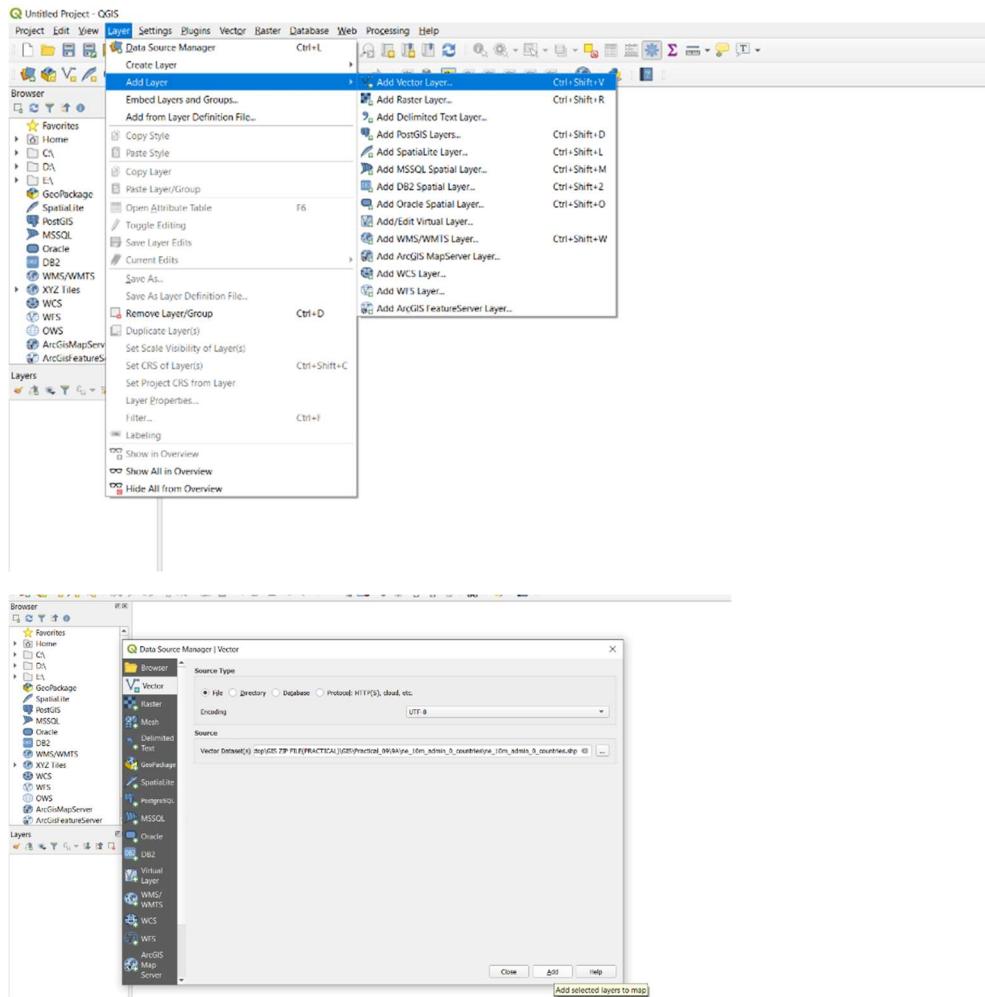
A)Batch processing using processing framework

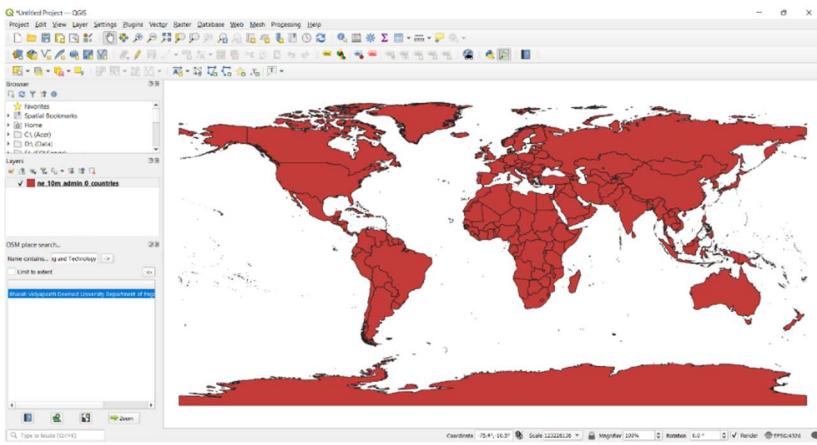
Batch processing means to execute a single tool multiple times with different inputs with your intervention.

- The processing framework in QGIS contains a batch processing interface that allows one to execute an algorithm on several layers easily. Batch processing is a useful tool that can save manual effort and help you automatic repetitive tasks.
- In this practical we will take several global vector layers & clip them to the extent of Africa in a single batch command.

Step I:

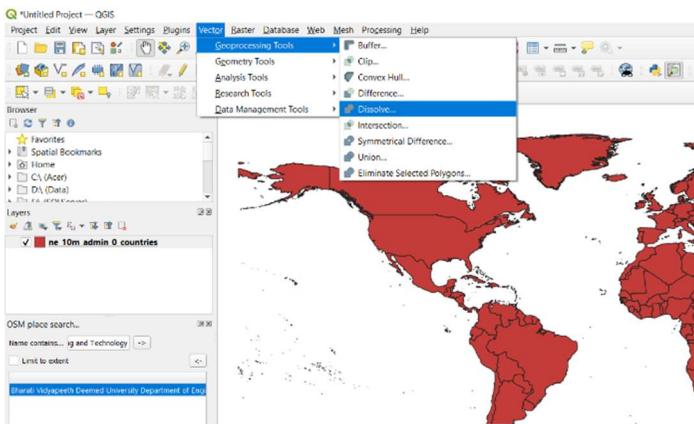
Layer → Add Layer → Add Vector Layer → [...] (ne_10m_admin_0_countries.shp) → Add → Close





Step II:

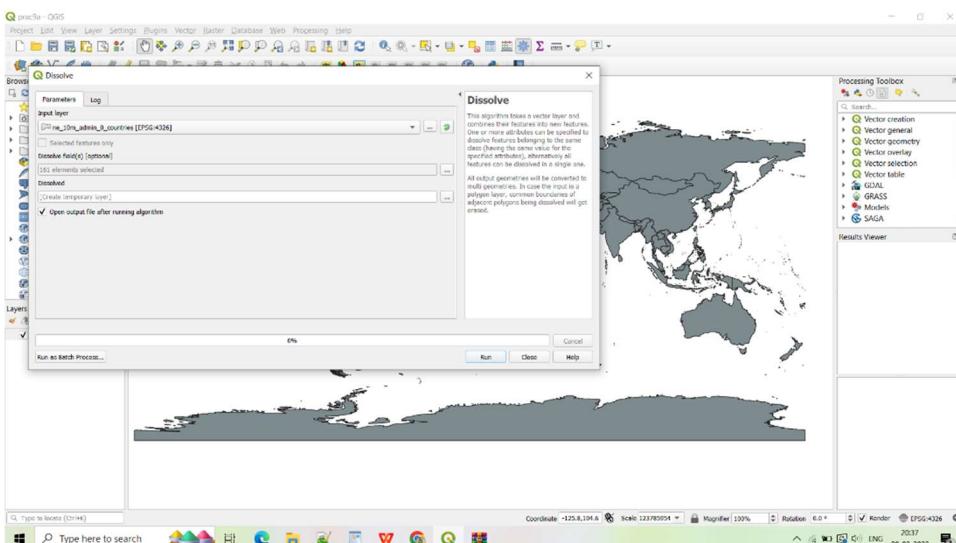
Vector → Geoprocessing tools → Dissolve



Input Layer: [ne_10m_admin_0_countries[EPSG:4326]]

