



Data Query - 2

Attribute Querying

Tutorial ID: IGET_GIS_010



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Data Query – 2

Objective: To get familiar with constructing attribute queries in Quantum GIS and presenting the results in the form of map for visualization and analysis purpose.

Software: Quantum GIS

Level: Beginner

Time required: 2 Hour

Prerequisites and Geospatial Skills:

1. Quantum GIS should be installed on the computer
2. Basic knowledge about the QGIS interface
3. Should have completed *Exercise ID: IGET_QGIS_007, ID: IGET_QGIS_008 and ID: IGET_QGIS_009*

Reading

1. Sutton, T., Dassau, O., & Sutton, M. (2009). [A gentle introduction to GIS](#). Chief Directorate: Spatial Planning & Information, Eastern Cape.

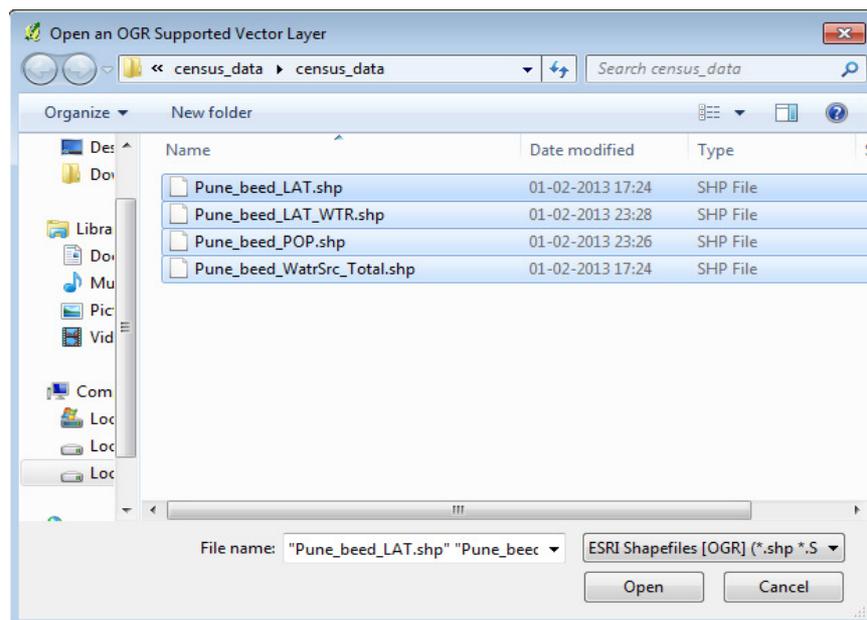
Tutorial Data: Tutorial data can be downloaded from [IGET_GIS_010](#).

Introduction:

As we have already seen in previous tutorials that GIS is not only a display tool; it can also be used to attach spatial information such as geographic co-ordinates and also attribute data describes the non spatial information. Query in GIS is a logical expression that selects and displays only the features or the attributes satisfying the criteria defined by the user. This is a very useful tool for exploring the information and spatial patterns in the given data-sets. Queries are generally of two types '*attribute query*' and '*spatial query*'. Attribute query is also known as '*aspatial query*' purely depends up on the attribute information associated with geographical data-set. It uses relational operators and Boolean logic to get the desired results from the attributes of the data-sets. Spatial query selects geographical features based on location and spatial relationships. It uses spatial logic or spatial relationships among the data-sets such as adjacency, intersect, within etc. In this tutorial we will focus on building attribute queries to retrieve the information in a useful form and export the results as new shape files.

In this exercise, we will use *Census Data* from Census of India for 2011 and the shapefiles of Pune and Beed in Universal Transverse Mercator (UTM) projection based on WGS 84 Datum.

1. First, we open Quantum GIS (QGIS) via the Start menu. (*Start → All Programs → QGIS Dufour → QGIS Desktop 2.0.1*)
2. Add the vector layers of Pune and Beed by clicking on the  '**Add Vector**' or from the Menu bar (*Layer → Add Vector Layer*) → Click on '**browse**' and Navigate to the data folder and select all shape files → Click '**Open**'.



- Before proceeding to the queries it is recommended to just explore the data-sets, so that it is easier to solve the following queries.

Query no 1: From the given data-sets, which tehsil in two districts have least population?

Solution: Since our query is related to population we have to use the shape file contains population information, in our data the shape file named 'Pune_beed_POP.shp' contains population information.

- Open the *Attribute table* of 'Pune_beed_POP.shp' (Right click on the layer → *Open Attribute Table*).
- Search for the "POP_TOTAL" column in the attribute table.

LIT_UT	LIT_UM	LIT_UF	POP_TOTAL	CHILD_POP	LITERATES	Density
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- Similar title bar will be seen in the attribute table. Click on 'POP_TOTAL'.
- A triangle is seen next to title POP_TOTAL name.
- Triangle pointing upward indicates that the data in the column is in 'Ascending order' and vice-versa. Arrange the data in ascending order for 'POP_TOTAL'. So the first entry will have minimum population, which we are looking for.
- Next step is to see this area spatially. Click on the "7" at the extreme left of the attribute table.

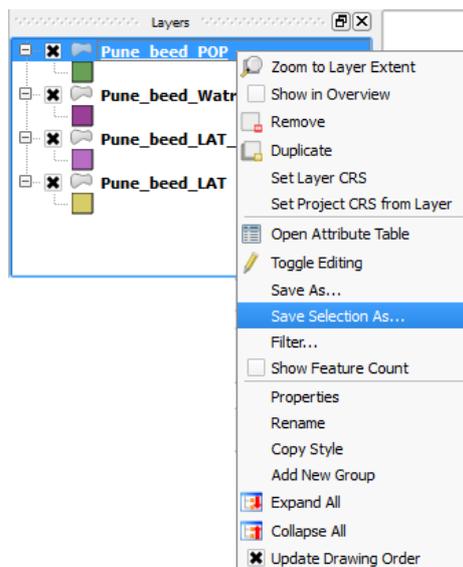
	LIT_RT	LIT_RM	LIT_RF	LIT_UT	LIT_UM	LIT_UF	POP_TOTAL	CHILD_POP	LITERATES	Density
7	72.189999999999...	84.560000000000...	59.630000000000...	NULL	NULL	NULL	54497.000000000...	5966.000000000...	35035.000000000...	101
23	68.700000000000...	80.959999999999...	55.490000000000...	NULL	NULL	NULL	87683.000000000...	12320.000000000...	51772.000000000...	107
20	67.819999999999...	79.459999999999...	55.130000000000...	80.969999999999...	89.540000000000...	71.829999999999...	122332.000000000...	16486.000000000...	74116.000000000...	357
1	69.920000000000...	82.370000000000...	56.310000000000...	NULL	NULL	NULL	125029.000000000...	15471.000000000...	76604.000000000...	148
14	68.799999999999...	81.180000000000...	55.350000000000...	NULL	NULL	NULL	128618.000000000...	16044.000000000...	77452.000000000...	187

- Once you clicked, the area is selected and highlighted in the map canvas.

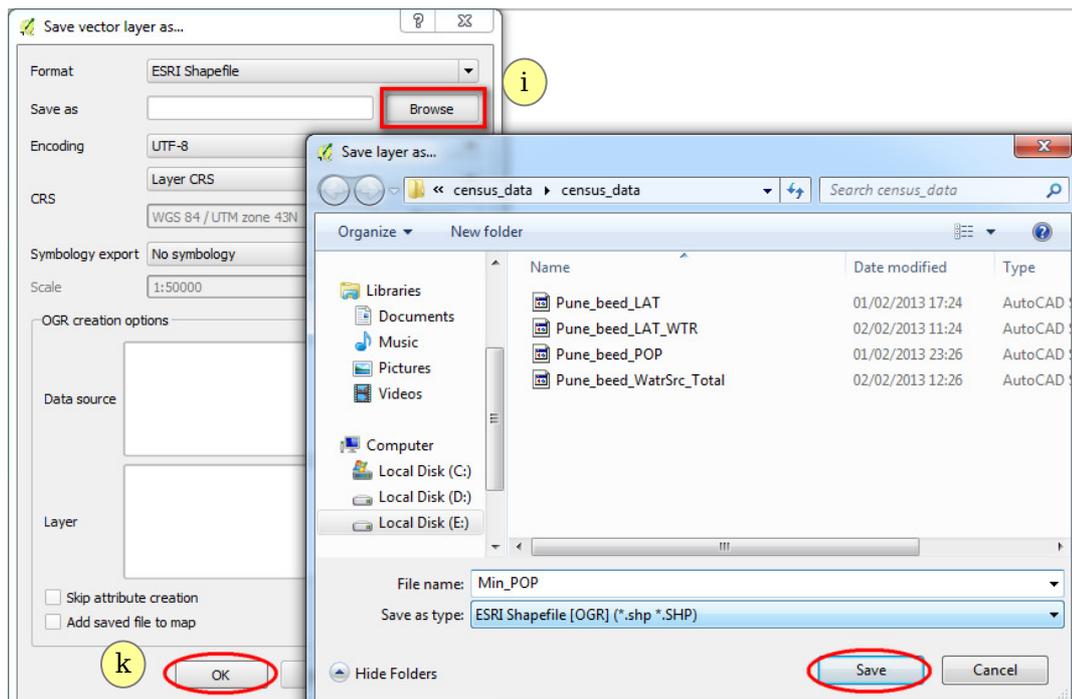
	Area_km2	UID	TEHSIL_NAM	DIST_CODE	SR_T	SR_R	SR_U
7	539.40861430664	04197	Velhe Tahsil	521	976.000000000000...	976.000000000000...	NULL
23	819.79239702075	04220	Wadwani Tahsil	523	906.000000000000...	906.000000000000...	NULL
20	343.11905573425	04223	Dharur Tahsil	523	904.000000000000...	899.000000000000...	928.000000000000...
1	843.60829150562	04216	Petoda Tahsil	523	898.000000000000...	898.000000000000...	NULL
14	686.18959854285	04217	Shirur(Kasar) Ta...	523	900.000000000000...	900.000000000000...	NULL
8	1032.83156011481	04192	Mulshi Tahsil	521	892.000000000000...	903.000000000000...	830.000000000000...
2	837.25943031683	04198	Bhor Tahsil	521	973.000000000000...	971.000000000000...	995.000000000000...
10	1118.88456194940	04196	Purandhar Tahsil	521	959.000000000000...	960.000000000000...	955.000000000000...
4	1065.79304396906	04188	Ambegaon Tahsil	521	960.000000000000...	913.000000000000...	958.000000000000...
0	1459.29127089282	04215	Ashti Tahsil	523	921.000000000000...	919.000000000000...	959.000000000000...
15	1212.05180664880	04222	Kajj Tahsil	523	898.000000000000...	899.000000000000...	886.000000000000...
16	1181.21537711609	04219	Manjlegaon Ta...	523	916.000000000000...	912.000000000000...	931.000000000000...
17	763.89091772913	04225	Ambejogai Tahsil	523	927.000000000000...	922.000000000000...	940.000000000000...
18	648.90227706946	04224	Parli Tahsil	523	919.000000000000...	913.000000000000...	932.000000000000...
13	1342.13052973340	04218	Georai Tahsil	523	917.000000000000...	915.000000000000...	940.000000000000...
12	1132.45355223364	04191	Mawal Tahsil	521	894.000000000000...	889.000000000000...	900.000000000000...
3	1306.36294066650	04195	Daund Tahsil	521	929.000000000000...	925.000000000000...	958.000000000000...
5	1463.66889830774	04200	Indapur Tahsil	523	923.000000000000...	923.000000000000...	922.000000000000...
11	1557.18841501532	04189	Shirur Tahsil	521	914.000000000000...	918.000000000000...	895.000000000000...

Note: In-order to view the results, we have to bring the '*Pune_beed_POP.shp*' layer to the top under Map legend items (i.e., Layers catalog tree). To do this, click on '*Pune_beed_POP.shp*' and drag it to the top.

- h) The Area in yellow color is the tehsil having lowest population. We can construct similar queries to find areas having highest population, lowest or highest literacy rate etc.
- i) To create a new shape file of the selected area, right click on layer name i.e., '*Pune_beed_POP.shp*' under '*Layers*' and click on '**Save Selection As**'



- j) You will be directed to '**Save vector layer as**' window. Select desired name and location using '**Browse**'.

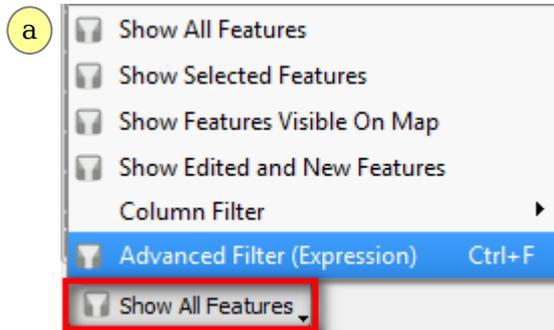


k) Click on **'Save'** and **'OK'** to finish.

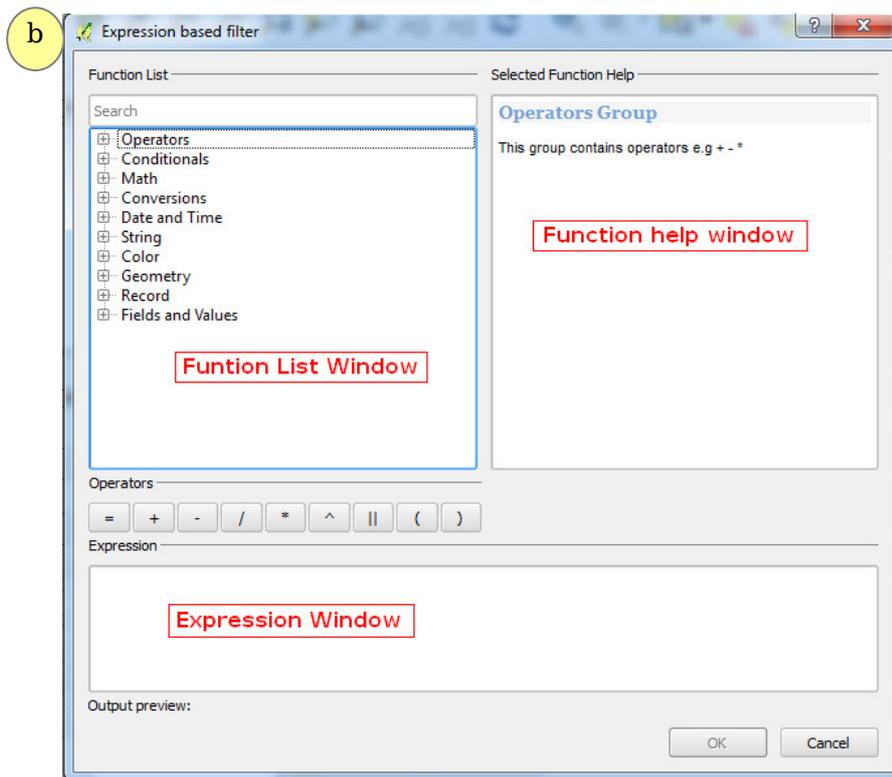
Query no 2: Find out the areas having child sex ratio ("**CH_SR**") above 850.

Solution: We will use *query builder* of Quantum GIS to solve this task.

a) Open the *Attribute table* of '*Pune_beed_POP.shp*'. Click on **'Show All Feature'** tab at the left bottom of the table and then click on **'Advance Filter (Expression)'**.

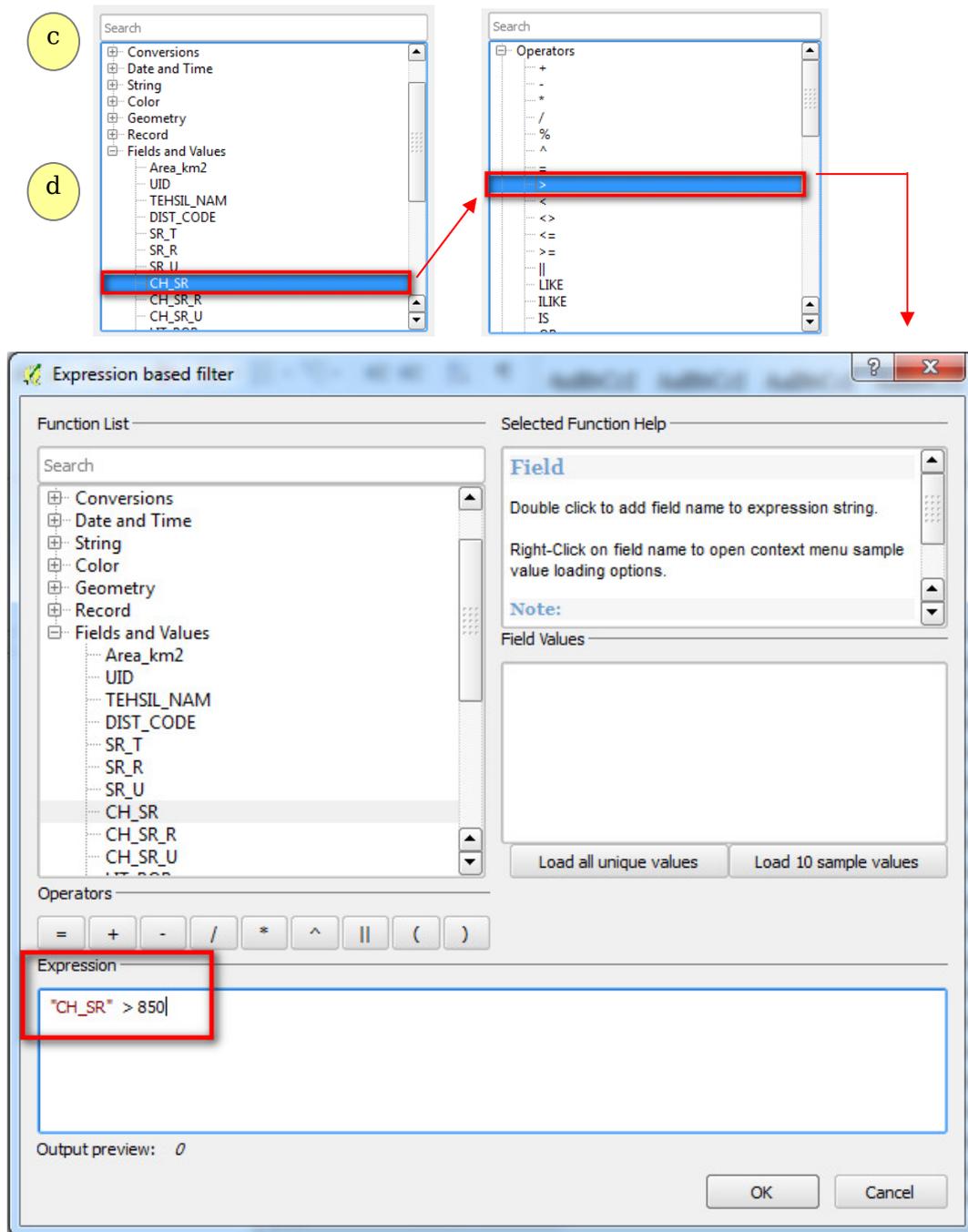


b) *'Expression based Filter'* window will be open up. This window contains different functions and list of fields.

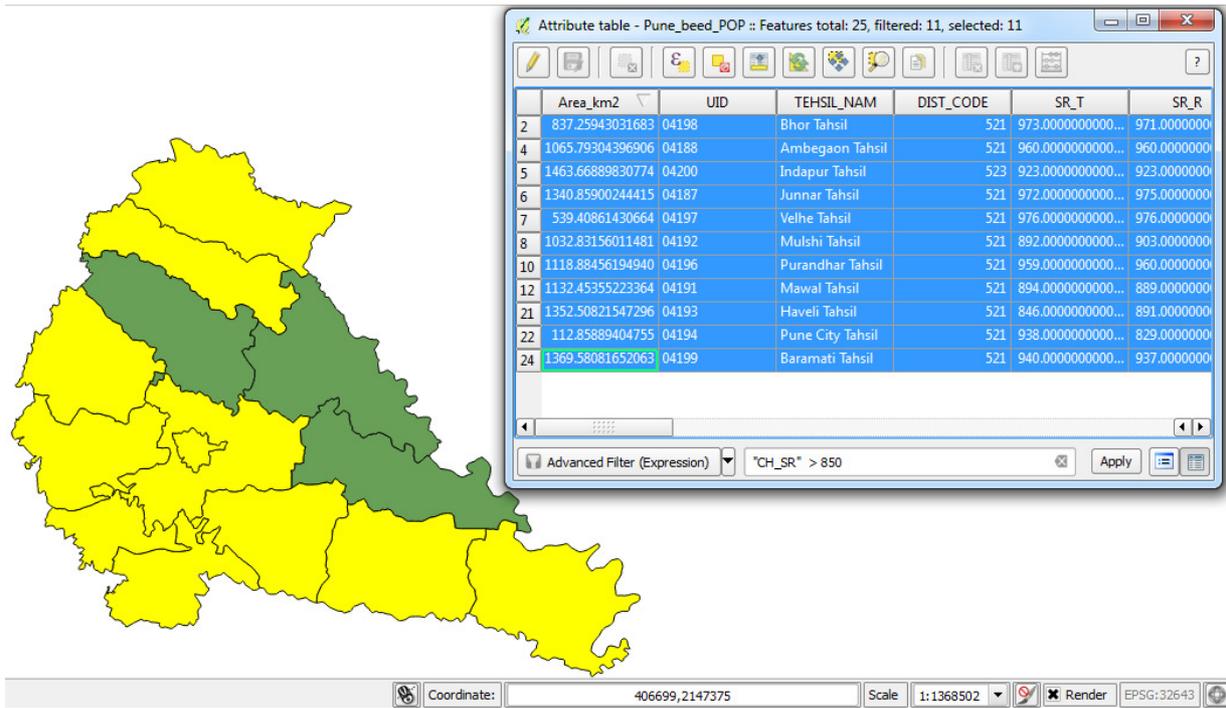


c) Function list window on the top left provides different operations/functions. *'Fields and Values'* in function list provides list of fields (Columns) in attribute table, Function help window is to the top right, different operators in the center and a space to build the required query under *'Expression'*.

d) Double Click on '**CH_SR**' from **'Fields and Values'**, it will be seen in *Expression window*. Then click on '*greater than (>)*' sign and place the cursor after '*>*' sign now type 850 in *Expression window* as shown below. Click **'OK'**.



e) This condition will select all the areas having child sex ratio greater than 850. Select these areas to highlight it on the map. As discussed earlier we can export these selected areas as separate vector layer to create a map.

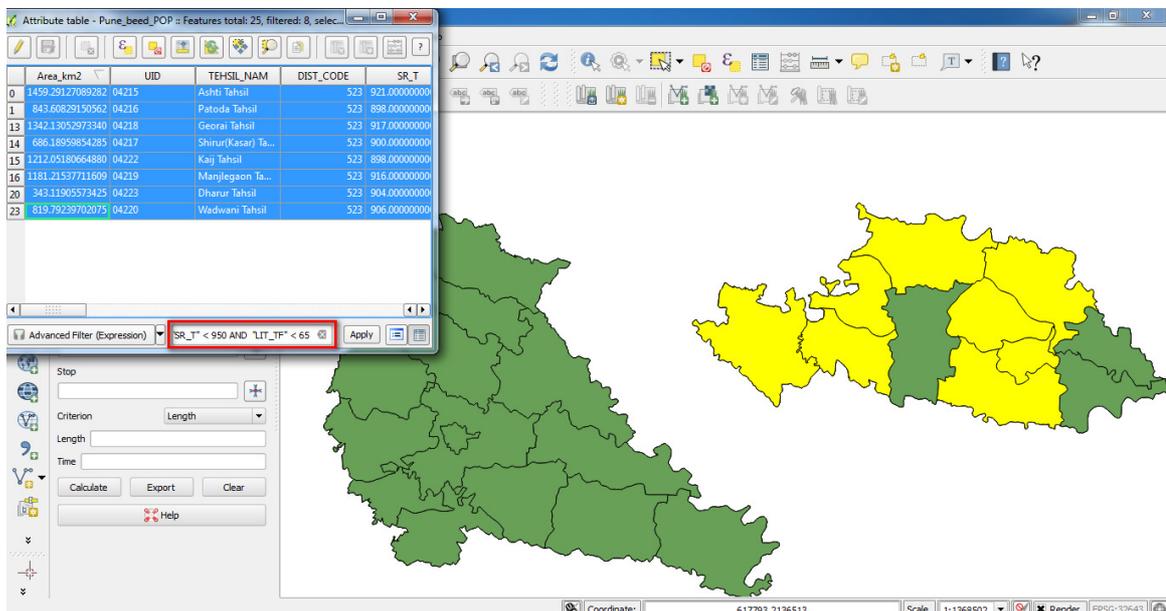


Question 1: Interpret the result of query no 1 with respect to the urbanization, use road shape file as base for urbanization?

Query no 3: Which are areas having sex ratio below 950 and total female literacy below 65%?

Solution: In this task we will examine the use of '**AND**' operator to simplify our task.

- Open the *Attribute table* of "*Pune_beed_POP.shp*". Click on '**Show All Feature**' tab at the left bottom of the table and then click on '**Advance Filter (Expression)**' (as previously done in Query 2).
- Then enter '**"SR_T" < 950 AND "LIT_TF" < 65**' in Expression window.
- This will select all the areas having sex ratio less than 950 and literacy below 65%.

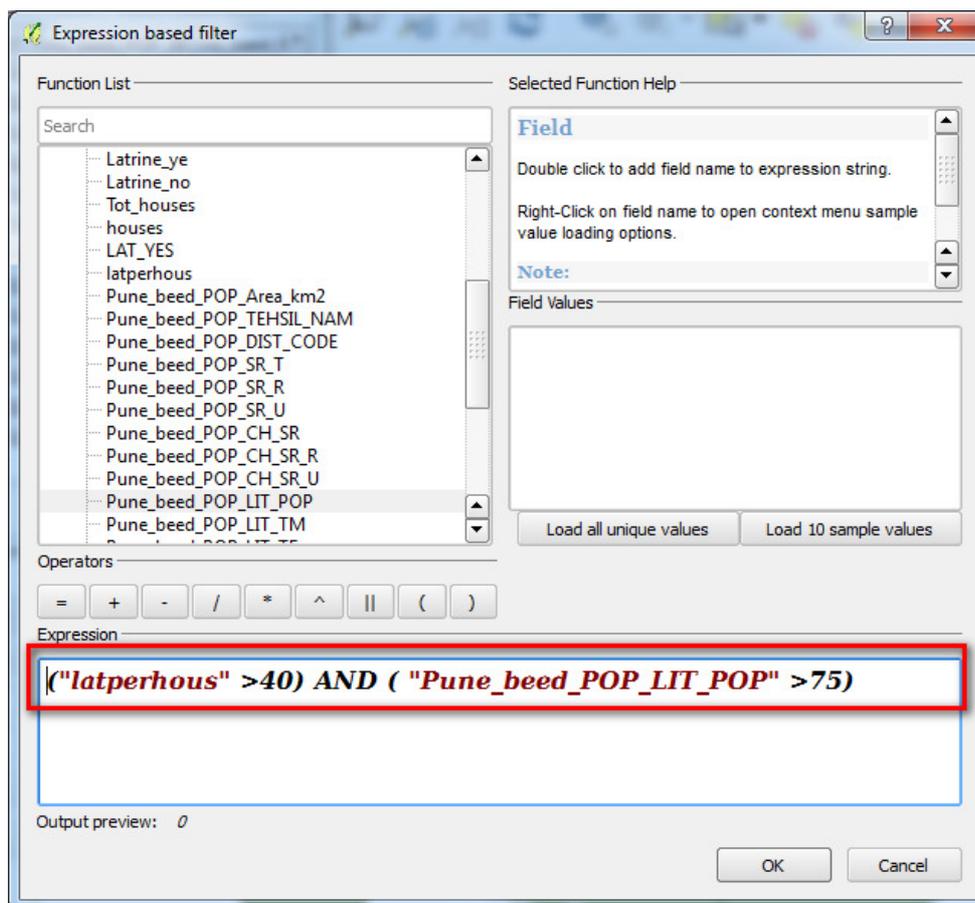


Question 2: How you can interpret the results of the query no 3? What happens if we use 'OR' in the place of 'AND' discuss?

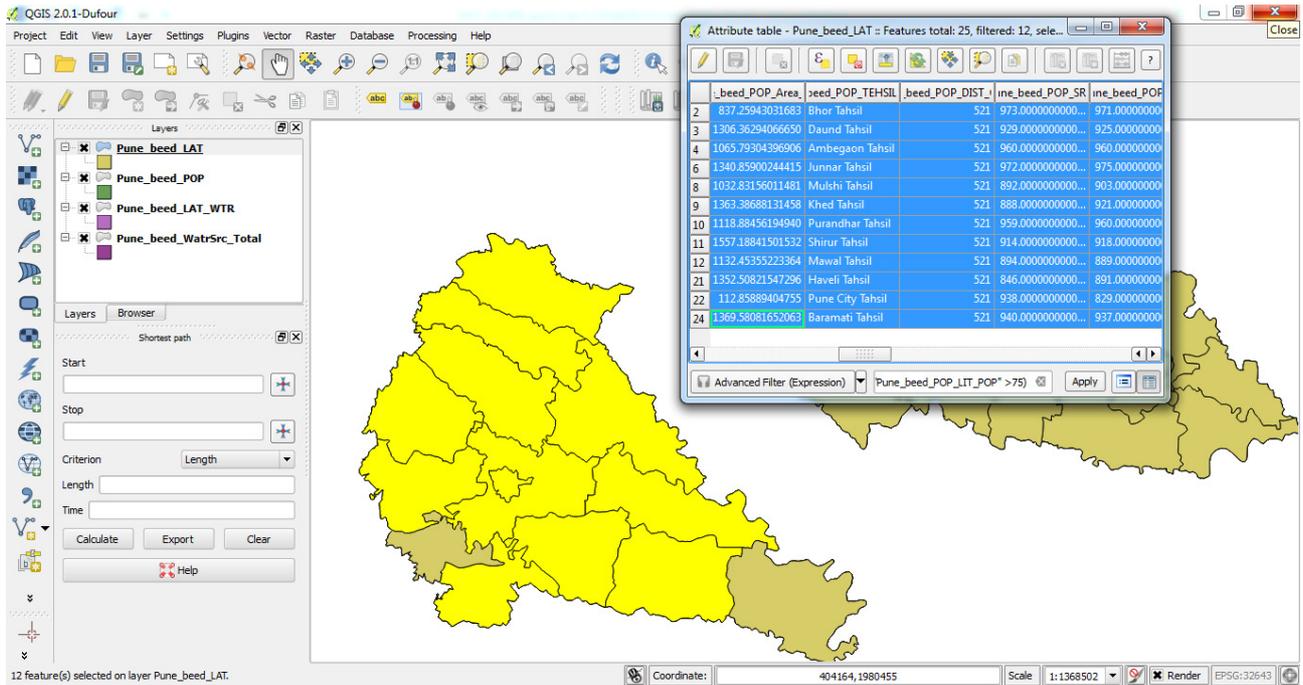
Query no 4: Find out the areas having Latrine facility more than 40% and literacy rate greater than 75%.

Solution: In this task we aimed to use the attribute data presented in different shape files to answer our question. This can be done by joining the attribute tables of shape file by using common field.

- To compare latrine facility with literacy rate we will have to **join** these two tables having latrine data and literacy rate data. Table joining exercise is already covered in *IGET_GIS_008* tutorial. So join "Pune_beed_LAT" and "Pune_beed_POP" with the help of common field as UID.
- Now both the attributes required for the query solution are there in a single table. So open the attribute table of 'Pune_beed_LAT'; Go in '**Advance Filter (Expression)**' and enter '**("latperhous" >40) AND ("Pune_beed_POP_LIT_POP" >75)**' equation in expression window.



- This equation shows all the areas having Latrine facility more than 40% and literacy rate greater than 75%. Create a map of selected areas.



Exercise

Query no 5: Which are the areas having rural sex ratio, literacy, and child sex ratio greater than 900, 70 and 900 respectively?

Query no 6: Which are the areas having either urban sex ratio or child ratio above 900?

Query no 7: Find out the areas which are having latrine ratio more than 40 and not having man made sources of water (i.e. manmade source ratio not more than 97).

Home Work

1. Create a map showing areas with urban female literacy rate more than 80 and also rural female literacy rate not less than 75.
2. Create a map showing areas with population density more than 3500 and latrine availability ratio more than 50%.