

Analytics and Business Intelligence Assignment.docx

by Malith Deshan Ranaweera

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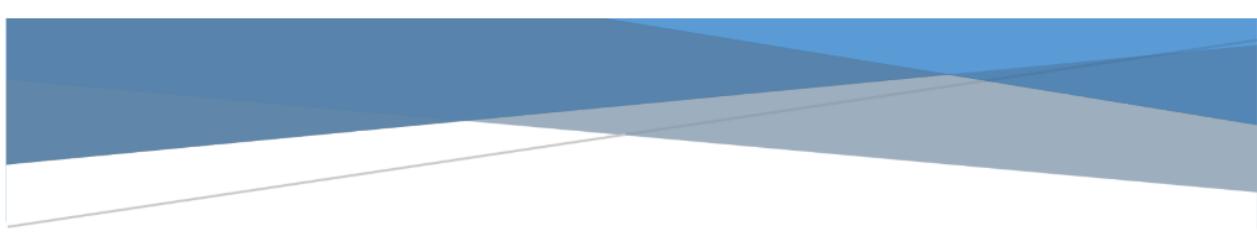
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Analytics and Business Intelligence

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CL/BSCSD/19/56
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June 2020

Task A

Task B

Task C

1 Develop a Sri Lanka map that visualizes information of Table 4: Number and Percentage of Agricultural Operators by Sex and District published in Agricultural Household Survey 2016/17 Report (page 17) by Department of senses and statistics of Sri Lanka (provided as Agriculture Household (AHS) 2016-17Report.pdf). The information such as District Name, Total agricultural operators, Total Male and Female operators with Respective percentages and numbers by district should be retrieved via newly created SLAHS1617.csv file to the map. All the information in CSV should be shown in the map while classifying it by Total agricultural operators by district. The map processing should be done using provided vector data set and the visualized information should be well described.

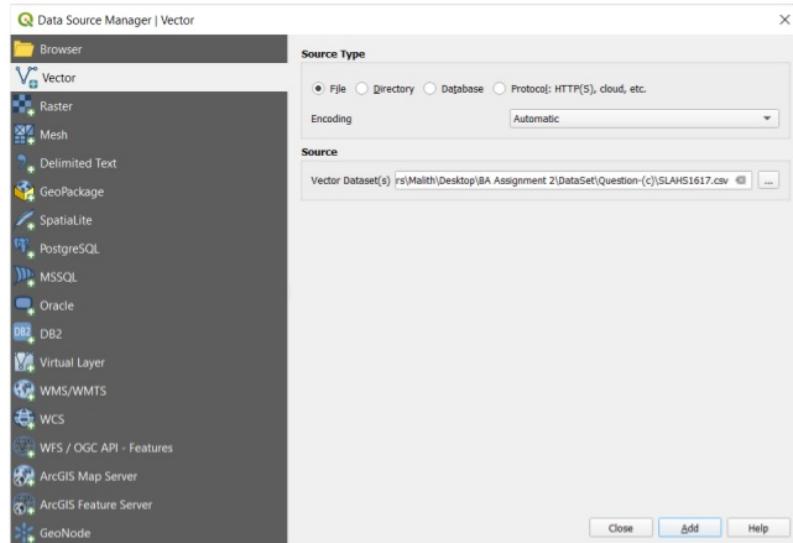
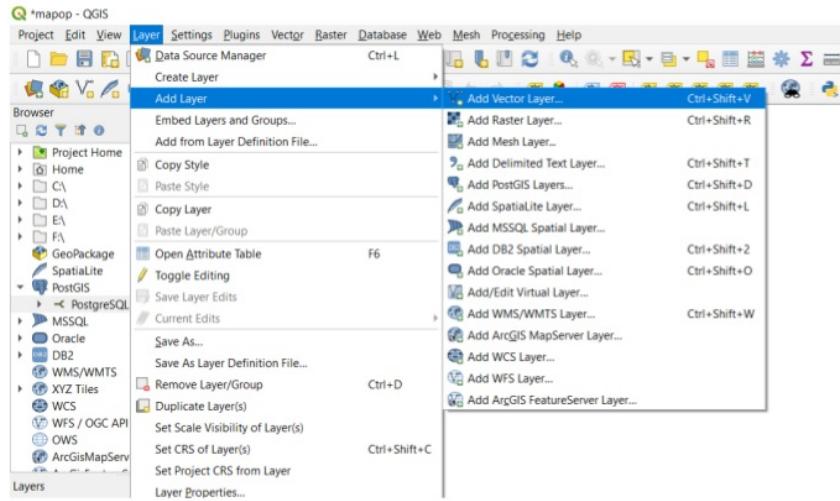
1 In this, we have to create a Sri Lankan Map to visualize information such as Agriculture operators' percentages by districts and sex.

Steps

First, we need to open the Agricultural Household Survey 2016/17 Report and turn to page number 17, table number 4. Then open a new excel file and copy that table number 4 in to the excel file and save it as **SLAHS1617.csv**. Save as CSV is very important.

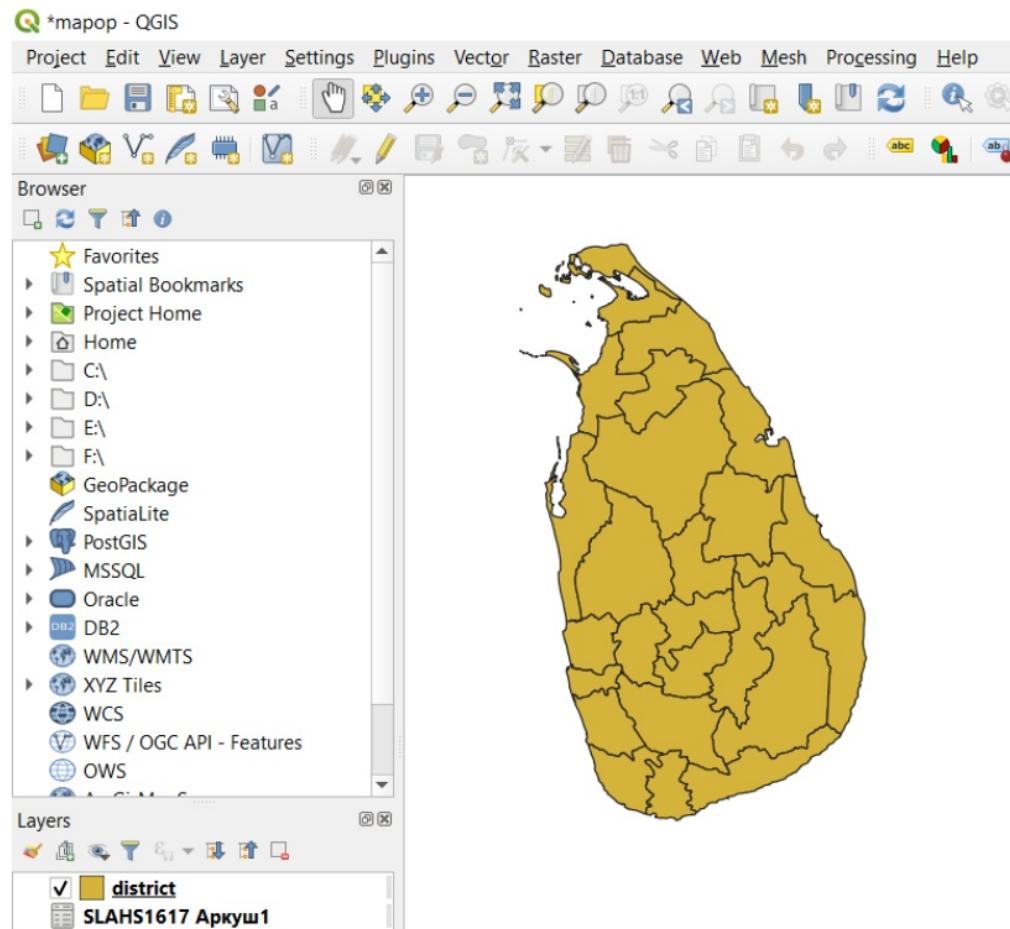
	A	B	C	D	E	F	G
1	COLOMBO	34,391	24,890	72	9,501	28	
2	GAMPAHA	110,889	82,130	74	28,759	26	
3	KALUTARA	97,814	72,036	74	25,778	26	
4	KANDY	139,061	101,955	73	37,106	27	
5	MATALE	78,180	63,127	81	15,053	19	
6	NUWARA ELIYA	85,162	67,996	80	17,166	20	
7	GALLE	129,101	94,971	74	34,130	26	
8	MATARA	110,426	85,852	78	24,574	22	
9	HAMBANTOTA	106,035	87,375	82	18,660	18	
10	JAFFNA	43,416	32,151	74	11,265	26	
11	MANNAR	9,261	7,345	79	1,916	21	
12	VAVUNIYA	25,371	18,847	74	6,524	26	
13	MULLAITIVU	22,532	19,015	84	3,517	16	
14	KILINOCHCHI	22,282	18,256	82	4,026	18	
15	BATTICALOA	34,462	27,677	80	6,785	20	
16	AMPARA	69,244	55,094	80	14,150	20	
17	TRINCOMALEE	33,395	26,825	80	6,570	20	
18	KURUNEGALA	290,552	218,350	75	72,202	25	
19	PUTTALAM	91,598	61,267	67	30,331	33	
20	ANURADHAPURA	182,834	145,435	80	37,399	21	
21	POLONNARUWA	79,613	67,877	85	11,736	15	
22	BADULLA	128,770	101,528	79	27,242	21	
23	MONERAGALA	104,642	83,674	80	20,968	20	
24	RATNAPURA	172,231	131,064	76	41,167	24	
25	KEGALLE	110,081	79,050	72	31,031	28	
26							
27							
28							
29							

1
After that step, we have to import that **SLAHS1617.csv** CSV file into the QGIS. In order to do that open QGIS, Click the Layer tab and go to the add layer in drop down menu and select the Add Vector Layer. Then it will show up a new window named Data source manage. Then browse and select **SLAHS1617.csv** The csv file you created before and Click the ADD button to import the file.



