



ICIMOD

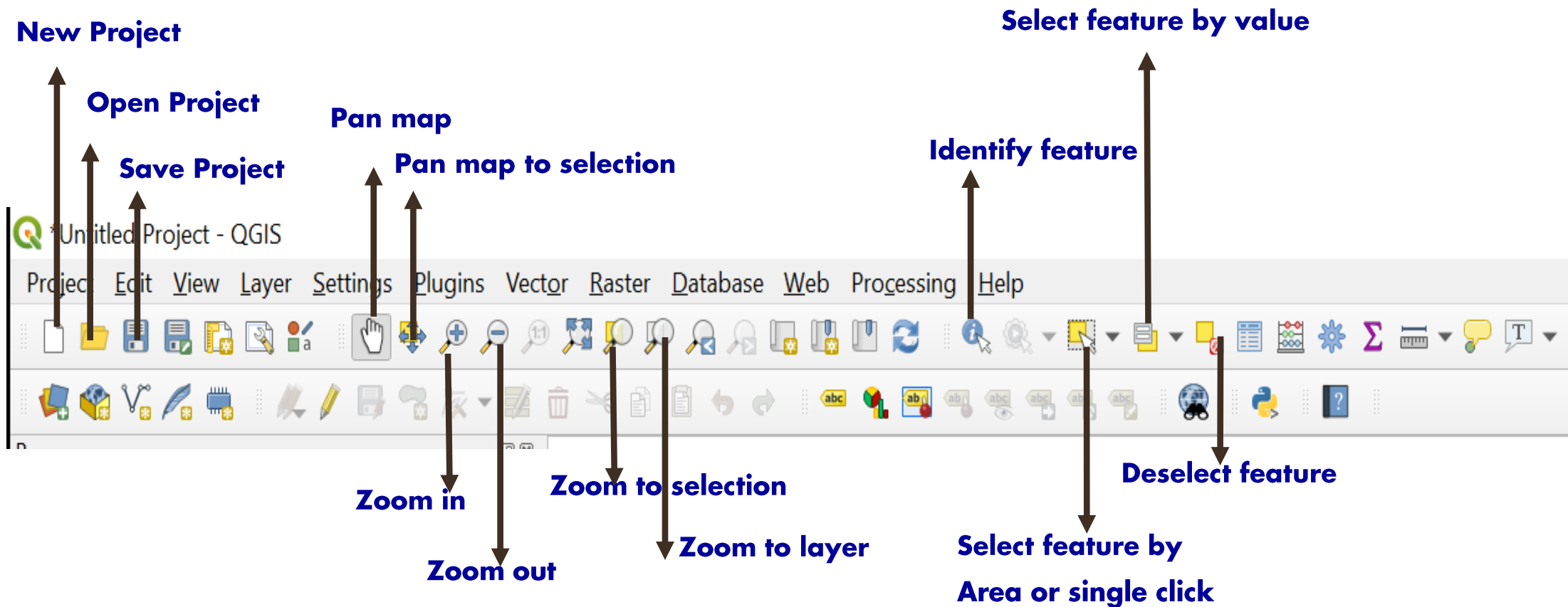
# Empowering Women in Geospatial Information Technology

Poonam Tripathi

## Vector data exploration and visualization

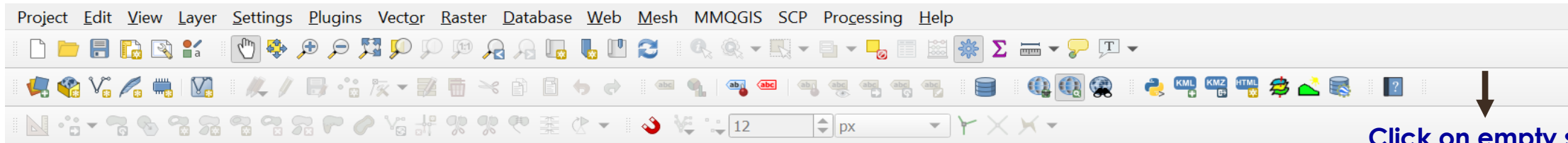
# Introduction to QGIS

## Exploring the Map View



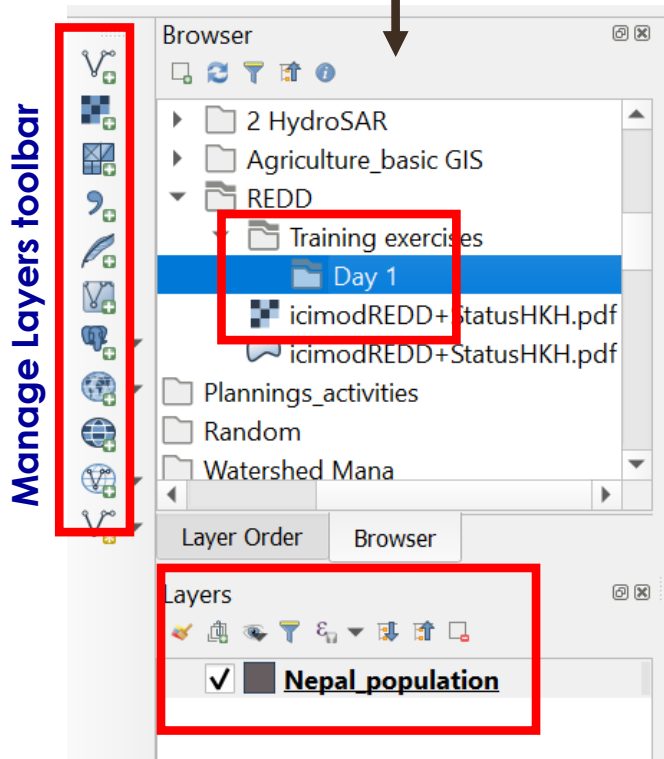
# Adding panels and toolbars

\*Untitled Project - QGIS



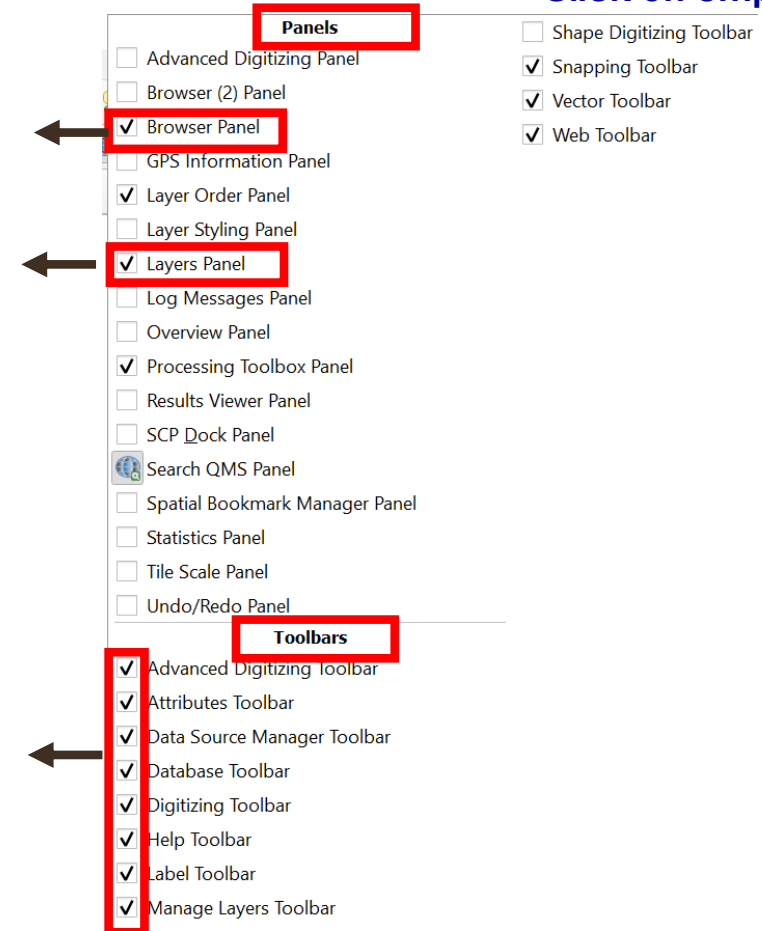
Click on empty space

Browse your folder and files to add any raster/vector layer



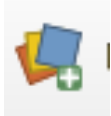
Displays the added raster /vector layer

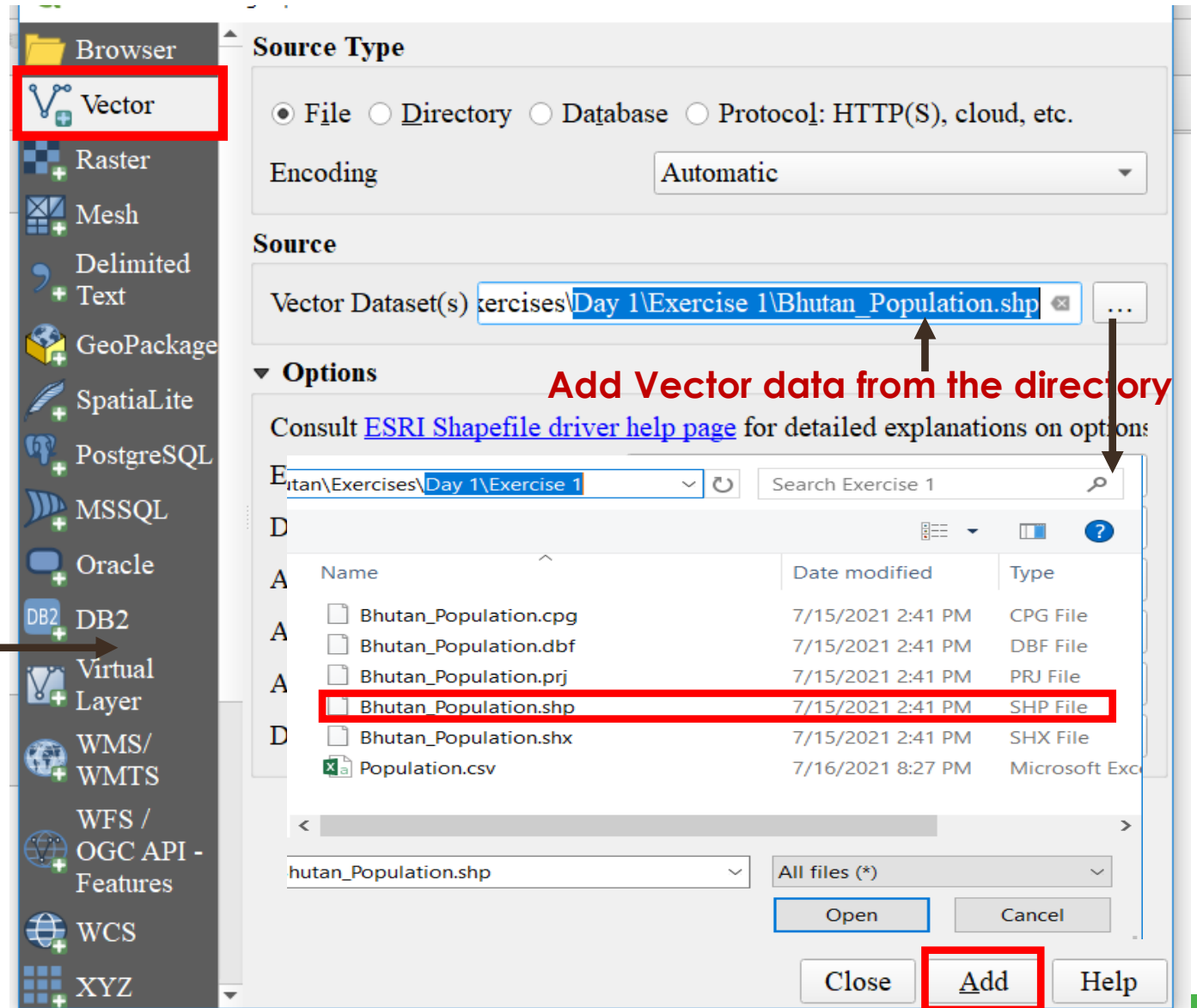
Check/Uncheck to add  
or remove the  
Panel/Toolbar