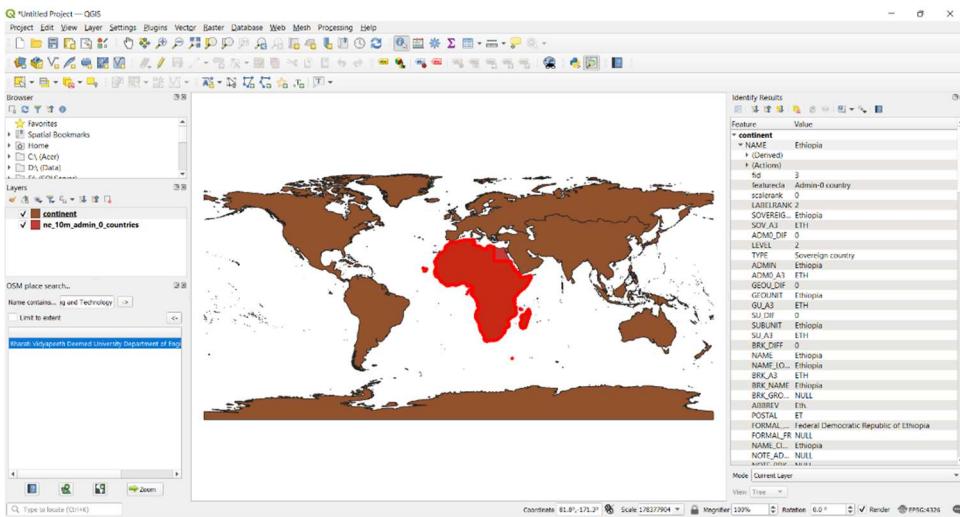
Dissolve field: Continent (checked) → OK

Dissolved: [Save to file] → continent.shp

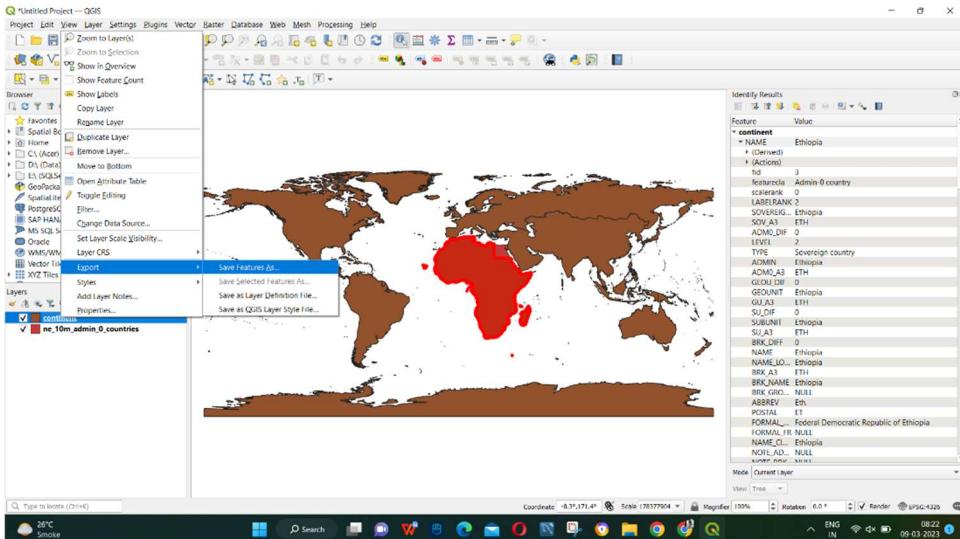


(Note: we are merging all the countries continent wise) → Run → Close

Step III: →Select selection tool from toolbar → Click on any continent (we are selecting africa)



Step IV: Right click on continent layer → Export → Save selected feature as



Format: ESRI shapefile

File Name: [...] → Africa.shp → Save

Layer name : → blank

CRS: EPSG.4326-WGS 84

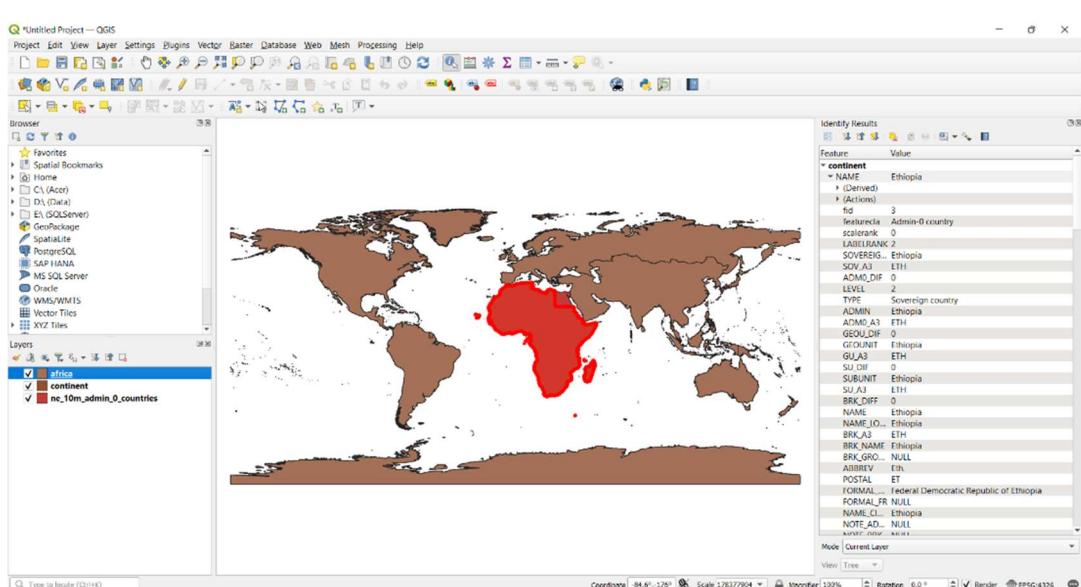
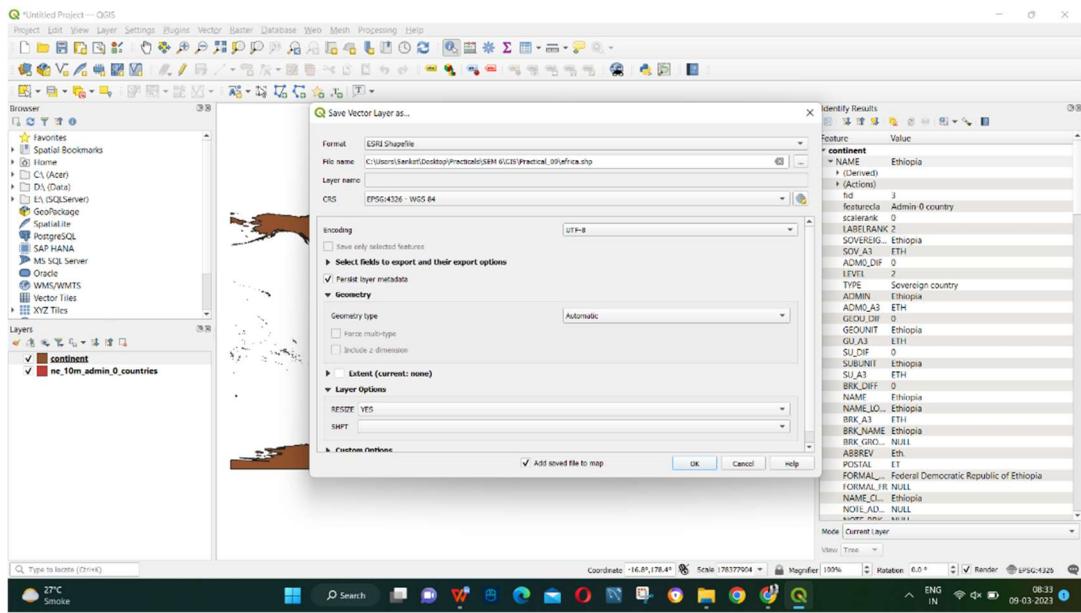
Encoding: UTF-8