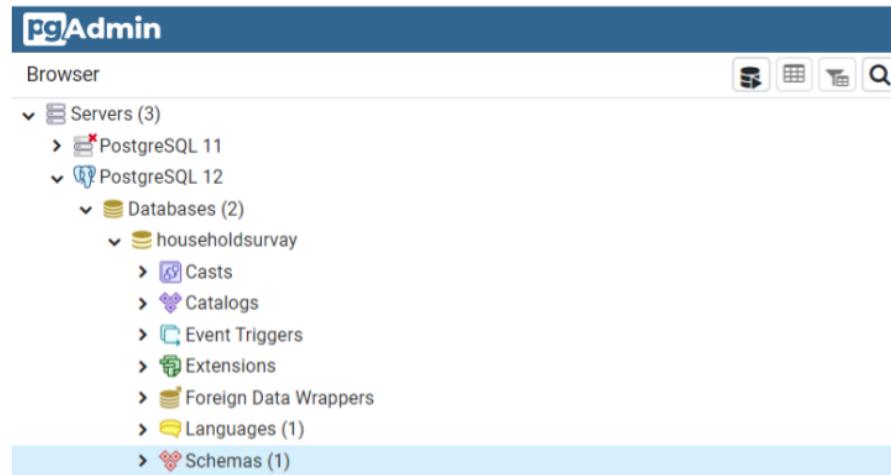
1
Now, we have to import the Sri Lankan district map. It is similar to previous one, go and Click the Layer tab and go to the add layer in drop down menu and select the Add Vector Layer. Then it will show up a new window named Data source manage. Then browse and

select the given district shape file “**District.shp**” Click the ADD button to import the file. It will show up like the figure below.

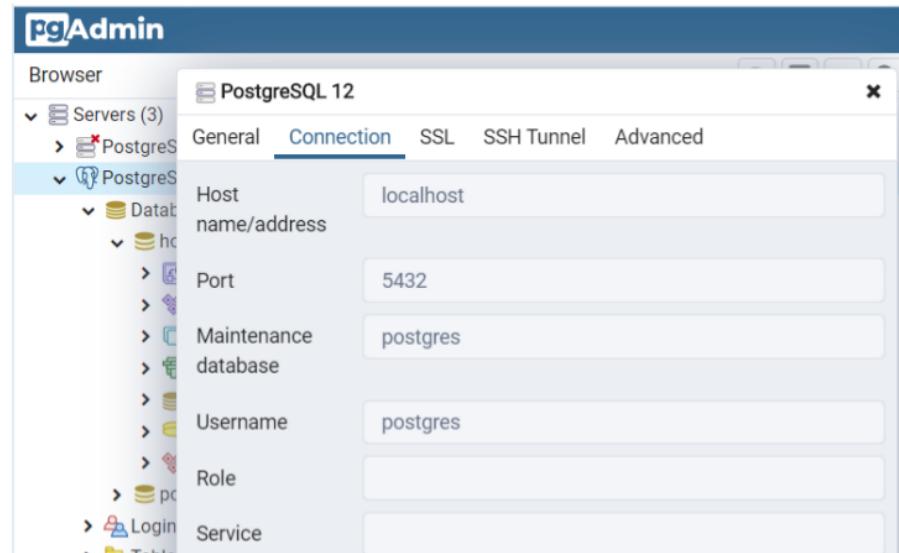


We can see the imported layers by left corner below like the figure above.

After this we have to import **SLAHS1617.csv** file in to the PostgreSQL by pgAdmin. Before that first open the pgAdmin select the exiting sever PostgreSQL 12, right click, and connect the server. Then select create database and give a name to the database. In my server, I created a database named “householdsurvey” like in the image below.



We can check the server details like server host name, port name, user name by the server properties



After this, we have to create a table with six columns to import the **SLAHS1617.csv** CSV file. For do that go to the database you named as **householdsurvey**, drop down; go to the Schemas, and select the public then you find tab named Tables. Right click on tables and select the create table and it will show up a popup window. Inside that window give a name to the table first (**householdsurvey** – same as database name) then create the six columns to add CSV dataset file like figure below

Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?
District	character	1,000		No	No
Total_Agricultural	character	1,000		No	No
Male	character	1,000		No	No
Male_percentage	character	1,000		No	No
Female	character	1,000		No	No
Female_percentage	character	1,000		No	No

Now we can import the **SLAHS1617.csv** CSV file by right click on the table name (**householdsurvey**) and selecting the import/Export. It will show up a pop up window again as in the figure below. Select import, give the path to the file name field and select the delimiter to the as “,” comma, it’s very important thing. In addition, click OK to import CSV file.

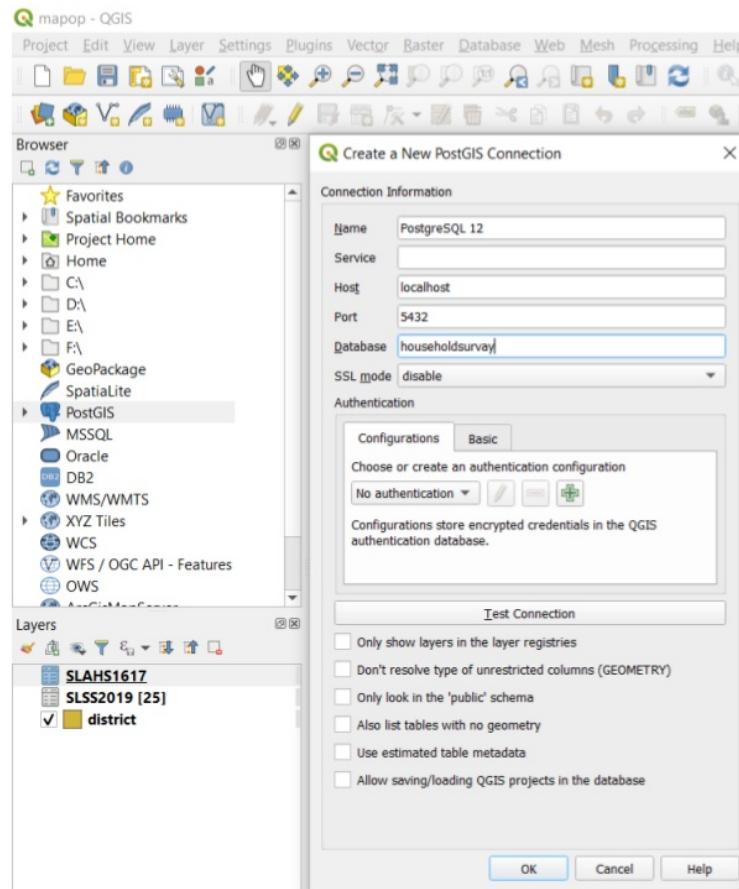
Specifies the character that separates columns within each row (line) of the file. The default is a tab character in text format, a comma in CSV format. This must be a single one-byte character. This option is not allowed when using binary format.

To check whether the record successfully add to the table click on the view data icon in the top of the left side. It will appear the table with all records you imported as a CSV file. As in the figure 9 below.

District	Total_Agricultural_Operators	Male	Male_presentation	Female	Female_presentation
COLOMBO	34,391	24,890	72	9,501	28
GAMPHAHA	110,889	82,130	74	28,759	26
KALUTARA	97,814	72,036	74	28,778	26
HANDY	109,061	101,958	73	37,106	27
MATALE	78,180	63,127	81	15,053	19
NUWARA ELIYA	85,162	67,996	80	17,166	20
GALLE	129,101	94,971	74	34,130	26
MATARA	110,426	85,852	78	24,574	22
HAMBANTOTA	106,035	87,375	82	18,660	18
JAFFNA	43,416	32,151	74	11,265	26
MANNAR	9,261	7,345	79	1,916	21
VAVUNIYA	25,371	18,847	74	6,524	26
MULLAITIVU	22,532	19,015	84	3,517	16
KILINOCHCHI	22,282	18,256	82	4,026	18
BATTICALOA	34,462	27,677	80	6,785	20
AMPARA	69,244	55,094	80	14,150	20
TRINCOMALEE	33,395	26,825	80	6,570	20

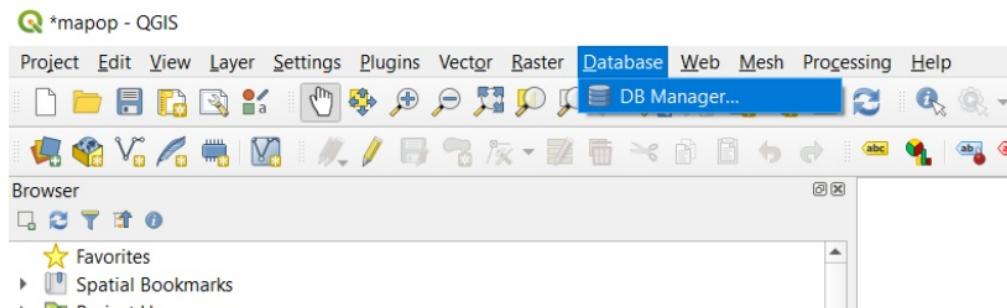
After this step, we have to create the connection to connect QGIS with the pgAdmin. Then go the QGIS right click on PostGIS tab in the left side and click on “New Connection”. As in the figure below.

After we clicked on the new connection, it will appear popup windows named “Create a New PostGIS Connection”. Then we have to fill some fields to make the connection. So I gave my PostgreSQL sever details to make the connection. I gave the name as “PostgreSQL 12”, host as “localhost”, port as “5432”, and database as “householdsurvey”. Click ok to make the connection. The created connection can find from left side in the QGIS named as PostgreSQL 12.

