



ICIMOD

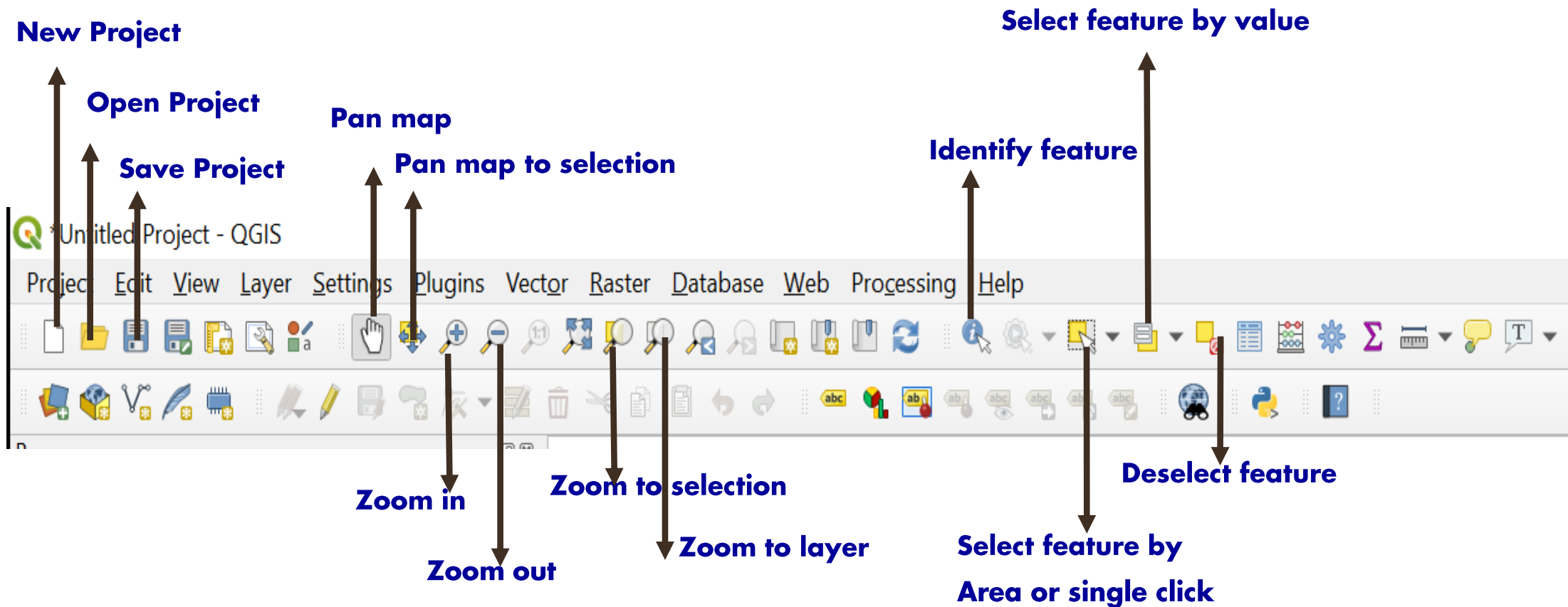
Empowering Women in Geospatial Information Technology