(checked) Save only selected features

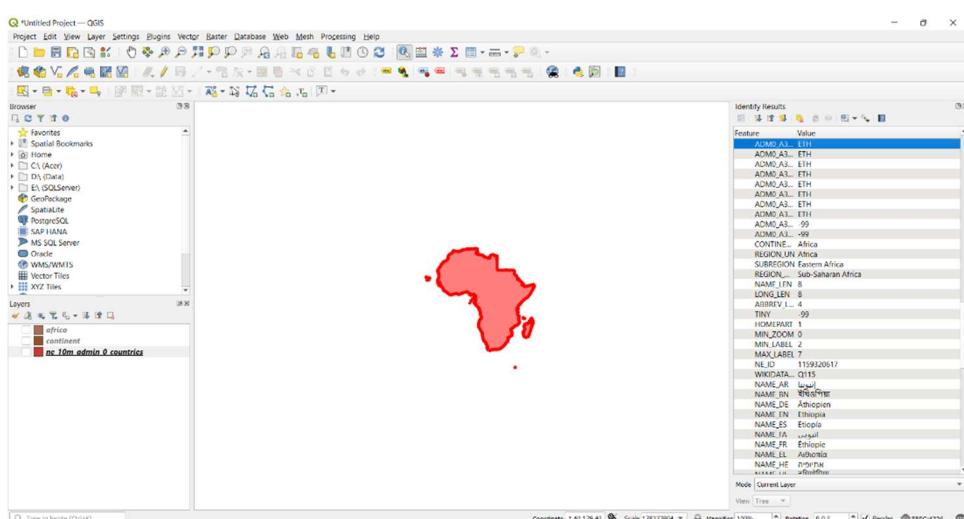
(checked) Persist layer metadata

Geometry type Automatic (checked)

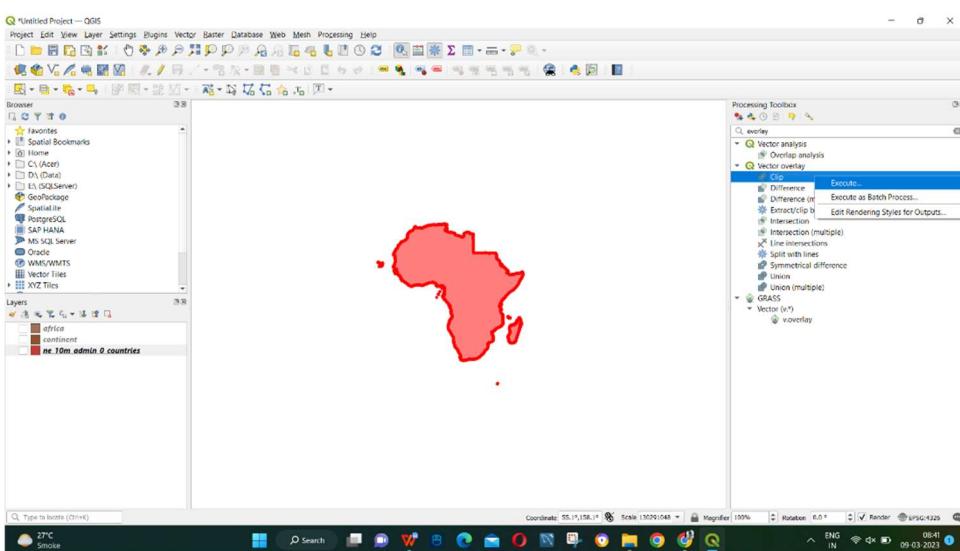
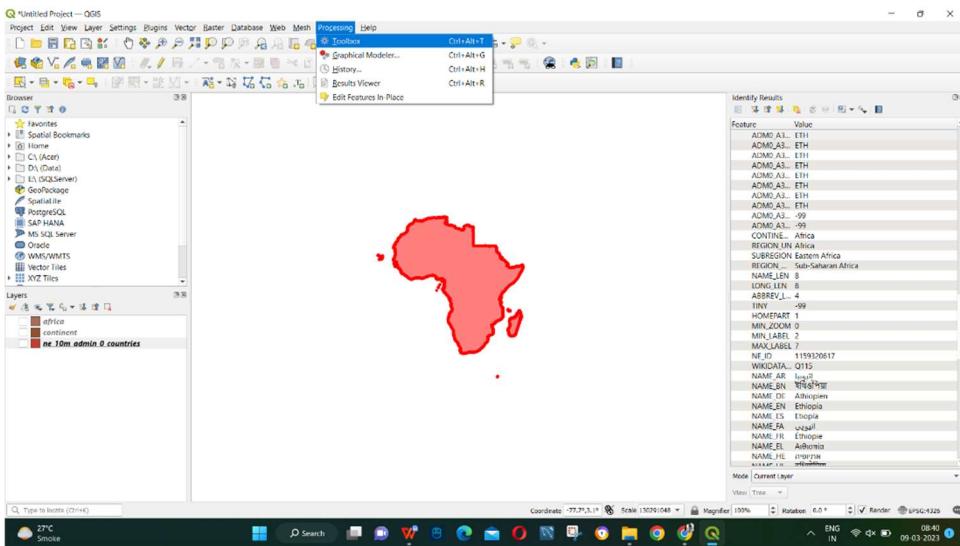
(checked) Add saved file to map → OK



Step V: Disselect both the previous layers & keep only Africa layer



Step VI: Processing toolbox → vector overlay → clip → Right Click on clip → Execute as Batch processing → Input layer: [.] → ne_10m_airports.shp [+] → Click on it.



Input layer: [...] → ne_10m_ports.shp → Click on it

Input layer: [...] → ne_10m_railroads.shp

Overlay layer: [select file] → Africa.shp

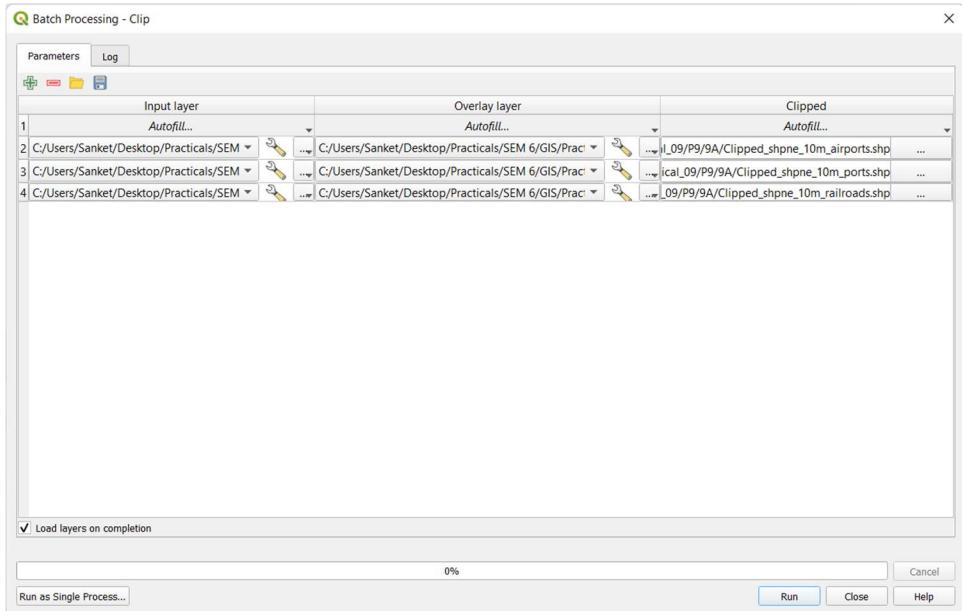
Overlay layer: [select file] → Africa.shp