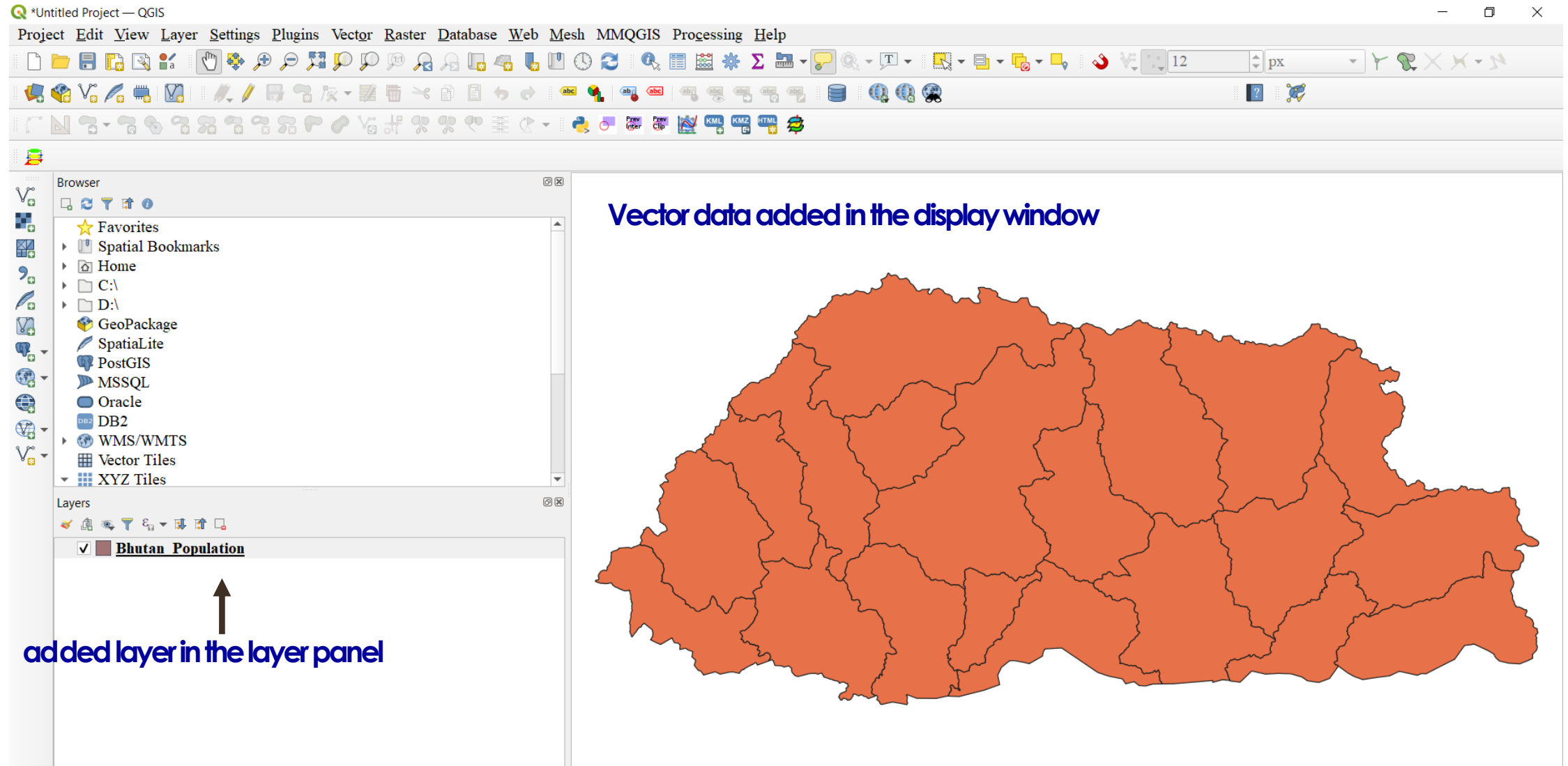


# Adding vector data

- Launch QGIS
- Click on the Tab 
- A window opens
- Click on **Vector**
- Navigate to the folder where the exercise data is kept
- Add vector file **Bhutan\_Population.shp** from Day1\Exercise1

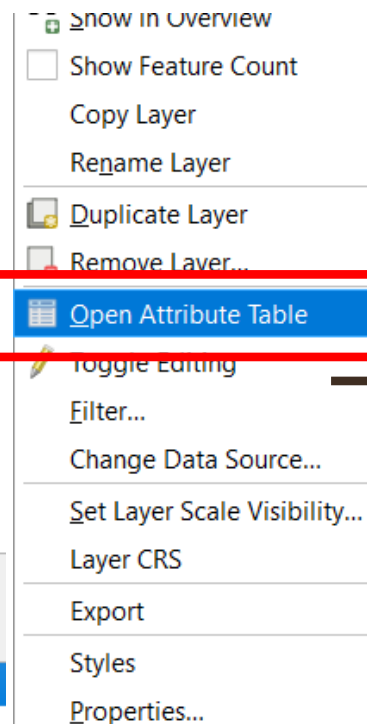
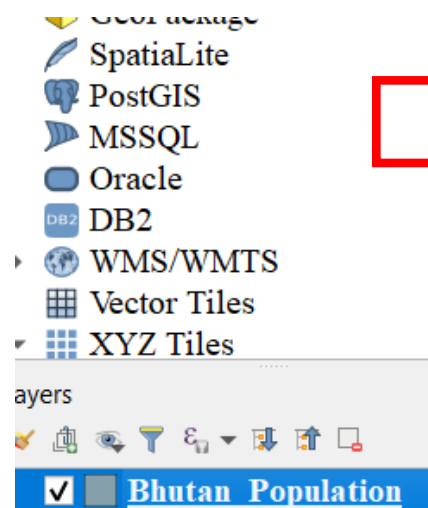


# Adding vector data



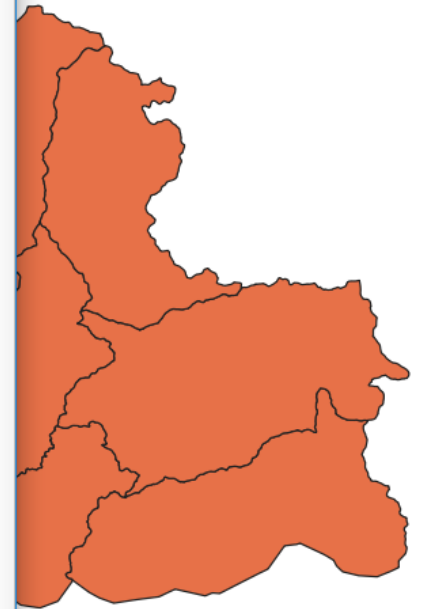
# Exploring attribute table

- **Right click** on the added Layer i.e. **Bhutan\_Population.shp**
- Click on **Open Attribute Table**



The screenshot shows the 'Bhutan\_Population' attribute table window. The table has three columns: 'ADM1\_EN', 'ADM1\_PCODE', and 'Pop\_2005'. The first row is highlighted in green, showing 'Bumthang' with population 16,116. The table lists 20 districts in total.

	ADM1_EN	ADM1_PCODE	Pop_2005
1	Bumthang	BT001	16,116
2	Chhukha	BT002	74,387
3	Dagana	BT003	18,222
4	Gasa	BT004	3,116
5	Haa	BT005	11,648
6	Lhuentse	BT006	15,395
7	Monggar	BT007	37,069
8	Paro	BT008	36,433
9	Pemagatshel	BT009	13,864
10	Punakha	BT010	17,715
11	Samdrupjon...	BT011	39,961
12	Samtse	BT012	60,100
13	Sarpang	BT013	41,549
14	Thimphu	BT014	98,676
15	Trashigang	BT015	51,134
16	Trongsa	BT017	13,419
17	Tsirang	BT018	18,667
18	Wangdueph...	BT019	31,135
19	Yangtse	BT016	17,740
20	Zhemgang	BT020	18,636



# Exploring attribute table


Annotations for the attribute table interface:

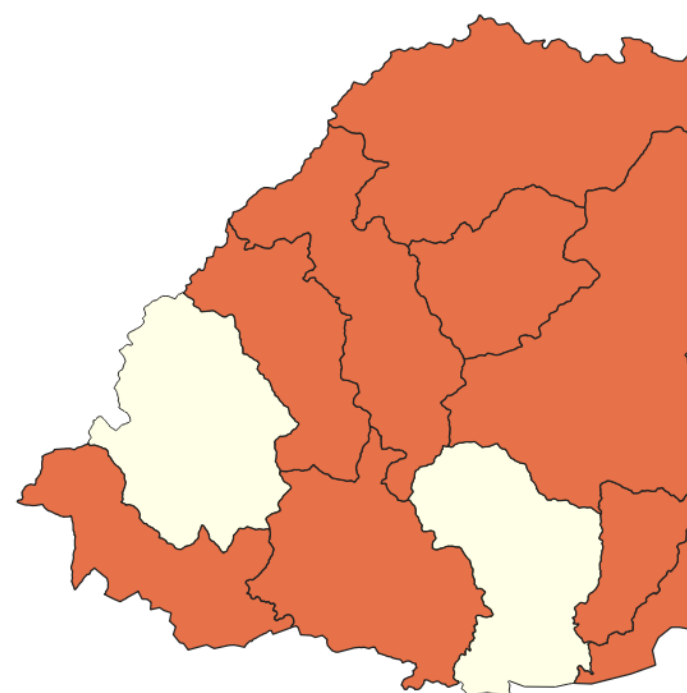
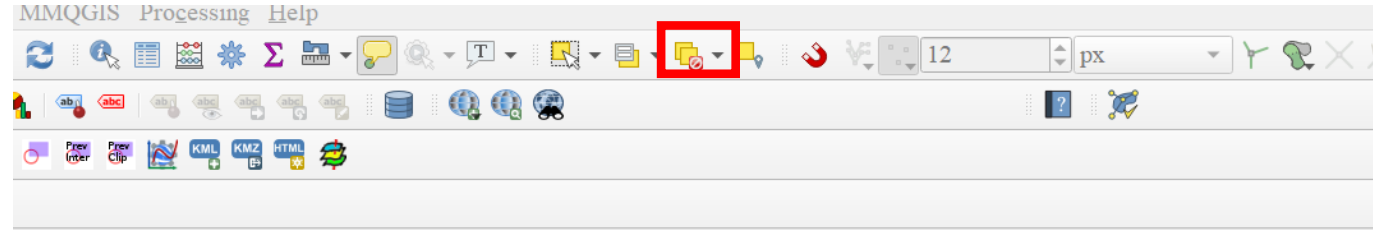
- Select all
- Invert selection
- Deselect all
- Delete field
- Organize column
- Open field calculator

The screenshot shows the 'Bhutan\_Population' attribute table with the following data:

	ADM1_PCODE	District	Pop_2005
1	BT001	Bumthang	16,116
2	BT002	Chhukha	74,387
3	BT003	Dagana	18,222
4	BT004	Gasa	3,116
5	BT005	Haa	11,648
6	BT006	Lhuentse	15,395
7	BT007	Monggar	37,069
8	BT008	Paro	36,433
9	BT009	Pemagatshel	13,864
10	BT010	Punakha	17,715
11	BT011	Samdrupjon...	39,961
12	BT012	Samtse	60,100
13	BT013	Sarpang	41,549
14	BT014	Thimphu	98,676

# Exploring attribute table

- Select a feature in attribute table by clicking on any **row**
- Deselect by clicking on the **Deselect all** icon 



Bhutan\_Population — Features Total: 20, Filte...