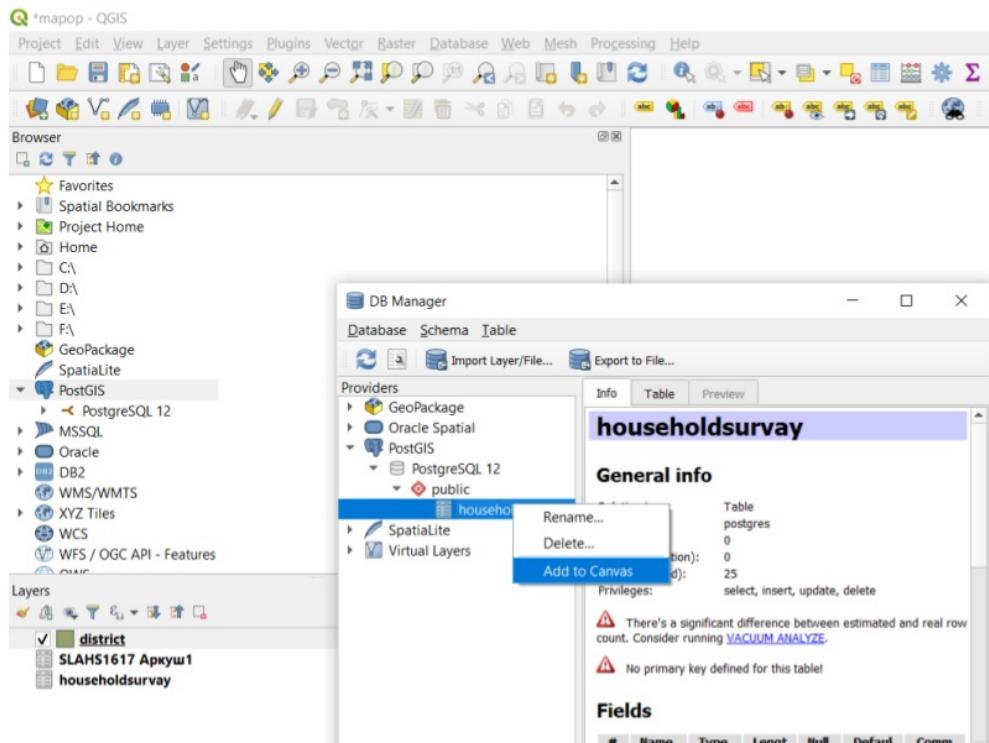


1

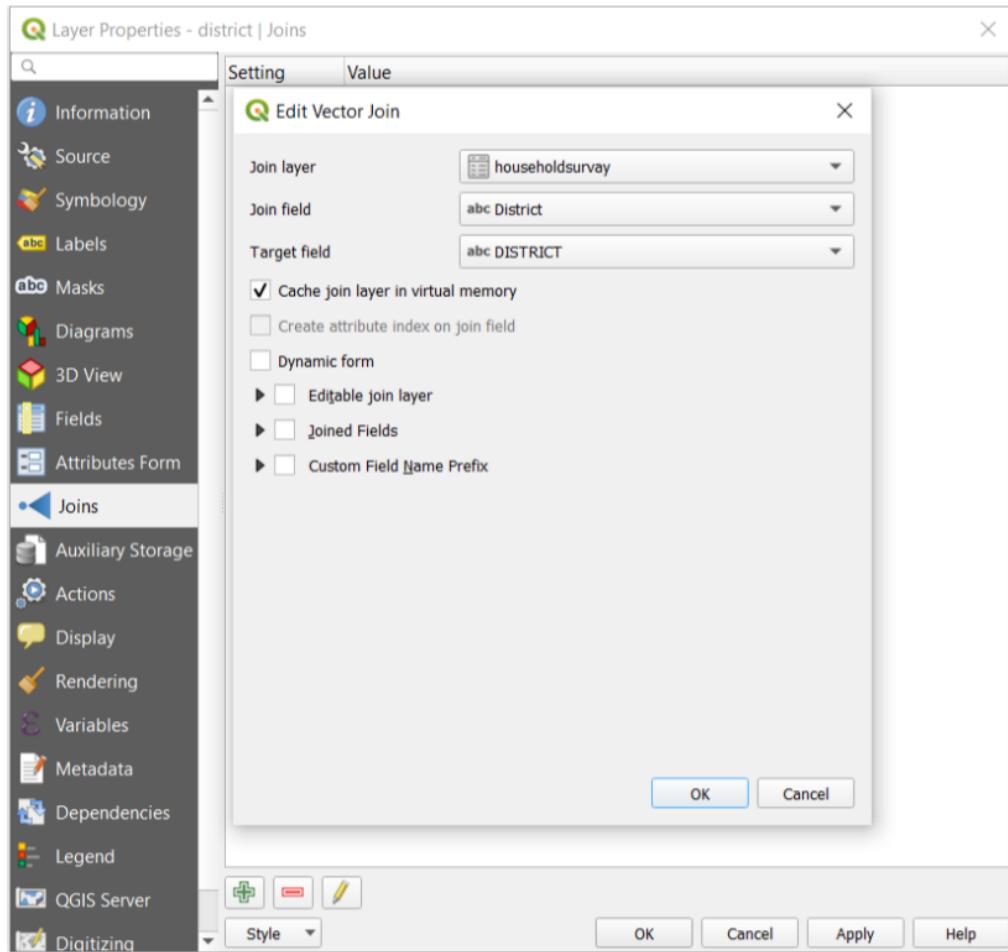
After that go to the tab called database and click “DB Manager”.



Now it will open up a window called DB manager, go to the PostGIS drop down it select the connection you created “PostgreSQL 12” drop down the public and right click on “householdsurvey” and click add to the Canvas. Then that householdsurvey table will appear on “Layers” section as in the figure below



1
After this, we need to connect/join the canvas District.shp shape file with “districts” file in the pgAdmin. To do that go to canvas, right click, and go to the “properties” after that select the “joins” it will pop and a window like figure below. Then give the join layer as the table from the pgAdmin named “householdsurvey”, give the join field as District according to the column in the table in pgAdmin, give the target field as “DISTRICT” that is the shape file we imported. After that click ok to apply the join.



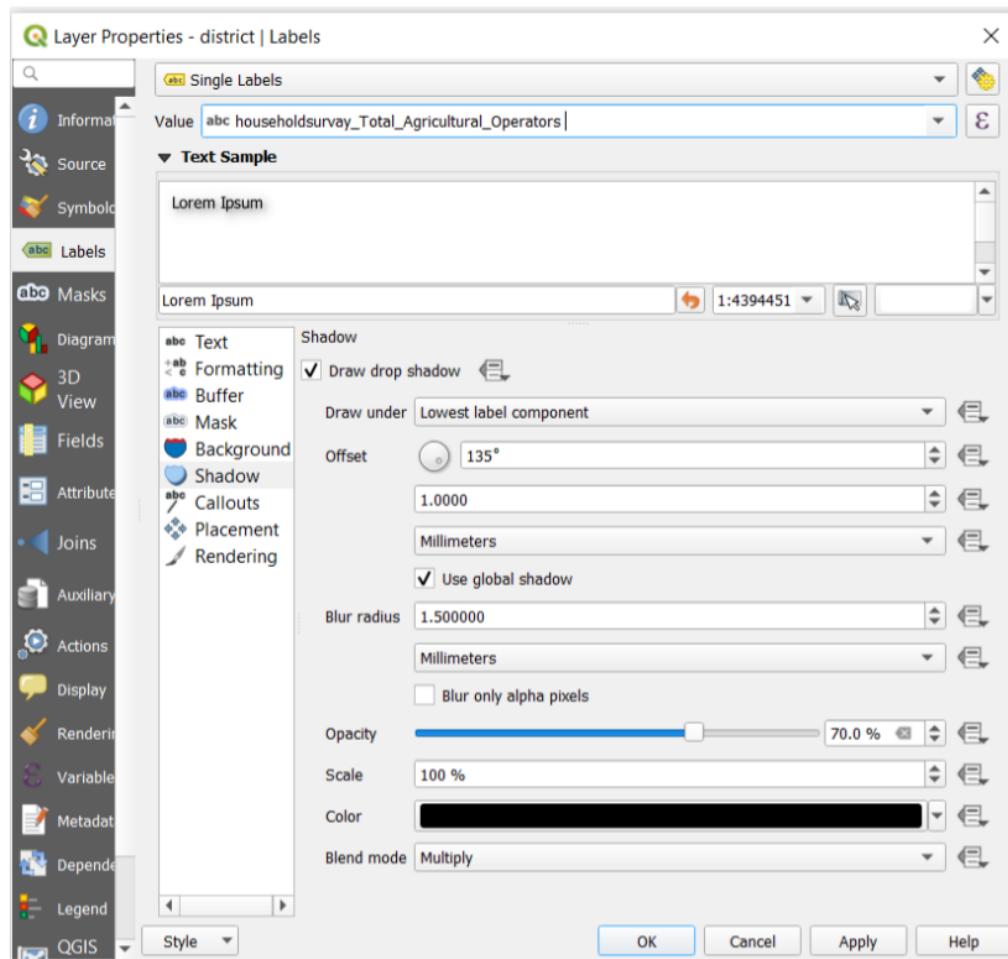
To check whether join is done successfully Open the attribute table and see all the information are same. As in the image below.

district :: Features Total: 25, Filtered: 25, Selected: 0

	AREA	PERIMETER	DISTRICT	vay_Total_Agricultur	useholdsurvay_Madsurvey_Male_pres	eholdsurvay_Fenoldsurvey_Female_pres	
1	3153562954.57999992371	558900.79284400004	PUTTALAM	91,598	61,267	67	30,331
2	1663221178.08999991417	249713.54211600000	KEGALLE	110,081	79,050	72	31,031
3	682478635.31099998951	182151.66681500000	COLOMBO	34,391	24,890	72	9,501
4	1922975628.63000011444	331791.60324600001	KANDY	139,061	101,955	73	37,106
5	1417049524.34999990463	205259.13441100001	GAMPAHA	110,889	82,130	74	28,759
6	1644986343.54999995232	217995.34025899999	KALUTARA	97,814	72,036	74	25,778
7	1612851246.76999998093	270757.72079799999	GALLE	129,101	94,971	74	34,130
8	906898686.7089999142	239072.86424000000	JAFFNA	43,416	32,151	74	11,265
9	2004578526.24000000954	272689.39070500003	VAVUNIYA	25,371	18,847	74	6,524
10	4900646004.22999954224	402853.74836700002	KURUNEGALA	290,552	218,350	75	72,202
11	3288869819.7899996185	367724.25625099998	RATNAPURA	172,231	131,064	76	41,167
12	1308765205.23000001907	259040.40115799999	MATARA	110,426	85,852	78	24,574
13	287116863.19999980927	424854.15113100002	BADULLA	128,770	101,528	79	27,242
14	1872803850.34999990463	301787.59758900001	MANNAR	9,261	7,345	79	1,916
15	1744634232.44000005722	277857.86191300000	NUWARA ELIYA	85,162	67,996	80	17,166
16	2627532135.40000009537	319091.32682700001	BATTICALOA	34,462	27,677	80	6,785
17	4491165448.55000019073	556696.60606400005	AMPARA	69,244	55,094	80	14,150
18	5751780583.72000026703	517975.36233700003	MONERAGALA	104,642	83,674	80	20,968
19	2696854235.42999982834	415801.24942399998	TRINCOMALEE	33,395	26,825	80	6,570
20	7212691042.23999977112	482702.79077999998	ANURADHAPURA	182,834	145,435	80	37,399
21	2058649164.7699998093	287297.1897100000	MATALE	78,180	63,127	81	15,053
22	2625617925.73999977112	396193.04711200000	HAMBANTOTA	106,035	87,375	82	18,660
23	1299917871.2899996185	326893.34231400001	KILINOCHCHI	22,282	18,256	82	4,026
24	2600123162.86999988556	320901.35646699998	MULLAITIVU	22,532	19,015	84	3,517
25	3454435989.0199998093	346618.74713199999	POLONNARUWA	79,613	67,877	85	11,736