Poonam Tripathi

Vector data exploration and visualization

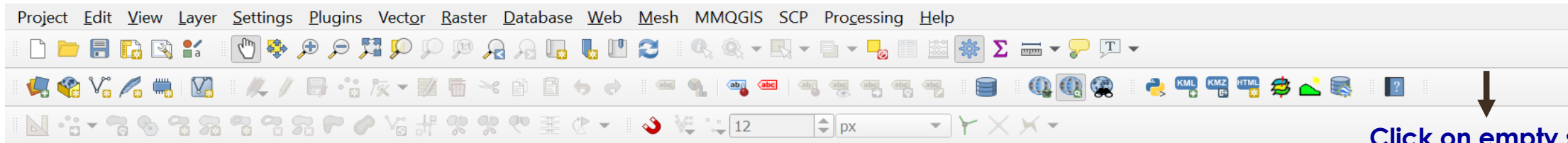
Introduction to QGIS

Exploring the Map View



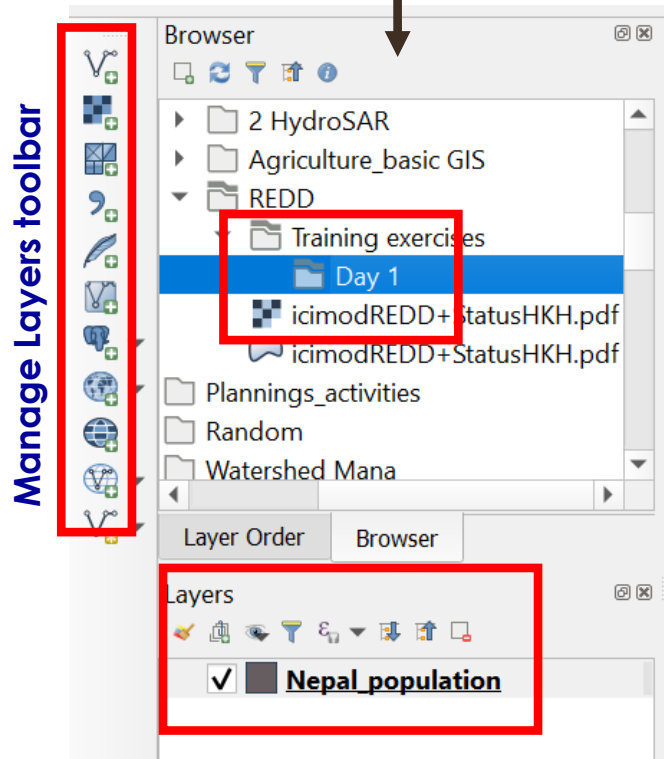
Adding panels and toolbars

*Untitled Project - QGIS



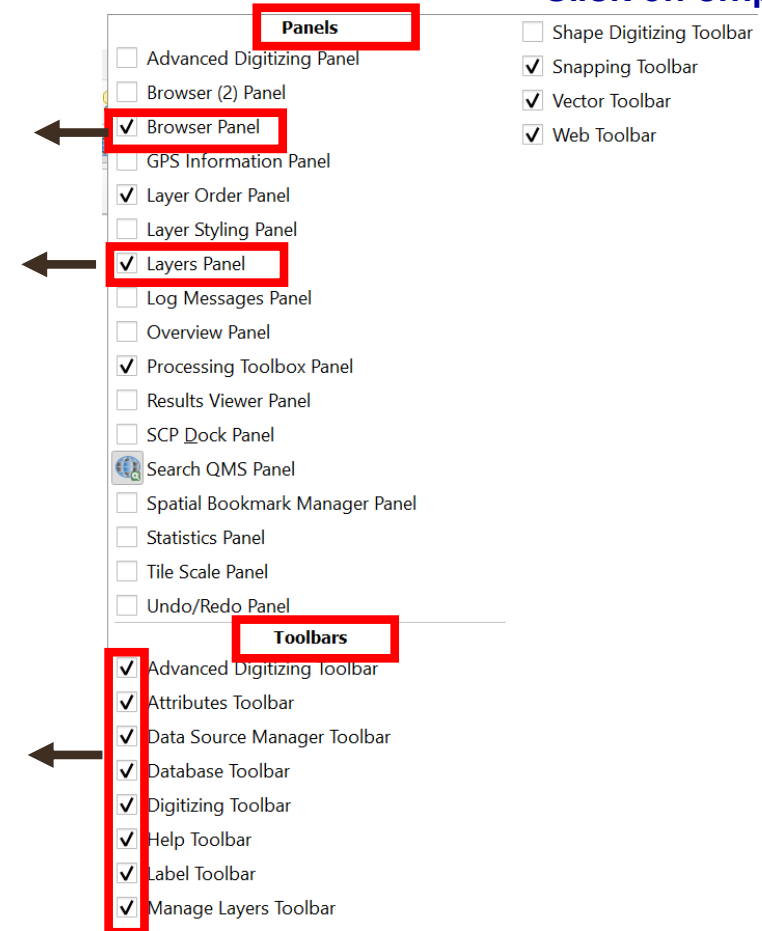
Click on empty space

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 

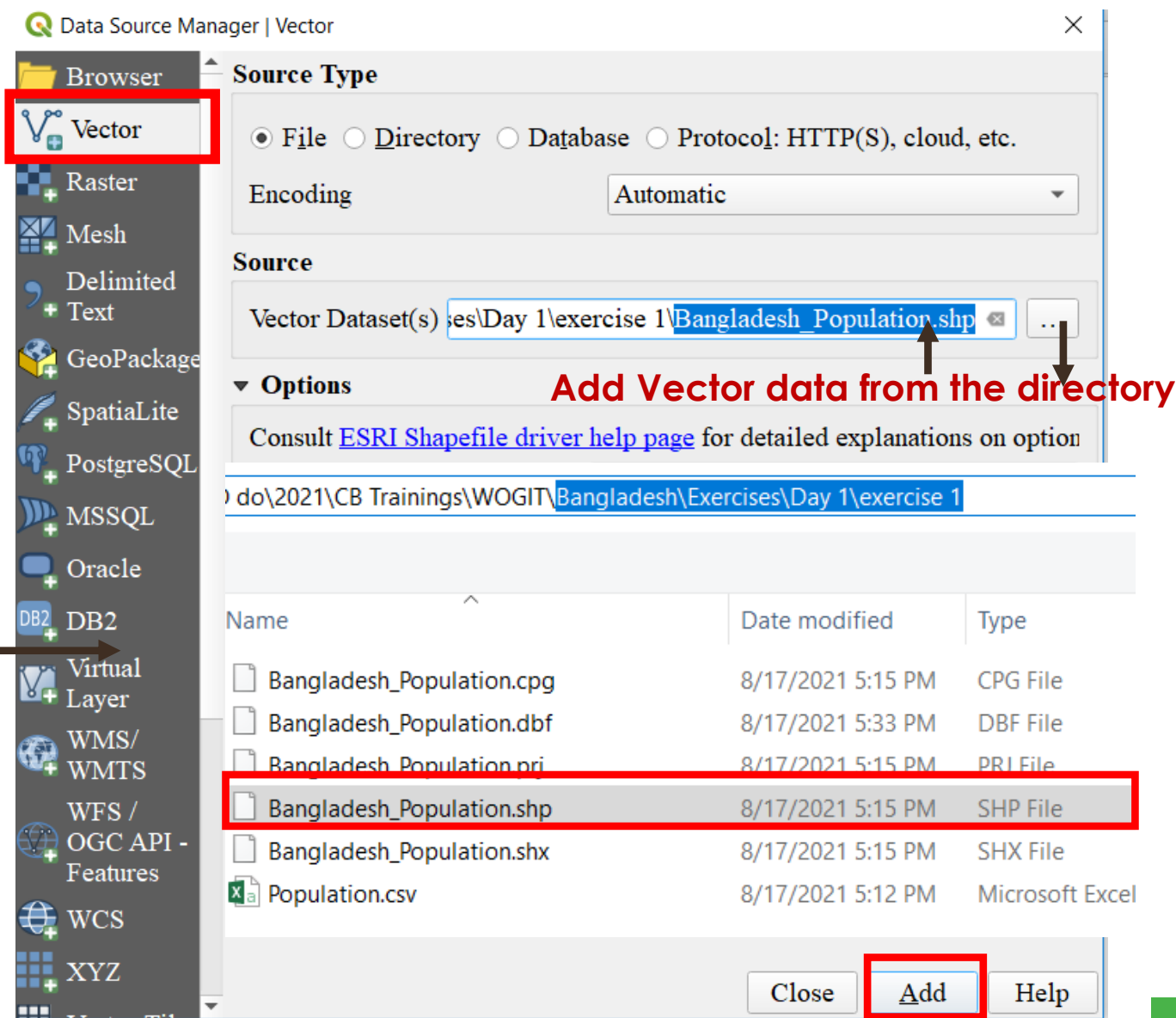
➤ A window opens

➤ Click on **Vector**

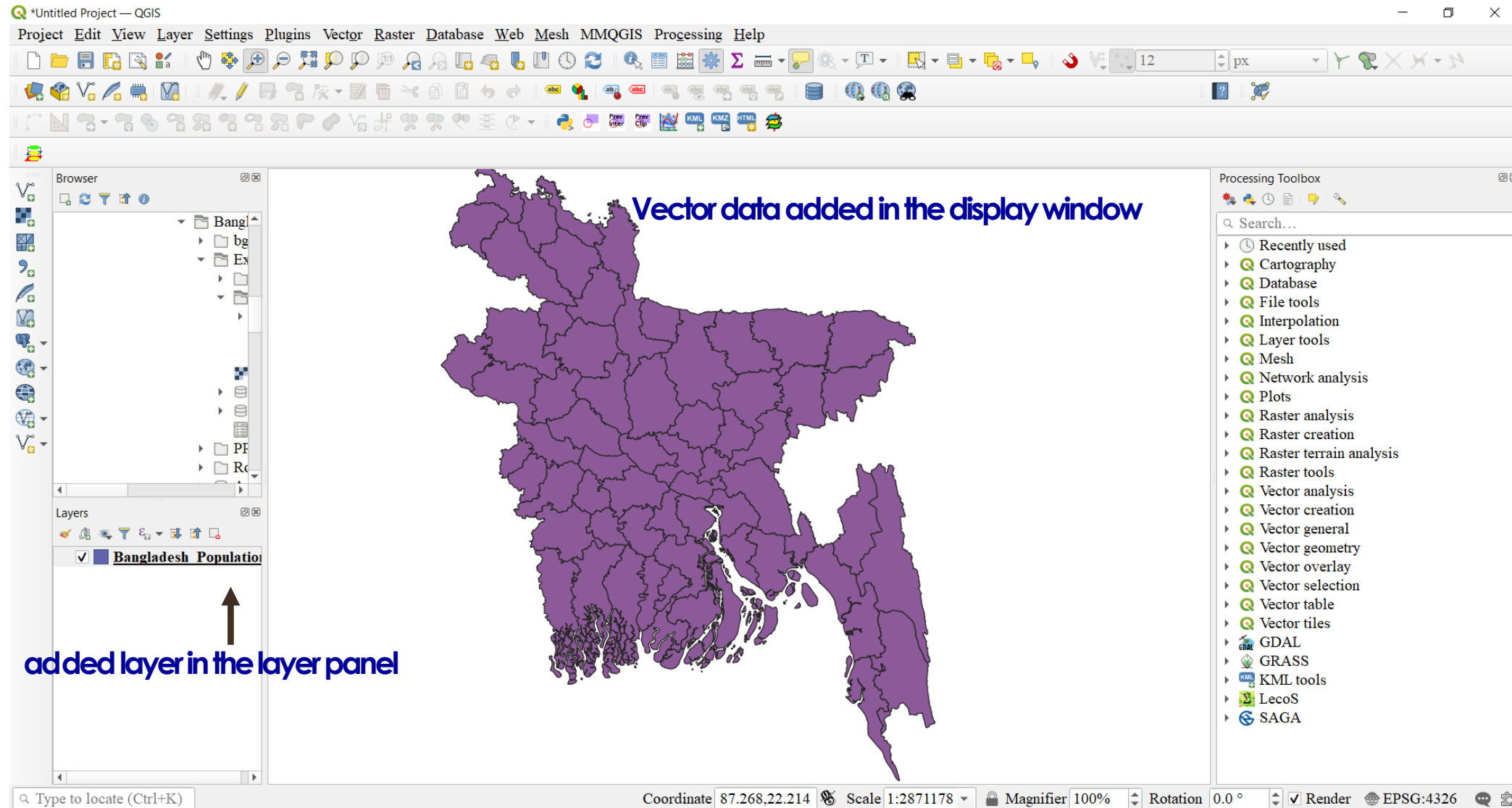
➤ Navigate to the folder where the exercise data is kept

➤ Add vector file

Bangladesh_Population.shp
from Day1\Exercise1

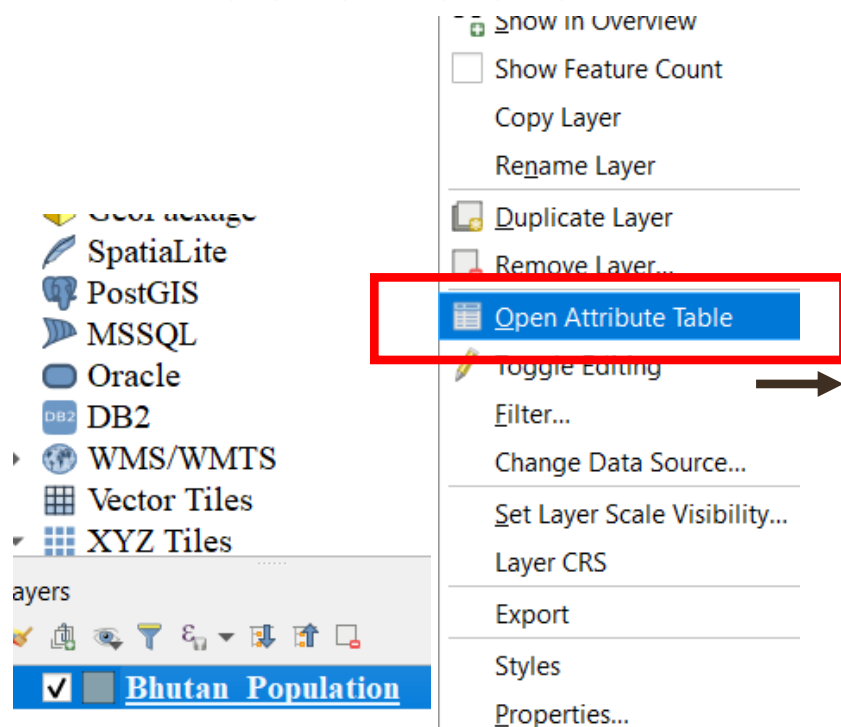


Adding vector data



Exploring attribute table

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



	District	District 1	Area(Sqkm)	Pop_1991	Pop_2001
1	Bagerhat	Bagerhat	BAG	3959	1431332
2	Bandarban	Bandarban	BAN	4479	230569
3	Barguna	Barguna	BRG	1831	775693
4	Barisal	Barisal	BRS	2785	2207426
5	Bhola	Bhola	BHO	3403	1476328
6	Bogra	Bogra	BOG	2920	2669287
7	Brahamanb...	Brahamanb...	BBA	1927	2141745
8	Chandpur	Chandpur	CHA	1704	2032449
9	Chittagong	Chittagong	CHI	5283	5296127
10	Chuadanga	Chuadanga	CHU	1177	807164
11	Comilla	Comilla	COM	3085	1177666
12	Cox's Bazar	Cox's Bazar	COX	2492	1419260
13	Dhaka	Dhaka	DHA	1464	5839642
14	Dinajpur	Dinajpur	DIN	3438	2260131
15	Faridpur	Faridpur	FAR	2073	1505686
16	Feni	Feni	FEN	928	1096745
17	Gaibandha	Gaibandha	GAI	2179	1949274
18	Gazipur	Gazipur	GAZ	1800	1621562
19	Gopalganj	Gopalganj	GOP	1490	1060791

Show All Features

Exploring attribute table


Diagram illustrating the exploration of an attribute table in a GIS application, showing various actions and their corresponding tool icons:

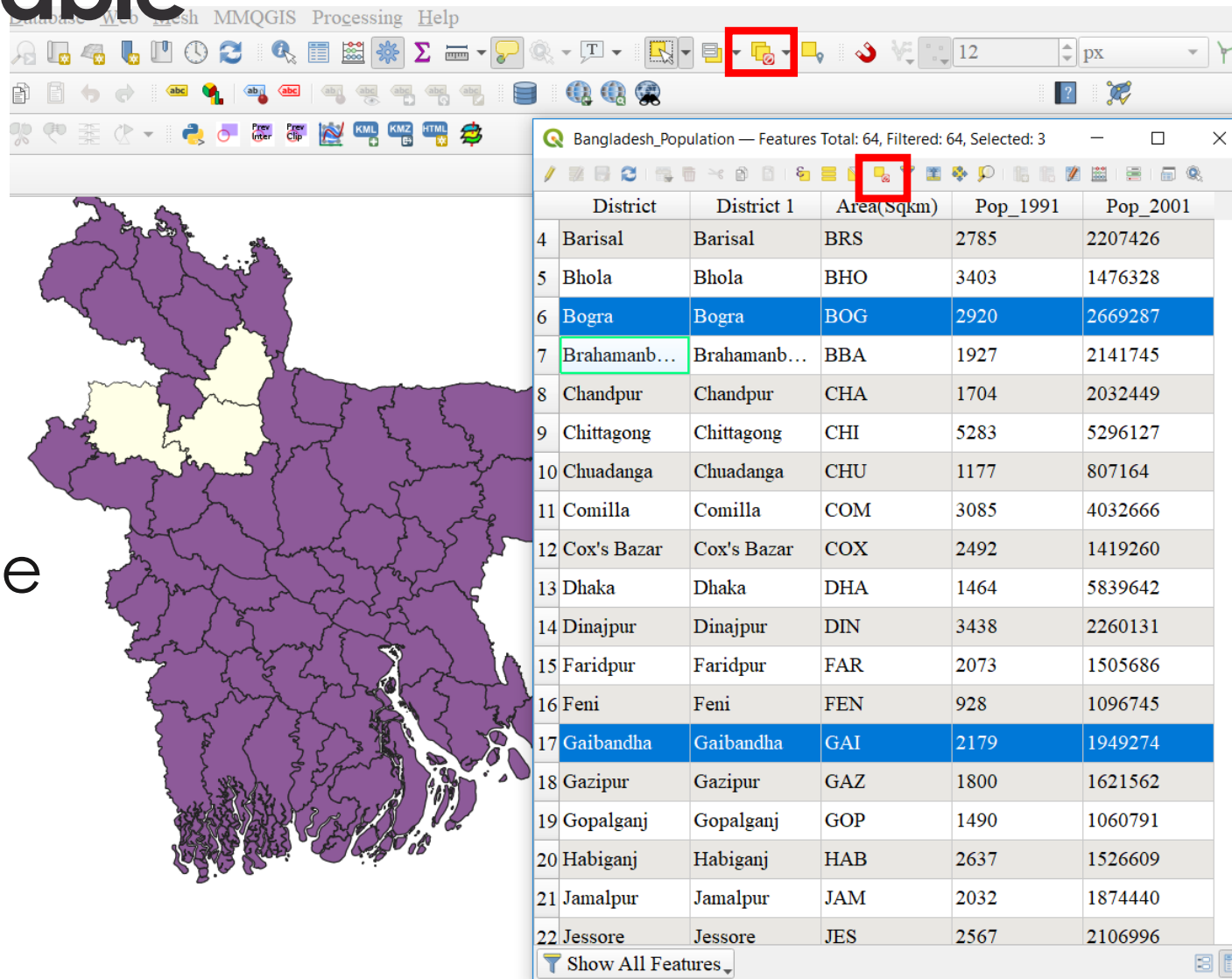
- Select all**: Indicated by an arrow pointing to the 'Select all' icon.
- Invert selection**: Indicated by an arrow pointing to the 'Invert selection' icon.
- Deselect all**: Indicated by an arrow pointing to the 'Deselect all' icon.
- Delete field**: Indicated by an arrow pointing to the 'Delete field' icon.
- Organize column**: Indicated by an arrow pointing to the 'Organize column' icon.
- Open field calculator**: Indicated by an arrow pointing to the 'Open field calculator' icon.