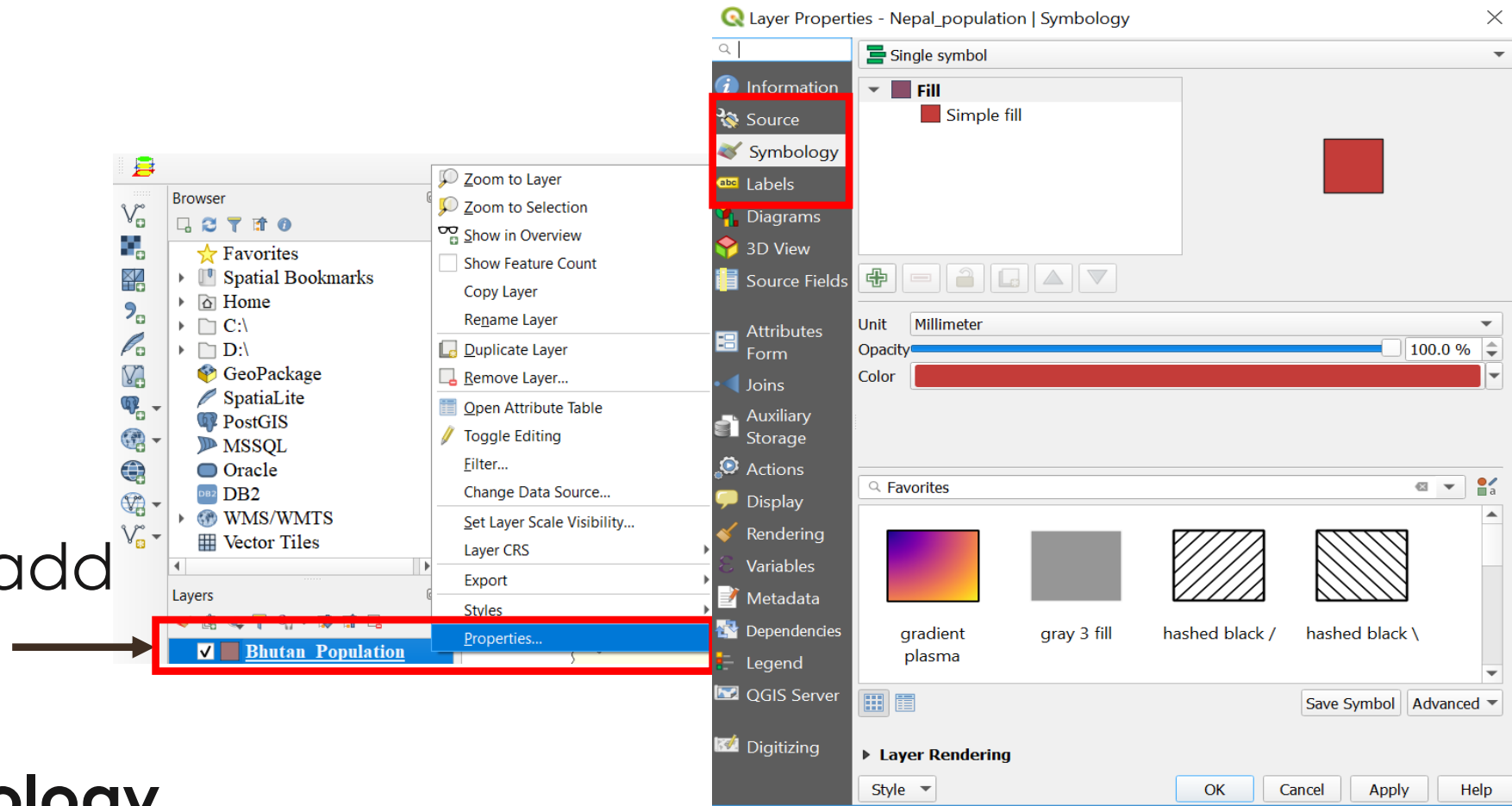
	ADM1_PCODE	District	Pop_2005
1	BT001	Bumthang	16,116
2	BT002	Chhukha	74,387
3	BT003	Dagana	18,222
4	BT004	Gasa	3,116
5	BT005	Haa	11,648
6	BT006	Lhuentse	15,395
7	BT007	Monggar	37,069
8	BT008	Paro	36,433
9	BT009	Pemagatshel	13,864
10	BT010	Punakha	17,715
11	BT011	Samdrupjon...	39,961
12	BT012	Samtse	60,100

Show All Features



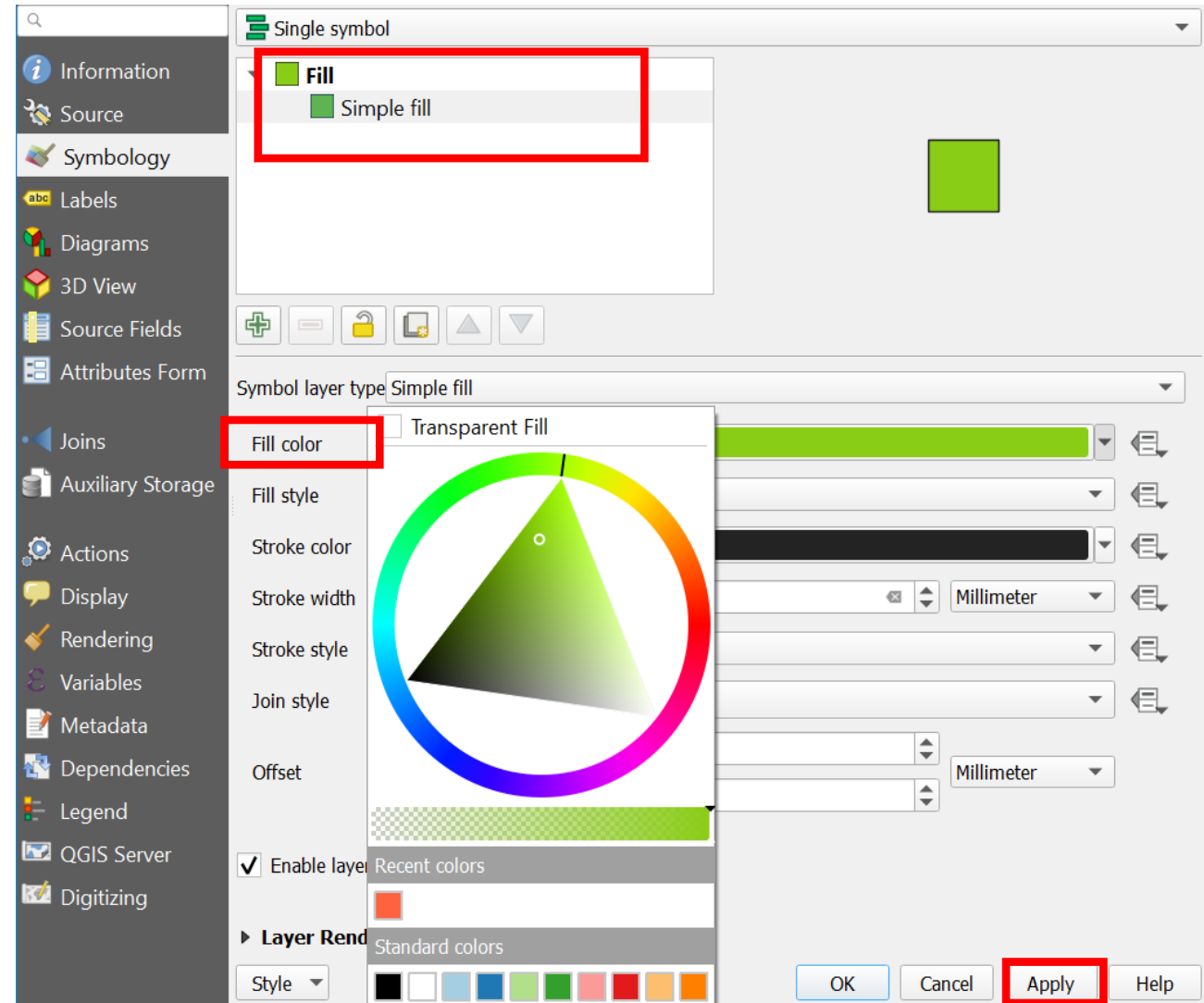
# Changing colour of vector data

- Right click on the add Layer
- > **Properties-> Symbology**

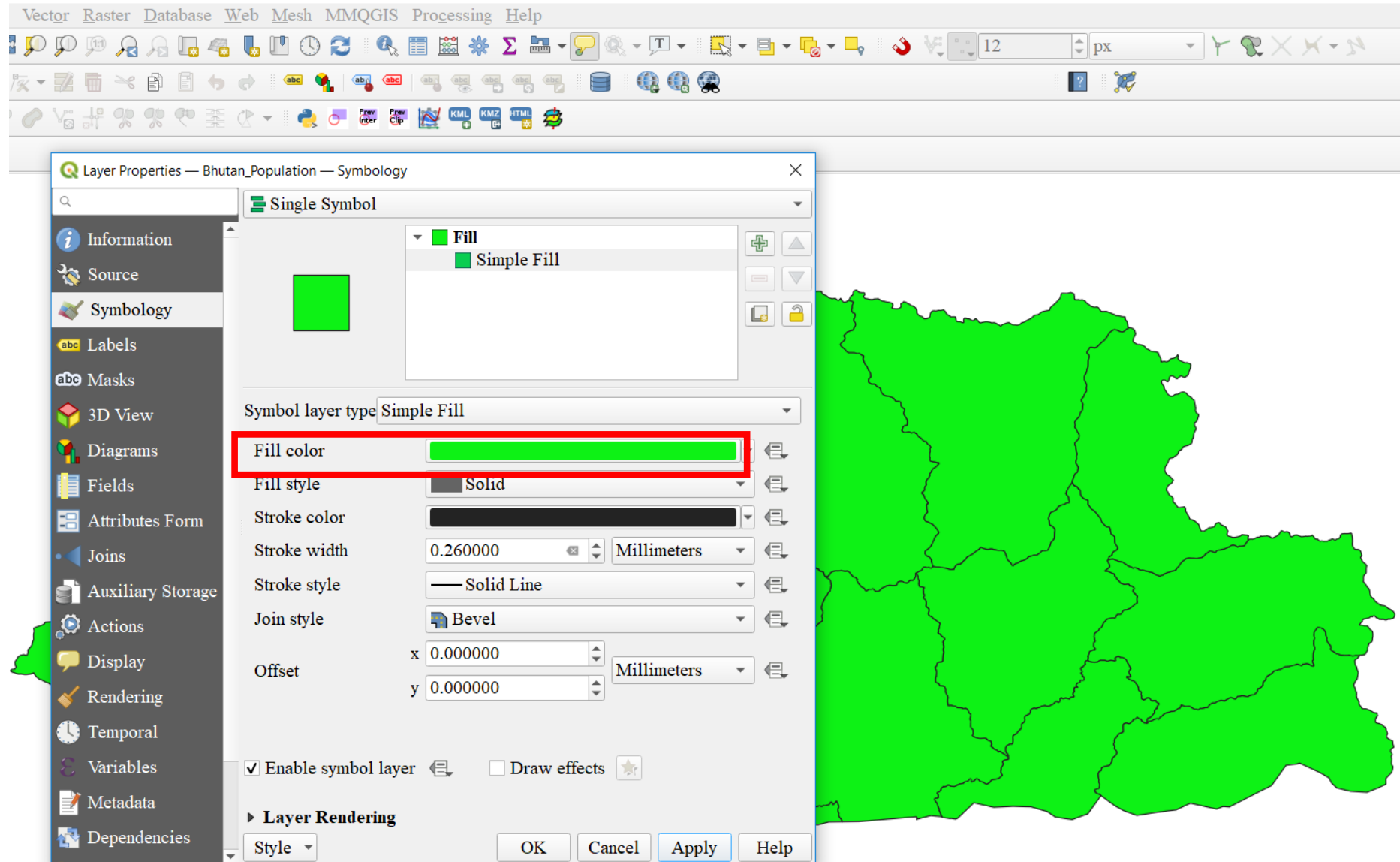


# Changing colour of vector data

- Click on the **Symbology** tab
- Select **Simple fill** under **Fill** and click on the **Fill Color**
- Change the colors by choosing from the Palette of the standard color -> click **Apply**