Overlay layer: [select file] → Africa.shp

Clipped layer: [...] → **clipped_shp

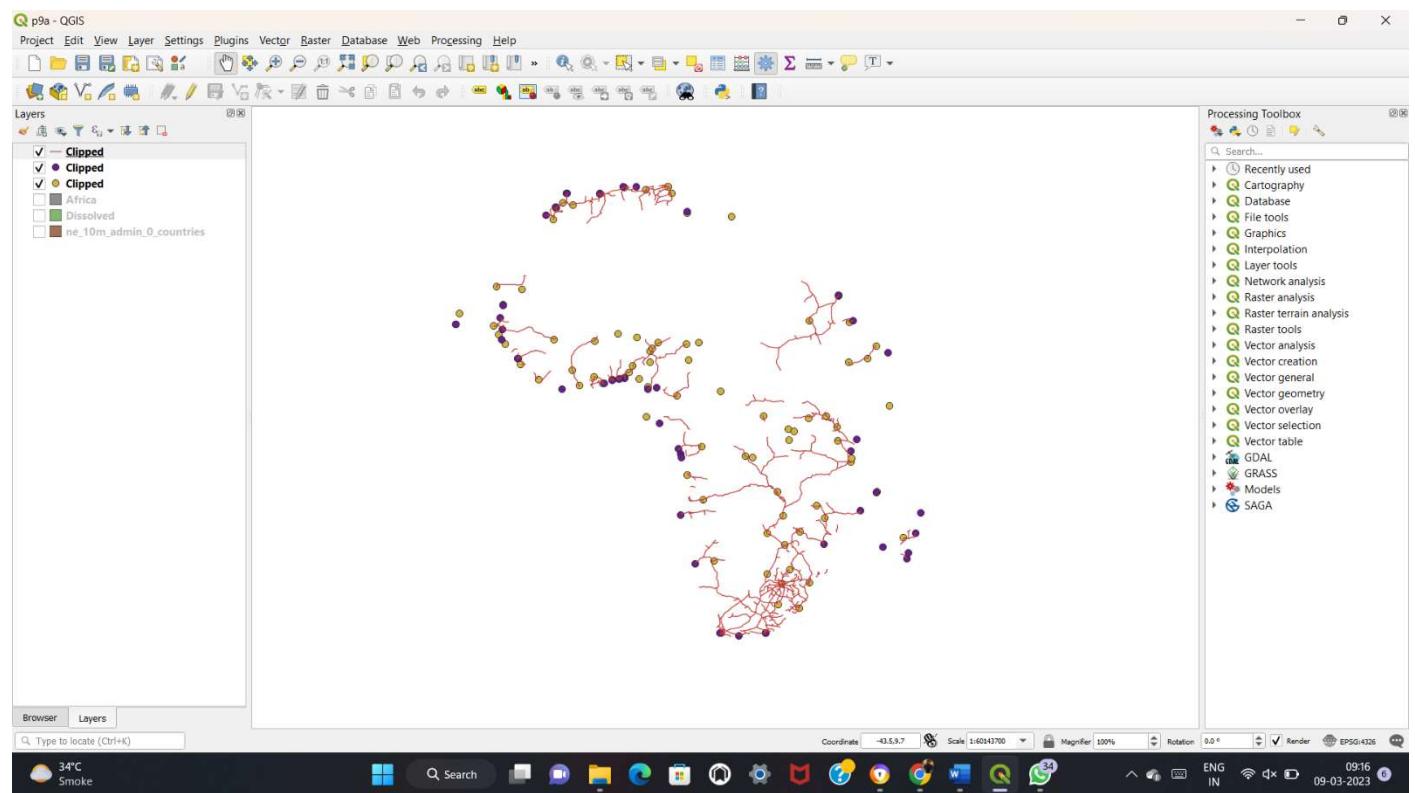
→ OK

(checked) Load layers on completion.

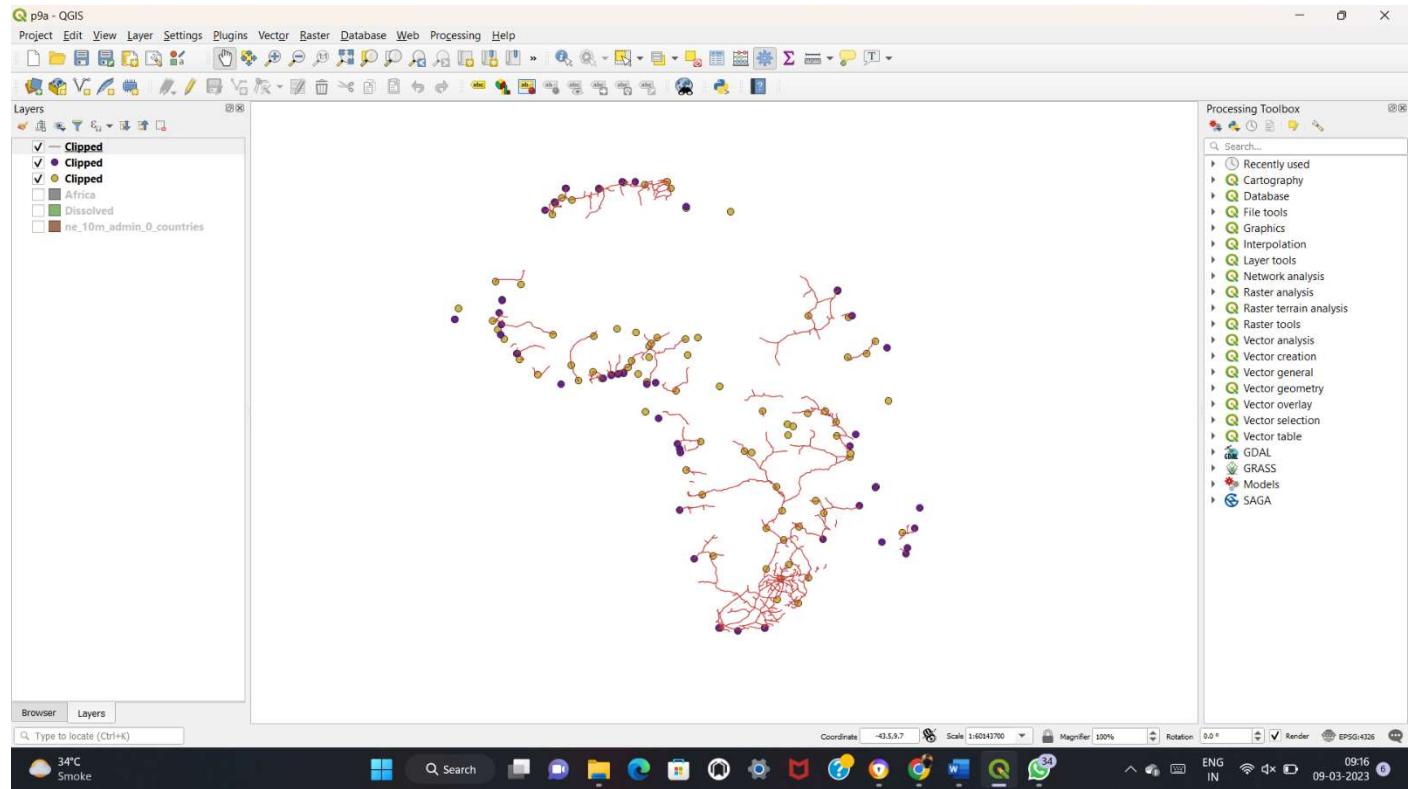


Step VII: Disselect the Africa layer and Check the output

Zoom it & check the three layers we created



OUTPUT:



(B) Automating complex workflows using Processing Modeler

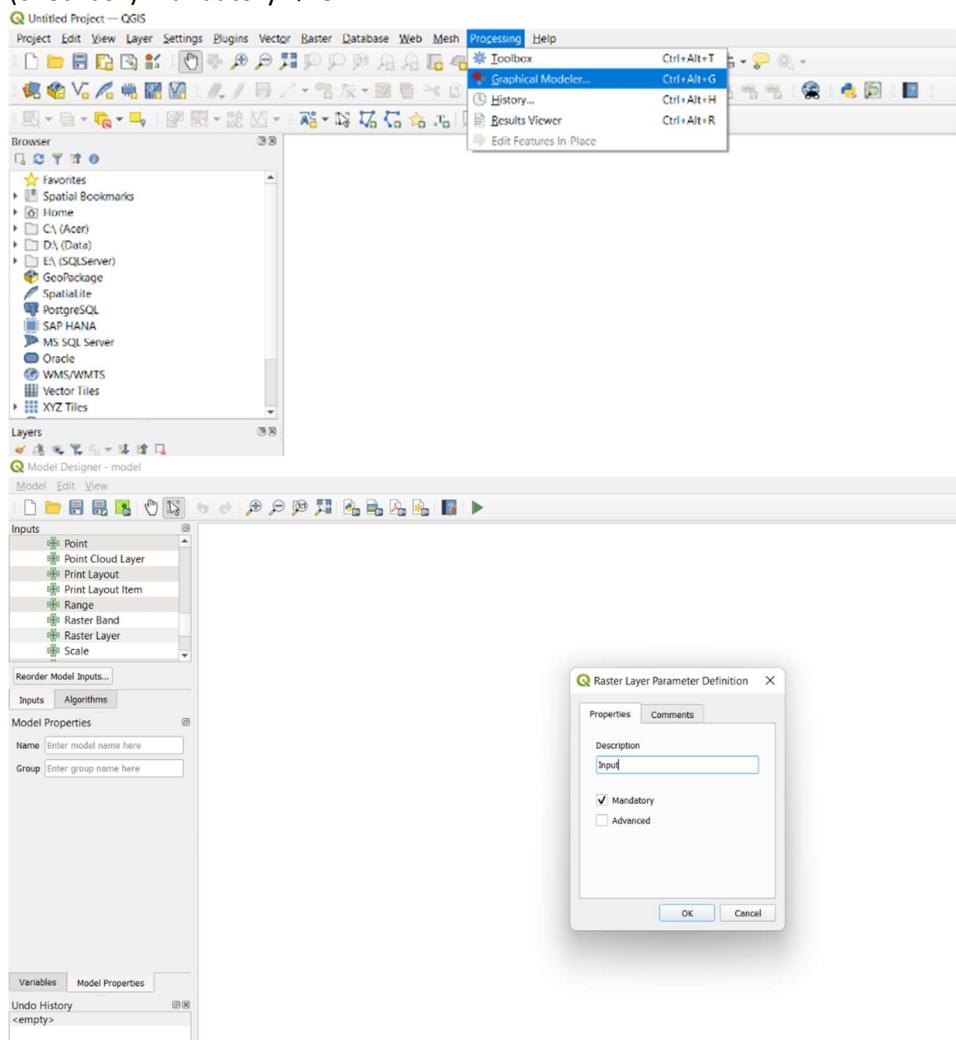
GIS workflows typically involve many steps - with each step generating intermediate output that is used by the next step. QGIS has a graphical modeler built-in that can help you define your workflow and run it with a single invocation.