The attribute table displayed is titled "Bangladesh_Population" and shows the following data:

	District	District 1	Area(Sqkm)	Pop_1991	Pop_2001
1	Bagerhat	Bagerhat	BAG	3959	1431332
2	Bandarban	Bandarban	BAN	4479	230569
3	Barguna	Barguna	BRG	1831	775693
4	Barisal	Barisal	BRS	2785	2207426
5	Bhola	Bhola	BHO	3403	1476328
6	Bogra	Bogra	BOG	2920	2669287
7	Brahamanb...	Brahamanb...	BBA	1927	2141745
8	Chandpur	Chandpur	CHA	1704	2032449
9	Chittagong	Chittagong	CHI	5283	5296127
10	Chuadanga	Chuadanga	CHU	1177	807164
11	Comilla	Comilla	COM	3085	1177666
12	Cox's Bazar	Cox's Bazar	COX	2492	1419260
13	Dhaka	Dhaka	DHA	1464	5839642
14	Dinajpur	Dinajpur	DIN	3438	2260131
15	Faridpur	Faridpur	FAR	2073	1505686

Exploring attribute table

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



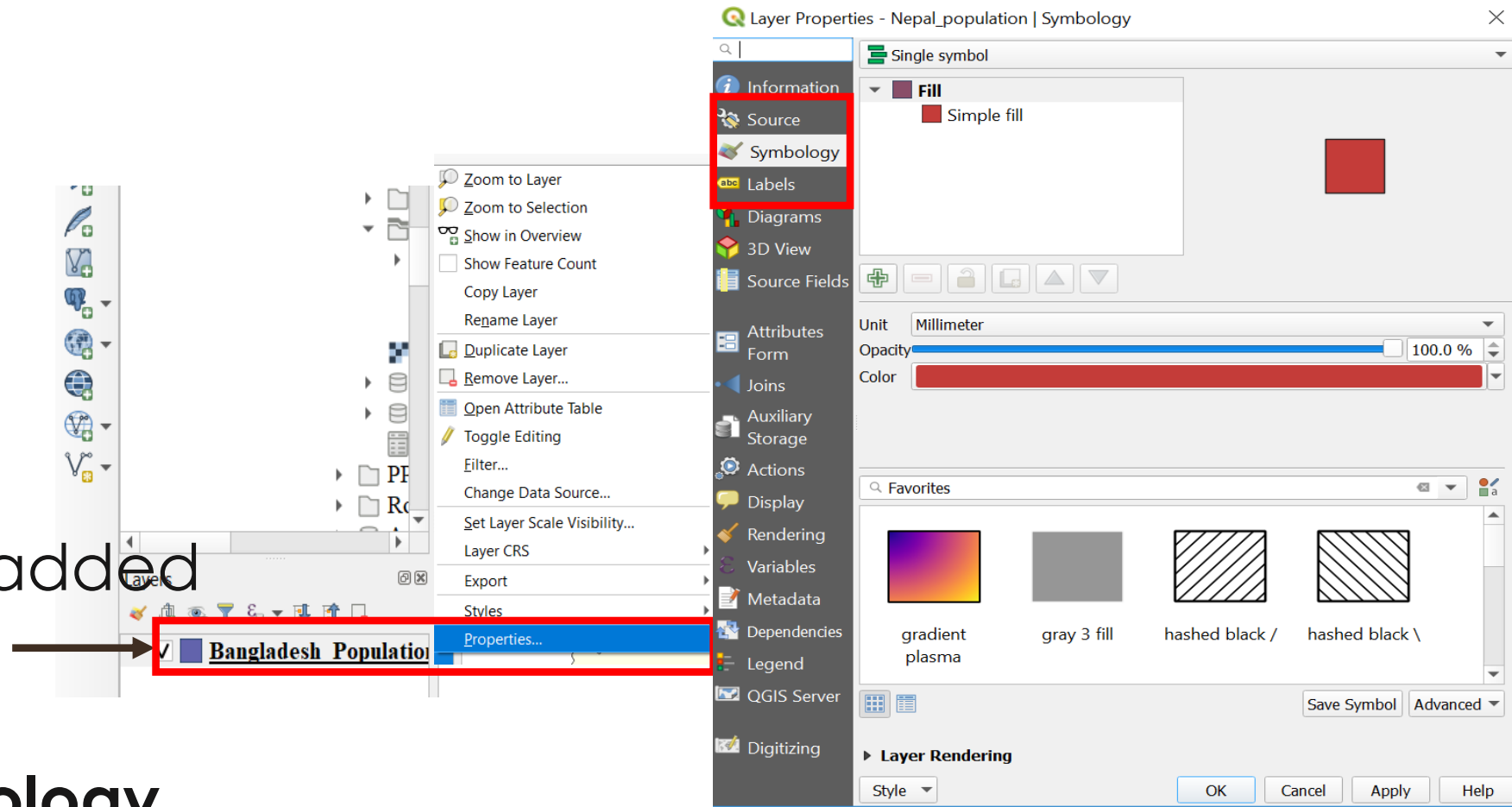
	District	District 1	Area(Sqkm)	Pop_1991	Pop_2001
4	Barisal	Barisal	BRS	2785	2207426
5	Bhola	Bhola	BHO	3403	1476328
6	Bogra	Bogra	BOG	2920	2669287
7	Brahmanb...	Brahmanb...	BBA	1927	2141745
8	Chandpur	Chandpur	CHA	1704	2032449
9	Chittagong	Chittagong	CHI	5283	5296127
10	Chuadanga	Chuadanga	CHU	1177	807164
11	Comilla	Comilla	COM	3085	4032666
12	Cox's Bazar	Cox's Bazar	COX	2492	1419260
13	Dhaka	Dhaka	DHA	1464	5839642
14	Dinajpur	Dinajpur	DIN	3438	2260131
15	Faridpur	Faridpur	FAR	2073	1505686
16	Feni	Feni	FEN	928	1096745
17	Gaibandha	Gaibandha	GAI	2179	1949274
18	Gazipur	Gazipur	GAZ	1800	1621562
19	Gopalganj	Gopalganj	GOP	1490	1060791
20	Habiganj	Habiganj	HAB	2637	1526609
21	Jamalpur	Jamalpur	JAM	2032	1874440
22	Jessore	Jessore	JES	2567	2106996