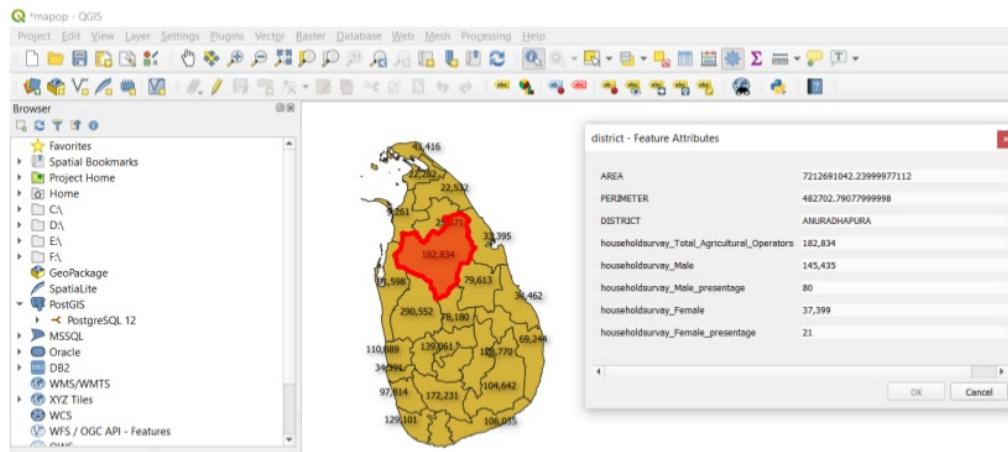
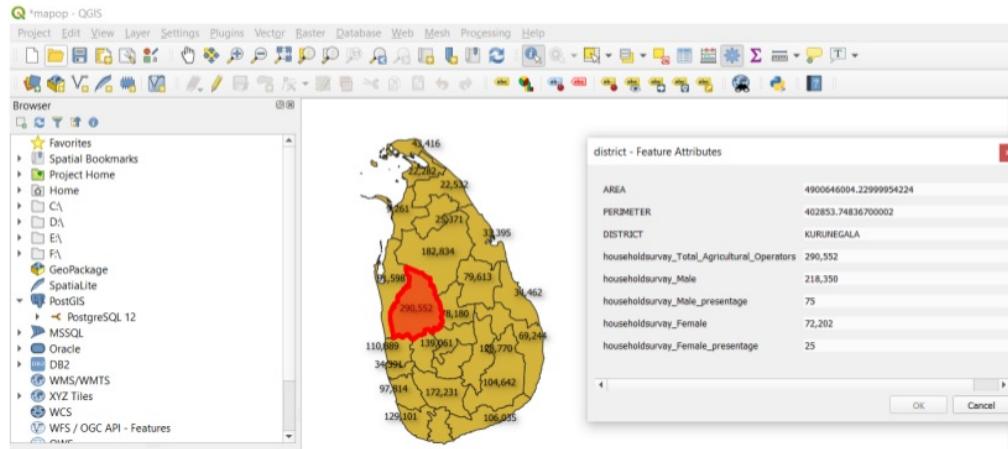
1

After that, we need to label the map. To do that right click on “district” canvas and go to the properties and go to the label after that give the first field as “single label” and in the second drop down field choose label value as “householdsurvey_Total_Agricultural_Operatoers” appear data on the map. In addition, click Apply.



1

Now all the information in the CSV file available in the map. As in the figures below



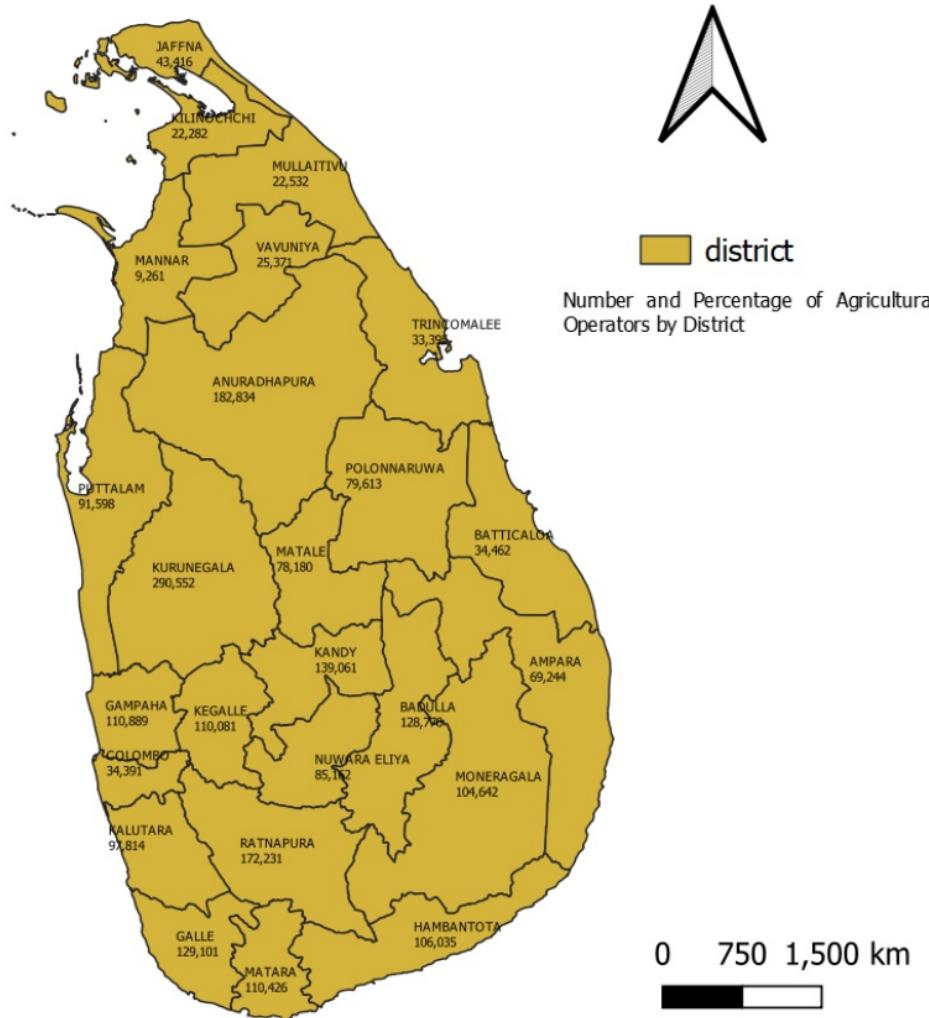
Now I created CSV file **SLSS2019.csv** from the saving the vector layer we generated up to this.

AREA	PERIMETER	DISTRICT	householdsurvey_Total_Agricultural_Ops	householdsurvey_Male	householdsurvey_Male_presentation	householdsurvey_Female	householdsurvey_Female_presentation
906898666.7	239072.8643	JAFFNA	43,416	32,251	74	11,285	26
12999197871	326893.3423	KILINOCHCHI	33,082	18,256	82	4,036	18
2600123163	320801.3565	MULLAITIVU	22,532	19,015	84	3,517	16
1872803850	301787.5976	MANNAR	9,261	7,345	79	1,916	21
2004578529	272689.3907	VAVUNIYA	25,371	18,847	74	6,524	26
2696854235	415801.2494	TRINCOMALEE	33,395	26,825	80	6,570	20
7212691042	482702.7908	ANURADHAPURA	182,834	145,435	80	37,399	21
3153562955	558900.7928	PUTTALAM	91,598	61,267	67	30,331	33
3445400000	346000.0000	MONERAGALA	79,131	67,877	85	11,736	15
2627532115	319095.3265	BATTICALOA	34,462	22,277	80	6,395	20
4900646004	402853.7488	KURUNEGALA	290,552	218,350	75	72,202	25
20564016165	287297.1808	MATALE	78,180	63,127	81	15,053	19
4491165449	556096.6065	AMPARA	69,244	55,094	80	14,150	20
2871168963	424854.1511	BADULLA	128,770	101,528	79	27,242	21
1922975629	331791.6037	KANDY	139,061	101,955	73	37,206	27
5751780584	517975.3623	MONERAGALA	104,642	83,674	80	20,968	20
1663221178	249797.1542	KEGALLE	110,081	79,050	72	31,031	28
1412000024	205207.1344	GAMBAKA	110,889	82,130	74	28,799	26
2073400000	277857.7000	NUWARA ELIYA	85,032	67,920	80	17,006	20
682478635.3	182151.6668	COLOMBO	34,391	24,980	72	9,501	18
2388860830	367724.3565	RATHNAPURA	172,231	131,064	76	41,167	24
1644986344	217995.3403	KALUTARA	97,814	72,036	74	25,778	26
2625617926	396193.0471	HAMBANTOTA	106,035	87,375	82	18,660	18
1612851247	270757.7209	GALLE	129,101	94,971	74	34,130	26
1308765205	259040.4012	MATARA	110,426	85,852	78	24,574	22

Now we can see all the required information, District Name and the Total Agricultural Operators in each different district



Finally, I am adding the North Arrow, Map Scale, Map title, Map legends to the created map using print layout function.