Our workflow for this practical will have the following steps:

- Apply a majority filter algorithm to the input landover raster . This will reduce noise in our output by eliminating isolated pixels.
- Convert the resulting raster to a polygon Layer
- Query for a class value from the attribute table of the polygon layer and create a vector layer for that class.

Step I: Processing → Graphical Modeler → Input [Raster Layer] (Drag & Drop into window)

Description [Input]
(checkbox) Mandatory → OK



Step II: Algorithms [Majority/ Minority filter] (Drag & Drop)

Description [Majority / Minority Filter]

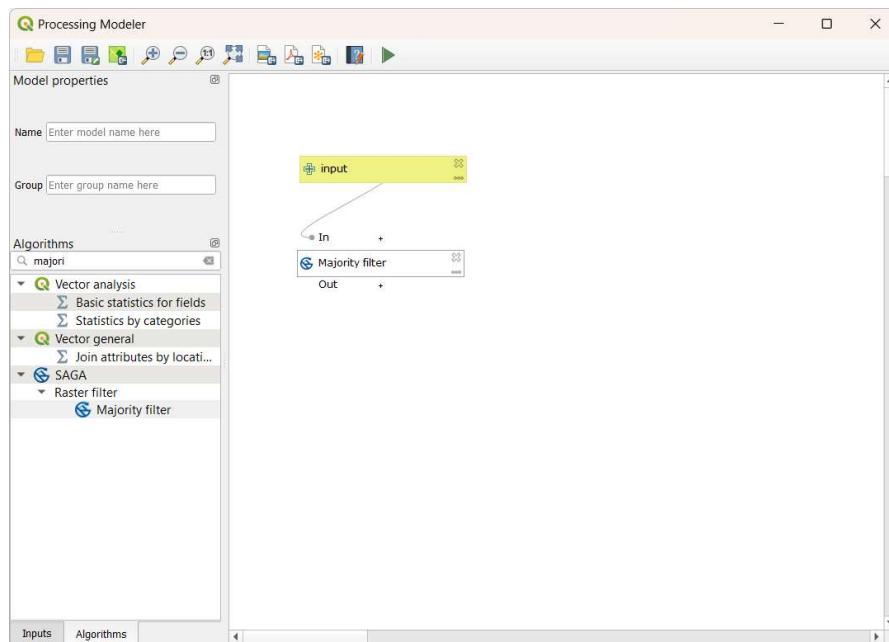
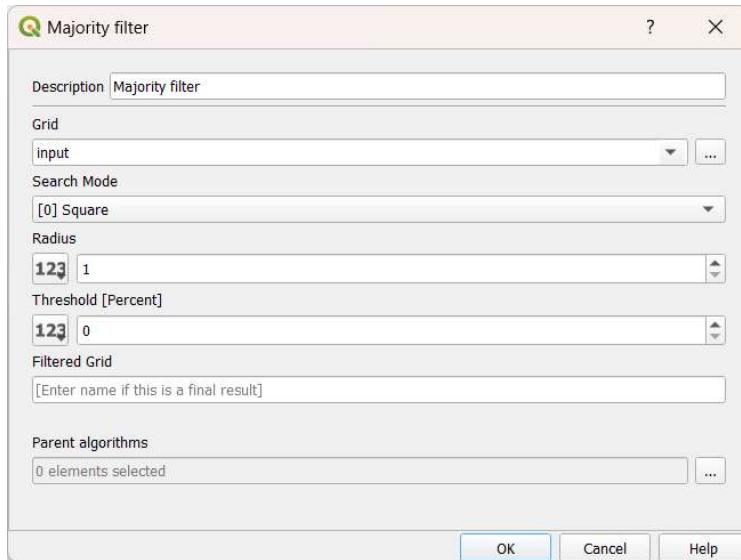
Grid: [123] → click on it & select [Model Input]

Type: [Majority]

Threshold [0.000000]

Kernel Type: [[O] Square]

Radius: [1] → OK.



Step III: Algorithms [Polygonize (raster to vector)] **(Drag & Drop- er to vector).

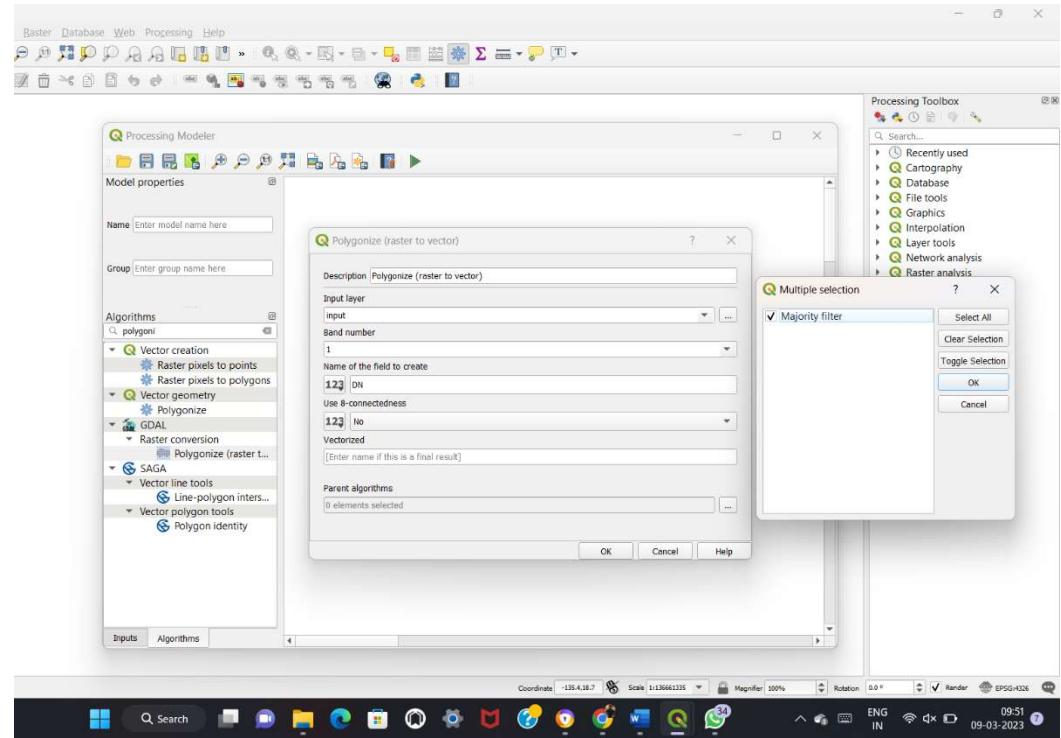
Description Polygonize (raster to vector) [**show Adv. Paran]

Input layer [123] ← click on it & select [Algorithm Output)

Band number [1]

Name of the field to create [IN]

Use 8-connectedness [no] → OK



Step IV: Algorithms → Extract by attribute

Description [Extract by attribute]