Show All Features

Changing colour of vector data

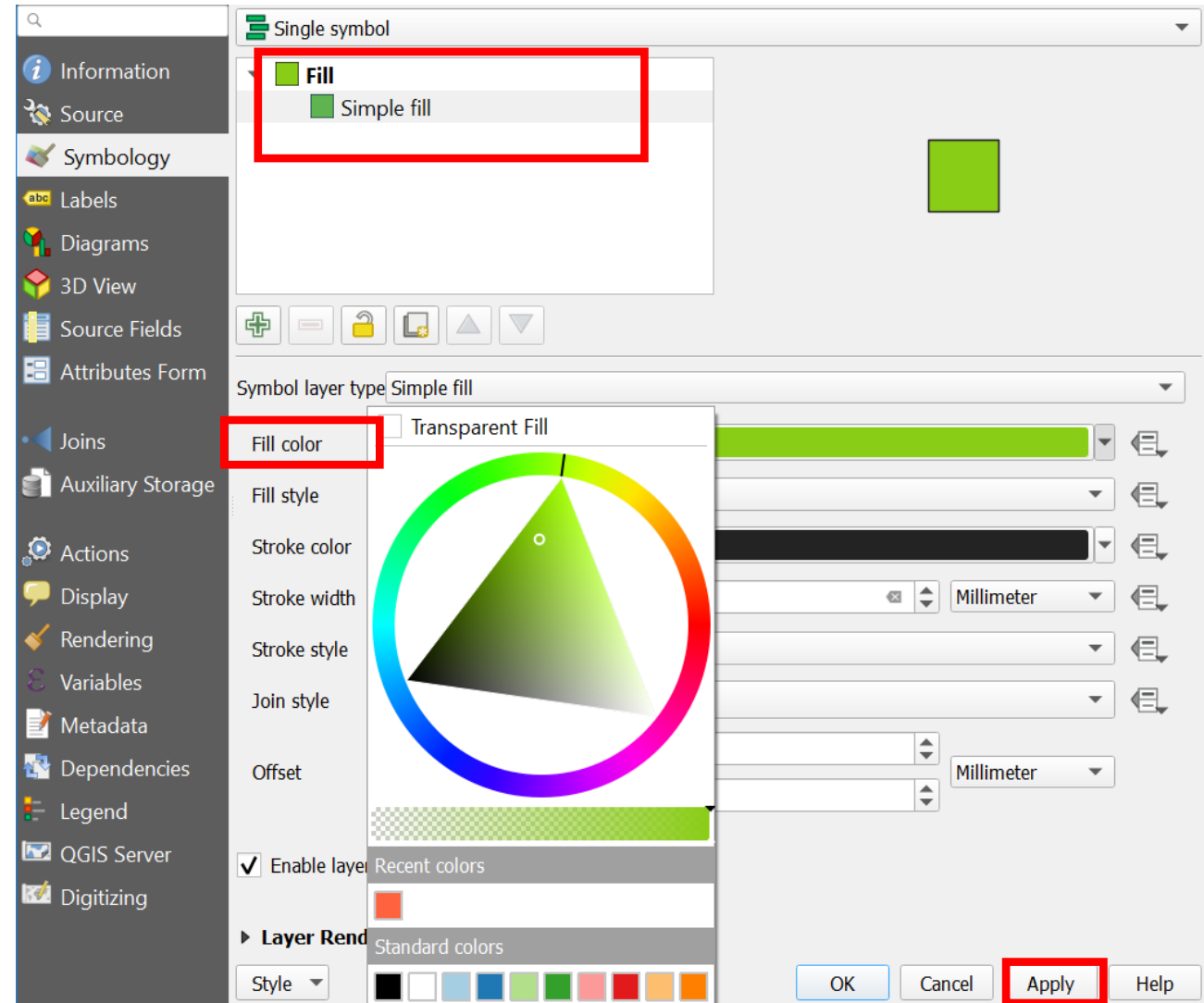
➤ Right click on the added Layer

-> Properties-> Symbology

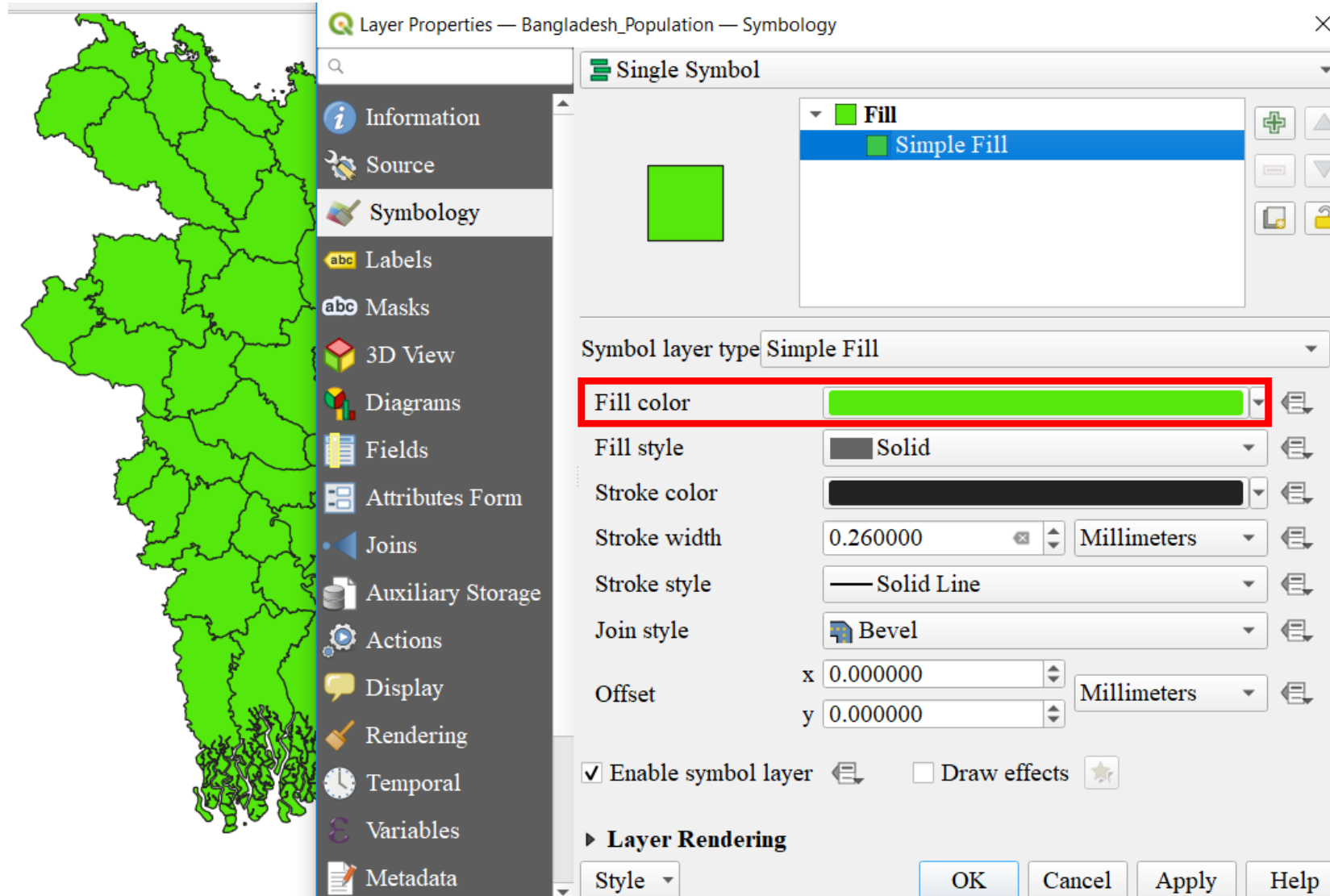


Changing colour of vector data

- 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 **Pop_1991**
- Select the classification mode
- Change the colors by choosing from the Palette of the color ramp -> click **Apply**

Layer Properties — Bangladesh_Population — Symbology

Graduated **Select Graduated**

Value: 123 Popul_1991

Symbol: [Red color bar]

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

Color ramp: [Red to white gradient bar]

Classes Histogram

Symbol	Values	Legend
<input checked="" type="checkbox"/>	700.00 - 1783.20	700 - 1783
<input checked="" type="checkbox"/>	1783.20 - 2866.40	1783 - 2866
<input checked="" type="checkbox"/>	2866.40 - 3949.60	2866 - 3950
<input checked="" type="checkbox"/>	3949.60 - 5032.80	3950 - 5033
<input checked="" type="checkbox"/>	5032.80 - 6116.00	5033 - 6116

Mode: **Equal Interval** Classes: 5

☐ Symmetric Classification

Classify [x] [x] Delete All [x]

☒ Link class boundaries

Layer Rendering

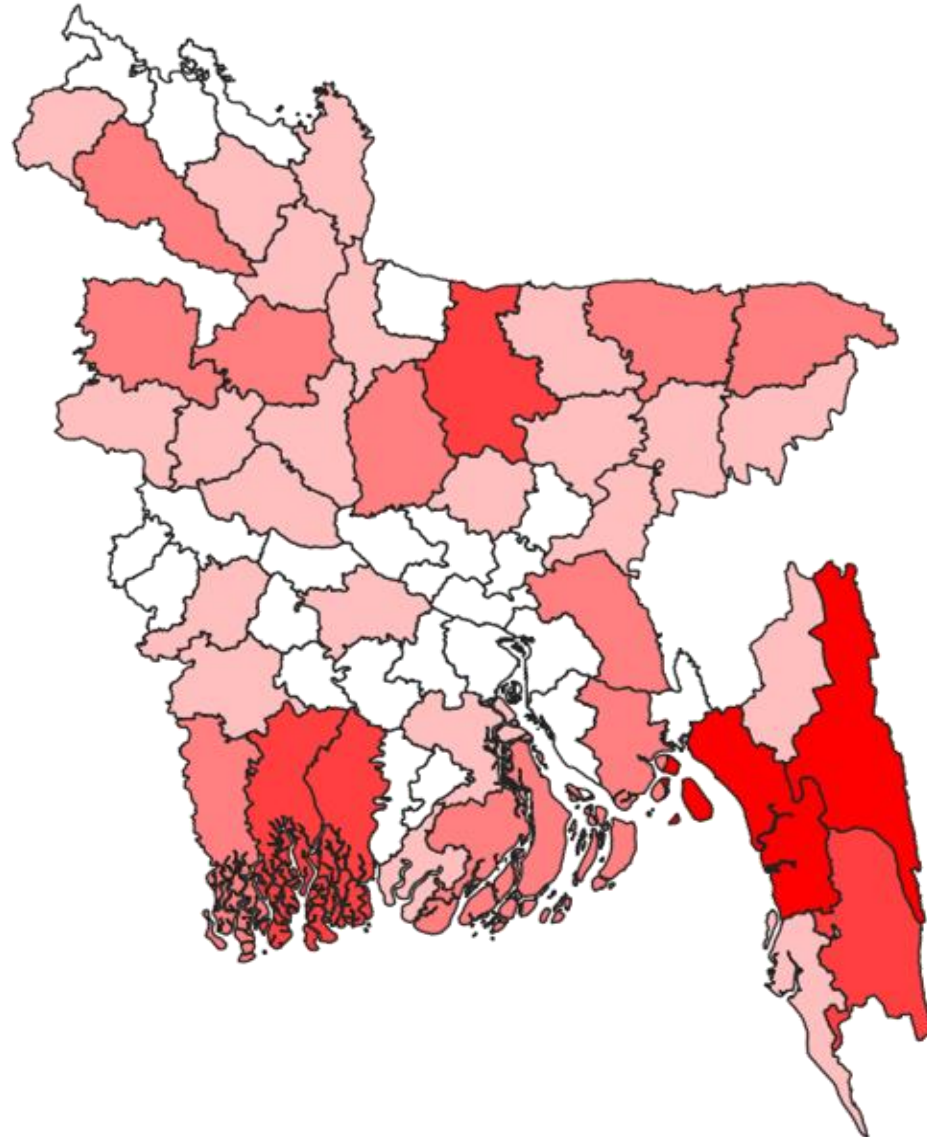
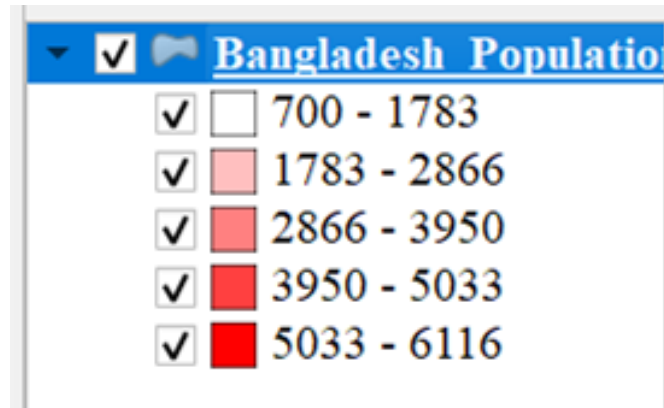
Style [x] OK Cancel Apply **Help**