Task D

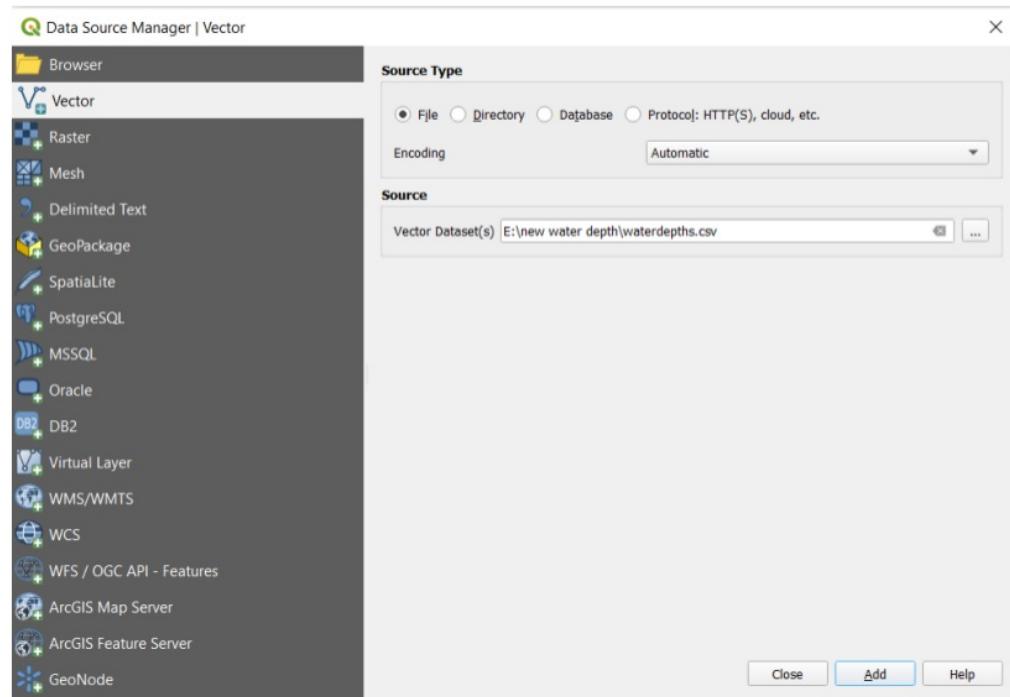
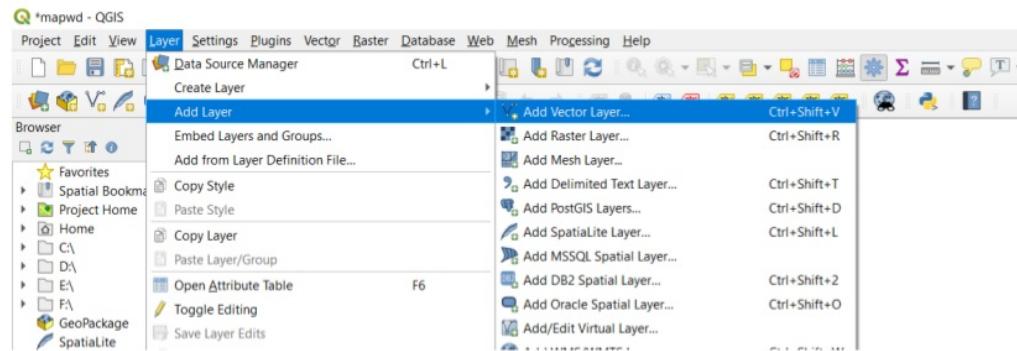
Using the map available as surfacewaterpotential.pdf published by Ministry of agriculture develop an informative map using provided shape files and classify it by district water depth(m) do precise and critical justifications about how well surface water potential levels in Sri Lanka support for selecting suitable crops for districts and develop Ceylon agroindustry accordingly.

Steps

First, we need to open the “surfacewaterpotential.pdf” Report and open a new excel file and copy the district names and water depth and six different water depth rangers in to the excel file and give it a name and save it as a CSV file. In my case I saved it as **waterdepths.csv** as the figure below.

		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	COLOMBO	2.47	2.0 - 2.5																		
2	GAMPHA	1.6	1.5 - 2.0																		
3	KALUTARA	2.83	2.5 <																		
4	KANDY	1.23	1.0 - 1.5																		
5	MATALE	1.09	1.0 - 1.5																		
6	NUWARA	2.3	2.0 - 2.5																		
7	GALLE	2.54	2.5 <																		
8	MATARA	1.72	1.5 - 2.0																		
9	HAMBANT	0.64	0.5 - 1.0																		
10	JAFFNA	0.13	0 - 0.5																		
11	MANNAR	0.26	0 - 0.5																		
12	VELLAVU	0.27	0 - 0.5																		
13	MULLAITH	0.22	0 - 0.5																		
14	KILINDOW	0.18	0 - 0.5																		
15	BATTICAL	0.21	0 - 0.5																		
16	AMPARA	0.22	0 - 0.5																		
17	TRINCOM	0.22	0 - 0.5																		
18	KURUNEG	0.62	0.5 - 1.0																		
19	PUTTALAM	0.34	0 - 0.5																		
20	ANURADH	0.29	0 - 0.5																		
21	POLONNA	0.46	0 - 0.5																		
22	BADULLA	0.87	0.5 - 1.0																		
23	MONERAG	0.7	0.5 - 1.0																		
24	RATNAPU	2.54	2.5 <																		
25	REGALLE	2.51	2.5 <																		

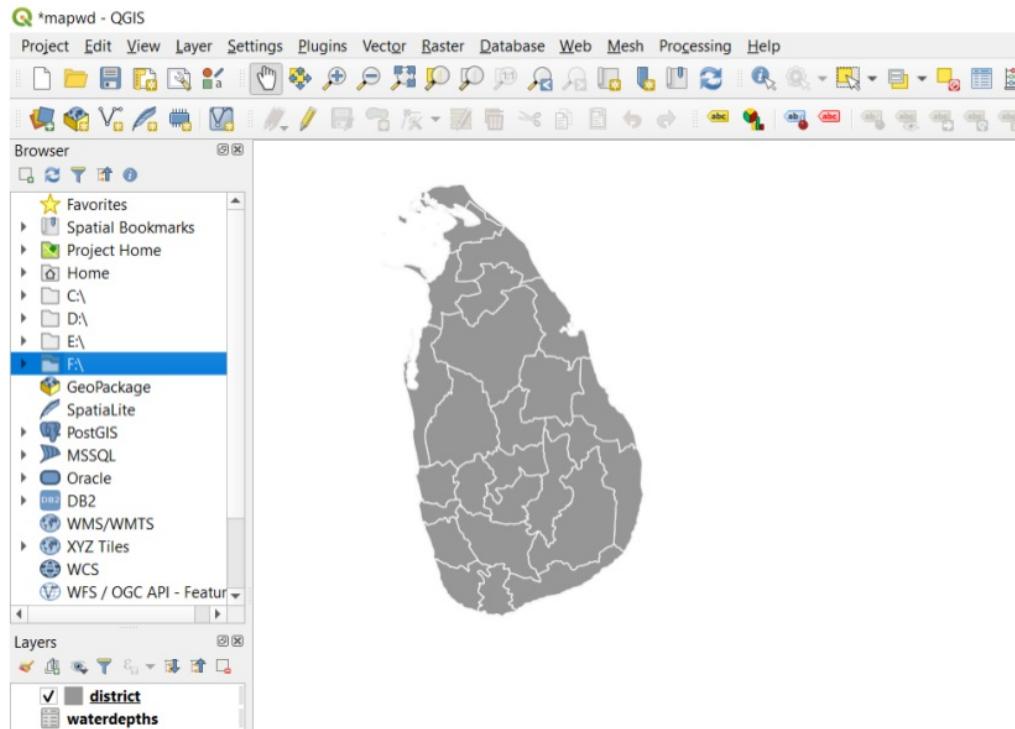
1 Then we have to import that **waterdepths.csv** CSV file into the QGIS. In order to do that open QGIS, Click the Layer tab and go to the add layer in drop down menu and select the Add Vector Layer. Then it will show up a new window named Data source manage. Then browse and select **waterdepths.csv** the csv file you created before and Click the ADD button to import the file.



After this, we have to import the Sri Lankan district map. It is similar to previous one, go and

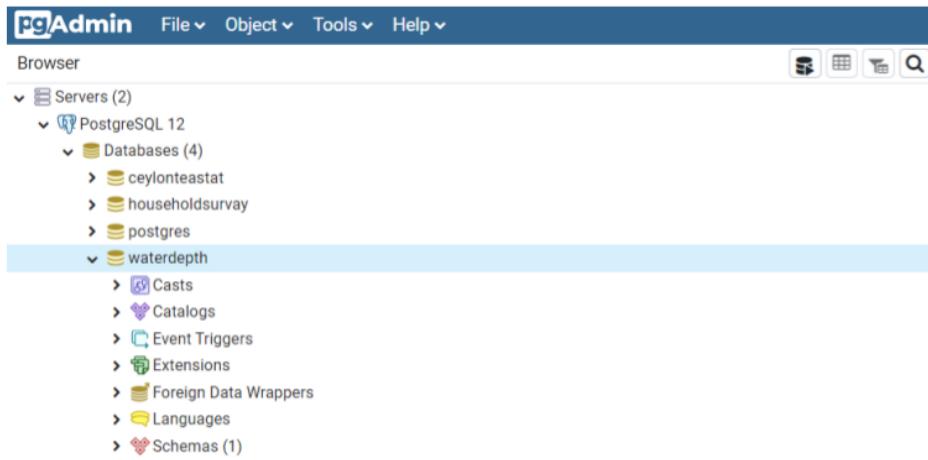
Click the Layer tab and go to the add layer in drop down menu and select the Add Vector

Layer. Then it will show up a new window named Data source manage. Then browse and select the given district shape file **District.shp** Click the ADD button to import the file. It will show up like the figure below.