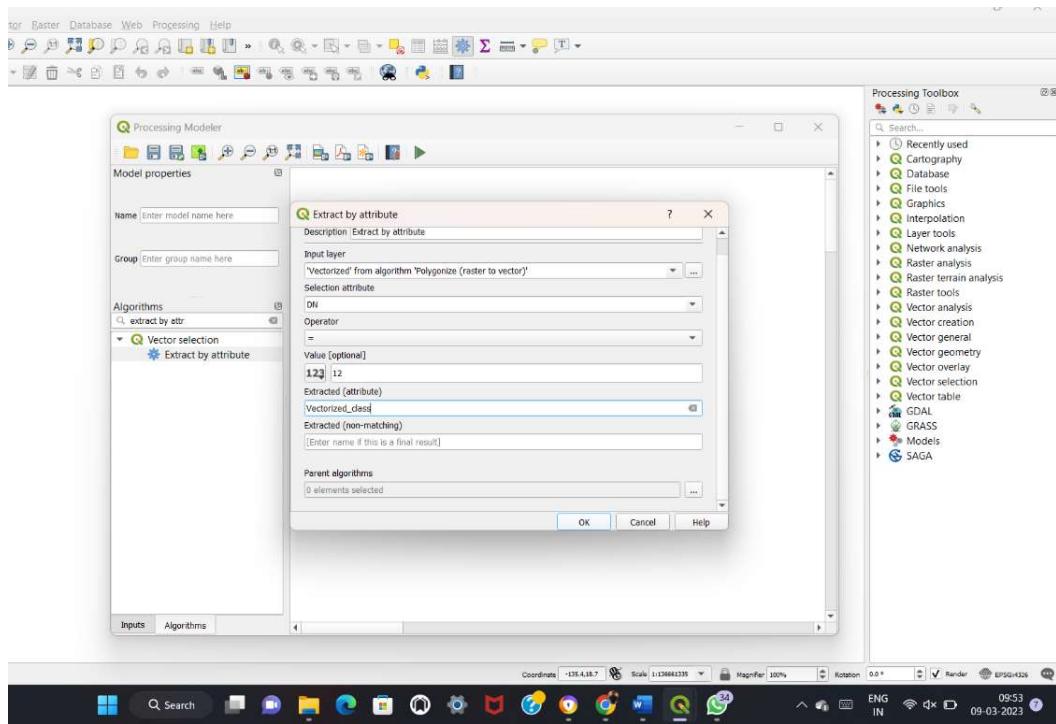
Input layer [Algorithm output]

Selection attribute :[**DN]

Operator [=]

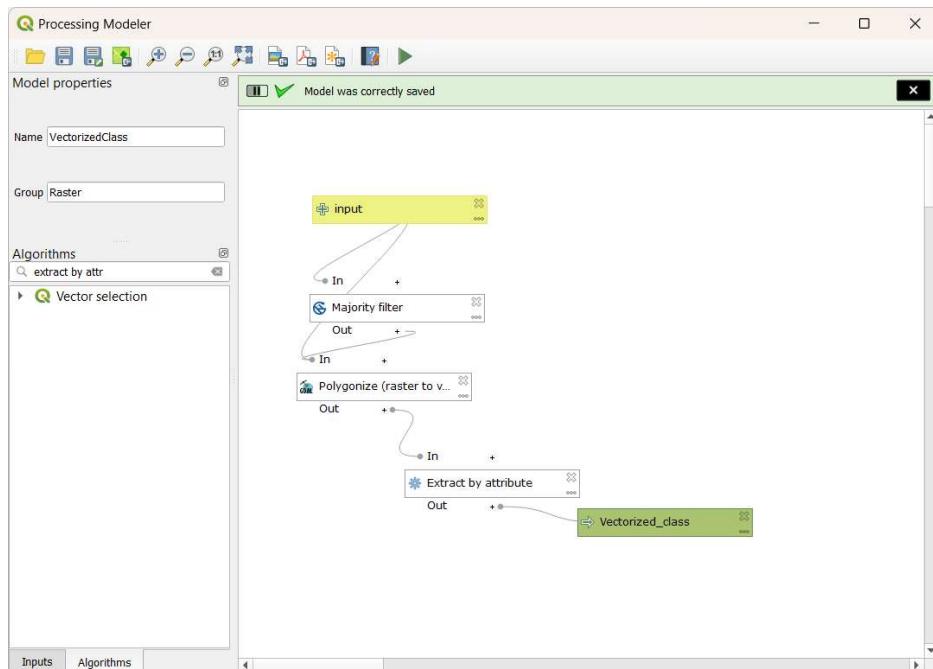
Value [optional] [12]

Extracted (attribute) [Vectorized_class] → OK



Step V: Model properties → Name [vectorized]

Group[raster]

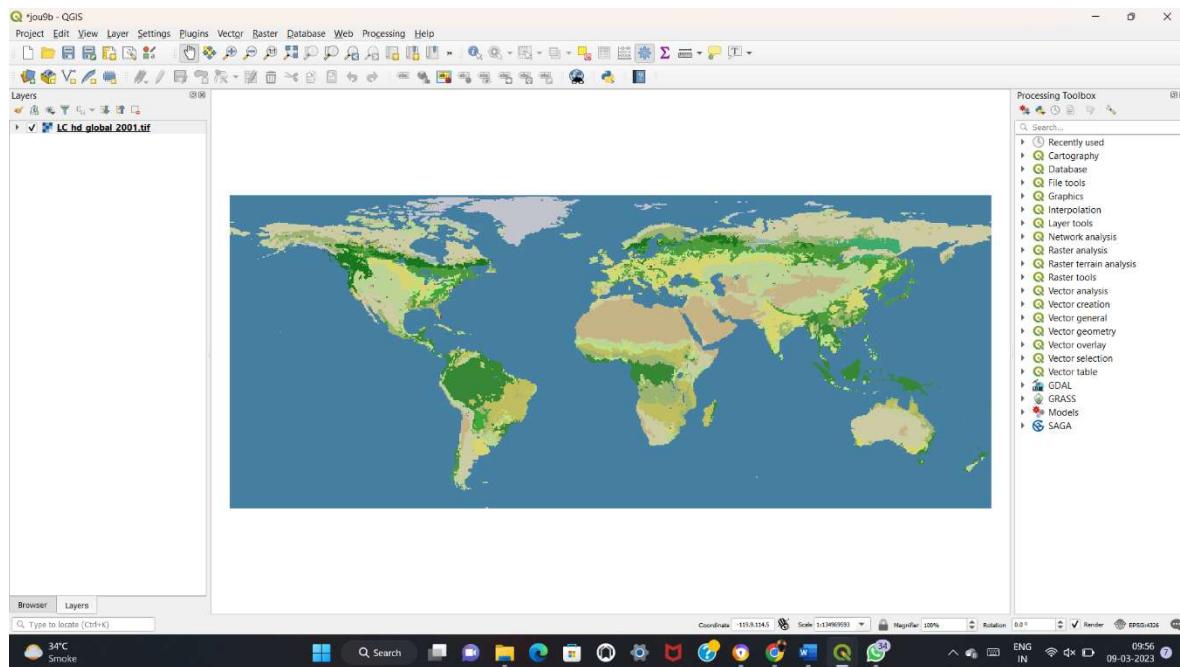
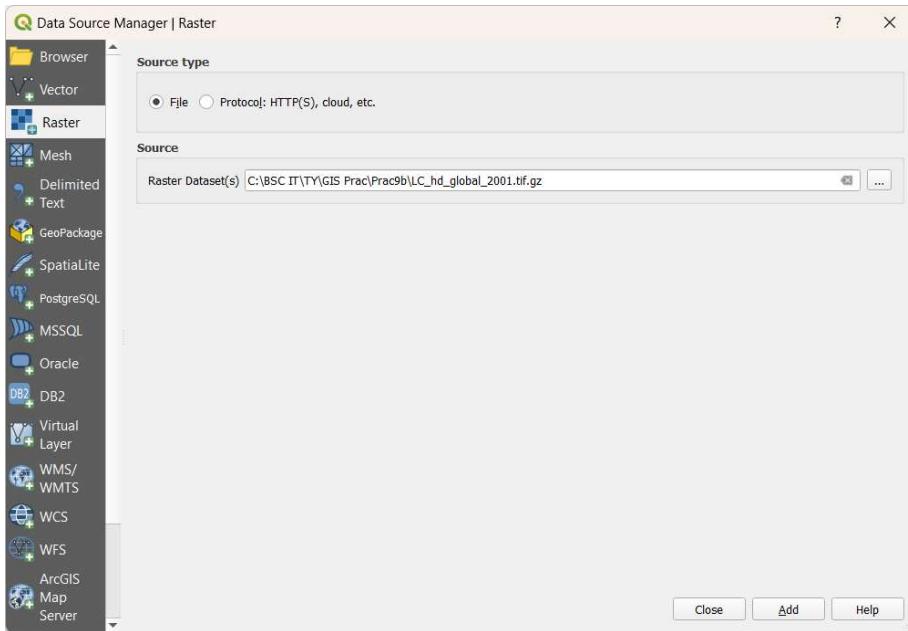


Step VI: Model → Save Model → [vectorize]

Save as type [Processing models (**)] → Save (Now we will test the model)

Step VII: Add Layer → Add Raster Layer → [...]