# Changing colour of vector data



# Changing colour of vector data

- Click on the **Symbology** Tab
- Dropdown from **Single symbol** to **Graduated**
- Under **Value** select **Popul\_2005**
- Change the colors by choosing from the Palette of the color ramp -> click **Apply**

Layer Properties — Bhutan\_Population — Symbology

**Graduated** **Select Graduated**

Value: 123 Popul\_2005

Symbol: [Red-Blue Color Ramp]

Legend format: %1 - %2 Precision: [1] Trim: [x]

Color ramp: [Red-Blue]

Classes Histogram

Symbol	Values	Legend
<input checked="" type="checkbox"/>	3116.00 - 22228.00	3116 - 22228
<input checked="" type="checkbox"/>	22228.00 - 41340.00	22228 - 41340
<input checked="" type="checkbox"/>	41340.00 - 60452.00	41340 - 60452
<input checked="" type="checkbox"/>	60452.00 - 79564.00	60452 - 79564
<input checked="" type="checkbox"/>	79564.00 - 98676.00	79564 - 98676

Choose the color

Select the column to be classified

Mode: [Equal Interval] Classes: 5

☐ Symmetric Classification

Classify [x] [x] Delete All

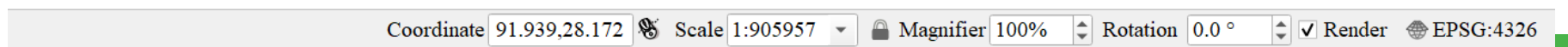
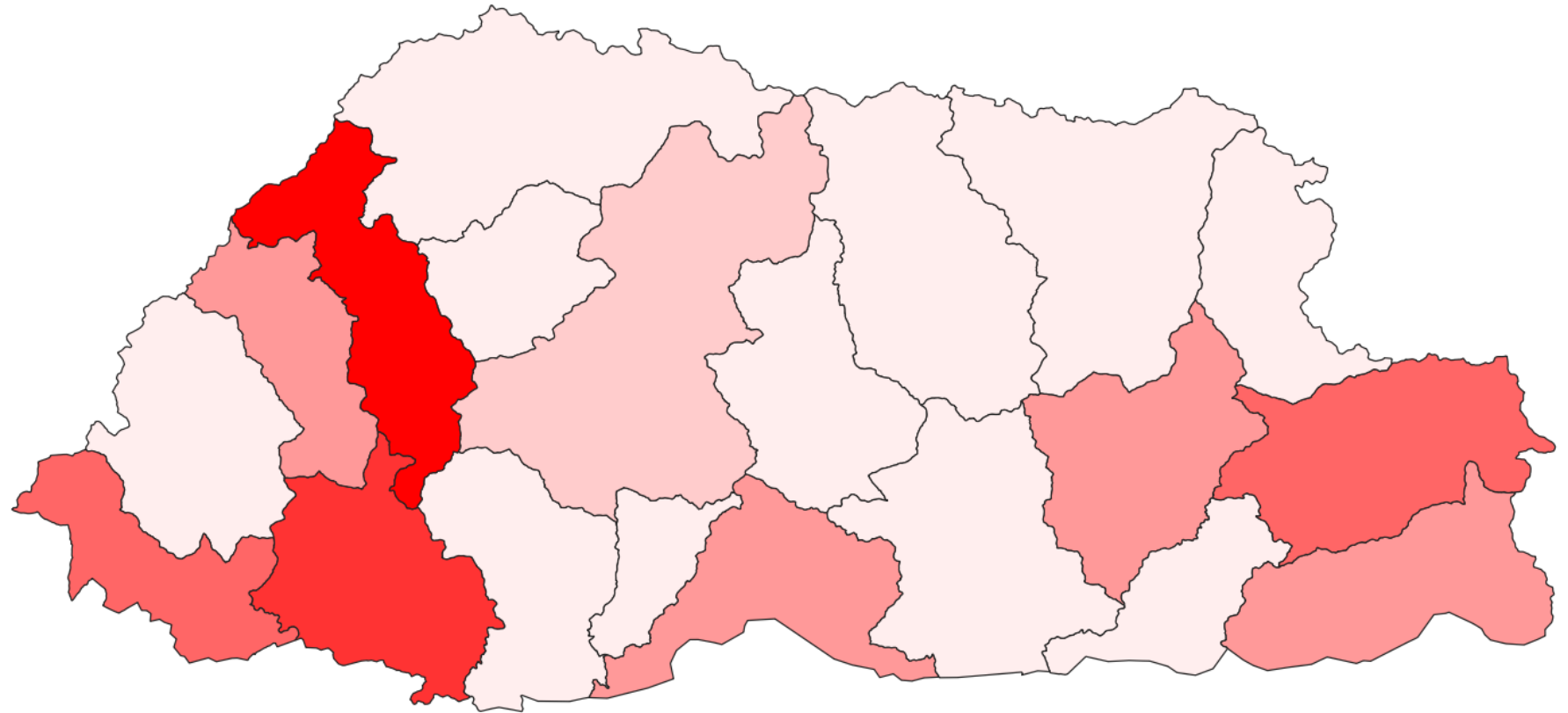
☒ Link class boundaries

Layer Rendering

Style [v]

OK Cancel Apply **Help**

# Changing colour of vector data





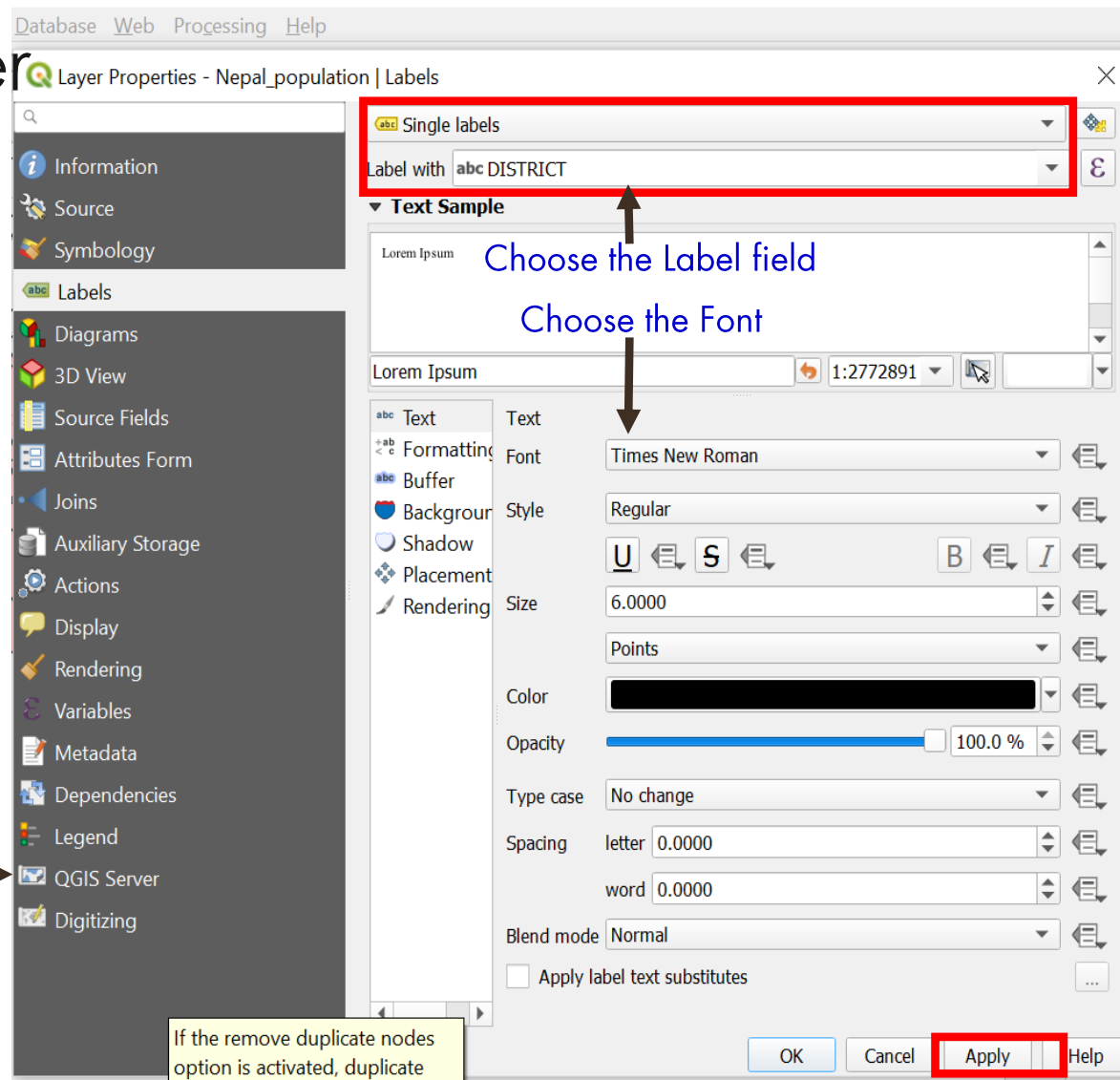
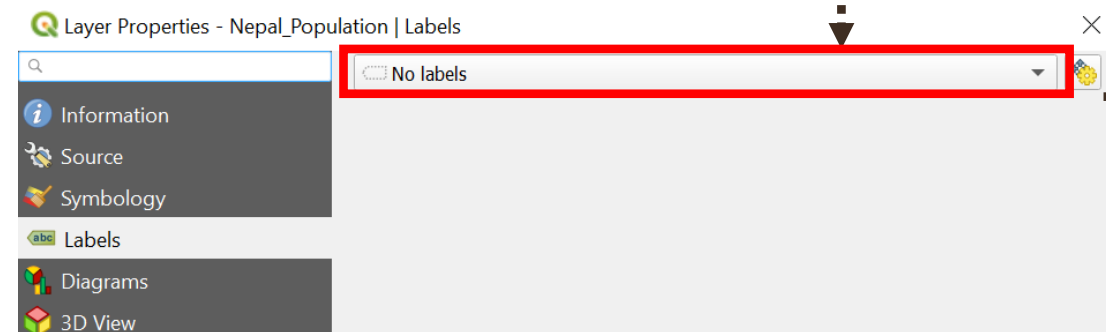
# Labelling vector data