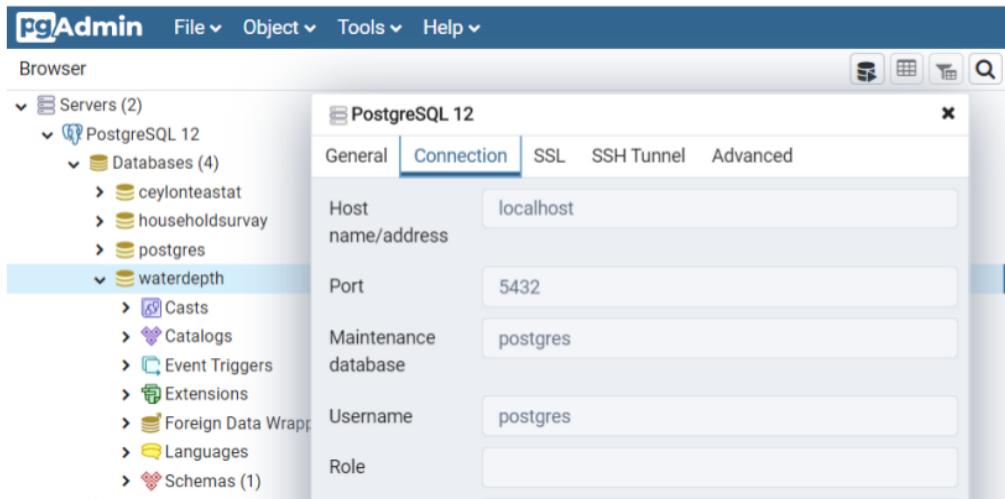


We can check the imported layers by left corner below like the figure above.

1 After this, we need to import **waterdepths.csv** file in to the PostgreSQL by pgAdmin. Before that first open the pgAdmin select the exiting sever PostgreSQL 12, right click, and connect the server. Then select create database and give a name to the database. In my server, I created a database named “waterdepth” like in the image below.



We can check the server details like server host name, port name, user name by the server properties



Then we have to create a table with three columns to import the **waterdepths.csv** CSV file. For do that go to the database you named as “waterdepth”, for that drop down; go to the Schemas, and select the public then you find tab named Tables. Right click on tables and select the create table and it will show up a popup window. Inside that windows give a name to the table first (water_depth_DB) then create the three columns to add CSV dataset file like figure below.

The screenshot shows the PgAdmin interface. On the left, the browser tree shows the 'waterdepth' database with its various objects. A new table 'water_depth_DB' is being created. The 'Columns' tab is selected in the 'water_depth_DB' dialog. It contains three columns:

Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?
district	character	1,000		No	No
waterdepth	character	1,000		No	No
range	character	1,000		No	No

Now we have to import the **waterdepths.csv** CSV file by right click on the table name (water_depth_DB) and selecting the import/Export. It will show up a pop up window again as in the figure below. Select import, give the path to the file name field and select the delimiter to the as “,” comma, it's very important thing. In addition, click OK to import CSV file.

The screenshot shows the 'Import/Export data - table 'water_depth_DB'' dialog. The 'Import' tab is selected. The 'File Info' section includes:

- Filename: E:\new water depth\waterdepths.csv
- Format: CSV
- Encoding: Select an item...

The 'Miscellaneous' section includes:

- OID: No
- Header: No
- Delimiter: ,

A note below the Delimiter field states: "Specifies the character that separates columns within each row (line) of the file. The default is a tab character in text format, a comma in CSV format. This must be a single one-byte character. This option is not allowed when using binary format."

To check if the records successfully add to the table click on the view data icon in the top of the left side. It will appear the table with all records you imported as a CSV file. As in the figure below.

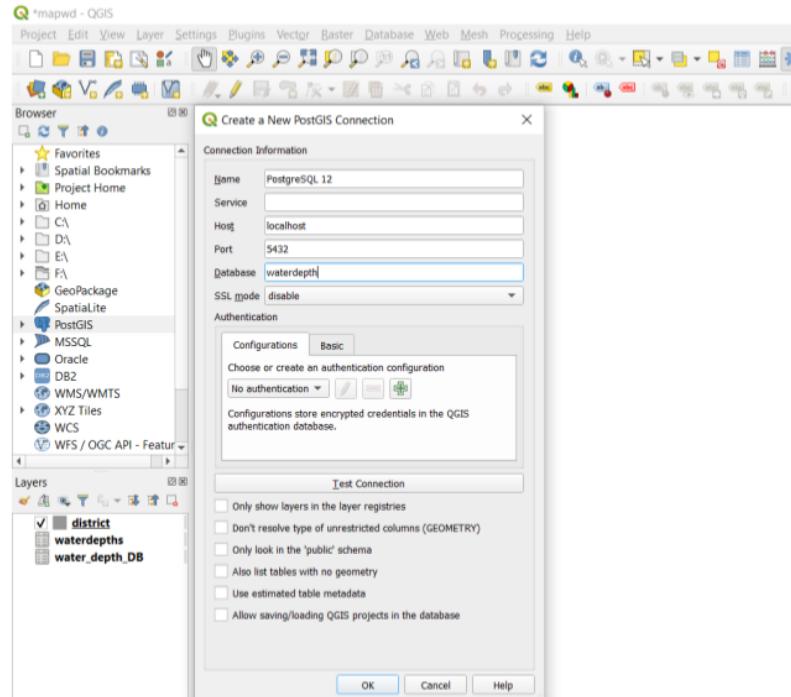
The screenshot shows the pgAdmin interface. On the left, the 'Browser' pane displays the database schema, including the 'water_depth_DB' schema which contains a single table named 'water_depth'. The 'Query Editor' pane shows the SQL query: 'SELECT * FROM public."water_depth_DB"'. The results are displayed in a table with three columns: 'district', 'waterdepth', and 'range'. The data consists of 17 rows, each representing a location with its water depth and range. The 'range' column is empty for most entries.

district	waterdepth	range
1 COLOMBO	.. 2.47	.. 2.0 - 2.5
2 GAMPHA	.. 1.6	.. 1.5 - 2.0
3 KALUTARA	.. 2.83	.. 2.5 4
4 KANDY	.. 1.23	.. 1.0 - 1.5
5 MATALE	.. 1.09	.. 1.0 - 1.5
6 NUWARA ELIYA	.. 2.3	.. 2.0 - 2.5
7 GALLE	.. 2.54	.. 2.5 4
8 MATARA	.. 1.72	.. 1.5 - 2.0
9 HAMBANTOTA	.. 0.64	.. 0.5 - 1.0
10 JAFFNA	.. 0.13	.. 0 - 0.5
11 MANNAR	.. 0.26	.. 0 - 0.5
12 VAVUNYA	.. 0.27	.. 0 - 0.5
13 MULLAITIVU	.. 0.22	.. 0 - 0.5
14 KILINOCHCHI	.. 0.18	.. 0 - 0.5
15 BATTICALOA	.. 0.21	.. 0 - 0.5
16 AMPARA	.. 0.22	.. 0 - 0.5
17 TRINCOMALEE	.. 0.22	.. 0 - 0.5

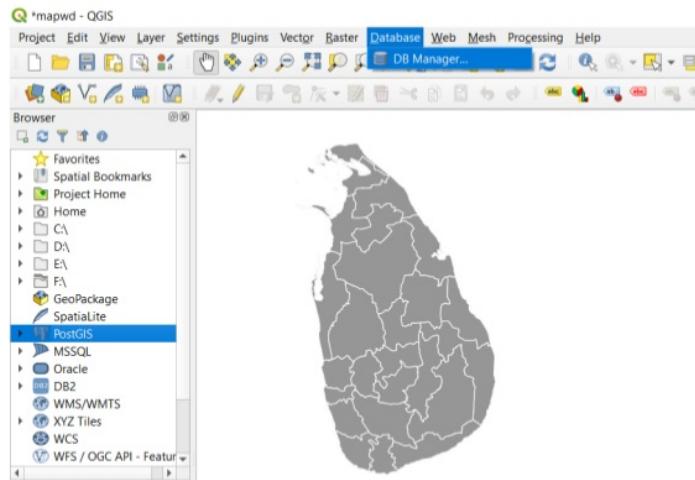
After this step, we have to create the connection to connect QGIS with the pgAdmin. Then go the QGIS right click on PostGIS tab in the left side and click on "New Connection". As in the figure below.

The screenshot shows the QGIS interface. The 'Browser' pane on the left has a tree view. Under the 'PostGIS' section, there is a 'New Connection...' option, which is highlighted with a blue selection bar. The main workspace shows a grayscale map of Sri Lanka with district boundaries.

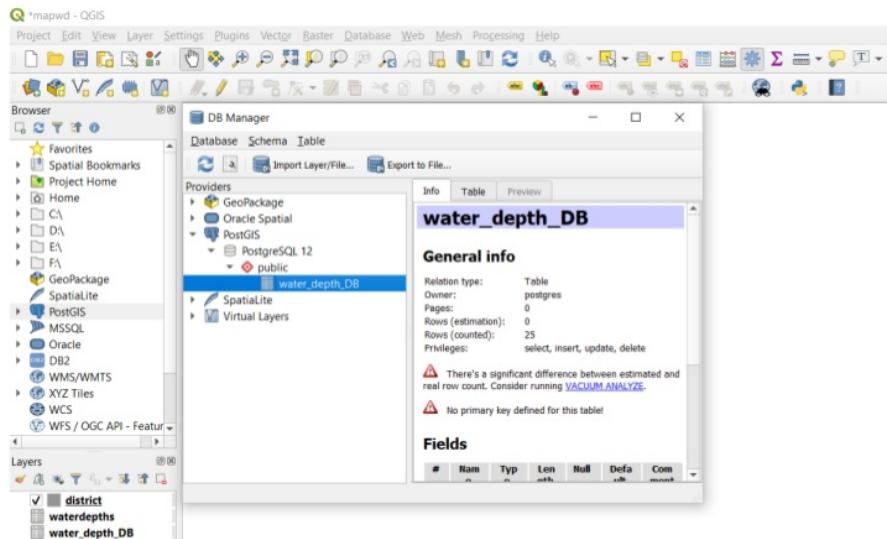
After we clicked on the new connection, it will appear popup windows named “Create a New PostGIS Connection”. Then we have to fill some fields to make the connection. So I gave my PostgreSQL sever details to make the connection. I gave the name as “PostgreSQL 12”, host as “localhost”, port as “5432”, and database as “waterdepth”. Click ok to make the connection. The created connection can find from left side in the QGIS named as PostgreSQL 12.