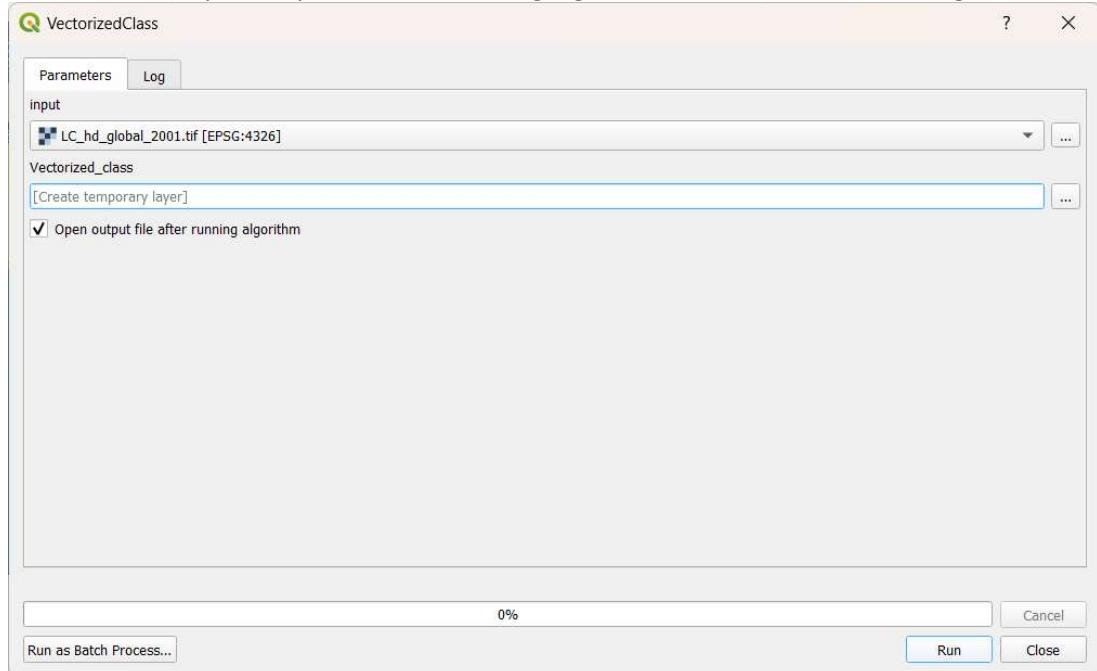
[LC_hd_global_2001.tif] → Add → Close



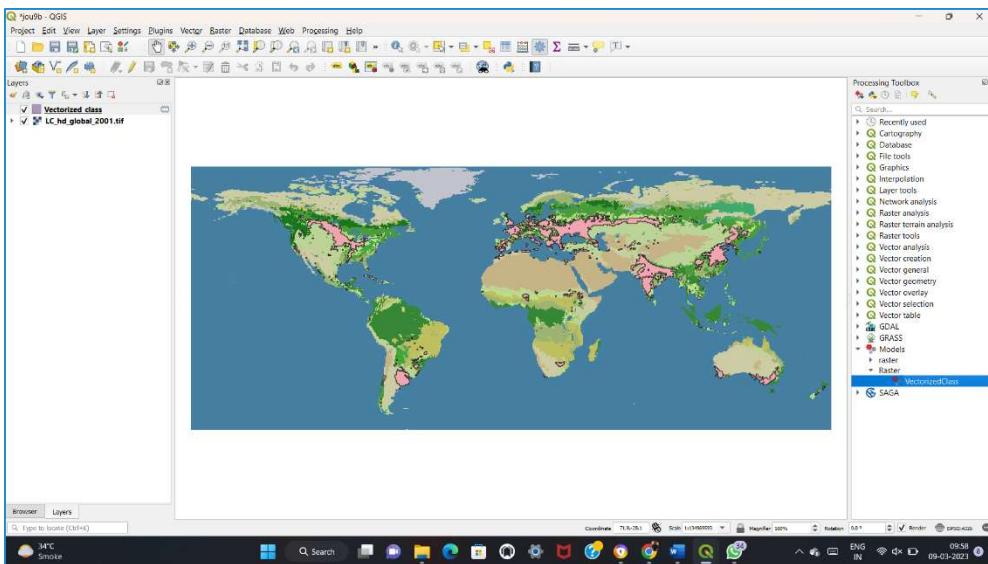
Step VIII: Processing → toolbox → Models → Raster → vectorized(Double click on it.)

Input [LC_hd_global_2001.tif]

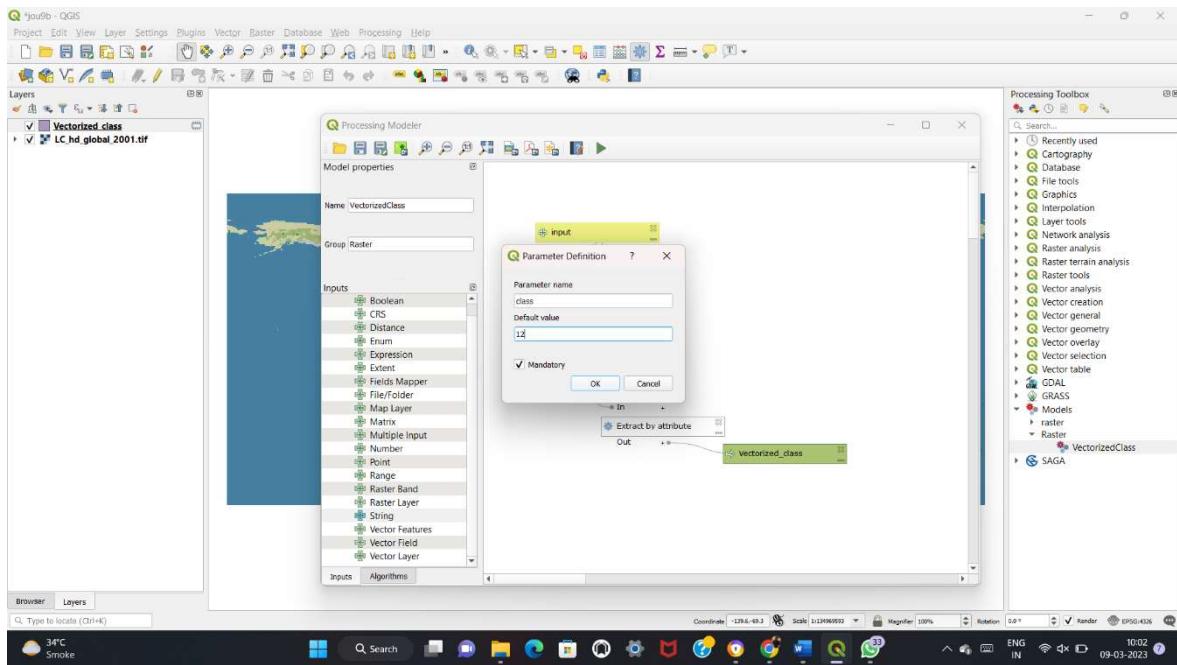
(checkbox) Open output file after running algorithm → Run (We are checking whether output model is corrected)



Step IX: processing→toolbox→raster→vectorized(right click on it) →edit model



Step X: inputs → string → parameter name: class, value: 12 → mandatory → ok



Step XI: Select Extract by attribute from Canvas → Value → [/] → Model Input → OK