Choose the color

Choose the mode

Select the column to be classified

Changing colour of vector data



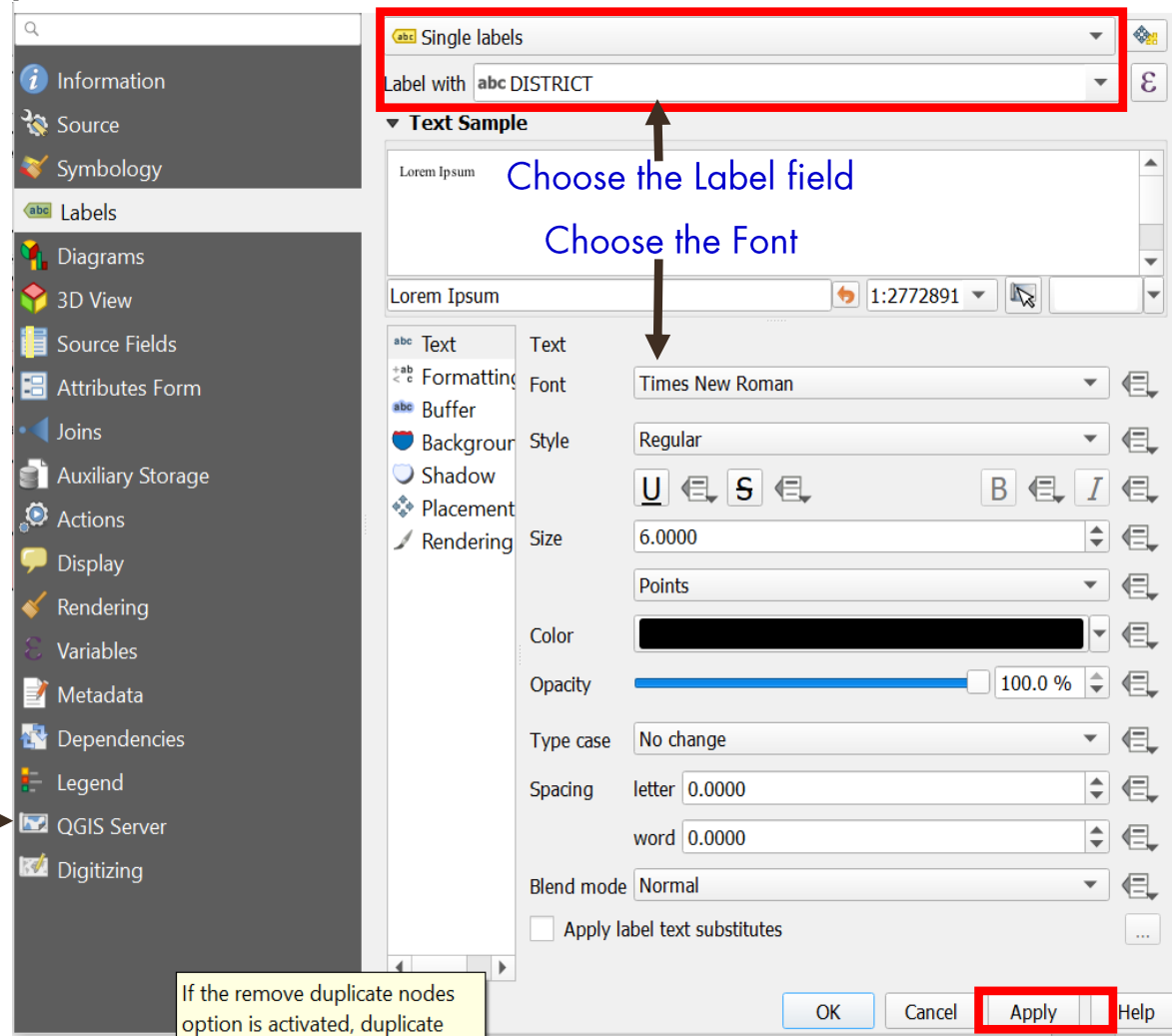
Labelling vector data

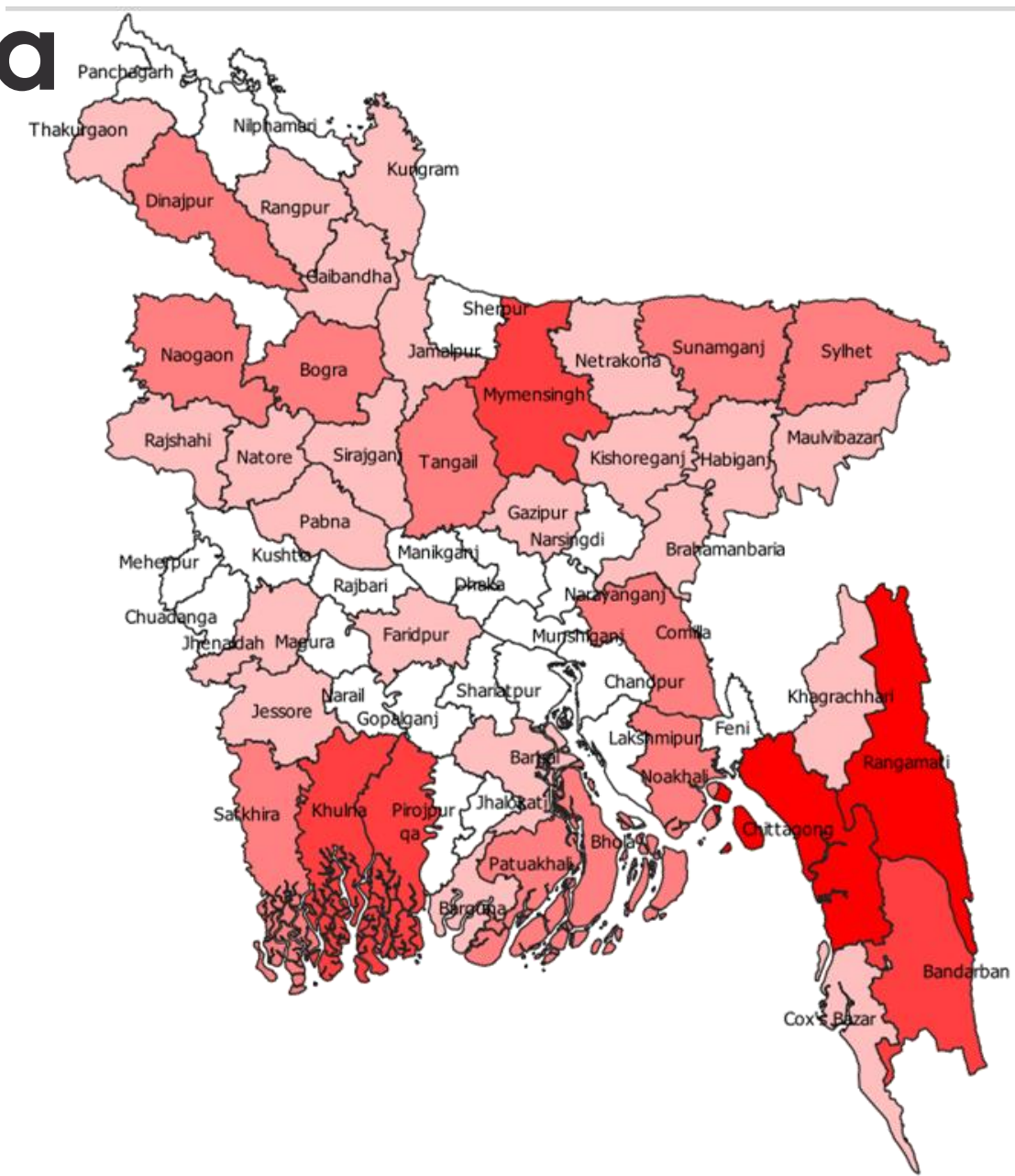
➤ Right click on the added Layer

-> **Properties-> Labels**

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

➤ Choose the Label field i.e. District






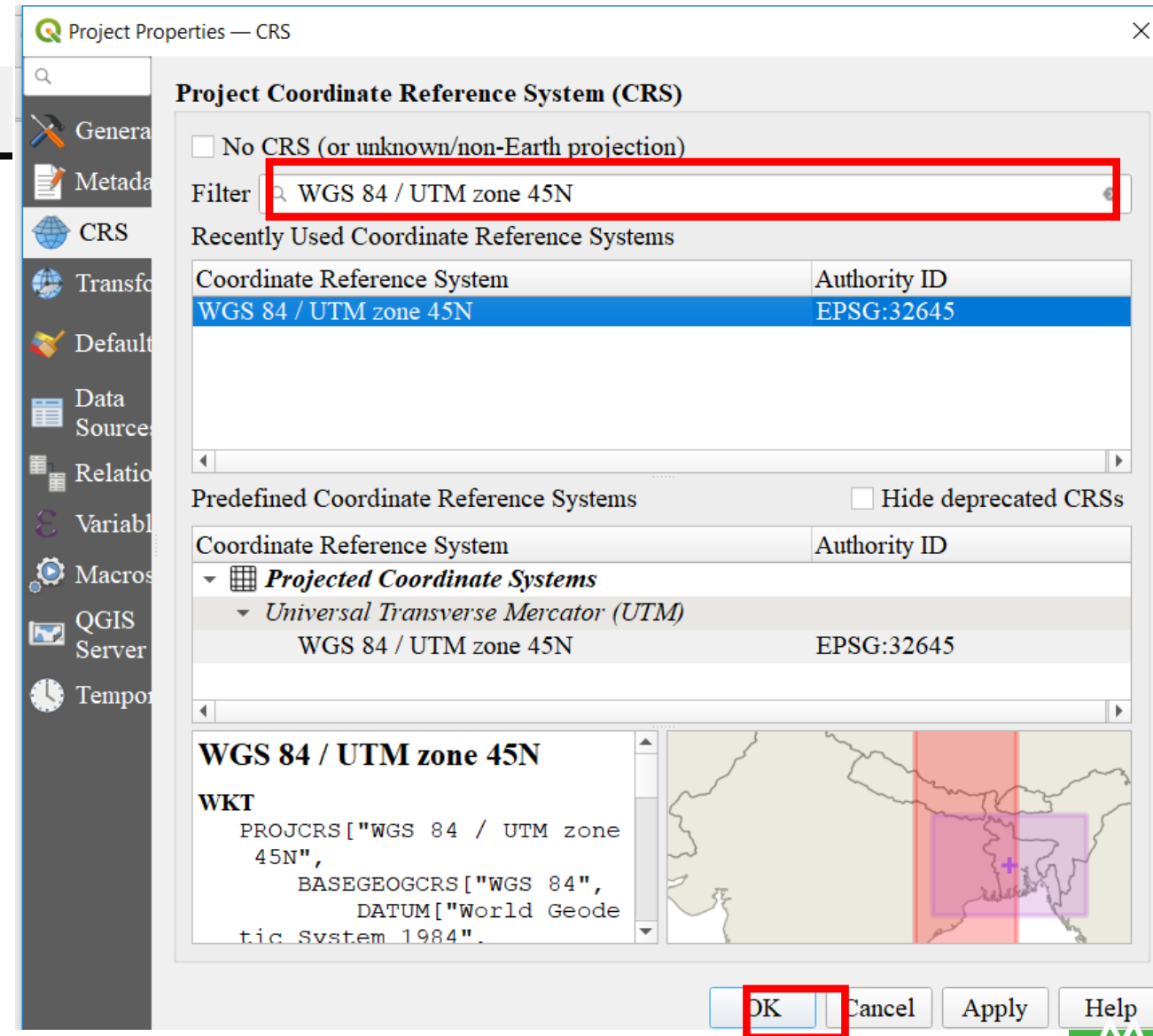
Why Project the layer?

- 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

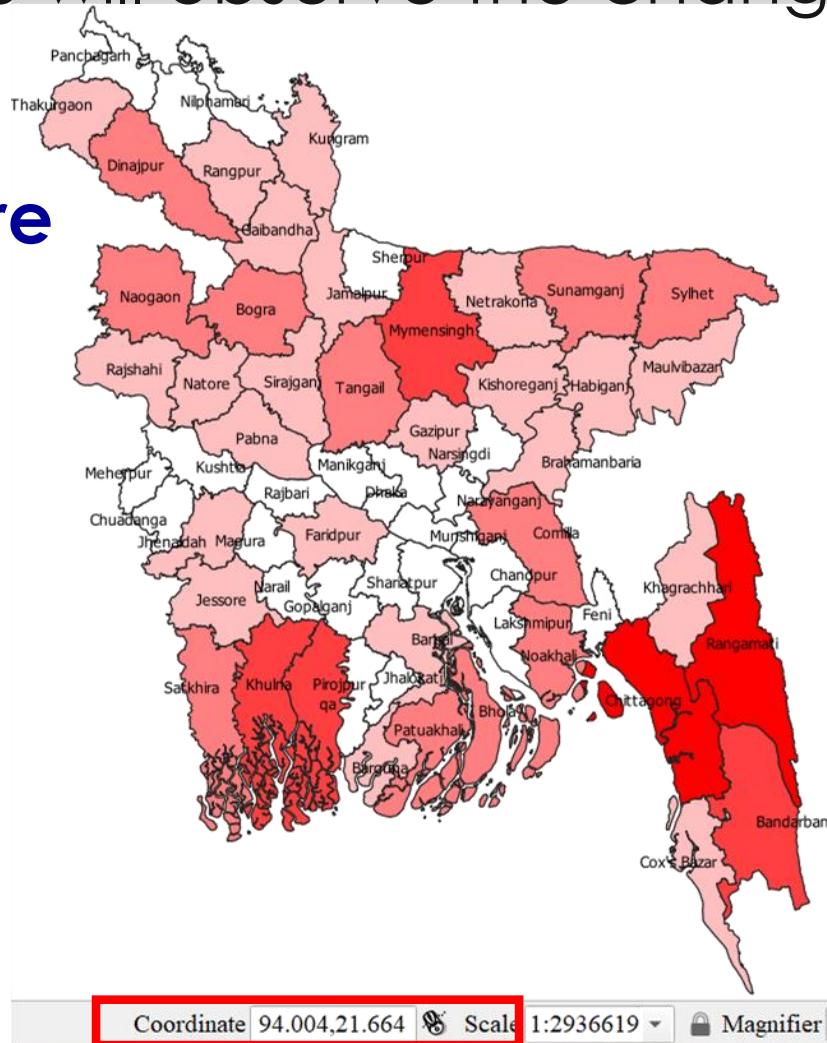
- Click at the **EPSG:4326**  at the bottom right of QGIS
- In the **Filter** tab search **WGS 84/ UTM zone 45N** -> select the zone
- Click **Apply** and **OK**