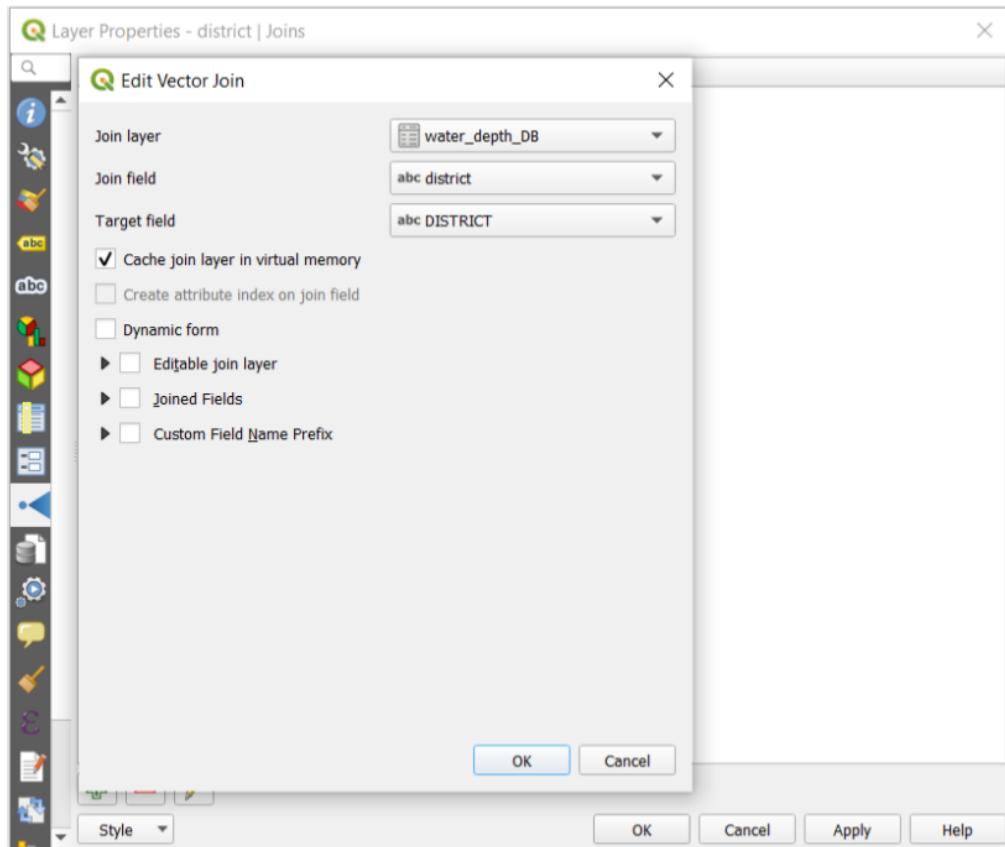
Now go to the tab called database and click “DB Manager”



Now it will open up a window called DB manager, go to the PostGIS drop down it select the connection you created “PostgreSQL 12” drop down the public and right click on “water_depth_DB” and click add to the Canvas. Then that water_depth_DB table will appear on “Layers” section as in the figure below



After this, we have to connect/join the canvas District.shp shape file with “districts” file in the pgAdmin. To do that go to canvas, right click, and go to the “properties” after that select the “joins” it will pop and a window like figure below. Then give the join layer as the table from the pgAdmin named “water_depth_DB”, give the join field as District according to the column in the table in pgAdmin, give the target field as “DISTRICT” that is the shape file we imported. After that, click ok to apply the join.



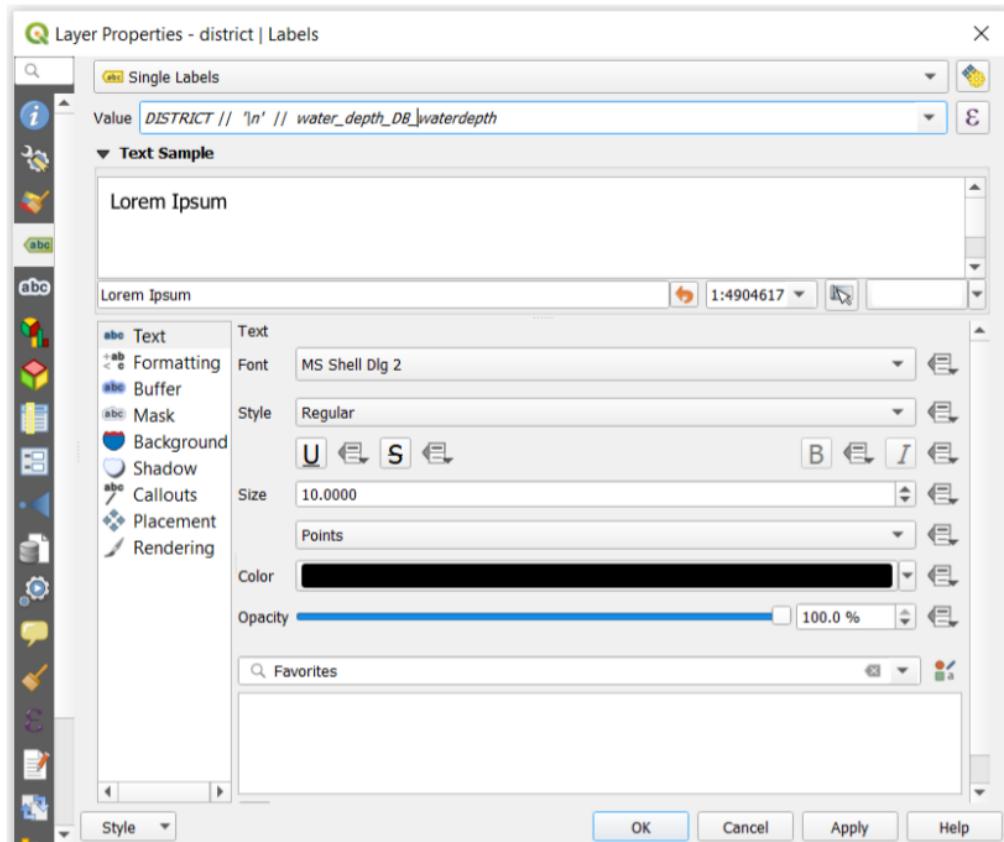
To check whether join successfully open the attribute table and see all the information are same. As in the image below.

district :: Features Total: 25, Filtered: 25, Selected: 0

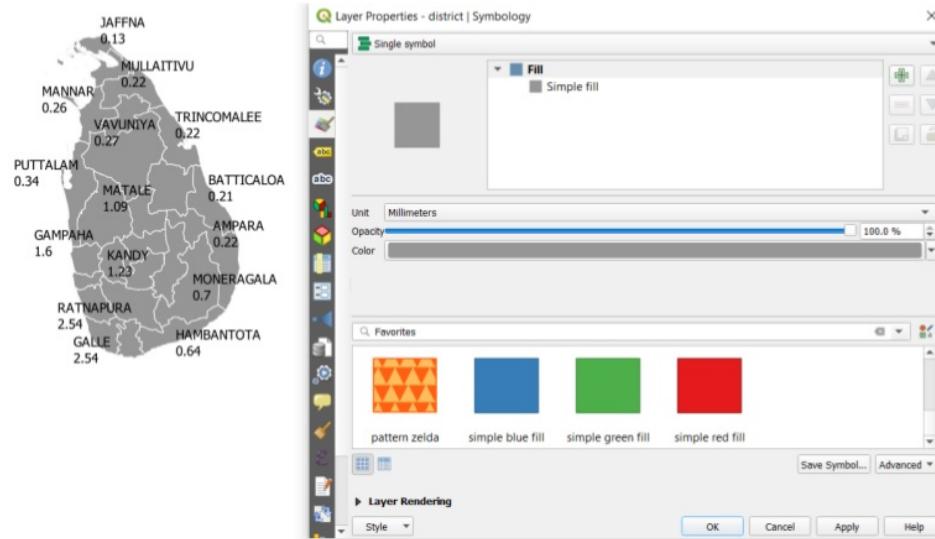
	AREA	PERIMETER	DISTRICT	water_depth_DB_waterdepth	water_depth_DB_range
1	1644988343.54999995232	217995.34025899999	KALUTARA	2.83	2.5 <
2	1612851246.76999998093	270757.72079799999	GALLE	2.54	2.5 <
3	3288869819.78999996185	367724.25625099999	RATNAPURA	2.54	2.5 <
4	1663221178.08999991417	24913.54211600000	KEGALLE	2.51	2.5 <
5	682478635.31099998951	182151.66681500000	COLOMBO	2.47	2.0 - 2.5
6	1744634232.44000005722	277857.86191300000	NUWARA ELIYA	2.3	2.0 - 2.5
7	1308765205.23000001907	259040.40115799999	MATARA	1.72	1.5 - 2.0
8	1417049524.34999990463	205259.13441100001	GAMPHA	1.6	1.5 - 2.0
9	1922975628.63000011444	331791.60324600001	KANDY	1.23	1.0 - 1.5
10	2058649164.7699998093	287297.18977100000	MATALE	1.09	1.0 - 1.5
11	2871168963.19999980927	424854.15113100002	BADULLA	0.87	0.5 - 1.0
12	5751780583.72000026703	517975.36233700003	MONERAGALA	0.7	0.5 - 1.0
13	2625617925.73999977112	396193.04711200000	HAMBANTOTA	0.64	0.5 - 1.0
14	4900646004.22999954224	402851.74836700002	KURUNEGALA	0.62	0.5 - 1.0
15	3454435980.01999998093	346618.74711999999	POLONNARUWA	0.46	0 - 0.5
16	3153562954.57999992371	558900.79284400004	PUTTALAM	0.34	0 - 0.5
17	7212691042.23999977112	482702.79077999998	ANURADHAPURA	0.29	0 - 0.5
18	2004578526.24000000954	272689.39070500003	VAVUNIYA	0.27	0 - 0.5
19	1872803850.34999990463	301787.59758900001	MANNAR	0.26	0 - 0.5
20	4491165448.55000019073	556696.60606400005	AMPARA	0.22	0 - 0.5
21	2600123162.86999980856	320901.35646699999	MULLAITIVU	0.22	0 - 0.5
22	2696854233.42999982834	415801.24942399999	TRINCOMALEE	0.22	0 - 0.5
23	2627532135.40000009537	319091.32682700001	BATTICALOA	0.21	0 - 0.5
24	1299917871.28999996185	326893.34231400001	KILINOCHCHI	0.18	0 - 0.5
25	906898686.70899999142	239072.86424000000	JAFFNA	0.13	0 - 0.5