➤ Right click on the added Layer

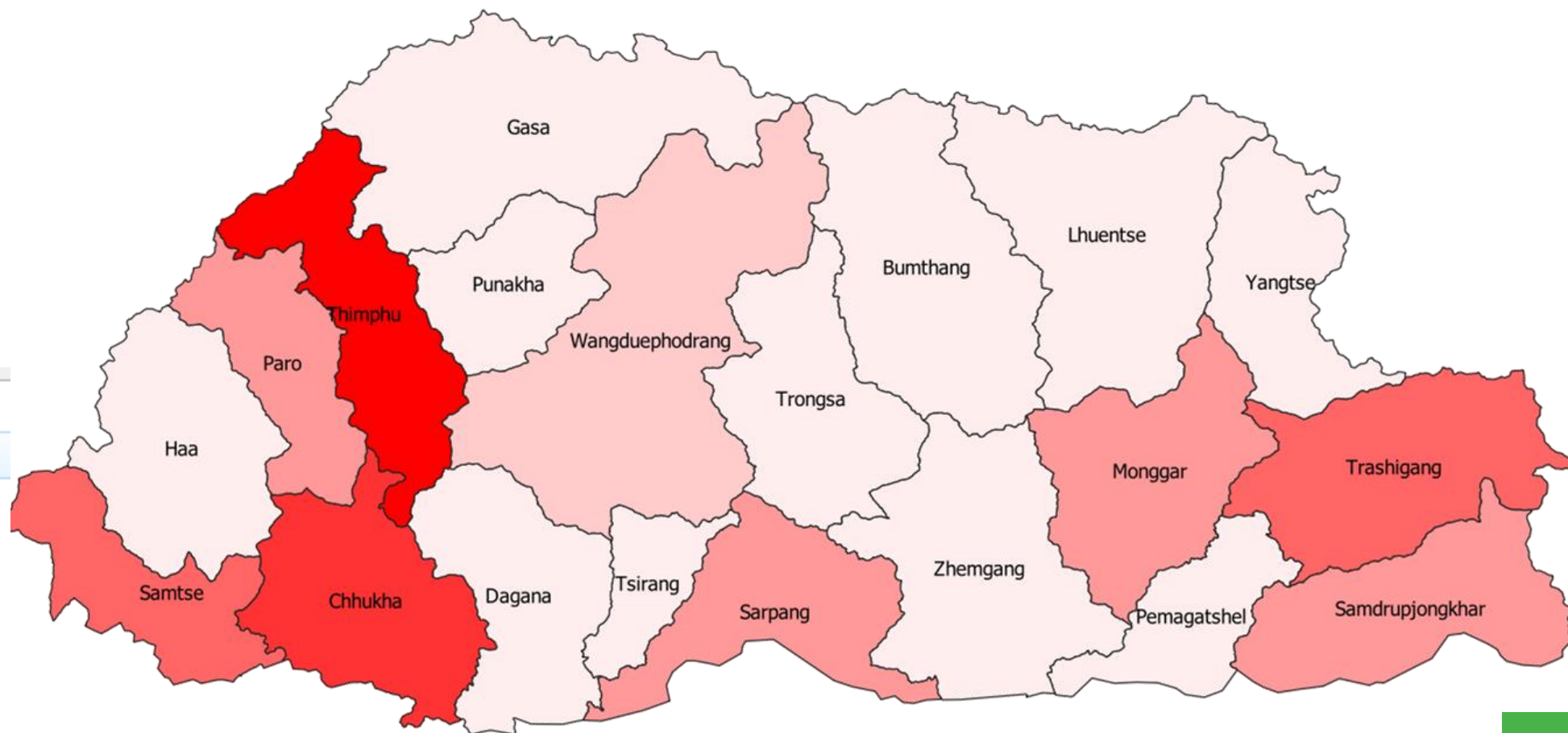
-> **Properties-> Labels**

➤ Dropdown the **No labels** and select **Single labels**

➤ Choose the Label field i.e. District



# Labelling vector data



## ✓ ☒ Bhutan Population

- ✓ ☒ 3116 - 19043
- ✓ ☒ 19043 - 34969
- ✓ ☒ 34969 - 50896
- ✓ ☒ 50896 - 66823
- ✓ ☒ 66823 - 82749
- ✓ ☒ 82749 - 98676

# Why Project the layer?

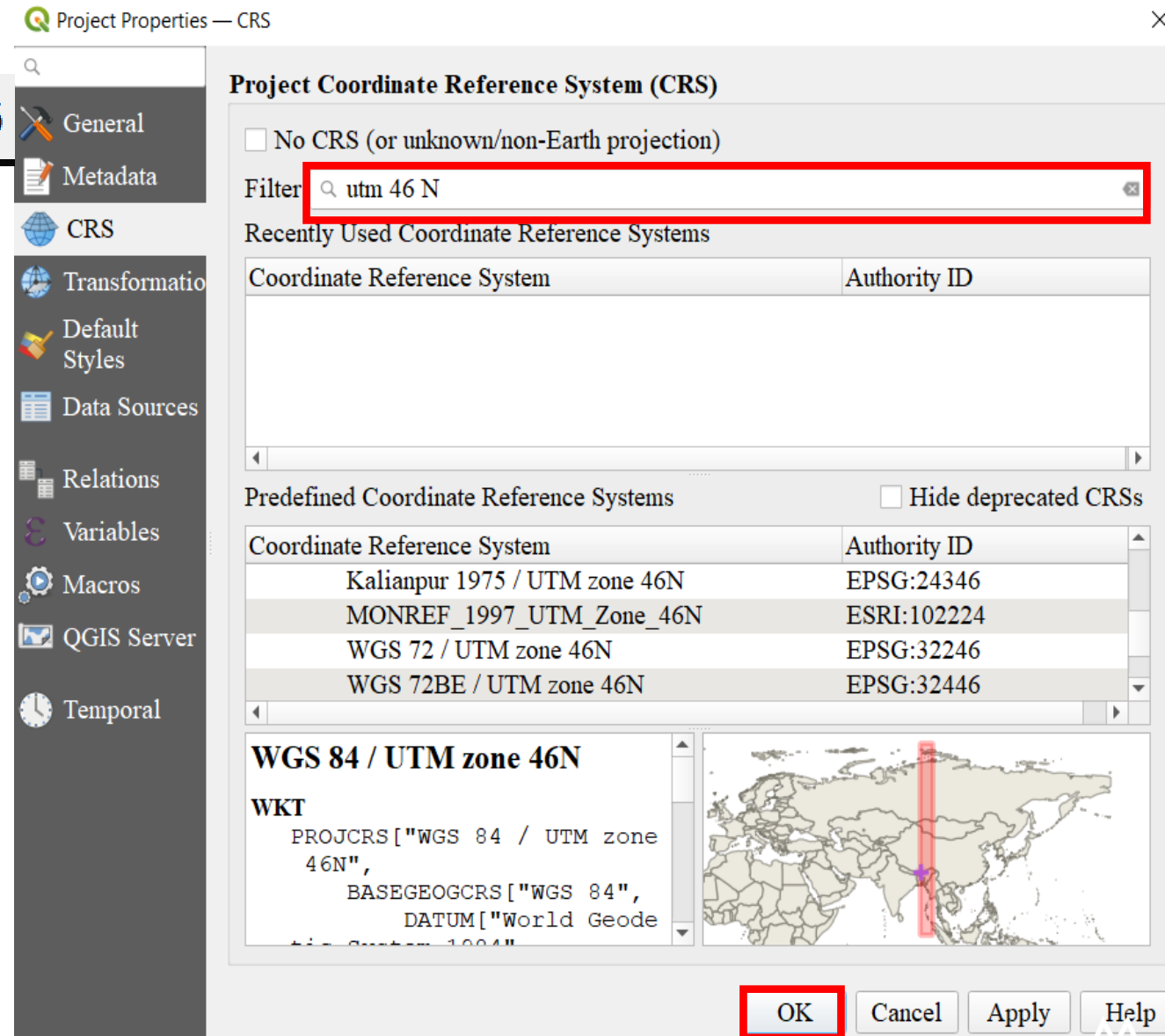
- To represent the curved surface of earth on a flat surface
- Coordinates are recorded in a Linear Unit i.e. meter
- Easy to understand and for calculations

**\* Please note for any analysis (raster/vector) all the layers must have similar CRS**



# Projection in QGIS

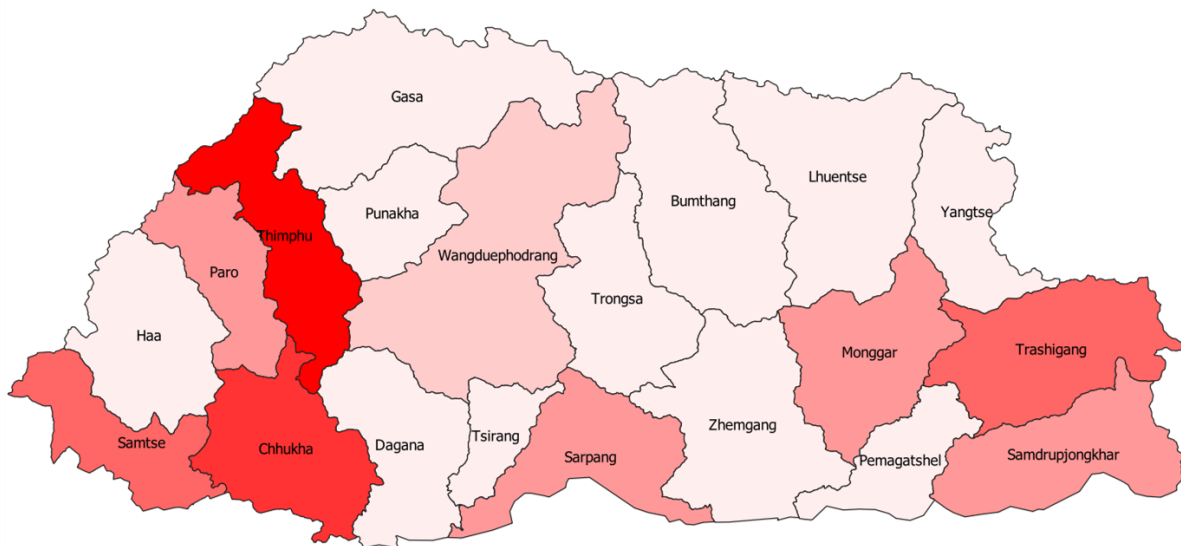
- Click at the **EPSG:4326** at the bottom right of QGIS
- In the **Filter** tab search UTM zone 42 -> select **WGS/UTM zone 46N**



# Projection in QGIS

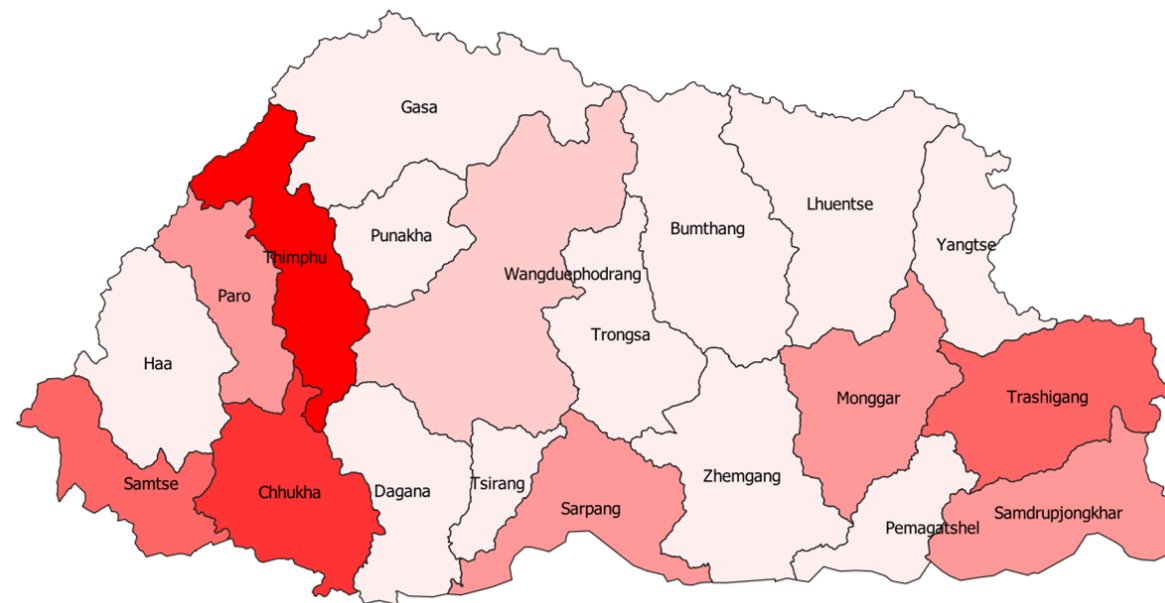
- You will observe the changed **CRS** below in the display window

Before



Coordinate 90.004,27.458 Scale 1:905957 Magnifier 100% Rotation 0.0 ° Render EPSG:4326

After



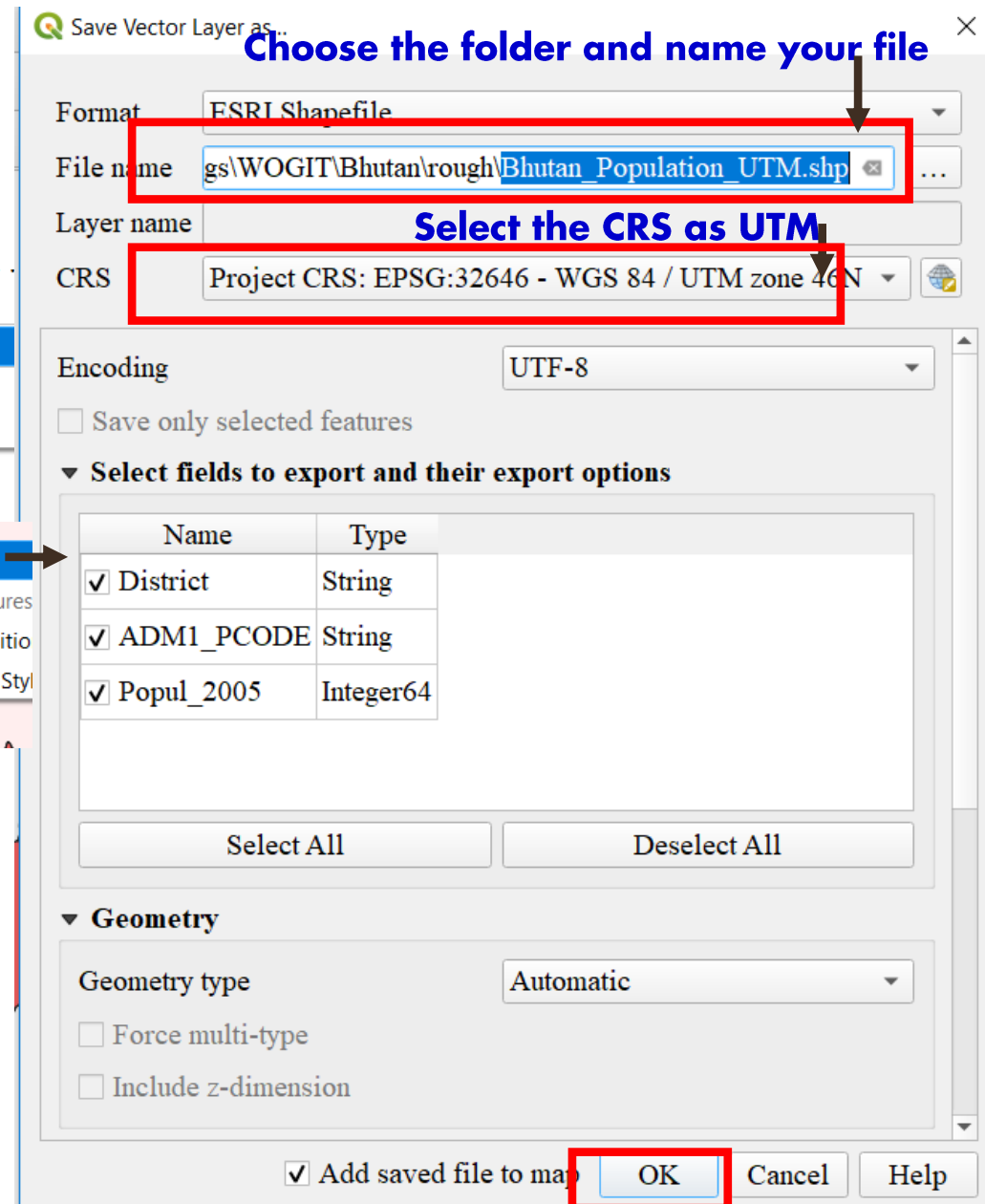
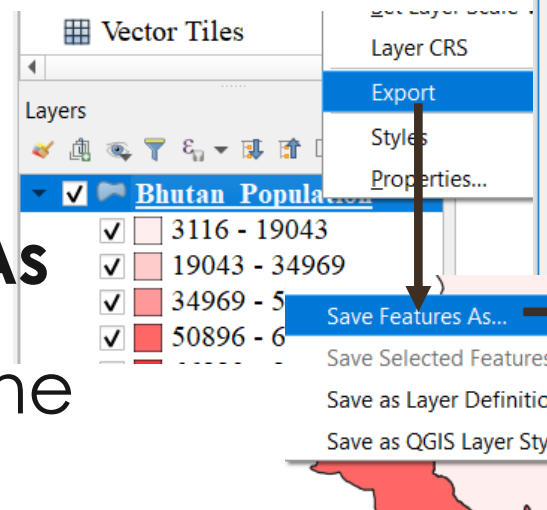
Coordinate 313401,3132558 Scale 1:1352974 Magnifier 100% Rotation 0.0 ° Render





# Projection in QGIS

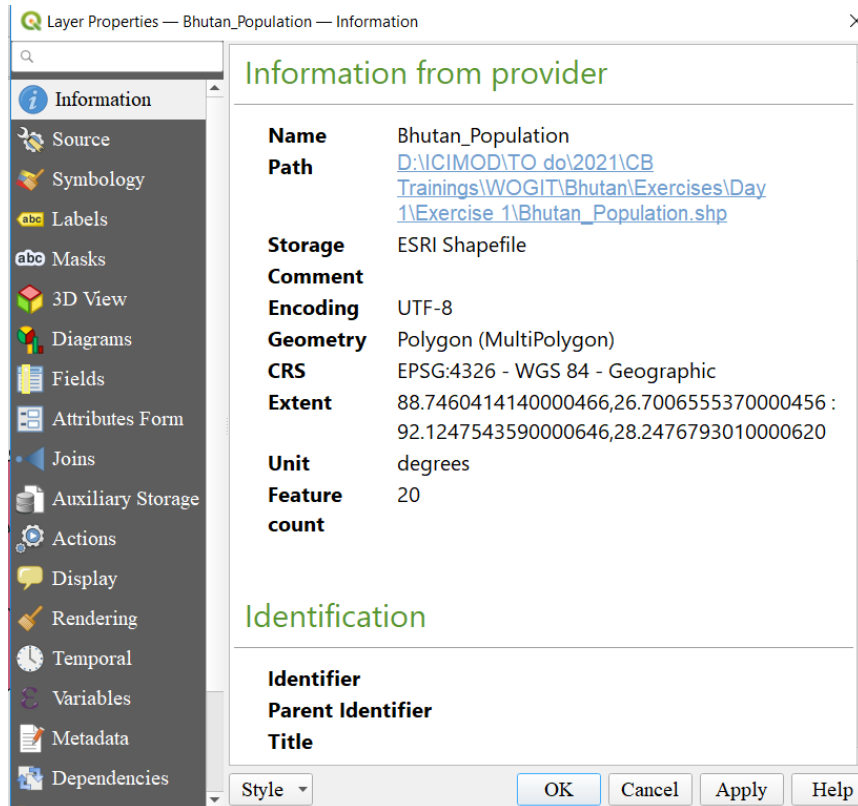
- Right click on the layer **Bhutan\_Population.shp** -> **Export** -> **Save Feature As**
- Select CRS and specify the parameters
- Give output file name as **Bhutan\_Population\_UTM.shp**



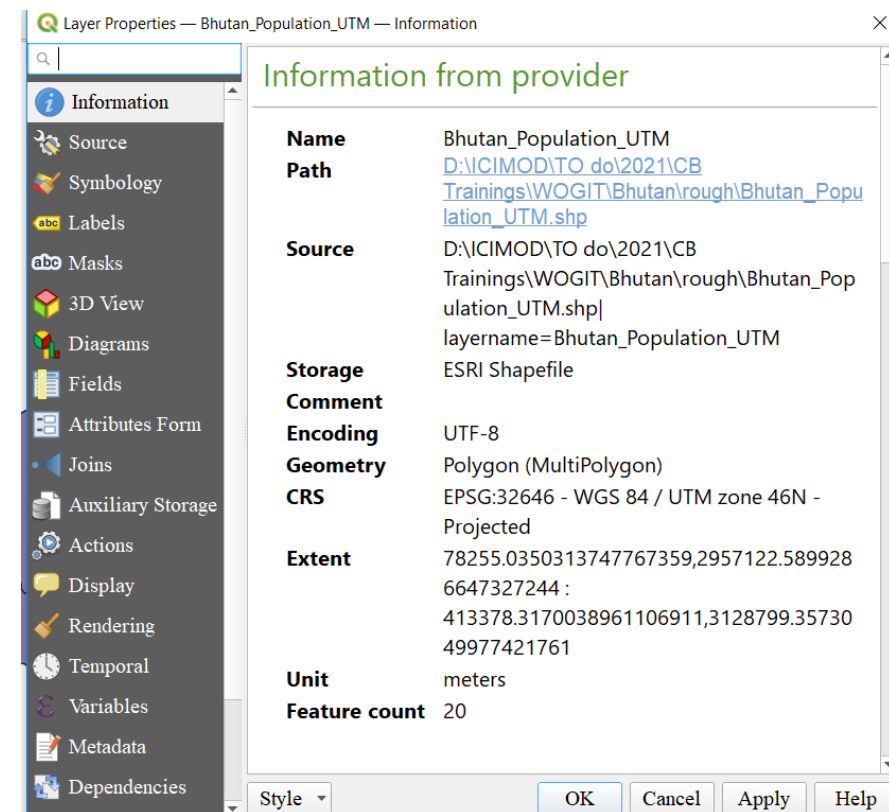
# Projection in QGIS

- Right click on **layer** -> **Properties**-> **Information** and observe the Difference

Before

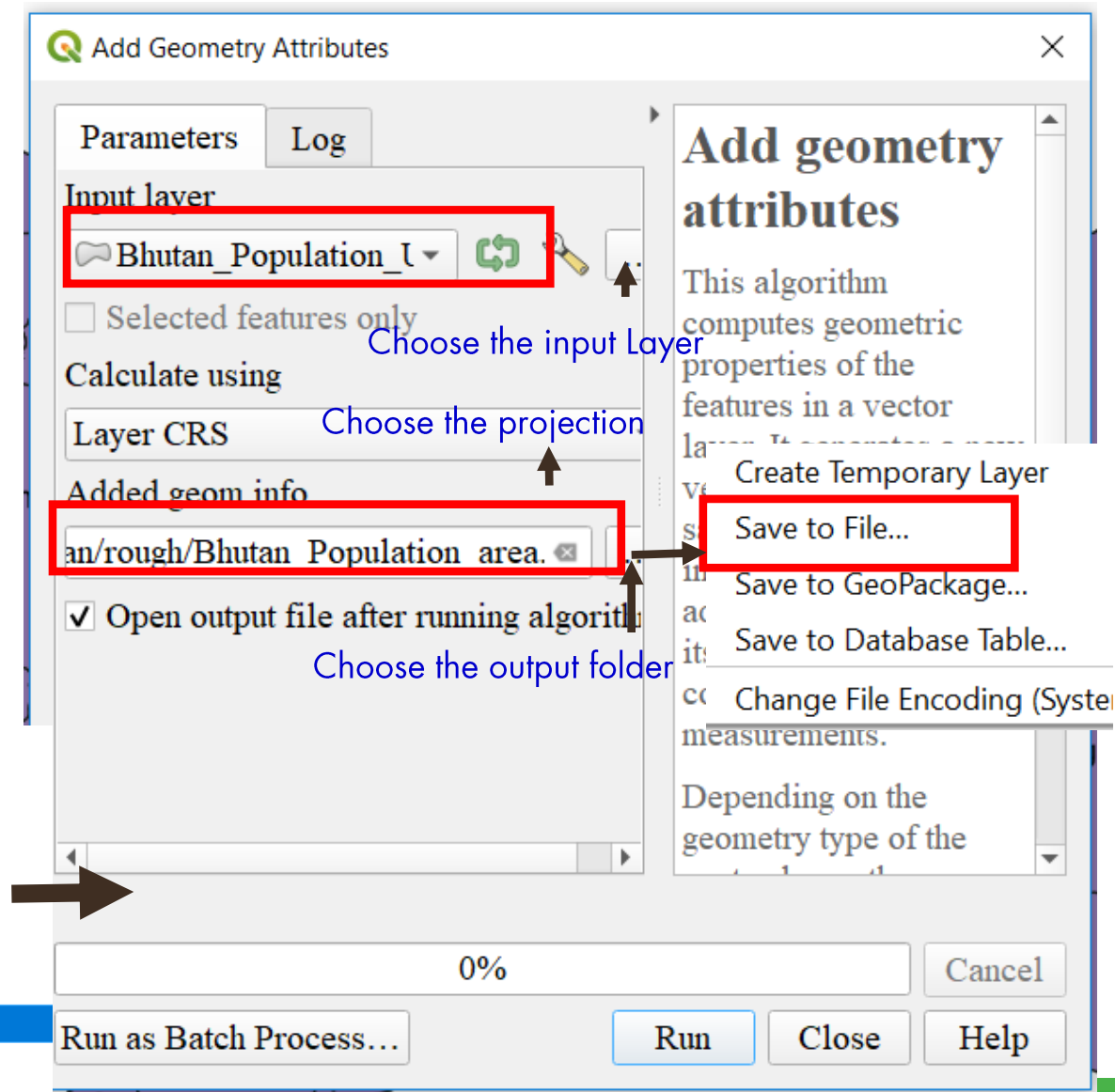
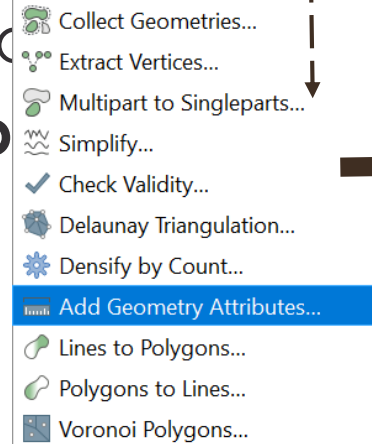
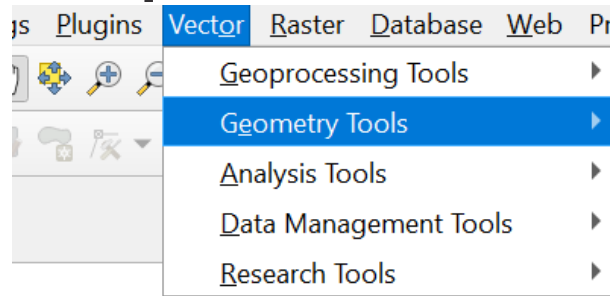


After



# Calculating area


- Load **Bhutan\_Population\_UTM.shp** (you created)
- Click on **Vector->Geometry Tools ->add geometry attributes**
- Select **Input layer** and CRS as **Layer CRS**
- Dropdown **Added geom info** and select **Save to File**
- Select the output folder and name as **Bhutan\_Population\_area.shp**
- **Run**





# Calculating area


Added Area and Perimeter fields


File with added geometry


☒  **Bhutan Population area**


☐  Bhutan\_Population\_UTM


☐  Bhutan\_Population


☒  3116 - 19043

☒  19043 - 34969

☒  34969 - 50896

☒  50896 - 66823

☒  66823 - 82749

☒  82749 - 98676



Bhutan\_Population\_area — Features Total: 20, Filtered: 20, Selected: 0

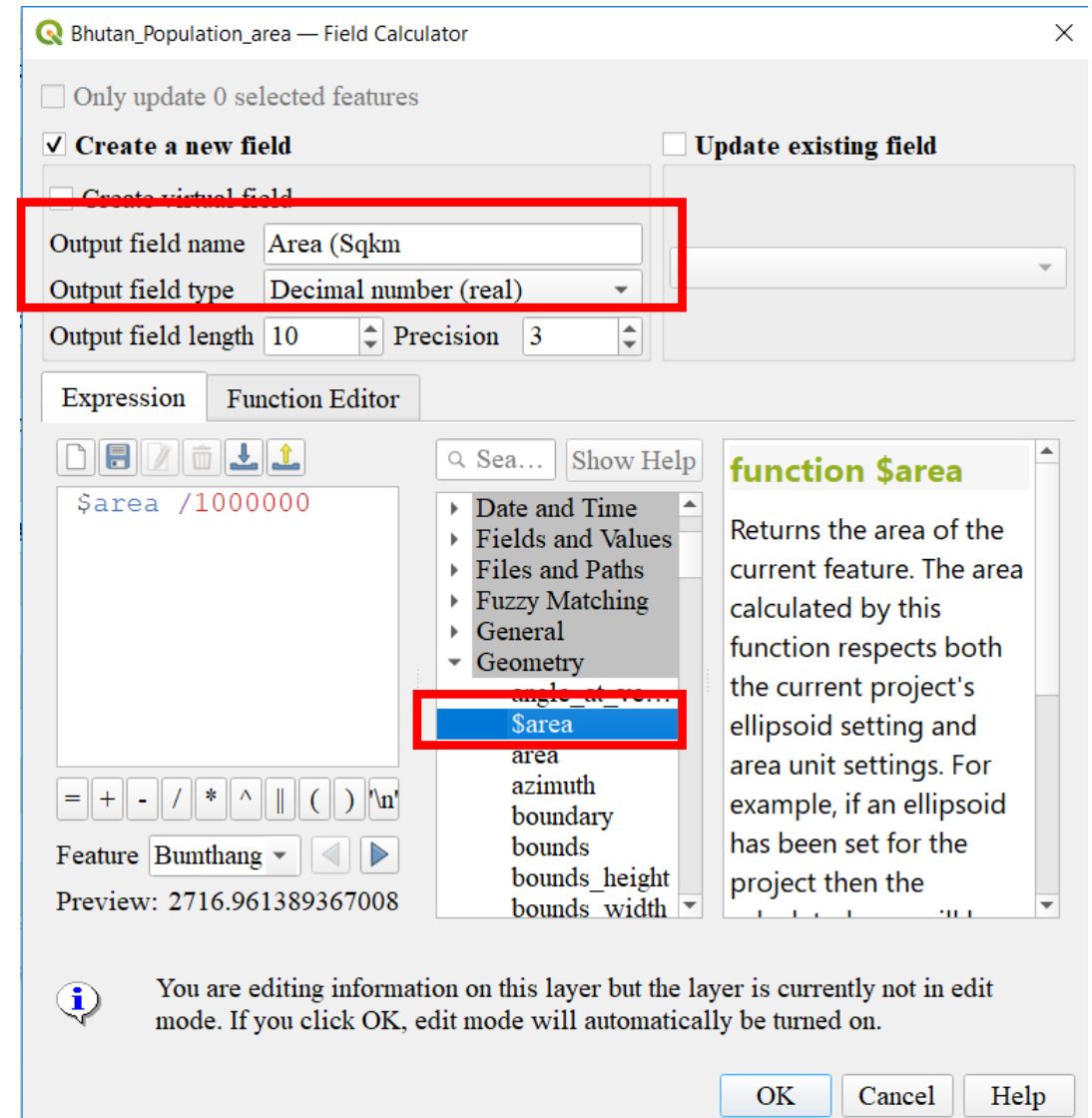
	District	ADM1_PCODE	Popul_2005	area	perimeter
1	Yangtse	BT016	17740	1447892249.2241210...	230577.491...
2	Zhemgang	BT020	18635	2416914472.1926879...	290233.716...
3	Tsirang	BT018	18667	638583262.48895263...	150671.848...
4	Wangdueph...	BT019	31135	4040275931.5161132...	419989.370...
5	Samdrupjon...	BT011	39961	1874805195.2678833...	233120.714...
6	Samtse	BT012	60100	1308447242.6657257...	251973.430...
7	Pemagatshel	BT009	13864	1021572033.5987548...	196255.763...
8	Punakha	BT010	17715	1111321481.5096435...	166449.464...
9	Trashigang	BT015	51134	2201425461.4020385...	282672.120...
10	Trongsa	BT017	13419	1814894287.1655273...	250183.511...
11	Sarpang	BT013	41549	1656664102.0897216...	286681.260...
12	Thimphu	BT014	98675	1799513737.1311645...	321107.322...
13	Dagana	BT003	18222	1725546886.6744079...	238930.107...
14	Gasa	BT004	3115	3139165218.6872253...	354869.919...
15	Bumthang	BT001	16115	2718119249.7778930...	281715.978...
16	Chhukha	BT002	74387	1883632872.9915466...	264795.845...

Show All Features



# Calculating area (Sq.Km) using field calculator

- Open Attribute Table -> **Click Toggle editing mode**  -> Open **Field Calculator** 
- Give Output **field name** and **type**
- Select **Geometry** from the Row groups -> **\$area**
- Type the expression





# Calculating area

Bhutan\_Population\_area — Features Total: 20, Filtered: 20, Selected: 0


Added new field

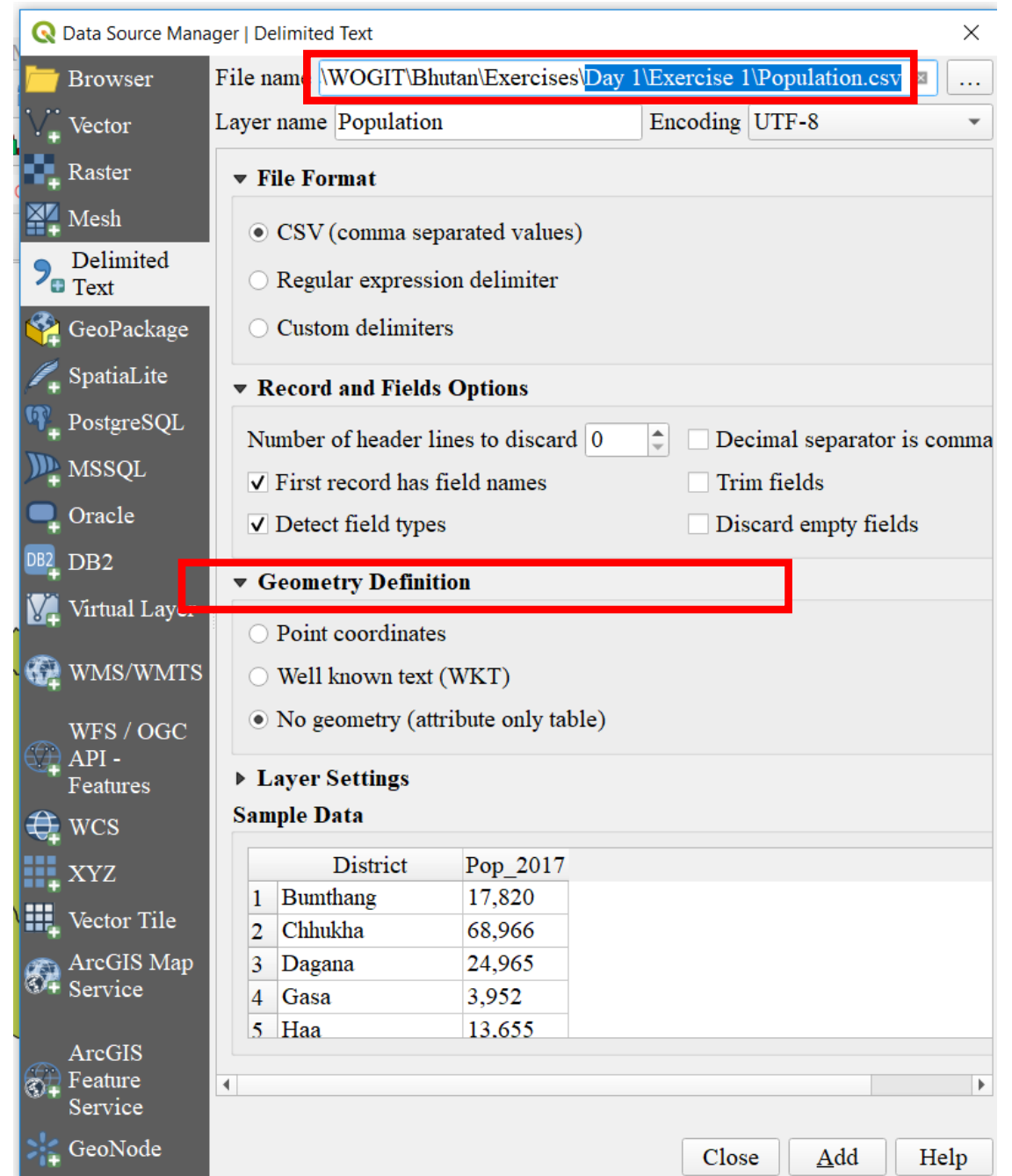
abc District =  $\epsilon$  Update All

	District	ADM1_PCODE	Popul_2005	area	perimeter	Area (Sqkm)
1	Bumthang	BT001	16116	2718119249.7778930...	281715.978...	2716.961
2	Chhukha	BT002	74387	1883632872.9915466...	264795.845...	1879.668
3	Dagana	BT003	18222	1725546886.6744079...	238930.107...	1722.822
4	Gasa	BT004	3116	3139165218.6872253...	354869.919...	3134.402
5	Haa	BT005	11648	1909847354.1775817...	225456.752...	1904.537
6	Lhuentse	BT006	15395	2857938248.1088256...	304882.747...	2857.812
7	Monggar	BT007	37069	1943497121.9293823...	247600.411...	1943.556
8	Paro	BT008	36433	1290071403.5017395...	229941.715...	1287.000
9	Pemagatshel	BT009	13864	1021572033.5987548...	196255.763...	1021.677
10	Punakha	BT010	17715	1111321481.5096435...	166449.464...	1109.560
11	Samdrupjon...	BT011	39961	1874805195.2678833...	233120.714...	1875.613
12	Samtse	BT012	60100	1308447242.6657257...	251973.430...	1304.562
13	Sarpang	BT013	41549	1656664102.0897216...	286681.260...	1655.305



# Joining Attributes

- Click  and select **Delimited Text**
- Add **Population.csv** file from **Day1 \Exercise1**
- Select **No geometry** under **Geometry Definition**
- You will observe the data under **Sample Data**
- Click **ADD**



# Joining Attributes

- Right click on layer

**Bhutan\_Population\_area.shp**

-> **properties**

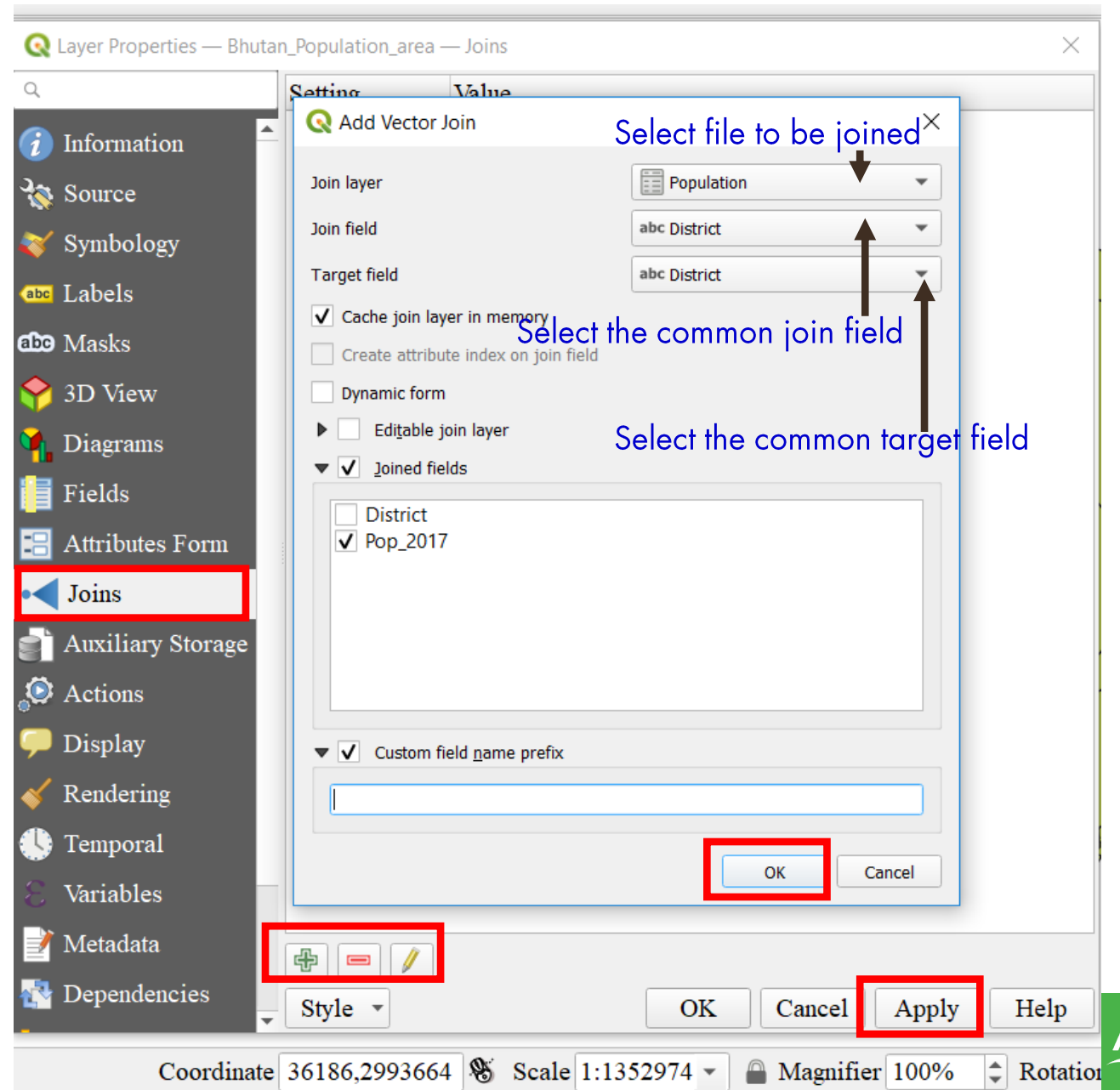
- Click **Joins**

- Click on  sign

- Select the join layer

- Select the common **join** and **target field**

- Click **OK**



# Joining Attributes

Bhutan\_Population\_area — Features Total: 20, Filtered: 20, Selected: 0

Joined field

abc District = [ ] Update All Update S

	District	ADM1_PCODE	Popul_2005	area	perimeter	Area (Sqkm)	Pop_2017
1	Chhukha	BT002	74387	1883632872.9915466...	264795.845...	1879.668	68,966
2	Samtse	BT012	60100	1308447242.6657257...	251973.430...	1304.562	62,590
3	Paro	BT008	36433	1290071403.5017395...	229941.715...	1287.000	46,316
4	Sarpang	BT013	41549	1656664102.0897216...	286681.260...	1655.305	46,004
5	Trashigang	BT015	51134	2201425461.4020385...	282672.120...	2202.328	45,518
6	Wangdueph...	BT019	31135	4040275931.5161132...	419989.370...	4035.593	42,186
7	Monggar	BT007	37069	1943497121.9293823...	247600.411...	1943.556	37,150
8	Samdrupjon...	BT011	39961	1874805195.2678833...	233120.714...	1875.613	35,079
9	Gasa	BT004	3116	3139165218.6872253...	354869.919...	3134.402	3,952
10	Punakha	BT010	17715	1111321481.5096435...	166449.464...	1109.560	28,740
11	Dagana	BT003	18222	1725546886.6744079...	238930.107...	1722.822	24,965
12	Pemagatshel	BT009	13864	1021572033.5987548...	196255.763...	1021.677	23,632
13	Tsirang	BT018	18667	638583262.48895263...	150671.848...	637.830	22,376
14	Trongsa	BT017	13419	1814894287.1655273...	250183.511...	1813.597	19,960
15	Bumthang	BT001	16116	2718119249.7778930...	281715.978...	2716.961	17,820
16	Zhemgang	BT020	18636	2416914472.1926879...	290233.716...	2416.157	17,763
17	Yangtse	BT016	17740	1447892249.2241210...	230577.491...	1448.266	17,300
18	Lhuentse	BT006	15395	2857938248.1088256...	304882.747...	2857.812	14,437
19	Thimphu	BT014	98676	1799513737.1311645...	321107.322...	1795.771	138,736
20	Ugong	BT005	11648	1000847354.1775817...	225456.752...	1004.527	12,655

Show All Features

Export the data as Pop\_Joined.shp







Thank you

Let's protect  
the pulse.