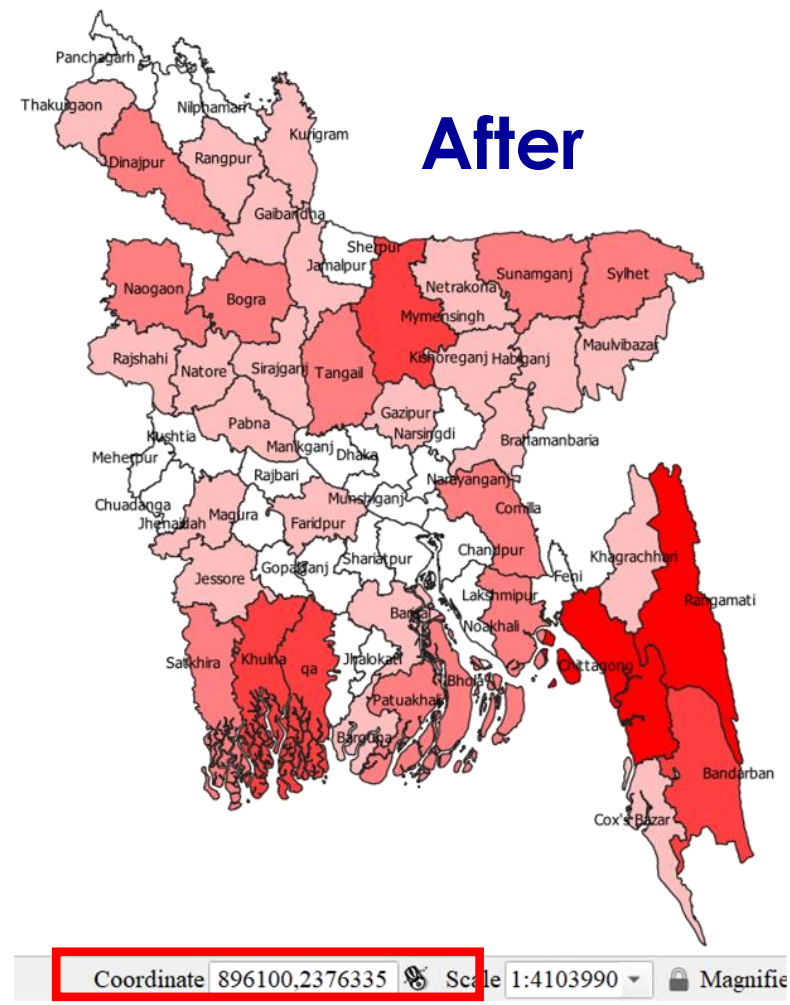
Projection in QGIS

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

Before

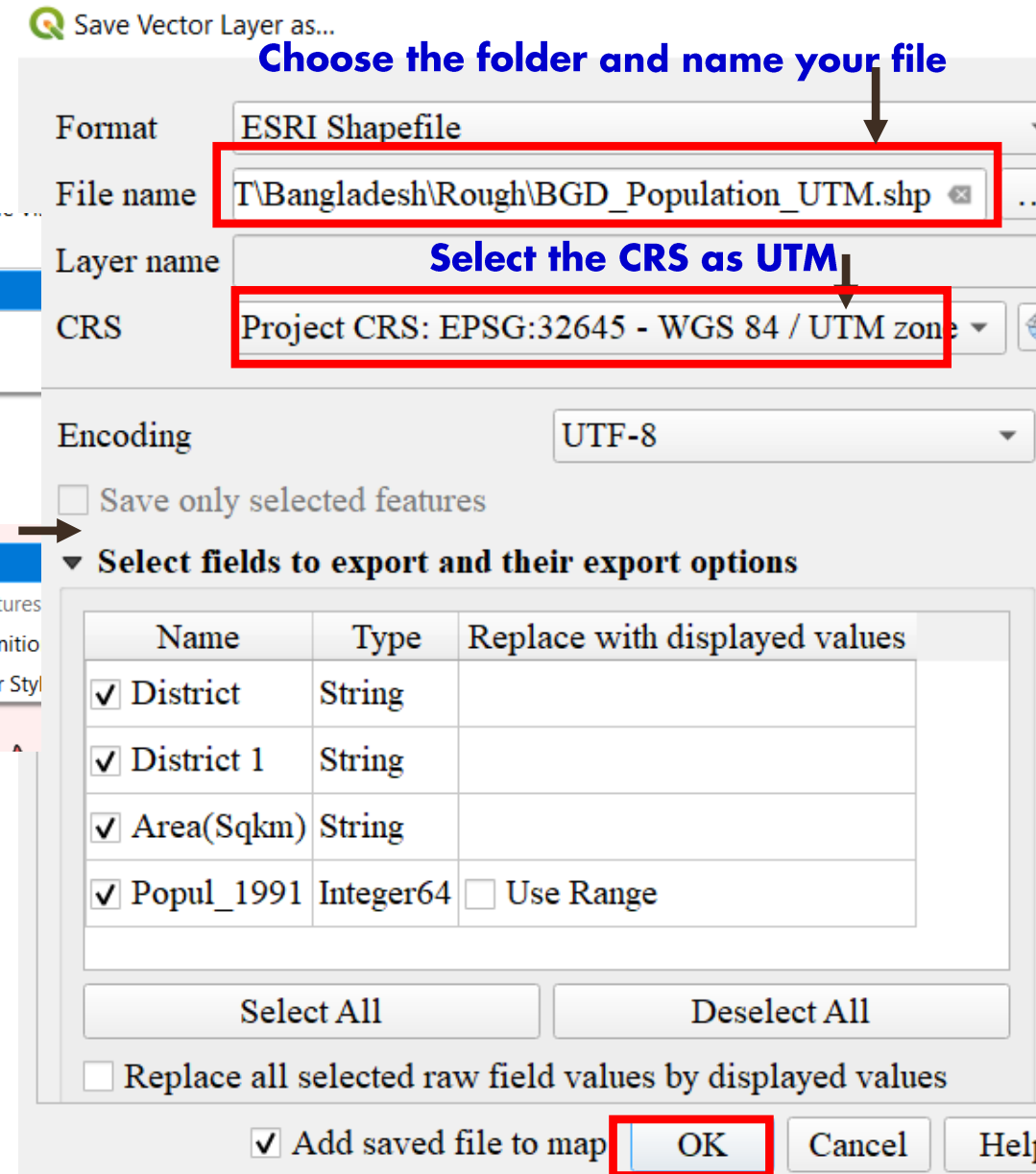
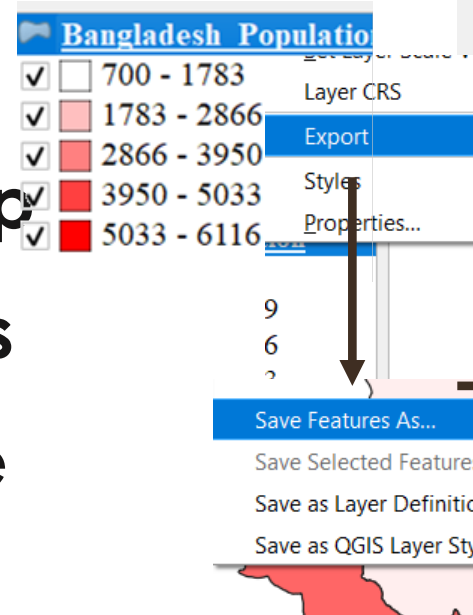


After



Projection in QGIS

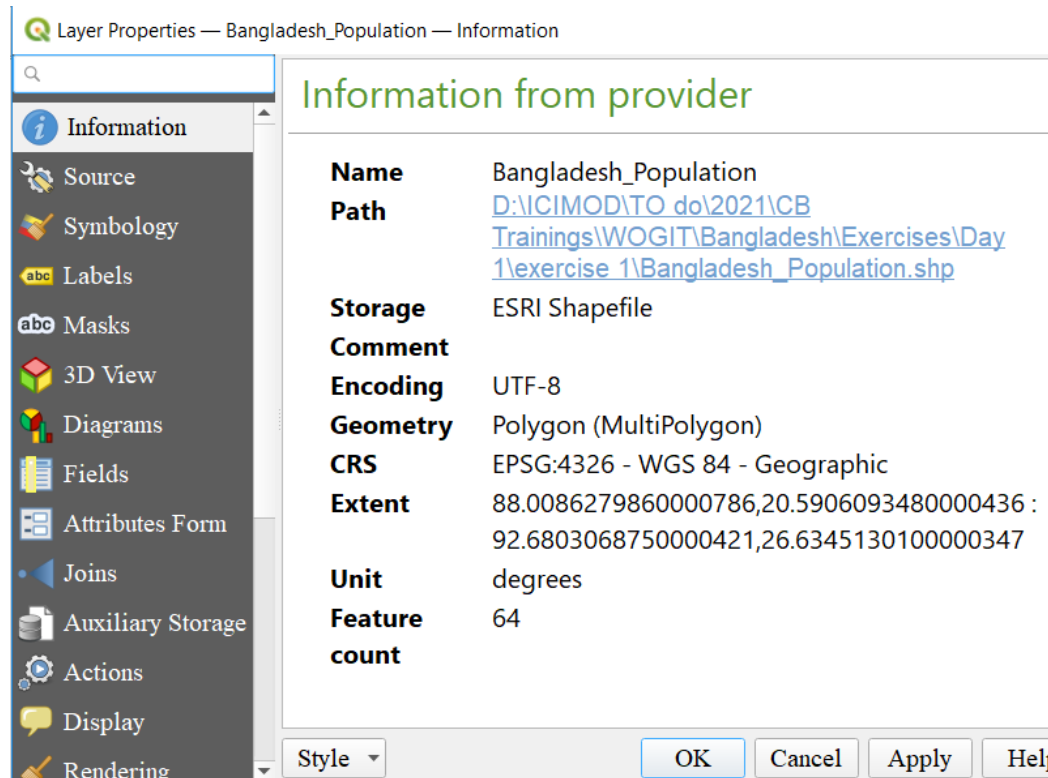
- Right click on the layer **Bangladesh_Population.shp**
->Export-> Save Feature As
- Select CRS and specify the parameters
- Give output file name as **BGD_Population_UTM.shp**