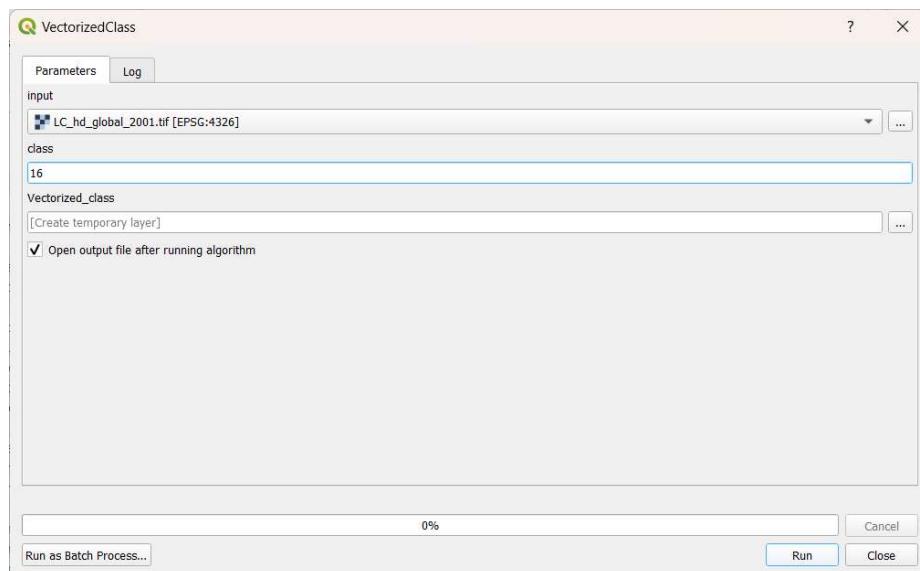
(Now Extract by attribute will have two inputs)

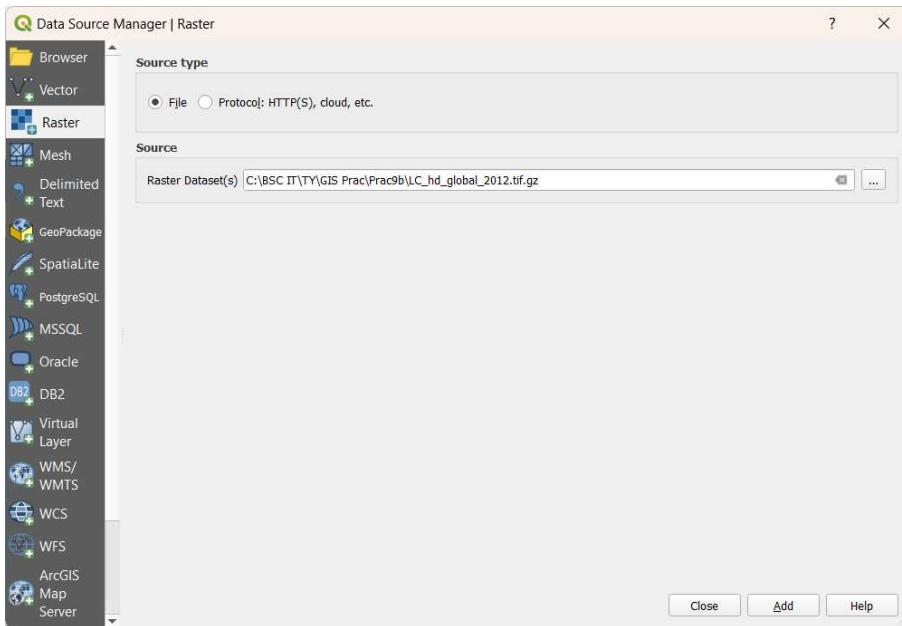
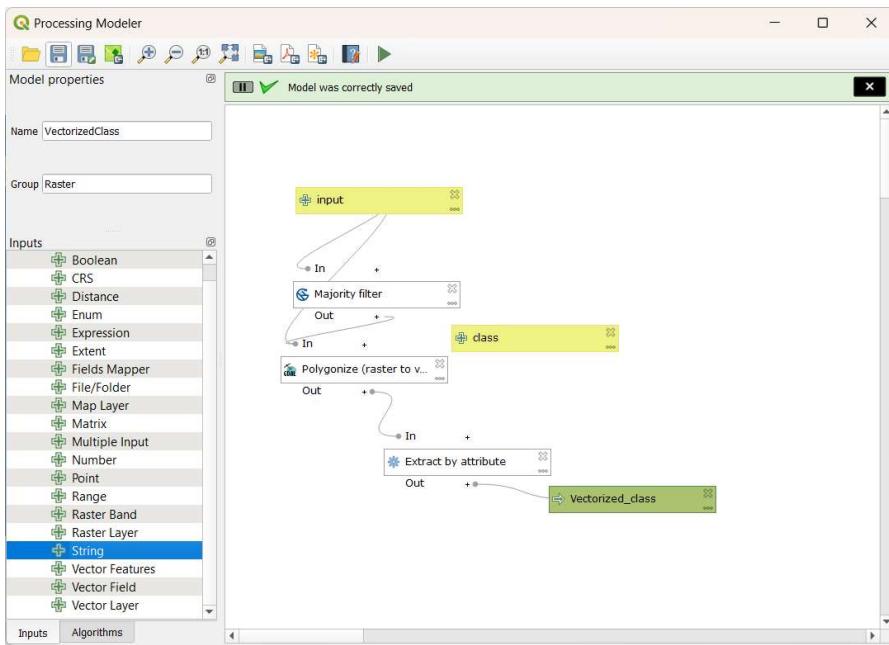
Step XII: Click on [pause btn] → Run

Step XIII: Class [16]

Input [LC_hd_global_2001.tif] → Run → Close ->Save

Add layer → Add Raster layer (LC_hd_global_2001.tif.gz) → Add → Close



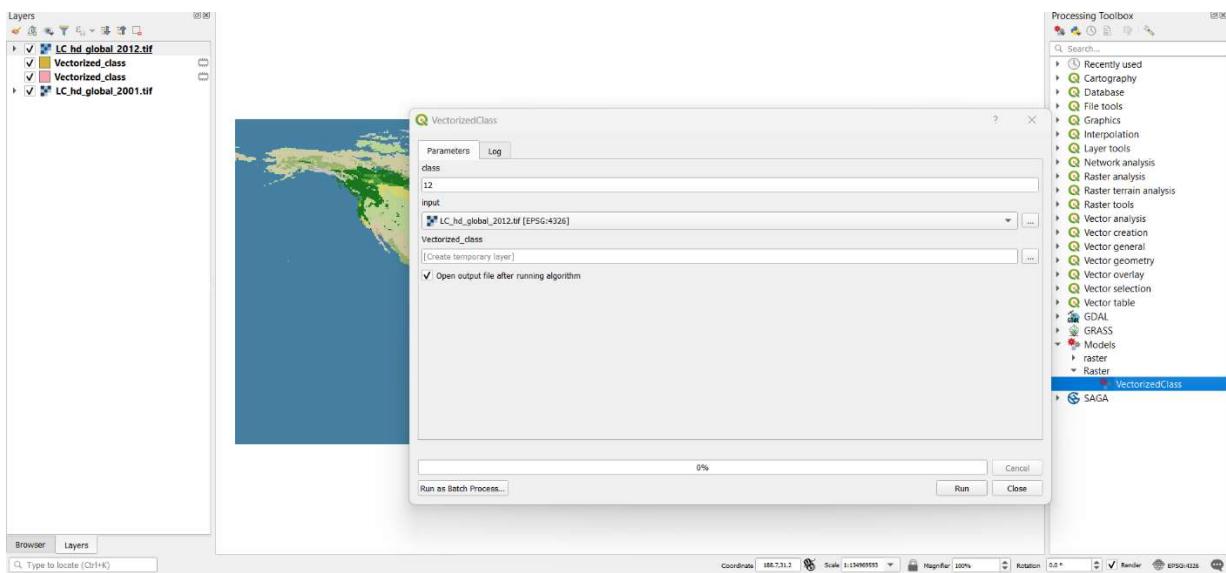


Step XIV: Processing toolbox → Models → raster →vectorized

Class[12]

Input [LC_hd_global_2012.tif]

→ Run → Close



Step XV: Disselect vectoniced class & LC_hd_global_2012.tif

OUTPUT:

