



ICIMOD

Empowering Women in Geospatial Information Technology

Mohammad Sharif Jalalzai

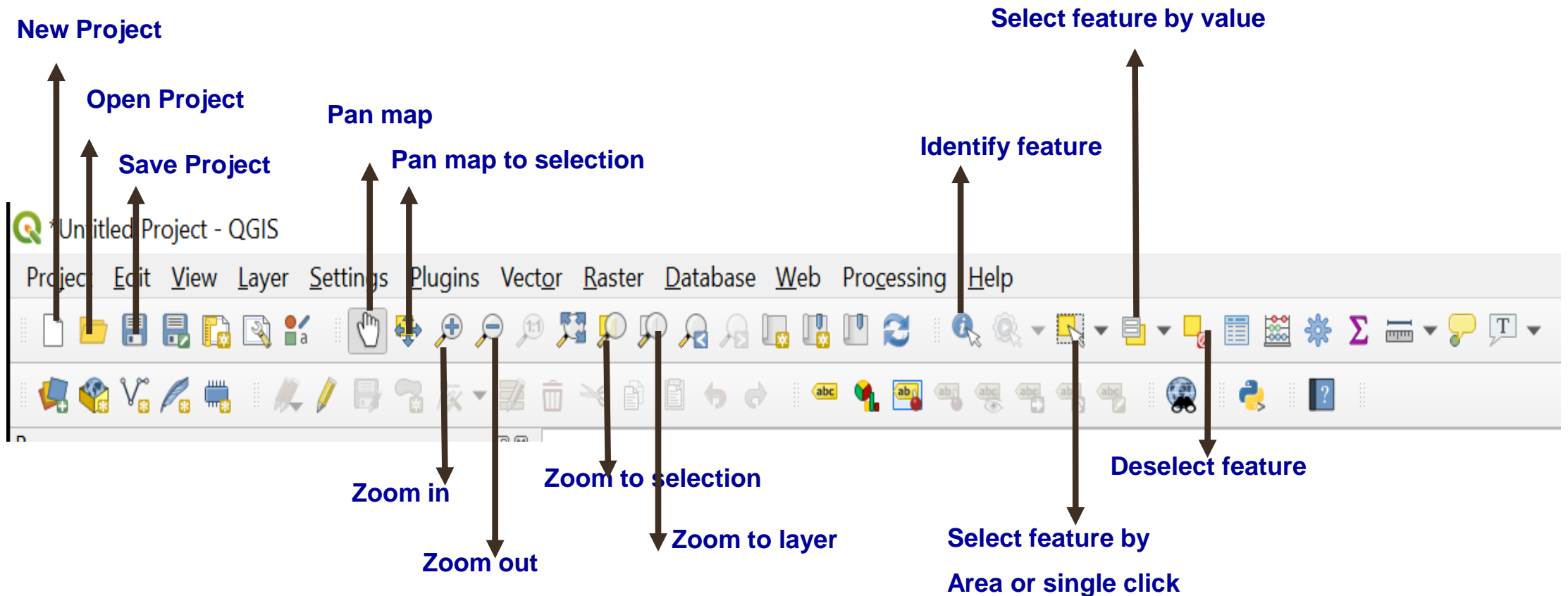
Poonam Tripathi

20 June 2021

Vector data exploration and visualization

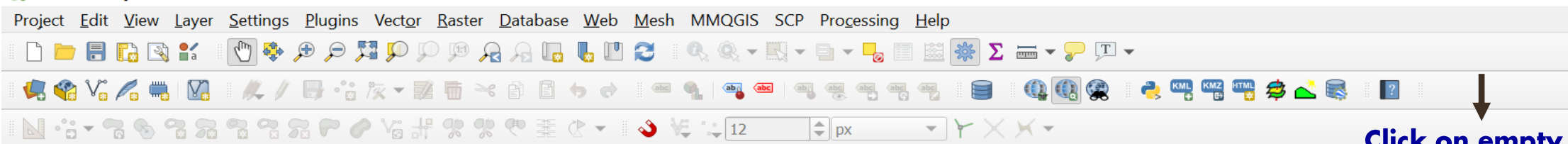
Introduction to QGIS

Exploring the Map View



Adding panels and toolbars

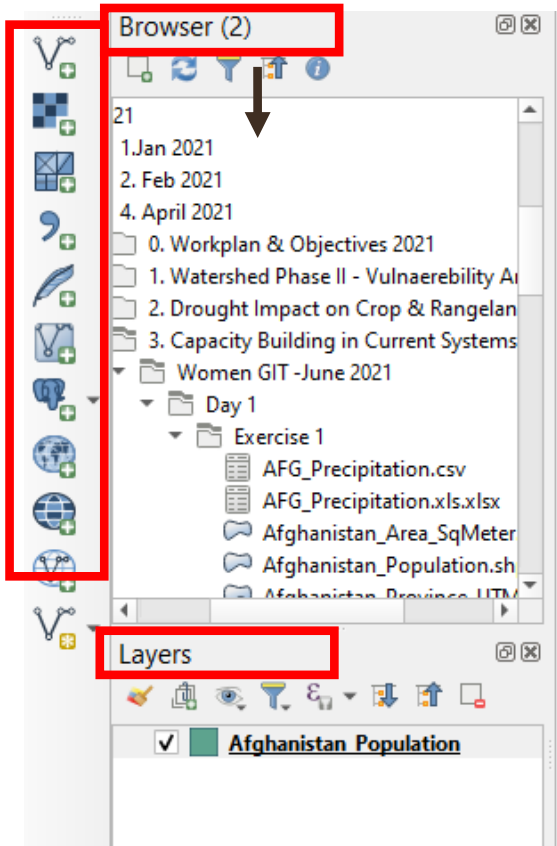
QGIS *Untitled Project - QGIS



Click on empty space

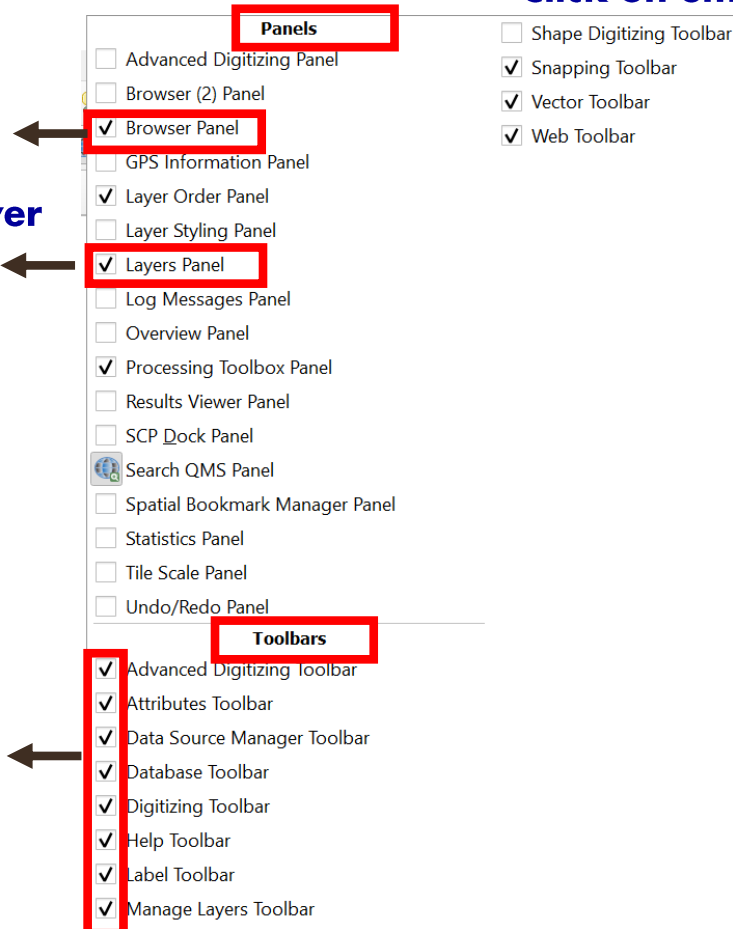
Browse your folder and files to add any raster/vector layer