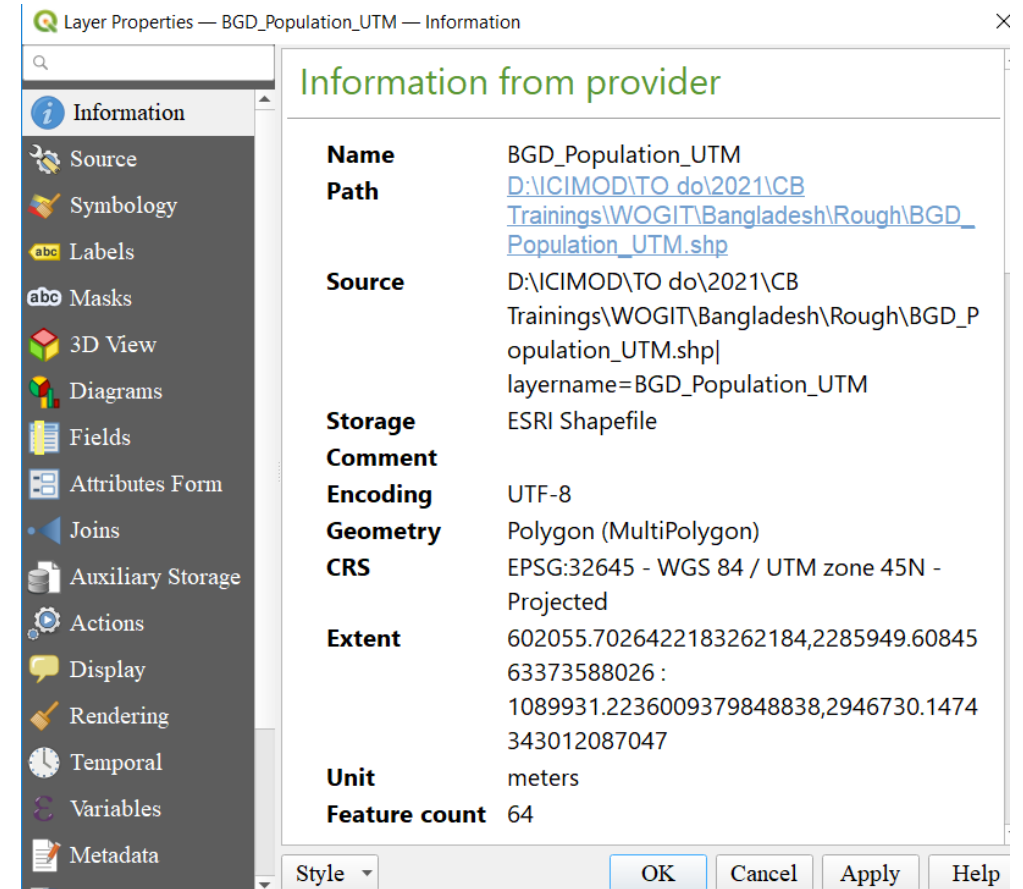
Projection in QGIS

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

Before



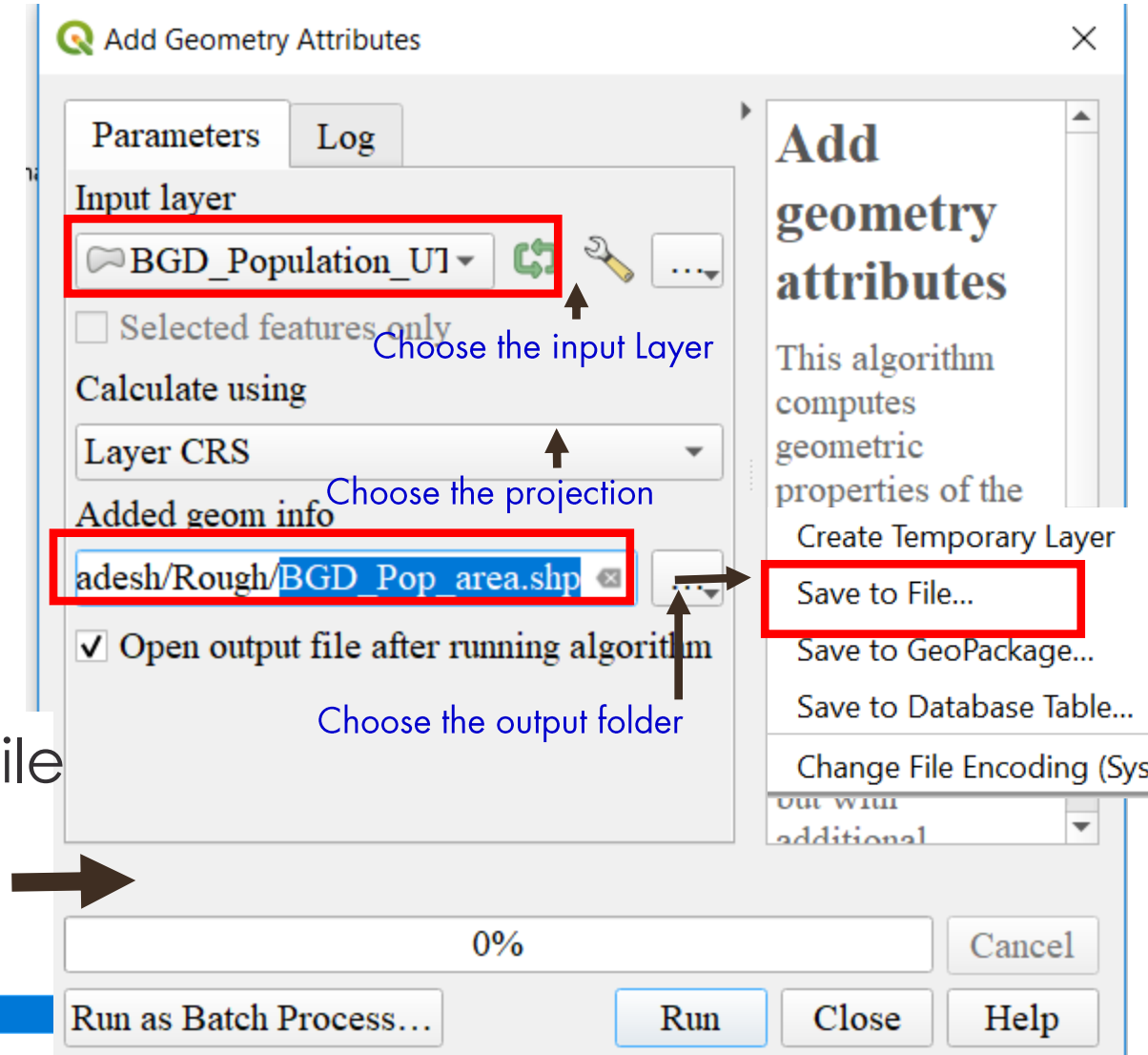
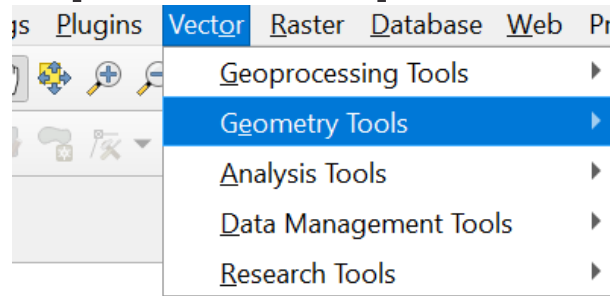
After



Calculating area

- Load **BGD_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 your file as **BGD_pop_area.shp**

➤ **Run**



Calculating area

Added Area and Perimeter fields

Added geom info — Features Total: 64, Filtered: 64, Selected: 0

	District	District 1	Code	rea(Sqkm)	Pop_1991	area	perimeter
1	Bagerhat	Bagerhat	BAG	3959	1431332	365044829...	1388488.85...
2	Bandarban	Bandarban	BAN	4479	230569	462666060...	578961.206...
3	Barguna	Barguna	BRG	1831	775693	134802513...	447530.677...
4	Barisal	Barisal	BRS	2785	2207426	222427600...	826620.055...
5	Bhola	Bhola	BHO	3403	1476328	195412050...	1092119.65...
6	Bogra	Bogra	BOG	2920	2669287	291444356...	453914.735...
7	Brahamanb...	Brahamanb...	BBA	1927	2141745	192936907...	382856.071...
8	Chandpur	Chandpur	CHA	1704	2032449	147367668...	464714.962...
9	Chittagong	Chittagong	CHI	5283	5296127	447466328...	888047.905...
10	Chuadanga	Chuadanga	CHU	1177	807164	116519498...	248343.570...
11	Comilla	Comilla	COM	3085	4032666	309856670...	409063.850...
12	Cox's Bazar	Cox's Bazar	COX	2492	1419260	218608322...	678065.201...
13	Dhaka	Dhaka	DHA	1464	5839642	147891104...	339450.319...
14	Dinajpur	Dinajpur	DIN	3438	2260131	346018835...	532788.980...
15	Faridpur	Faridpur	FAR	2073	1505686	204631380...	355719.896...
16	Feni	Feni	FEN	928	1096745	910767293...	315534.285...
17	Gaibandha	Gaibandha	GAI	2179	1949274	216826496...	340144.164...
18	Gazipur	Gazipur	GAZ	1800	1621562	182120339...	261541.856...
19	Gopalganj	Gopalganj	GOP	1490	1060791	147796591...	288617.978...
20	Habiganj	Habiganj	HAB	2637	1526609	259328858...	447161.565...

File with added geometry

Layers

☒

BGD_pop_area

☒



BGD_Population_UTM

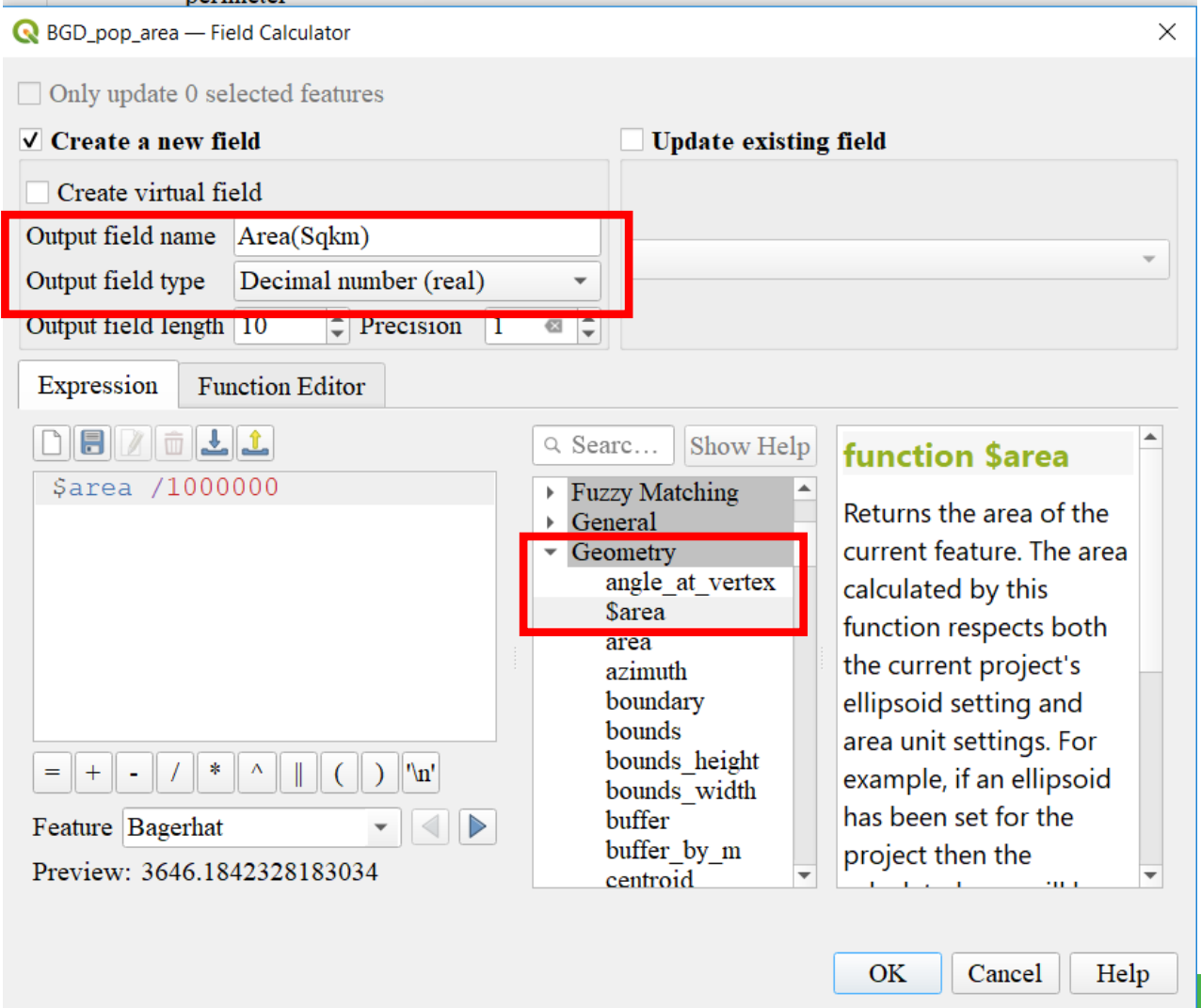
☒

Bangladesh_Population



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



The screenshot shows the 'Field Calculator' dialog box for the layer 'BGD_pop_area'. The 'Create a new field' option is selected. The 'Output field name' is 'Area(Sqkm)' and the 'Output field type' is 'Decimal number (real)'. The expression '\$area / 1000000' is entered in the 'Expression' tab. The 'Geometry' category is selected in the function list, and the '\$area' function is highlighted. The preview shows the value 3646.1842328183034 for the feature 'Bagerhat'.