Manage Layers toolbar



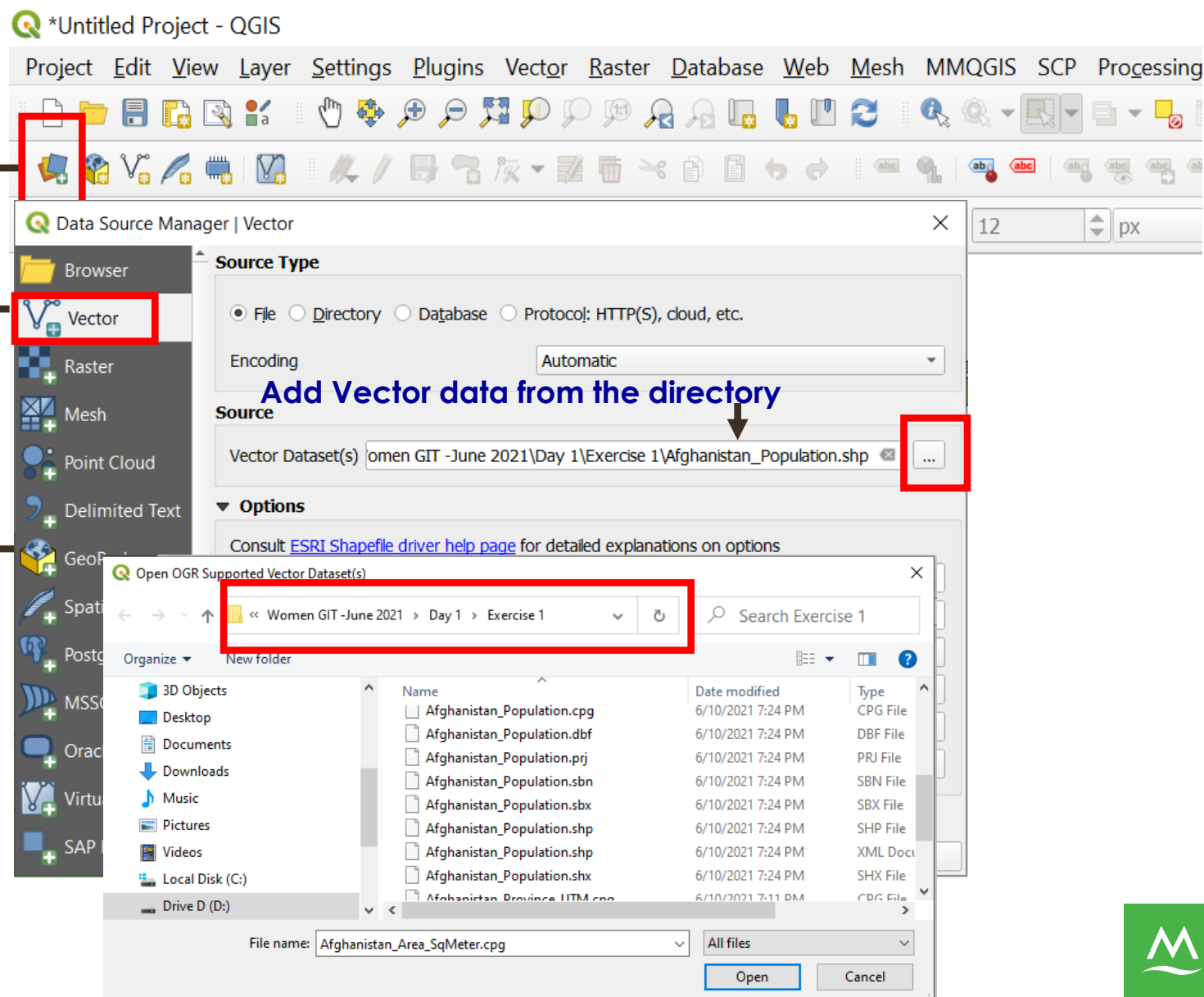
Displays the added raster /vector layer

Check/Uncheck to add or remove the Panel/Toolbar

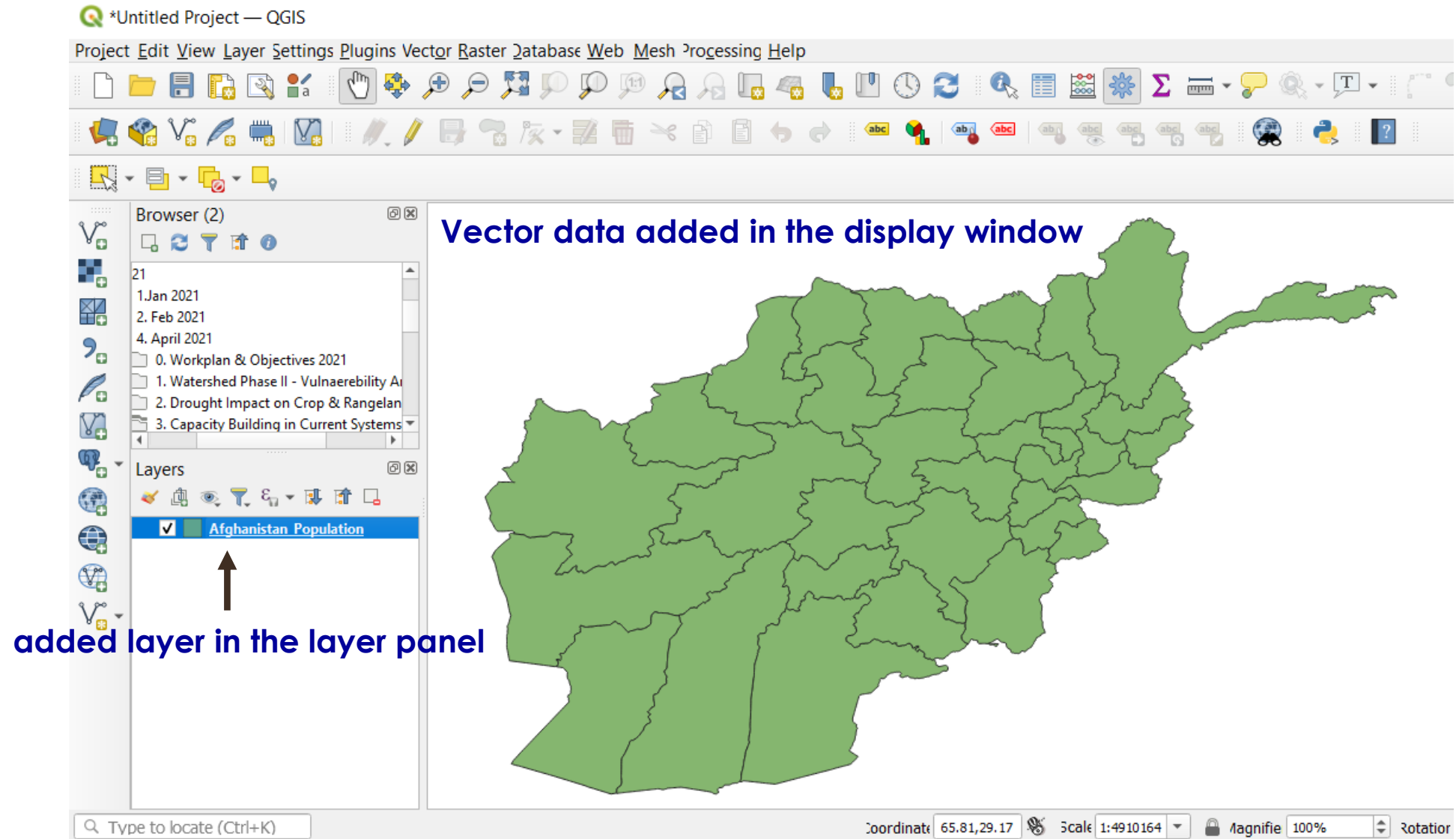


Adding vector data

- 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 **Afghanistan_Population.shp** from Day1\Exercise1

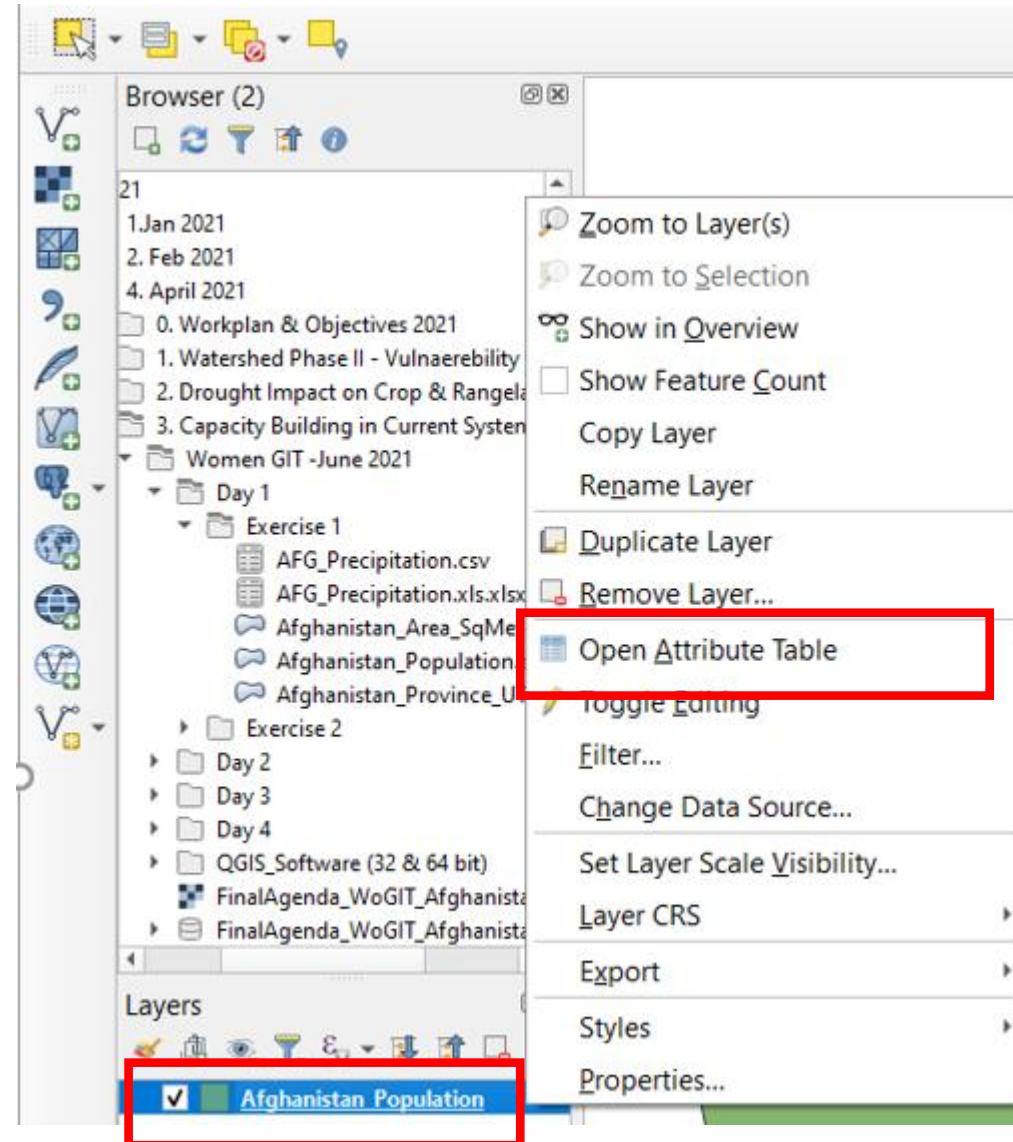


Adding vector data



Exploring attribute table

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



Exploring attribute table

Invert selection

Select all **Deselect all**


Organize column

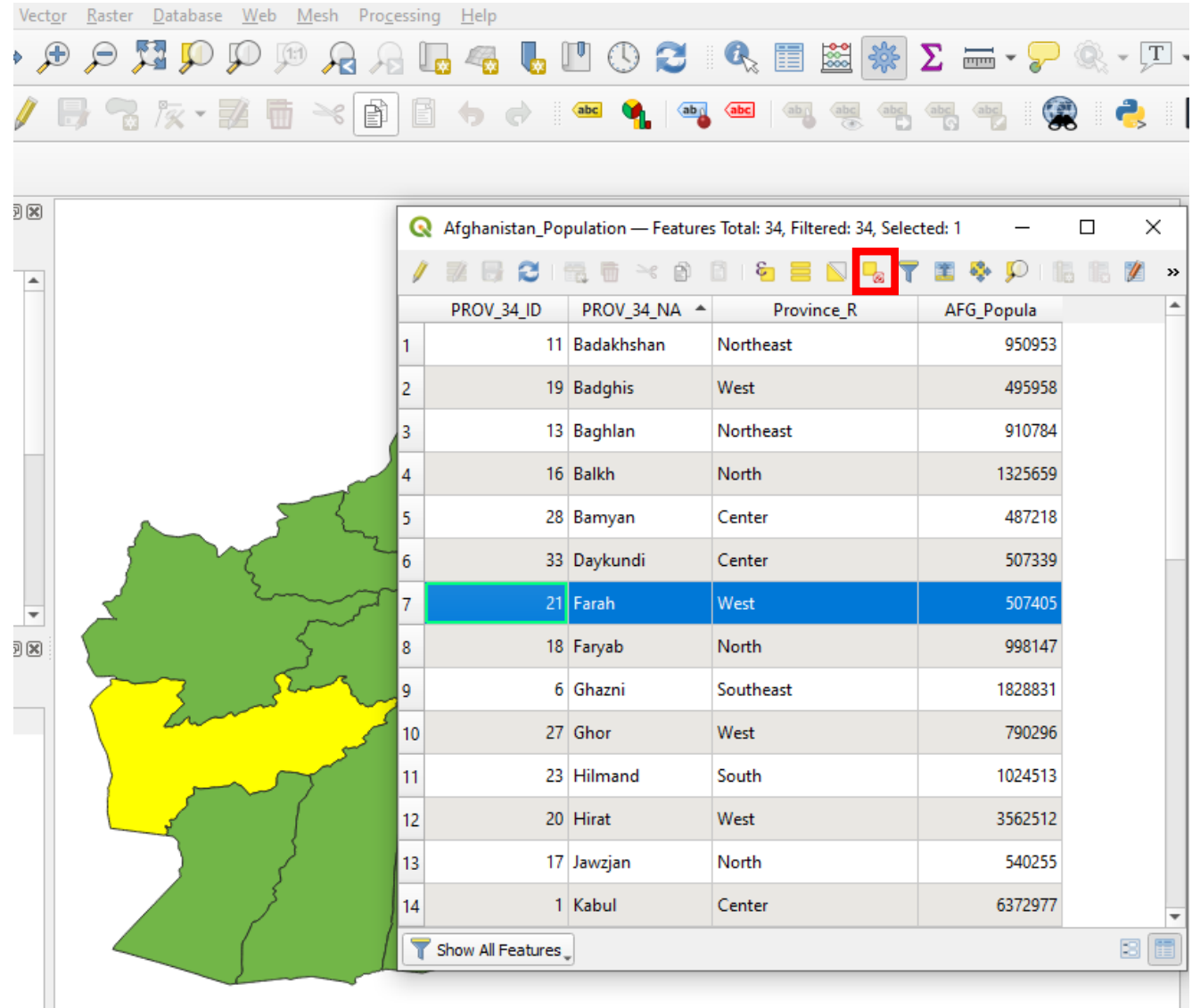
Open field calculator

	PROV_34_ID	PROV_34_NA	Province_R	AFG_Popula
1	1	Kabul	Center	6372977
2	2	Kapisa	Center	441010
3	3	Parwan	Center	664502
4	4	Maydan Wardak	Center	751212
5	5	Logar	Center	458262
6	6	Ghazni	Southeast	1828831
7	7	Paktya	Southeast	795262
8	8	Nangarhar	East	2352652
9	9	Laghman	East	562536
10	10	Kunar	East	652452
11	11	Badakhshan	Northeast	950953
12	12	Takhar	Northeast	1025123
13	13	Baghlan	Northeast	910784
14	14	Kunduz	Northeast	1010037

Show All Features

Exploring attribute table

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



QGIS interface showing the attribute table for 'Afghanistan_Population'. The table displays 14 rows of data. The 'Deselect all' icon (a yellow square with a red 'X') is highlighted in the table's toolbar.