BGD_pop_area — Field Calculator

☐ Only update 0 selected features

☒ Create a new field ☐ Update existing field

☐ Create virtual field

Output field name: Area(Sqkm)

Output field type: Decimal number (real)

Output field length: 10 Precision: 1

Expression: \$area / 1000000

Function Editor: Geometry (selected), \$area (selected)

Feature: Bagerhat

Preview: 3646.1842328183034

function \$area: Returns the area of the current feature. The area calculated by this function respects both the current project's ellipsoid setting and area unit settings. For example, if an ellipsoid has been set for the project then the

OK Cancel Help

Calculating area


Added new field

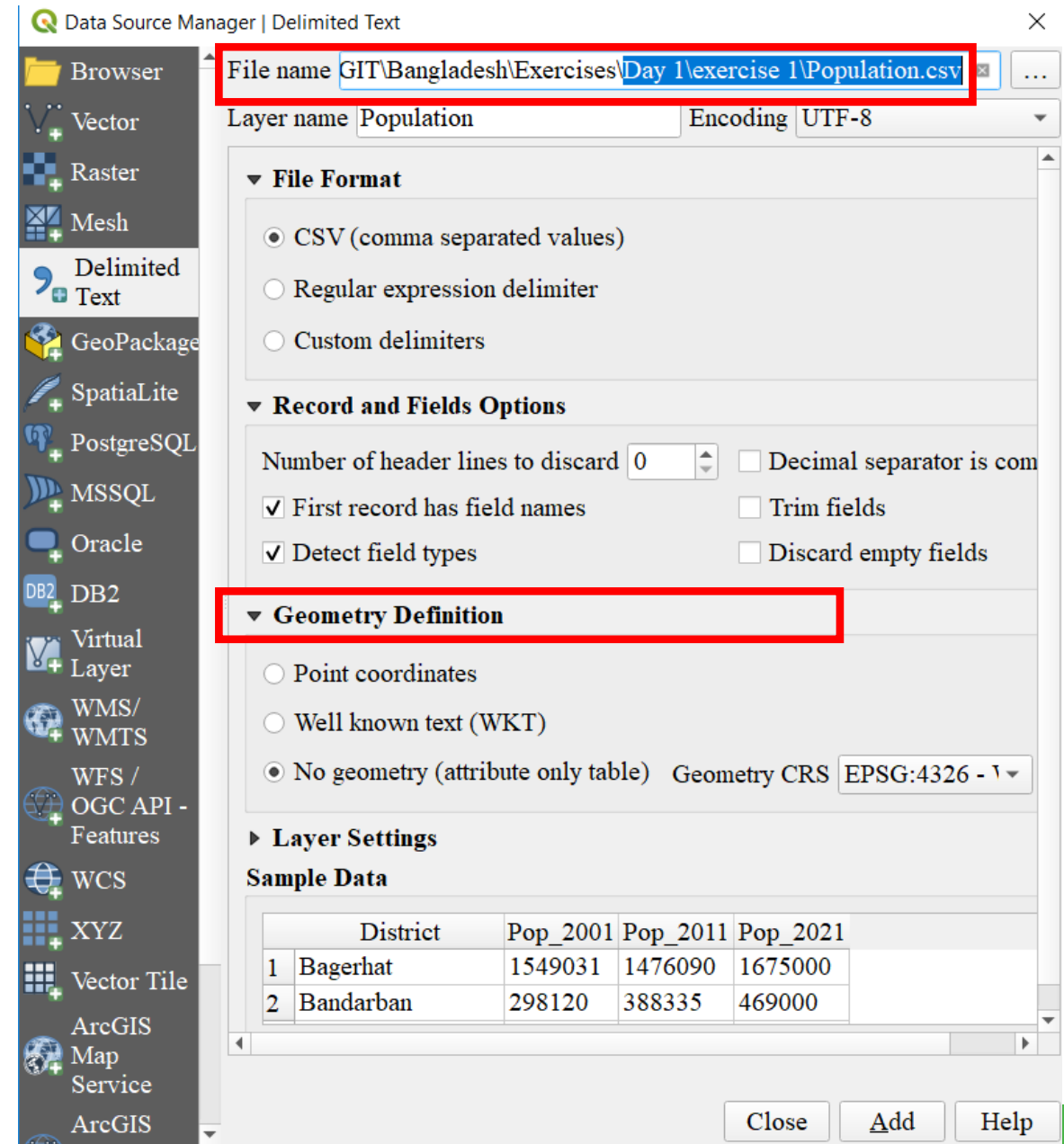
BGD_pop_area — Features Total: 64, Filtered: 64, Selected: 0

	District	District 1	Code	Pop_1991	area	perimeter	Area(Sqkm)
1	Bagerhat	Bagerhat	BAG	1431332	3650448293....	1388488.85..	3646.2
2	Bandarban	Bandarban	BAN	230569	4626660604....	578961.206..	4595.3
3	Barguna	Barguna	BRG	775693	1348025138....	447530.677..	1345.7
4	Barisal	Barisal	BRS	2207426	2224276003....	826620.055..	2219.6
5	Bhola	Bhola	BHO	1476328	1954120505....	1092119.65..	1948.5
6	Bogra	Bogra	BOG	2669287	2914443566....	453914.735..	2912.6
7	Brahamanb...	Brahamanb...	BBA	2141745	1929369070....	382856.071..	1922.7
8	Chandpur	Chandpur	CHA	2032449	1473676686....	464714.962..	1469.4
9	Chittagong	Chittagong	CHI	5296127	4474663286....	888047.905..	4450.9
10	Chuadanga	Chuadanga	CHU	807164	1165194983....	248343.570..	1165.1
11	Comilla	Comilla	COM	4032666	3098566701....	409063.850..	3088.0
12	Cox's Bazar	Cox's Bazar	COX	1419260	2186083224....	678065.201..	2173.0
13	Dhaka	Dhaka	DHA	5820642	1478011042	220450.210	1476.1



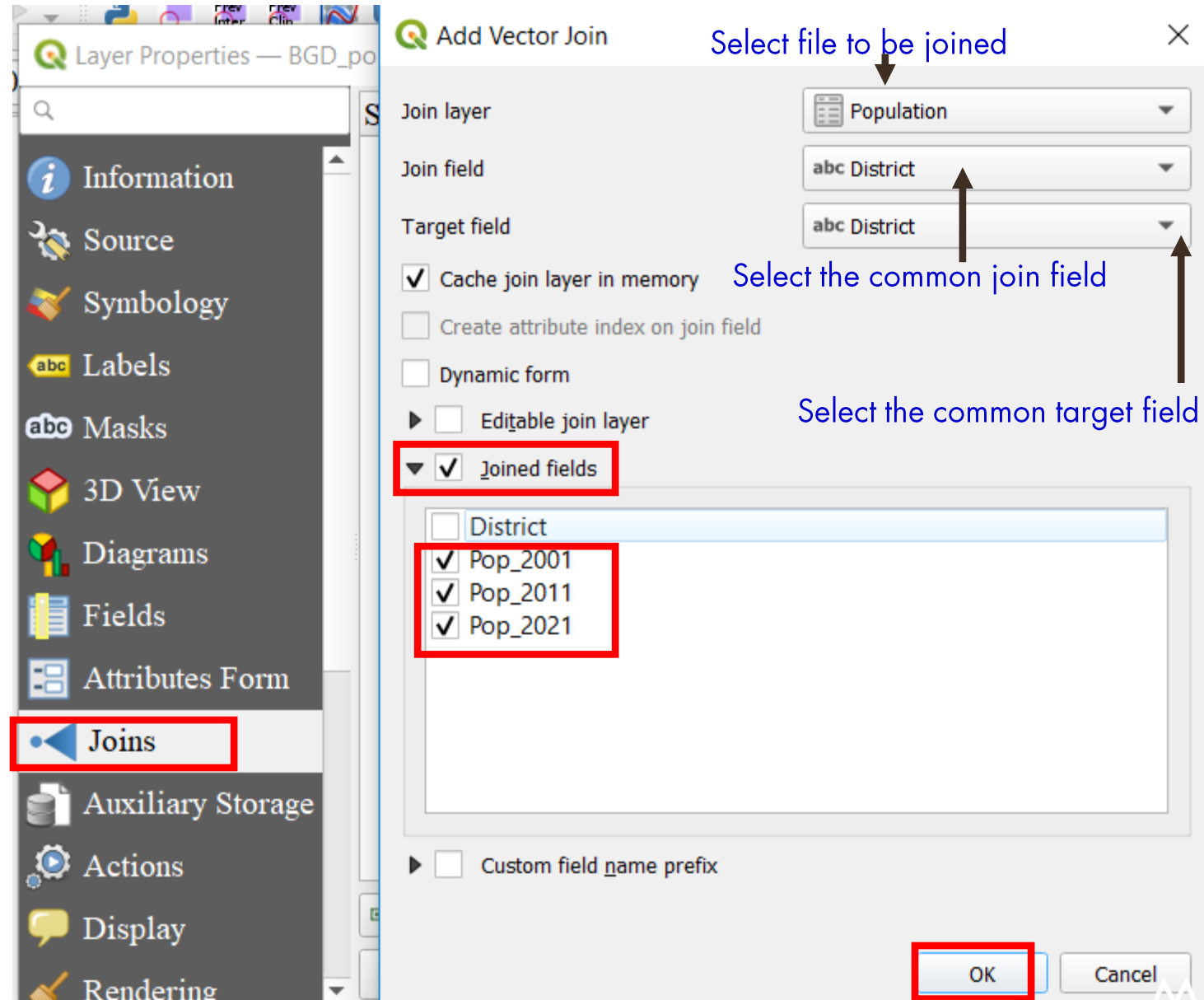
Joining Attributes

- 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
BGD_pop_area.shp
-> **properties**
- Click **Joins**
- Click on  sign
- Select the join layer
- Select the common **join** and **target field**
- Click **OK**



Joining Attributes

Joined field →

QGIS - Pop_Joined.shp - Features Total: 64, Filtered: 64, Selected: 0

	District	District 1	Code	Pop_1991	area	perimeter	Area(Sqkm)	Pop_2001	Pop_2011	Pop_2021
1	Bagerhat	Bagerhat	BAG	1431332	3650448293....	1388488.85...	3646.2	1549031	1476090	1675000
2	Bandarban	Bandarban	BAN	230569	4626660604....	578961.206...	4595.3	298120	388335	469000
3	Barguna	Barguna	BRG	775693	1348025138....	447530.677...	1345.7	848554	892781	1013000
4	Barisal	Barisal	BRS	2207426	2224276003....	826620.055...	2219.6	2355967	2324310	2776000
5	Bhola	Bhola	BHO	1476328	1954120505....	1092119.65...	1948.5	1703117	1776795	2057000
6	Bogra	Bogra	BOG	2669287	2914443566....	453914.735...	2912.6	3013056	3400874	3903000
7	Brahamanbaria	Brahamanbaria	BBA	2141745	1929369070....	382856.071...	1922.7	2398254	2840498	3617000
8	Chandpur	Chandpur	CHA	2032449	1473676686....	464714.962...	1469.4	2271229	2416018	2929000
9	Chittagong	Chittagong	CHI	5296127	4474663286....	888047.905...	4450.9	6612140	7616352	8990000
10	Chuadanga	Chuadanga	CHU	807164	1165194983....	248343.570...	1165.1	1007130	1129015	1299000
11	Comilla	Comilla	COM	4032666	3098566701....	409063.850...	3088.0	4595557	5387288	6559000
12	Cox's Bazar	Cox's Bazar	COX	1419260	2186083224....	678065.201...	2173.0	1773709	2289990	2979000
13	Dhaka	Dhaka	DHA	5839642	1478911043....	339450.319...	1476.1	8511228	1204391	2289990
14	Dinajpur	Dinajpur	DIN	2260131	3460188354....	532788.980...	3460.2	2642850	2990128	3430000
15	Faridpur	Faridpur	FAR	1505686	2046313806....	355719.896...	2043.7	1756470	1912969	2201000
16	Feni	Feni	FEN	1096745	910767293.9...	315534.285...	906.9	1240384	1437371	1754000
17	Gaibandha	Gaibandha	GAI	1949274	2168264968....	340144.164...	2166.6	2138181	2379255	2975000
18	Gazipur	Gazipur	GAZ	1621562	1821203392....	261541.856...	1817.1	2031891	3403912	4046000
19	Gopalganj	Gopalganj	GOP	1060791	1477965912....	288617.978...	1475.9	1165273	1172415	1346000
20	Habiganj	Habiganj	HAB	1526609	2593288586....	447161.565...	2582.4	1757665	2089001	2640000

Export the data as Pop_Joined.shp





Thank you

Let's protect
the pulse.