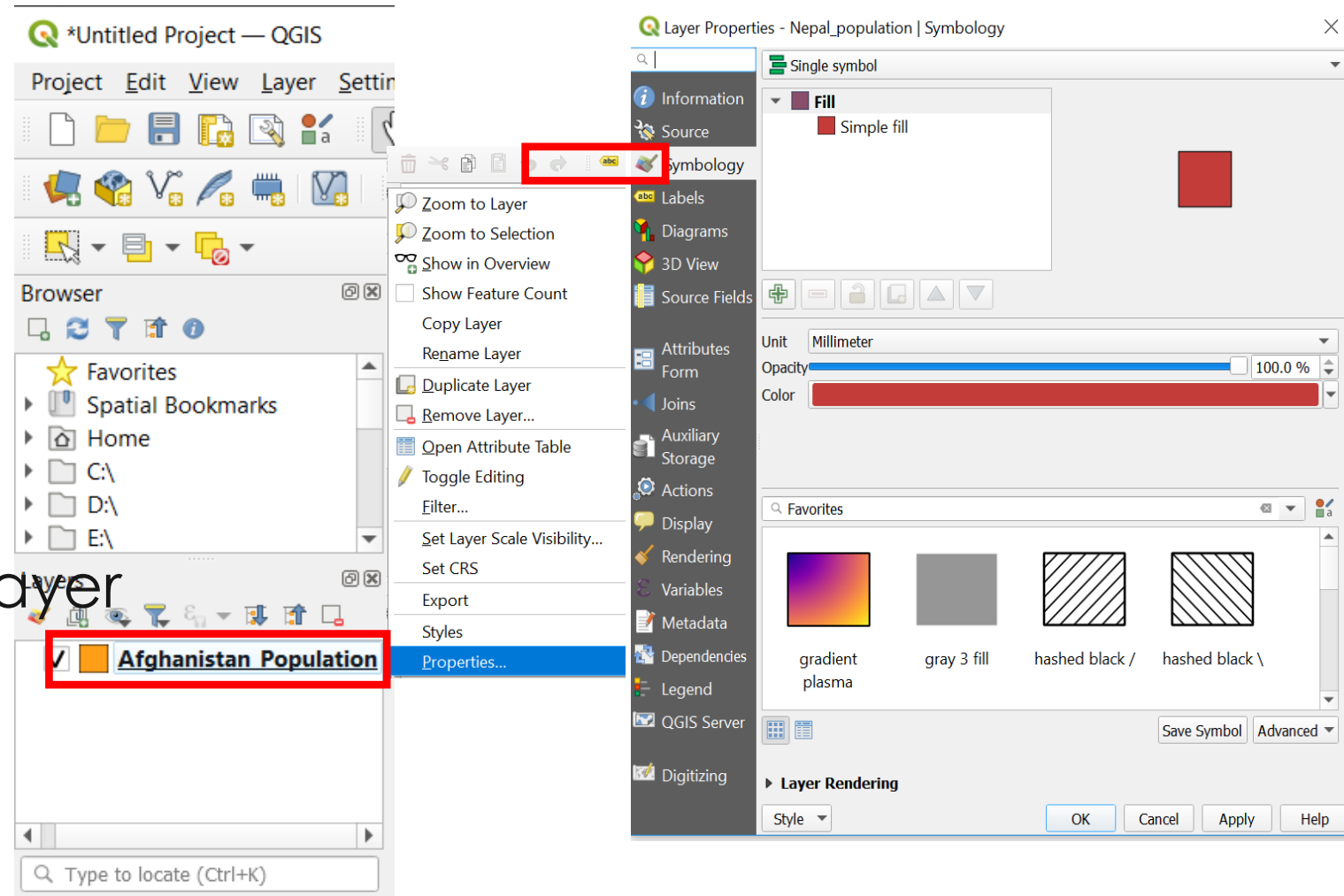
	PROV_34_ID	PROV_34_NA	Province_R	AFG_Popula
1	11	Badakhshan	Northeast	950953
2	19	Badghis	West	495958
3	13	Baghlan	Northeast	910784
4	16	Balkh	North	1325659
5	28	Bamyan	Center	487218
6	33	Daykundi	Center	507339
7	21	Farah	West	507405
8	18	Faryab	North	998147
9	6	Ghazni	Southeast	1828831
10	27	Ghor	West	790296
11	23	Hilmand	South	1024513
12	20	Hirat	West	3562512
13	17	Jawzjan	North	540255
14	1	Kabul	Center	6372977

Show All Features

Changing color of vector data

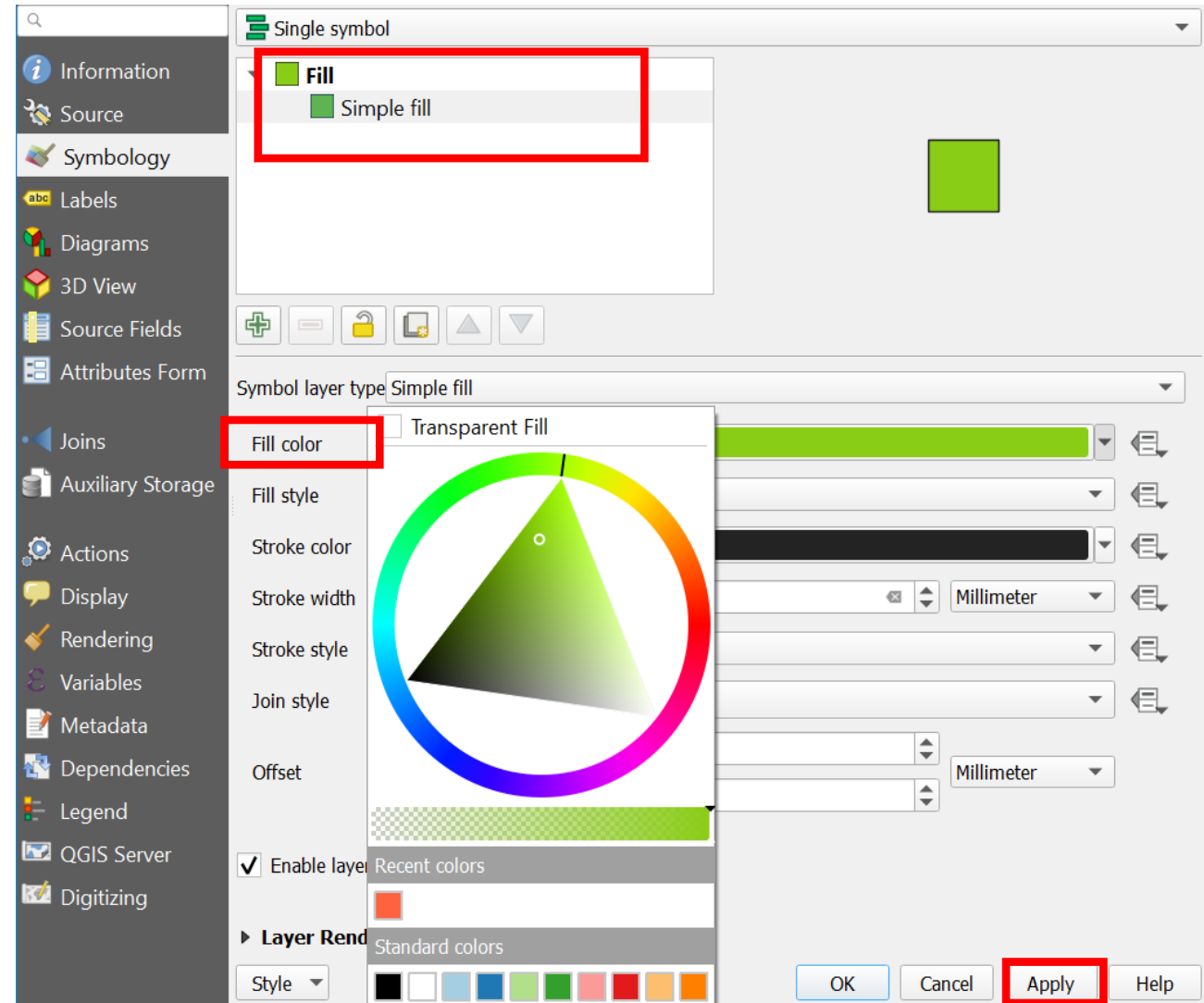
➤ Right click on the added Layer

-> **Properties-> Symbology**

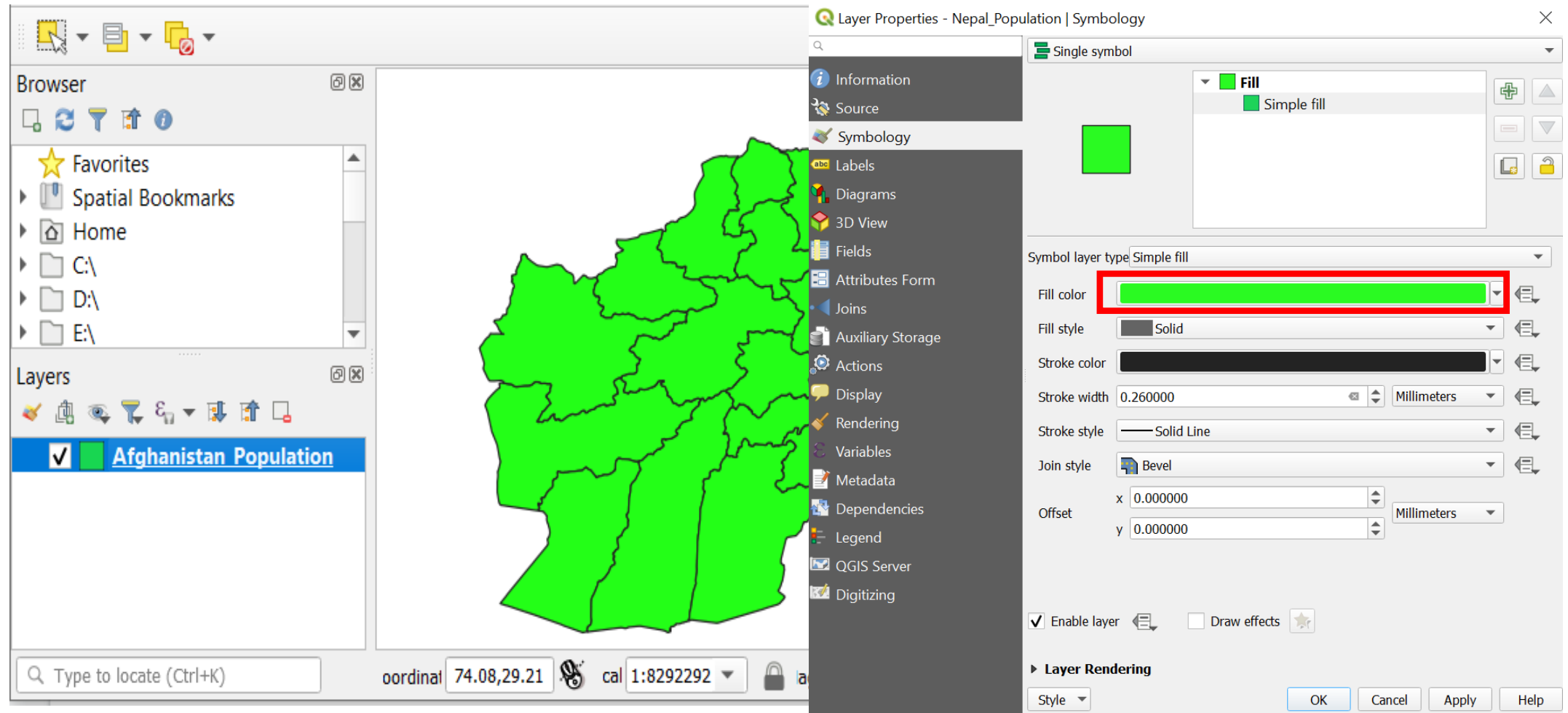


Changing color of vector data

- 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**

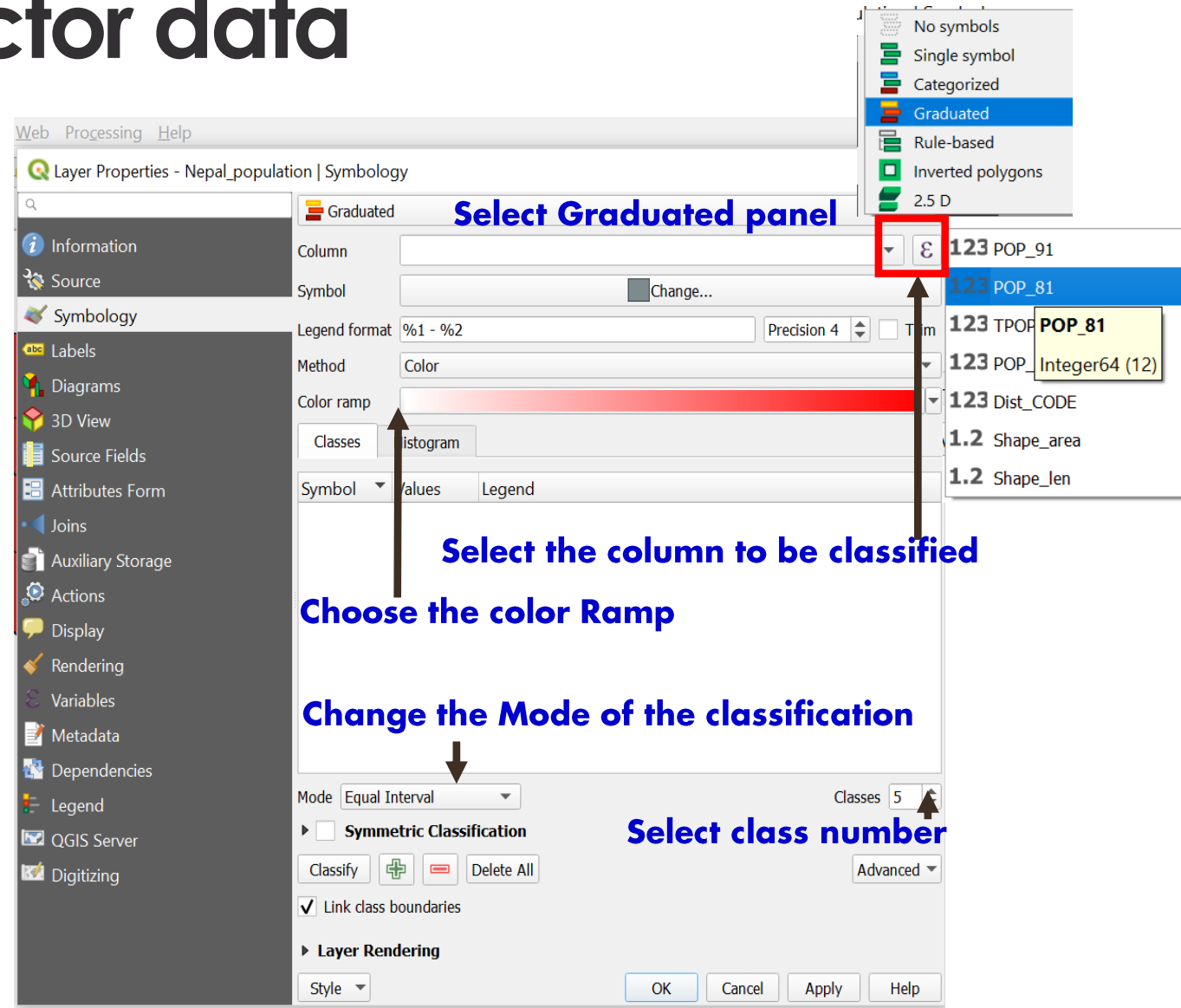


Changing color of vector data

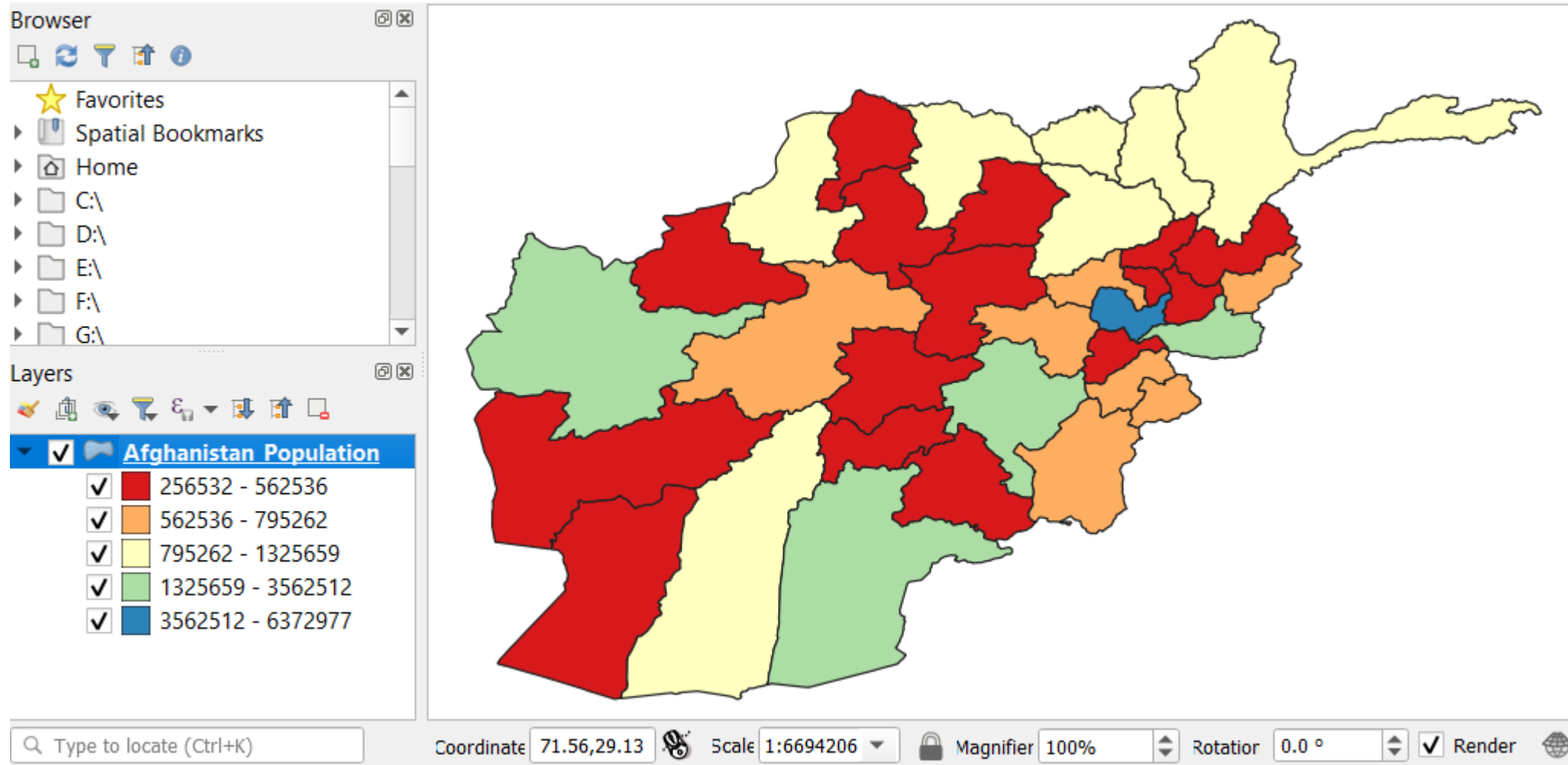


Changing color of vector data

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



Changing color of vector data



Labelling vector data

➤ Right click on the added Layer

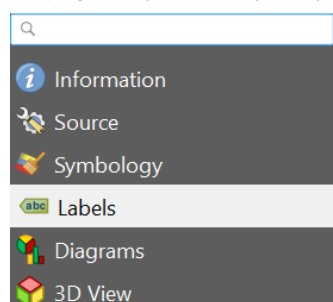
-> **Properties-> Labels**

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

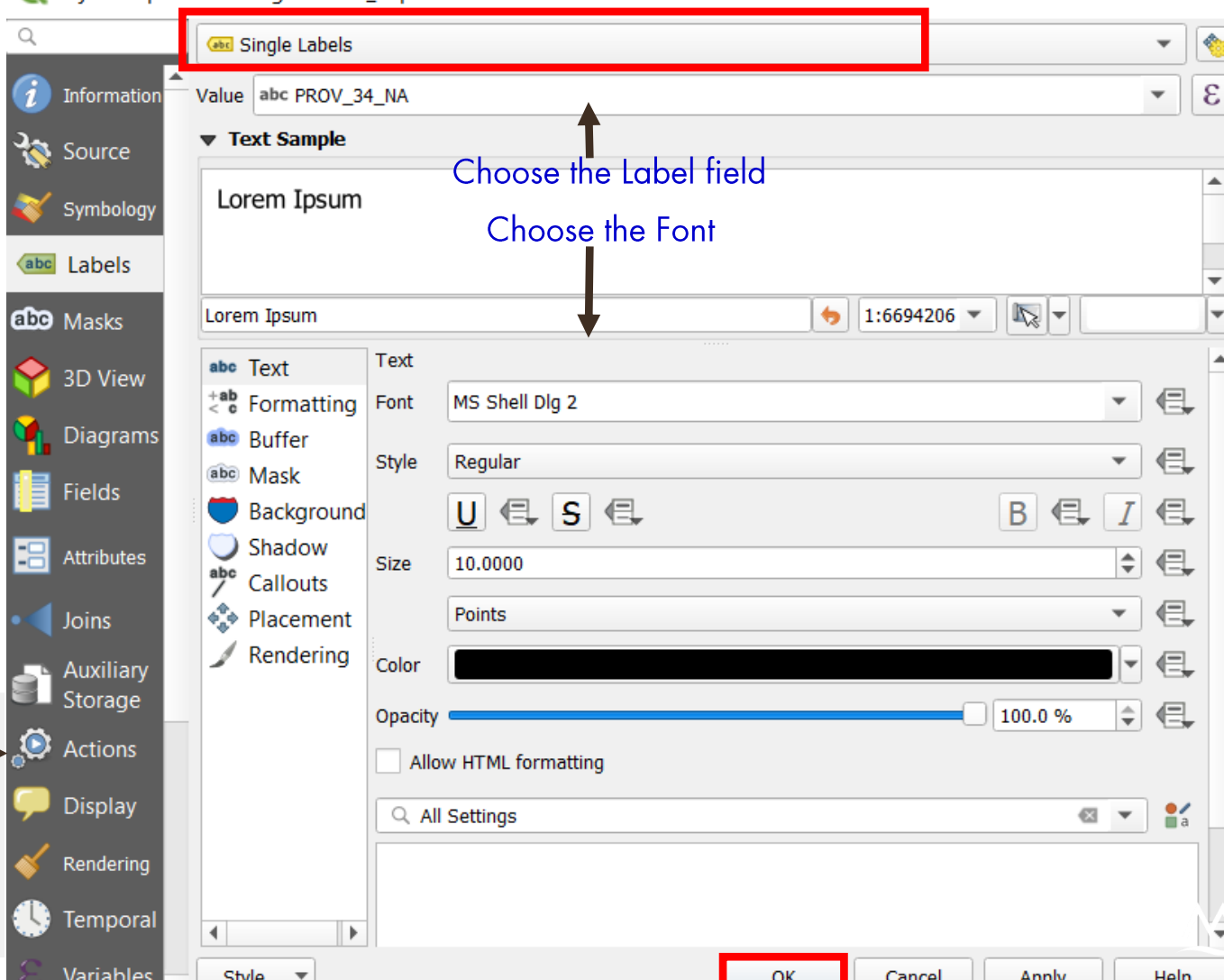
➤ Choose the Label field i.e. **PROV_34_NA**

➤ Change **Font, Style** etc.

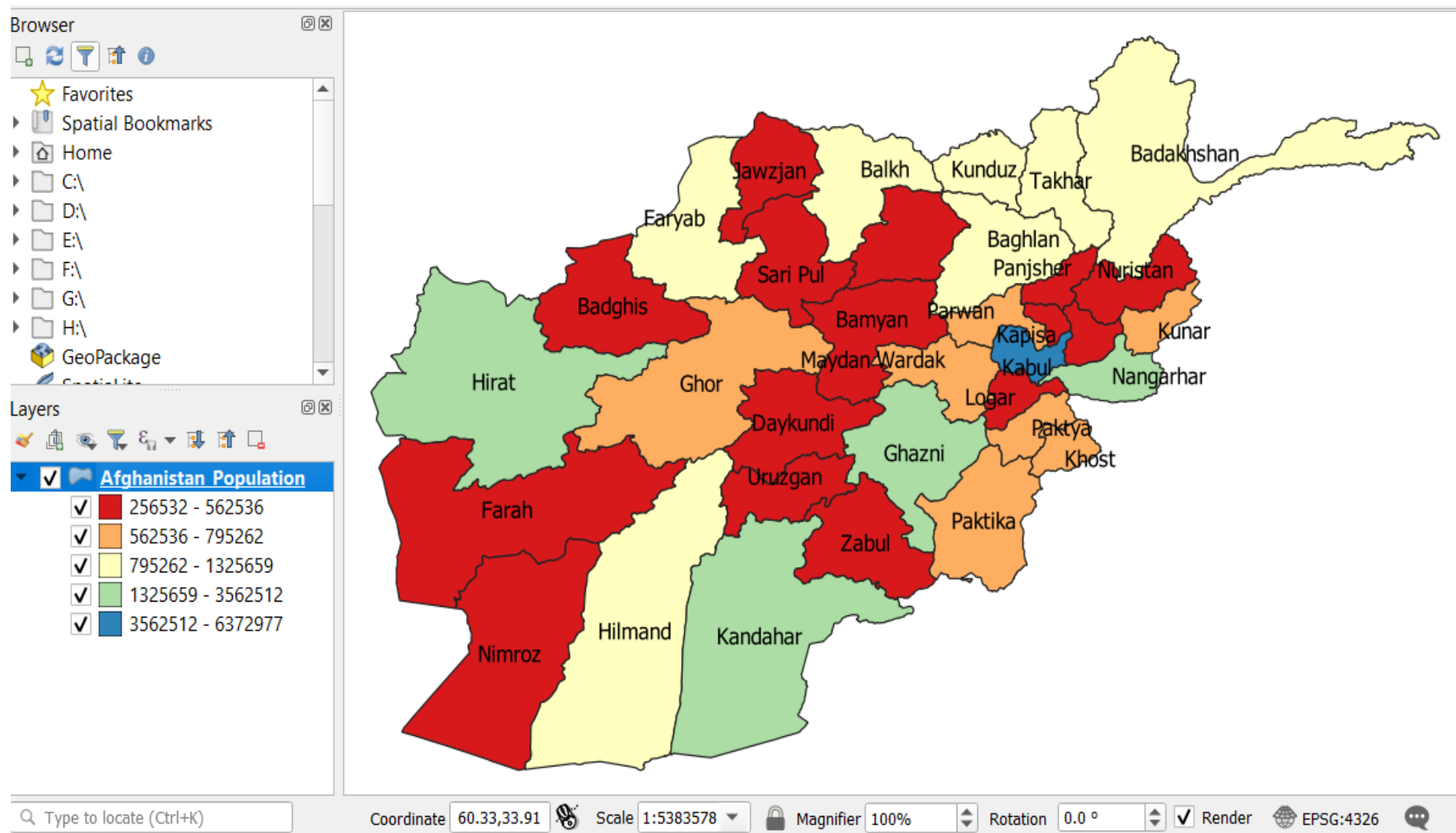
Layer Properties — Nepal_Population | Labels



Layer Properties — Afghanistan_Population — Labels



Labelling vector data



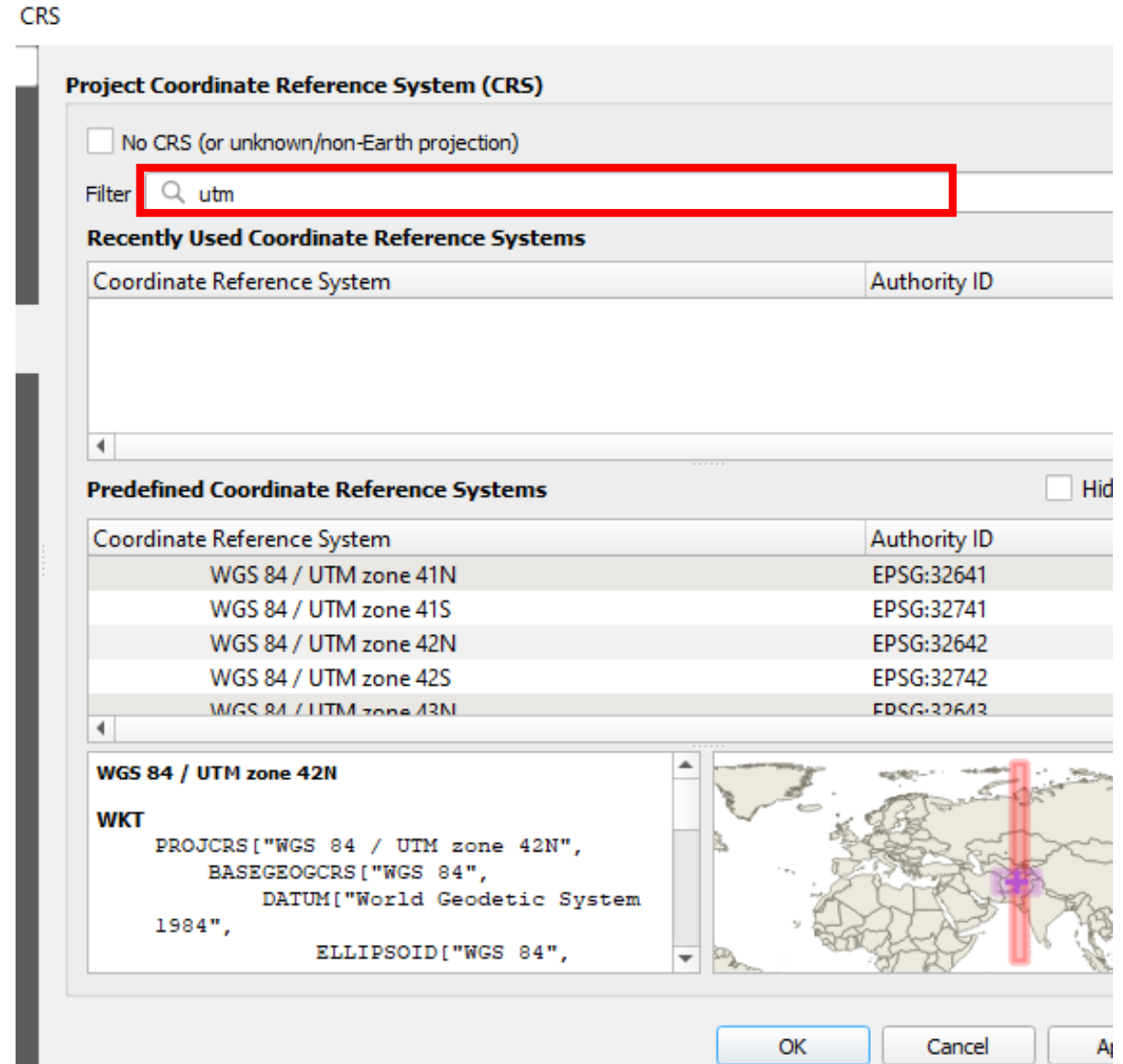
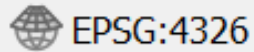
Why Project the layer?

- 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

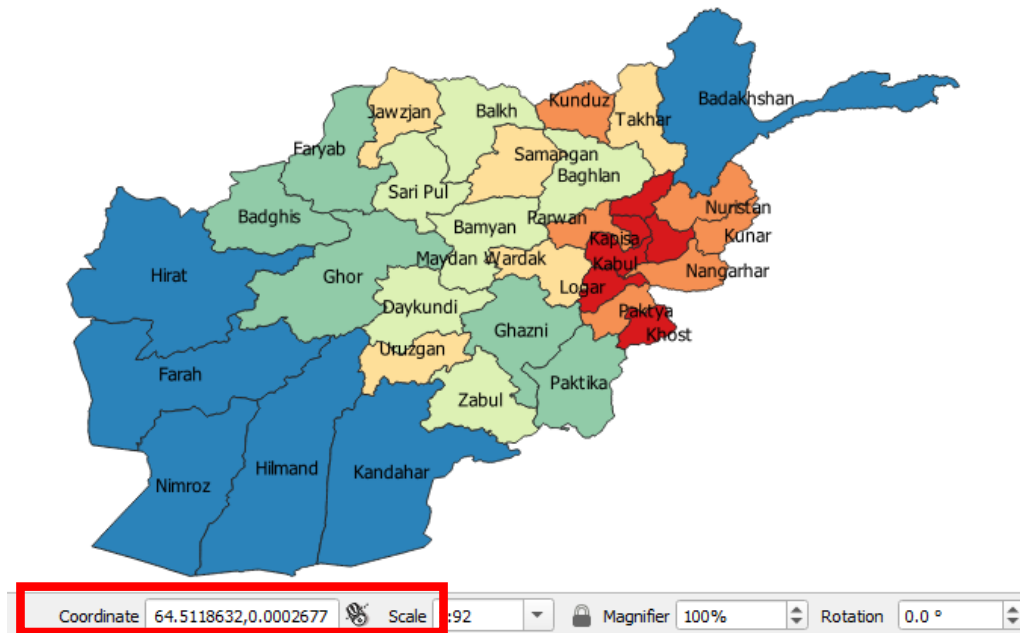
- Click at the **EPSG:4326** at the bottom right of QGIS
- In the **Filter** tab type **UTM**
- Select **WGS/UTM zone 42N** and **Apply**



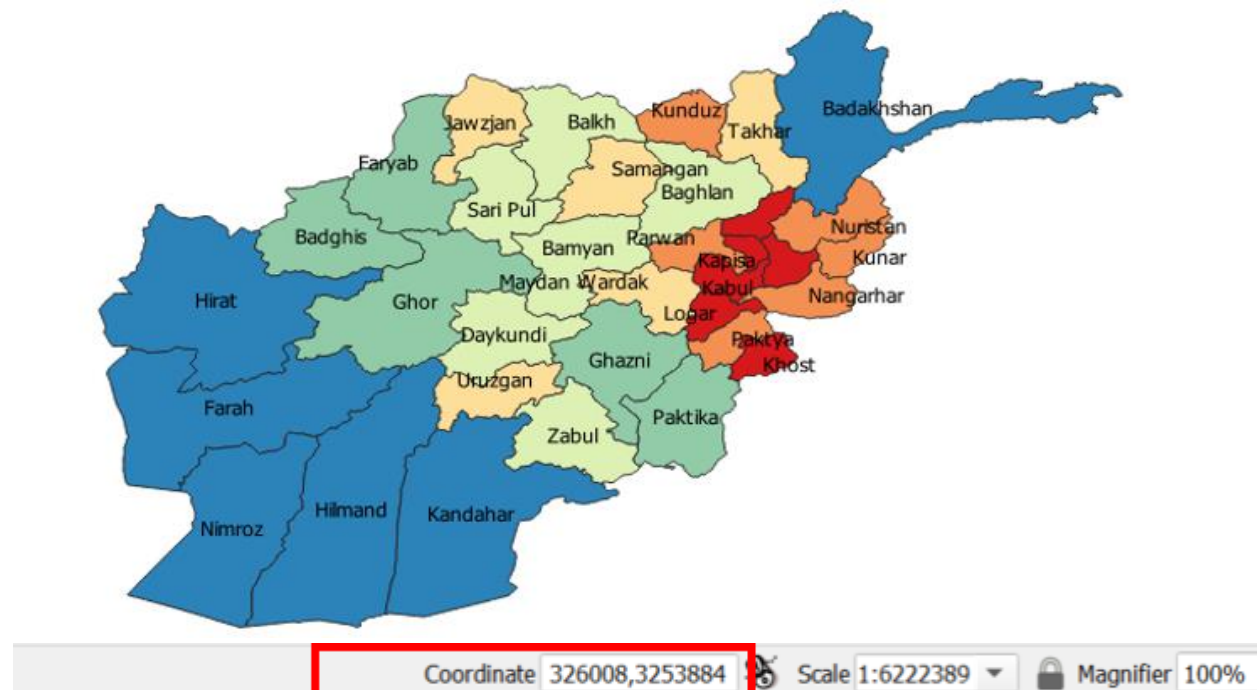
Projection in QGIS

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

Before



After



Projection in QGIS

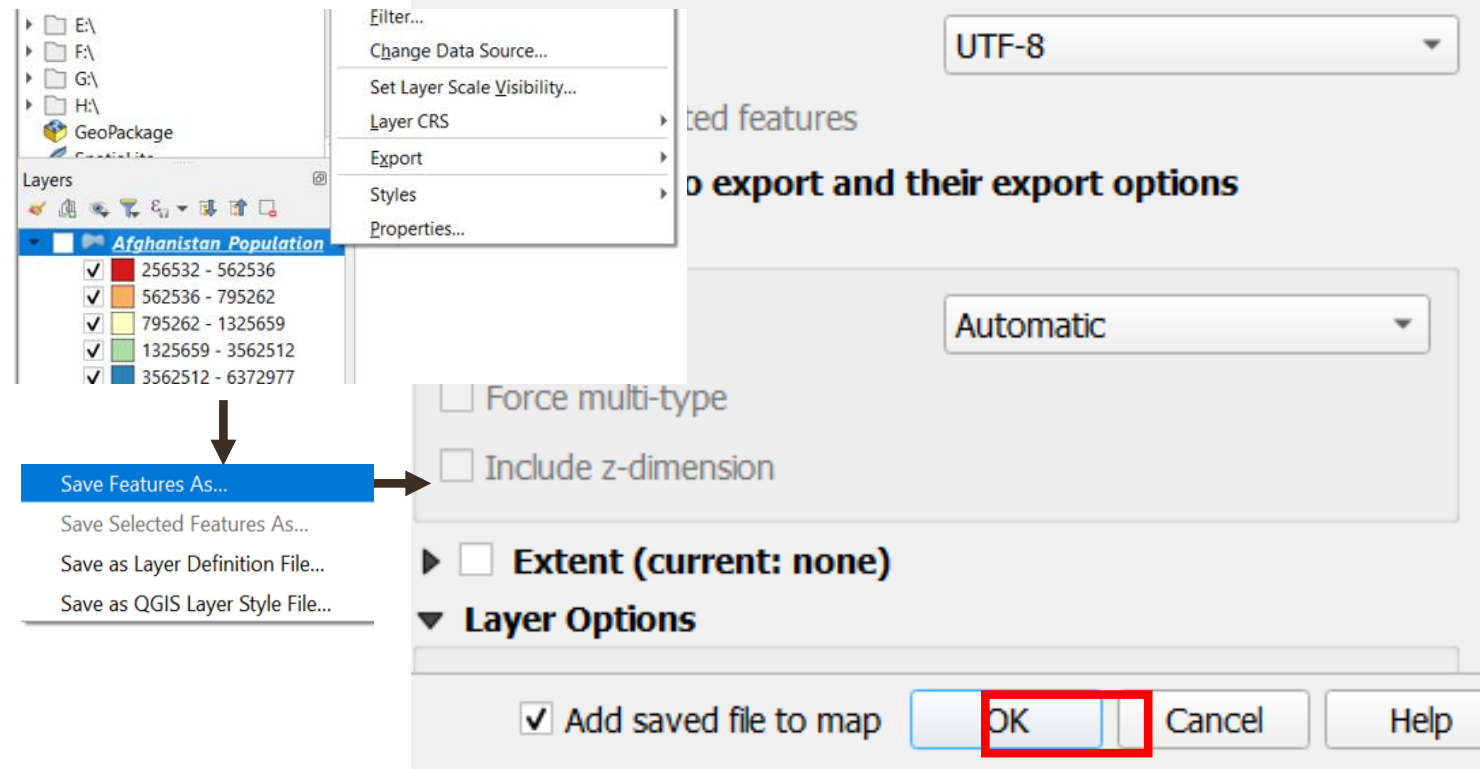
- Right click on the layer

Afghanistan_Population ->Export->

Save Feature As

- Select CRS
- Give output file name as

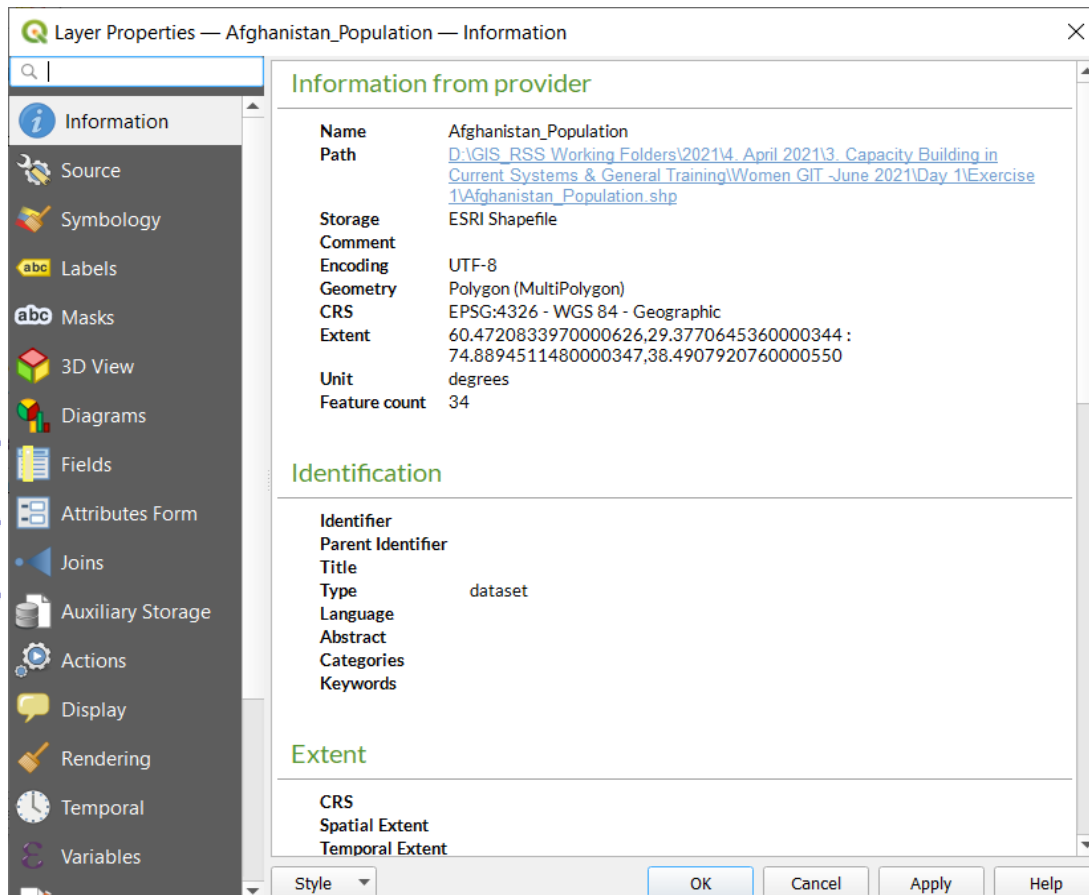
Afghanistan_Province_UTM



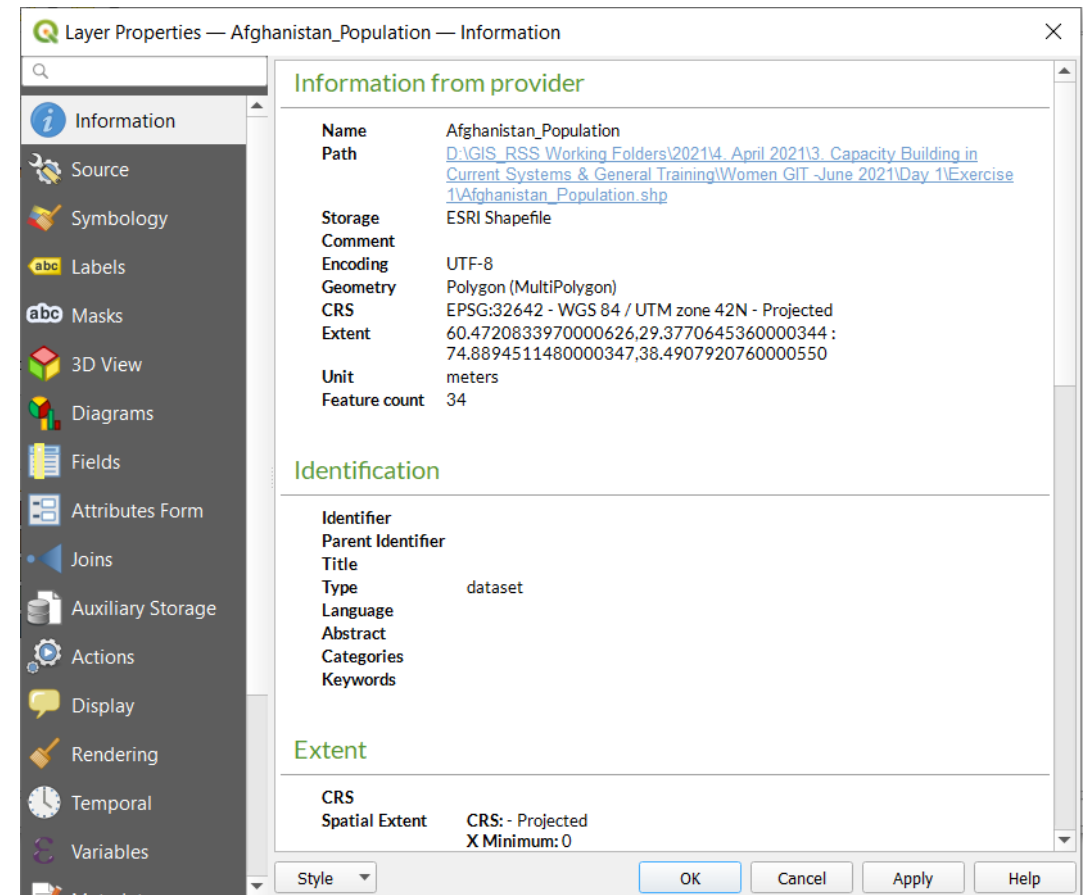
Projection in QGIS

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

Before

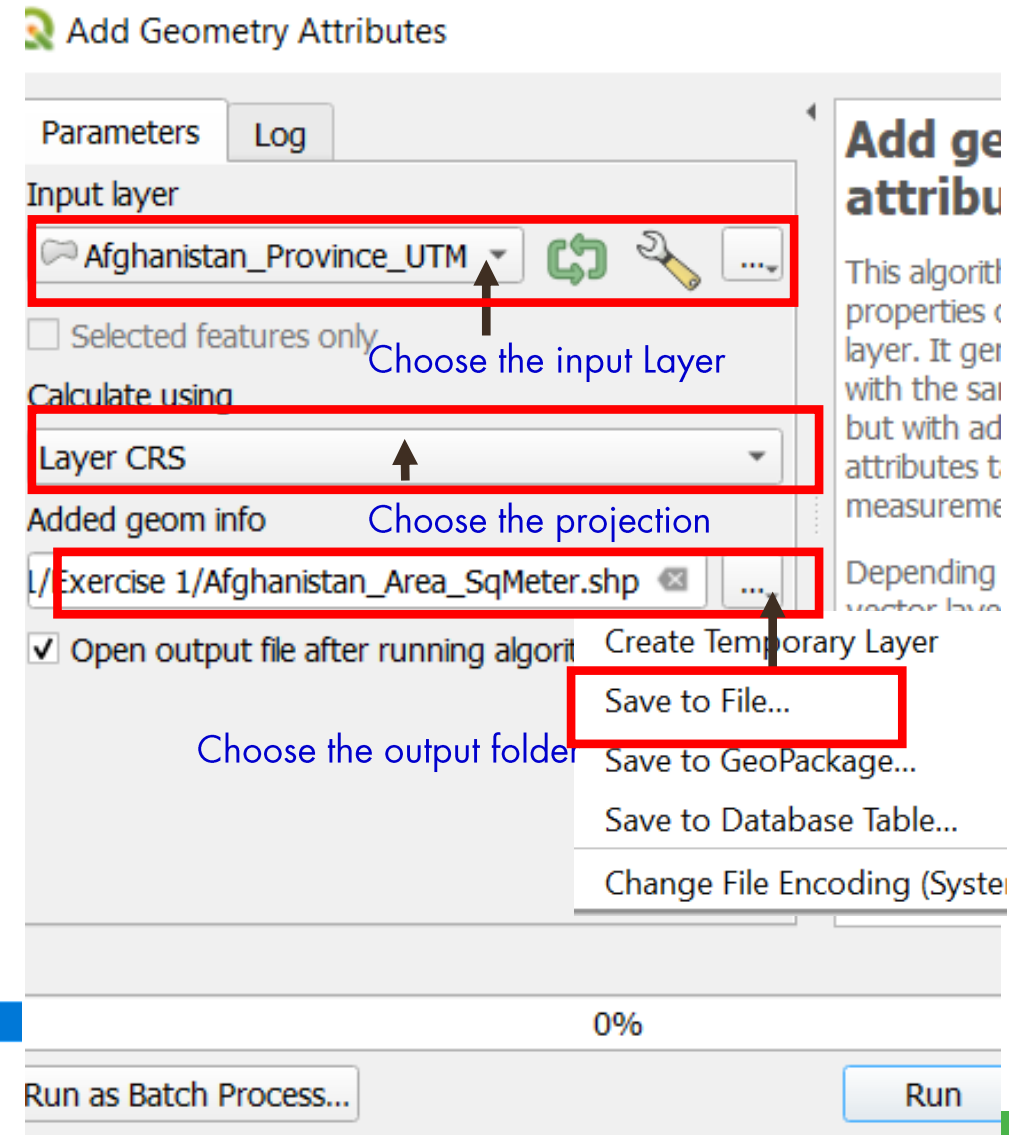
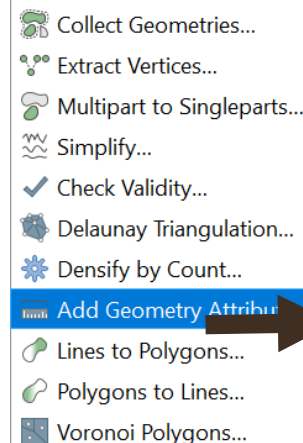
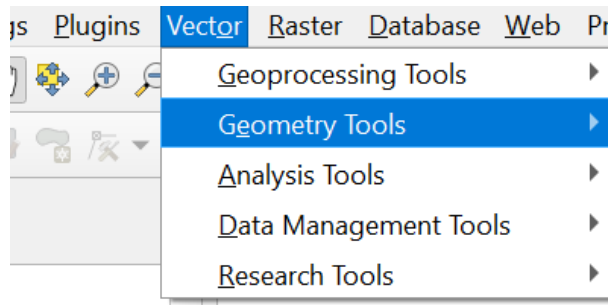


After



Calculating area

- Load **Afghanistan_Province_UTM .shp**
(you created on previous day)
- Click on **Vector->Geometry Tools ->add geometry attributes**
- Select Input layer and CRS
- Dropdown and select Save to File
- Select the output folder and name your file as **Afghanistan_Area_SqMeter**
- Run



Calculating area

Added Area and Perimeter fields



The screenshot displays the QGIS interface. On the left, the 'Browser' panel shows a project structure with folders for 'Day 1', 'Day 2', 'Day 3', and 'Day 4'. Under 'Day 2', there are files for 'Exercise 1', 'Exercise 2', 'KBL_Sentinel_2B.tif', 'KBL_Sentinel_2B.tif.ovr', and 'LandCover_Points.shp'. The 'Layers' panel at the bottom left shows a layer named 'Afghanistan Area SqMeter' with a blue square icon, which is highlighted with a red box. On the right, a table titled 'Afghanistan_Area_SqMeter' is shown, displaying calculated area and perimeter for 34 provinces. The table has columns for 'PROV_34_ID', 'PROV_34_NA', 'Province_R', 'AFG_Popula', 'area', and 'perimeter'. The 'area' and 'perimeter' columns are highlighted with a red box. A black arrow points from the text 'Added Area and Perimeter fields' to the 'area' and 'perimeter' columns. The status bar at the bottom shows 'Type to locate (Ctrl+K)', 'Toggles the editing state of the current layer', 'Coordinate: 239371,3244114', 'Scale: 1:5973340', 'Magnify: 100%', and 'Rotate'.

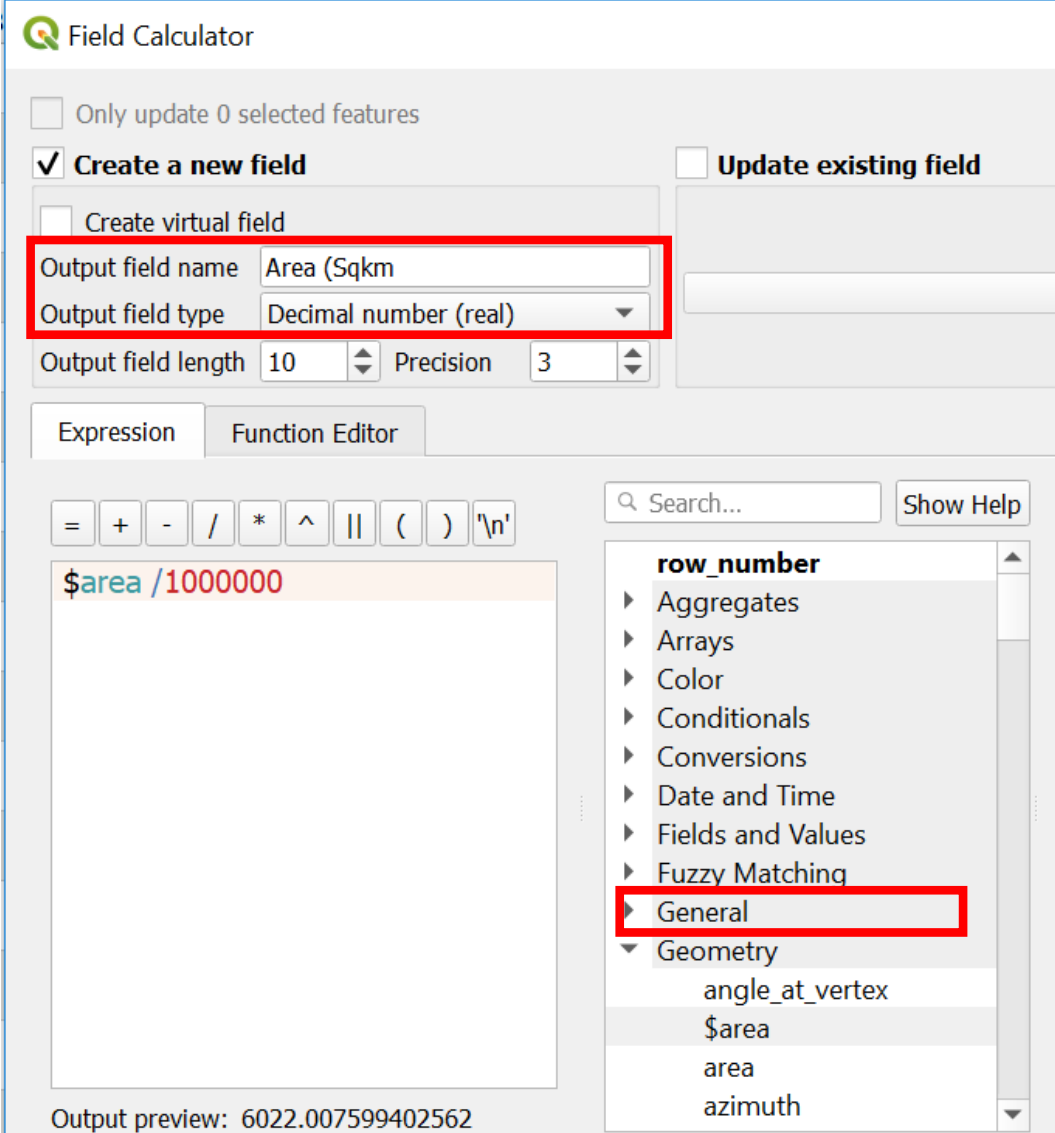
	PROV_34_ID	PROV_34_NA	Province_R	AFG_Popula	area	perimeter
1	25	Zabul	South	432561	1731602228...	860666.438...
2	26	Uruzgan	South	452152	1089312223...	745301.094...
3	12	Takhar	Northeast	1025123	1230797551...	703175.299...
4	31	Sari Pul	North	559577	1505893878...	804801.863...
5	15	Samangan	North	387928	1290517968...	612389.299...
6	3	Parwan	Center	664502	5570585406...	522481.437...
7	34	Panjsher	Center	371902	3738790170...	381062.406...
8	7	Paktya	Southeast	795262	5280219546...	462914.511...
9	29	Paktika	Southeast	652562	1906962713...	831746.871...
10	30	Nuristan	East	256532	8951473607...	633736.703...
11	22	Nimroz	South	356253	4181116124...	1078084.53...
12	8	Nangarhar	East	2352652	7364149636...	511498.983...
13	4	Maydan Wardak	Center	751212	1059278145...	688314.532...
14	5	Logar	Center	458262	4383948617...	416867.599...
15	9	Laghman	East	562536	3929843284...	338400.348...
16	14	Kunduz	Northeast	1010037	7949924194...	480082.304...
17	10	Kunar	East	652452	4863425793...	419101.778...
18	32	Khost	Southeast	652352	4288280600...	374629.839...

File with added geometry



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 number**-> **\$area**
- Type the expression



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: 3

Expression: $\$area / 1000000$

Function Editor

Search... Show Help

row_number

- Aggregates
- Arrays
- Color
- Conditionals
- Conversions
- Date and Time
- Fields and Values
- Fuzzy Matching
- General
- Geometry
 - angle_at_vertex
 - \$area
 - area
 - azimuth

Output preview: 6022.007599402562

Calculating area

Added new field

Browser

- 3. Capacity Building in Current Systems & Gene
 - Women GIT -June 2021
 - Day 1
 - Day 2
 - Exercise 1
 - Exercise 2
 - KBL_Sentinel_2B.tif
 - KBL_Sentinel_2B.tif.ovr
 - LandCover_Points.shp
 - Day 3
 - Day 4
 - QGIS_Software (32 & 64 bit)
 - FinalAgenda_WoGIT_Afghanistan_10_June
 - FinalAgenda_WoGIT_Afghanistan_10_June

Layers

- ☒ Afghanistan Area SqMeter

Afghanistan_Area_SqMeter — Features Total: 34, Filtered: 34, Selected: 0

	PROV_34_ID	PROV_34_NA	Province_R	AFG_Popula	area	perimeter	Area_SqKm
1	1	Kabul	Center	6372977	4600785734...	417311.765..	4600.78573...
2	2	Kapisa	Center	441010	1883764611...	239177.564..	1883.76461...
3	3	Parwan	Center	664502	5570585406...	522481.437..	5570.58540...
4	4	Maydan Wa...	Center	751212	1059278145...	688314.532..	10592.7814...
5	5	Logar	Center	458262	4383948617...	416867.599..	4383.94861...
6	6	Ghazni	Southeast	1828831	2175223208...	1023102.08..	21752.2320...
7	7	Paktya	Southeast	795262	5280219546...	462914.511..	5280.21954...
8	8	Nangarhar	East	2352652	7364149636...	511498.983..	7364.14963...
9	9	Laghman	East	562536	3929843284...	338400.348..	3929.84328...
10	10	Kunar	East	652452	4863425793...	419101.778..	4863.42579...
11	11	Badakhshan	Northeast	950953	4343634983...	2059114.54..	43436.3498...
12	12	Takhar	Northeast	1025123	1230797551...	703175.299..	12307.9755...
13	13	Baghlan	Northeast	910784	1780935859...	771548.368..	17809.3585...
14	14	Kunduz	Northeast	1010037	7949924194...	480082.304..	7949.92419...
15	15	Samangan	North	387928	1290517968...	612389.299..	12905.1796...
16	16	Balkh	North	1325659	1677797744...	838417.437..	16777.9774...
17	17	Jawzjan	North	540255	1130463837...	635203.819..	11304.6383...
18	18	Faryab	North	998147	2051898268...	923488.842...	20518.9826...

Show All Features

Type to locate (Ctrl+K) Toggles the editing state of the current layer Coordinate: 893676,3321556 Scale: 1:5973340 Magnify: 100% Rotator: 0.0 °



Joining Attributes



➤ Click

➤ Add **AFG_Precipitation.CSV**

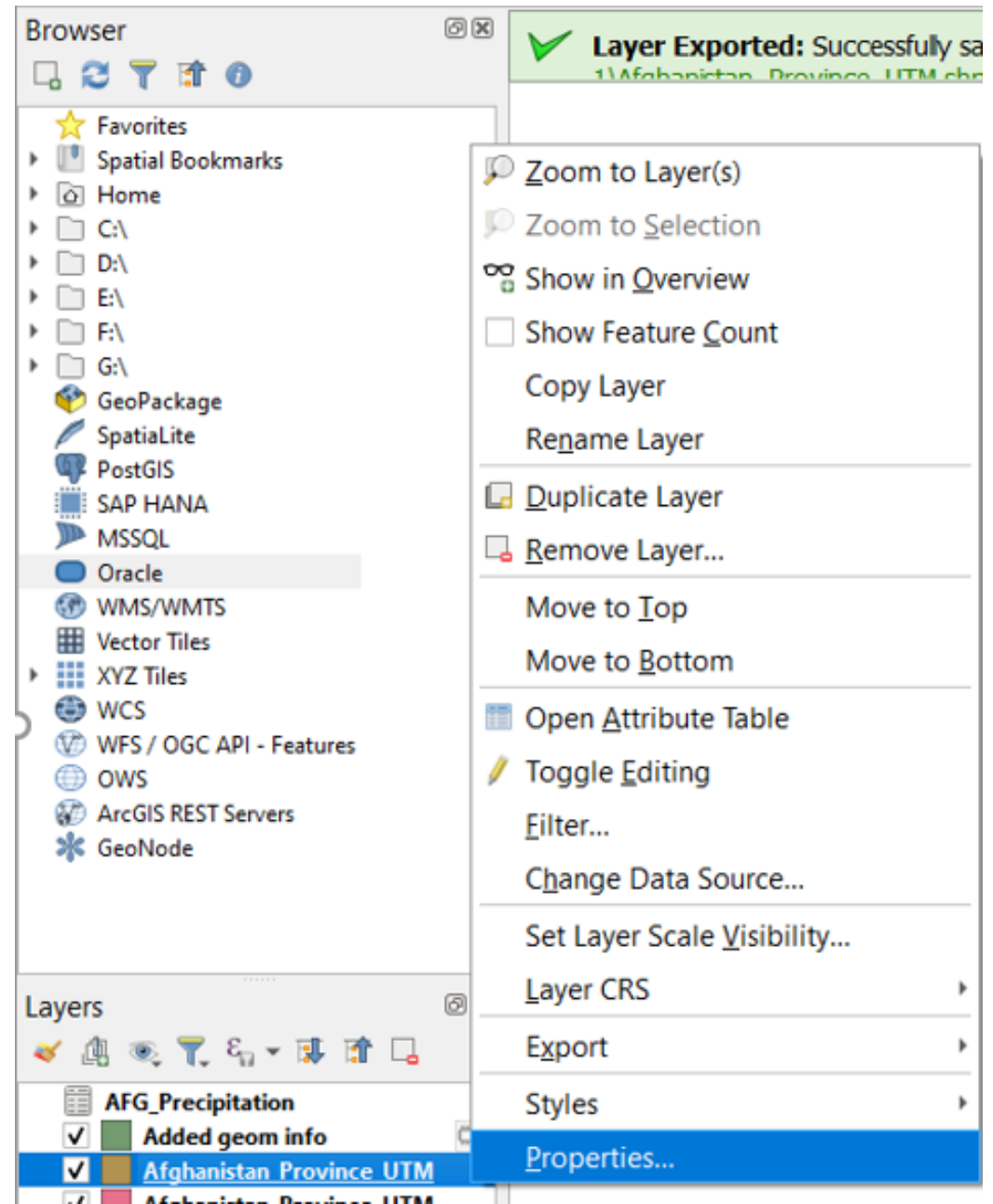
From **Day1 \Exercise1**

➤ Right click on layer

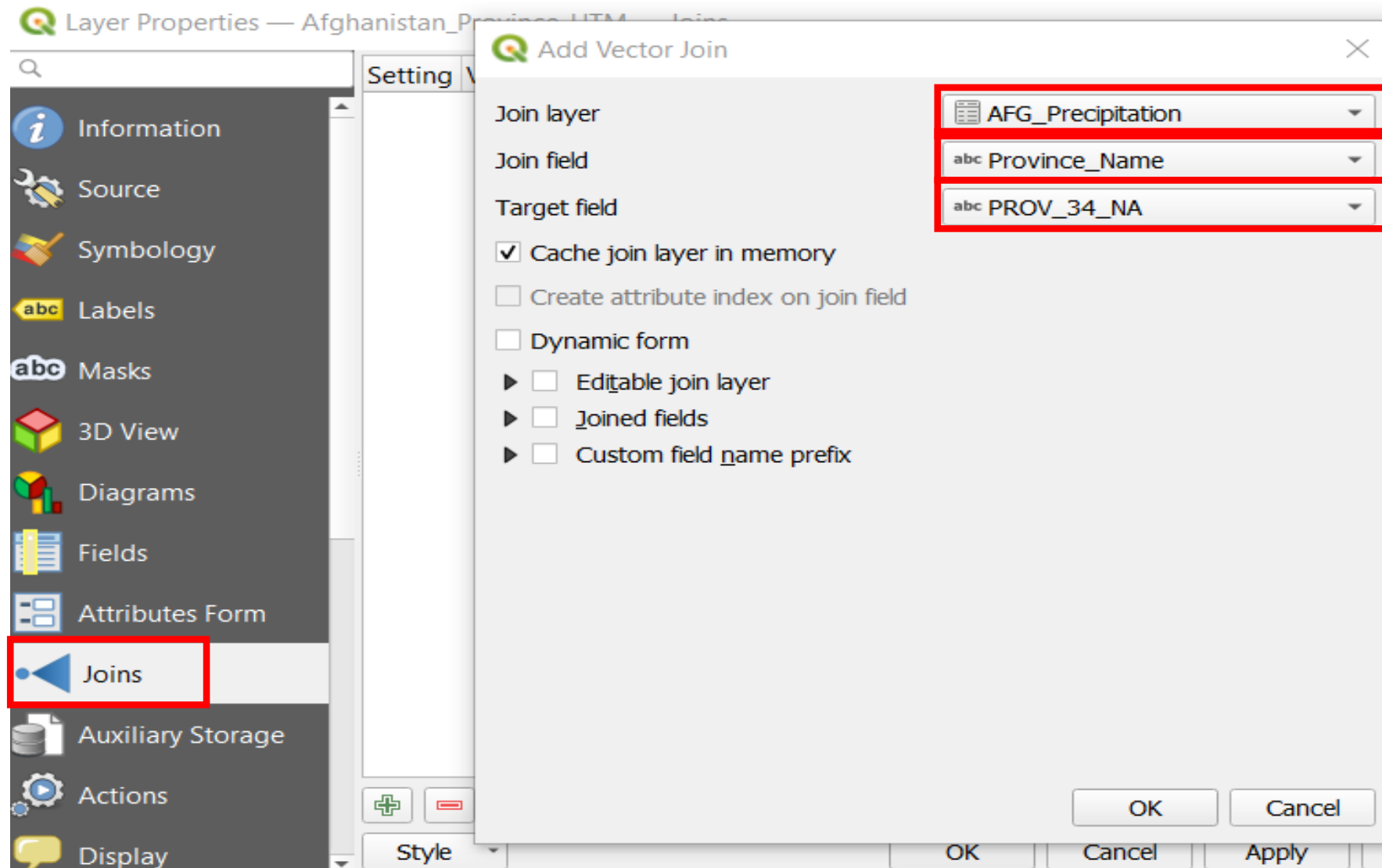
Afghansitan_Population.shp→

properties

➤ Click **Joins**



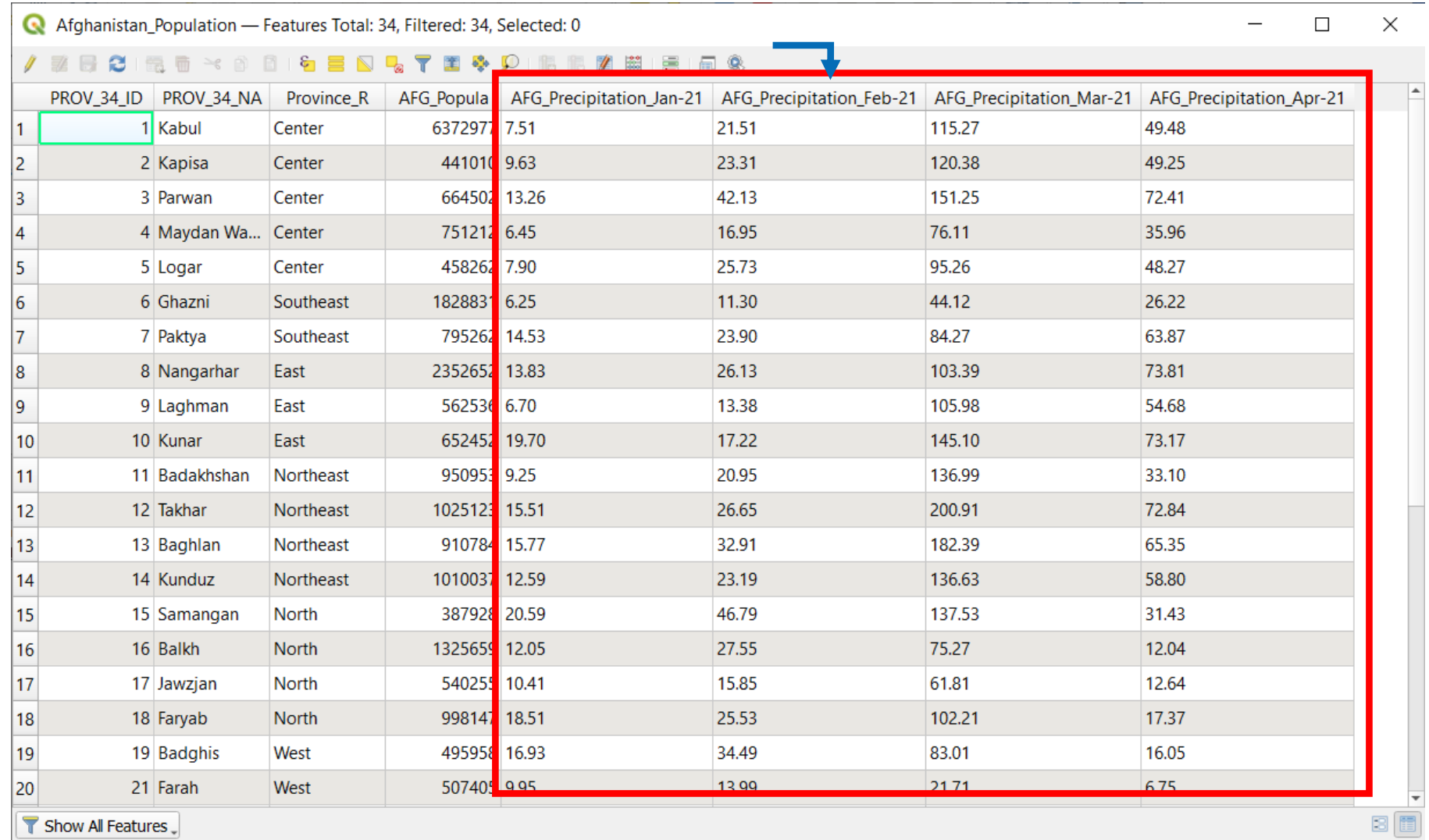
Joining Attributes



Joining Attributes

Joined field

Afghanistan_Population — Features Total: 34, Filtered: 34, Selected: 0



	PROV_34_ID	PROV_34_NA	Province_R	AFG_Popula	AFG_Precipitation_Jan-21	AFG_Precipitation_Feb-21	AFG_Precipitation_Mar-21	AFG_Precipitation_Apr-21
1	1	Kabul	Center	637297	7.51	21.51	115.27	49.48
2	2	Kapisa	Center	441010	9.63	23.31	120.38	49.25
3	3	Parwan	Center	664502	13.26	42.13	151.25	72.41
4	4	Maydan Wa...	Center	751212	6.45	16.95	76.11	35.96
5	5	Logar	Center	458262	7.90	25.73	95.26	48.27
6	6	Ghazni	Southeast	182883	6.25	11.30	44.12	26.22
7	7	Paktya	Southeast	795262	14.53	23.90	84.27	63.87
8	8	Nangarhar	East	235265	13.83	26.13	103.39	73.81
9	9	Laghman	East	562536	6.70	13.38	105.98	54.68
10	10	Kunar	East	652452	19.70	17.22	145.10	73.17
11	11	Badakhshan	Northeast	950953	9.25	20.95	136.99	33.10
12	12	Takhar	Northeast	1025123	15.51	26.65	200.91	72.84
13	13	Baghlan	Northeast	910784	15.77	32.91	182.39	65.35
14	14	Kunduz	Northeast	1010037	12.59	23.19	136.63	58.80
15	15	Samangan	North	387928	20.59	46.79	137.53	31.43
16	16	Balkh	North	1325659	12.05	27.55	75.27	12.04
17	17	Jawzjan	North	540255	10.41	15.85	61.81	12.64
18	18	Faryab	North	998147	18.51	25.53	102.21	17.37
19	19	Badghis	West	495958	16.93	34.49	83.01	16.05
20	21	Farah	West	507405	9.95	13.99	21.71	6.75

Show All Features

Export the data as **AFG_Precipitation_2021.shp**





Thank you

Let's protect
the pulse.