1

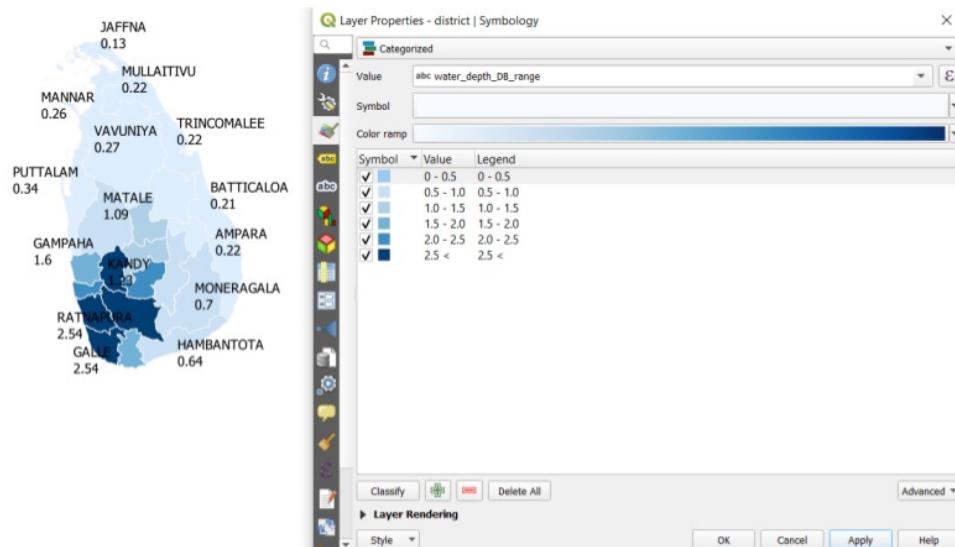
After that, we need to label the map. To do that right click on “district” canvas and go to the properties and go to the label after that give the first field as “single label” and in the second drop down field choose label values you need to show on the map. In here, I choose “District and water depth” to appear data on the map. In addition, click Apply.



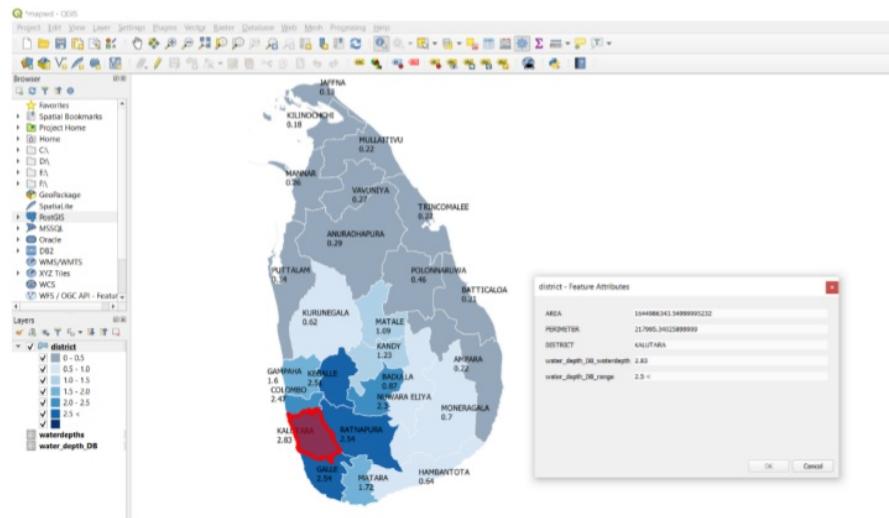
Now we need to show the colour of each district according to the water depth range. To do that right click on “district” canvas and go to the properties and go to the “symbology” and select a colour and click apply.



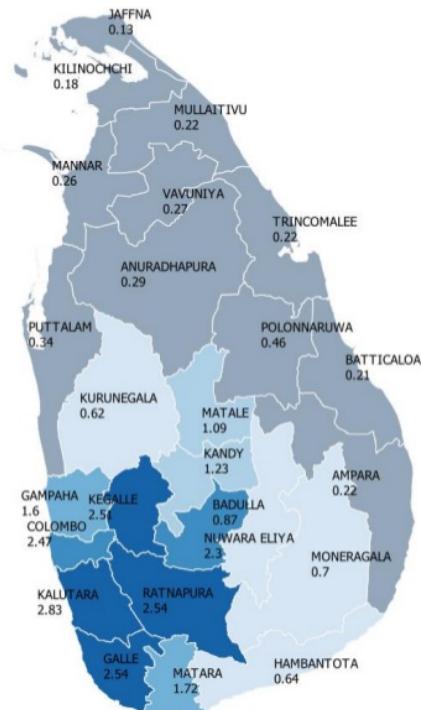
After that go to the “Categorized” and give the value to the value field (range). Now give a colour ramp to show each range in different colours as in the figure.



Now all the given values “District and water depth” as well as colour ranges are showing in the map. As in the figures below. By click on district, you can get the all information from the database.

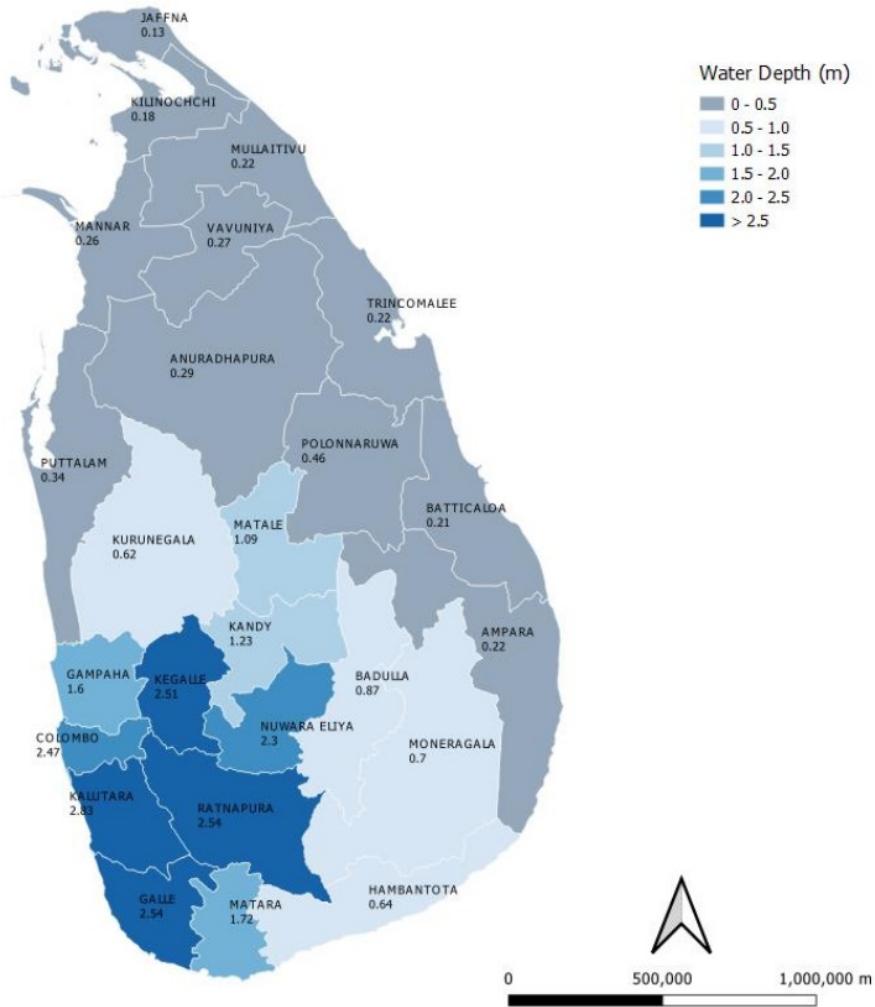


Now we can see all the required information, water depth, color ranges, in the map.



Finally, I am adding the North Arrow, Map Scale, Map title, Map legends to the created map using print layout function.

Surface Water Potential

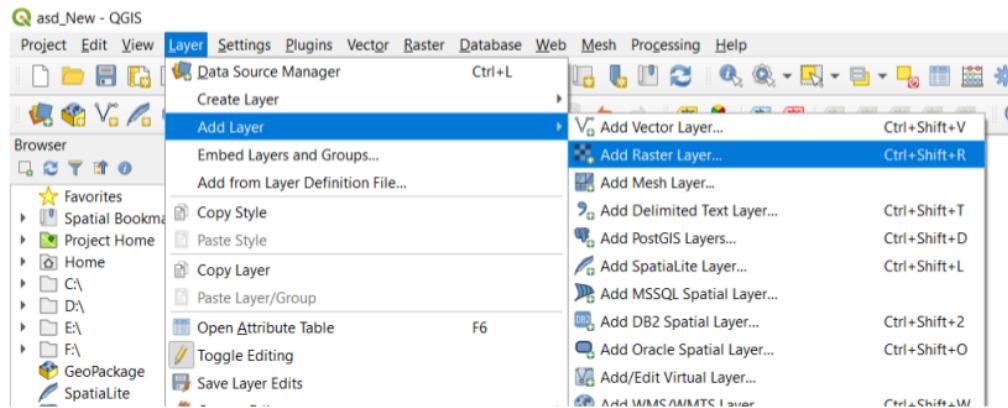


Task E

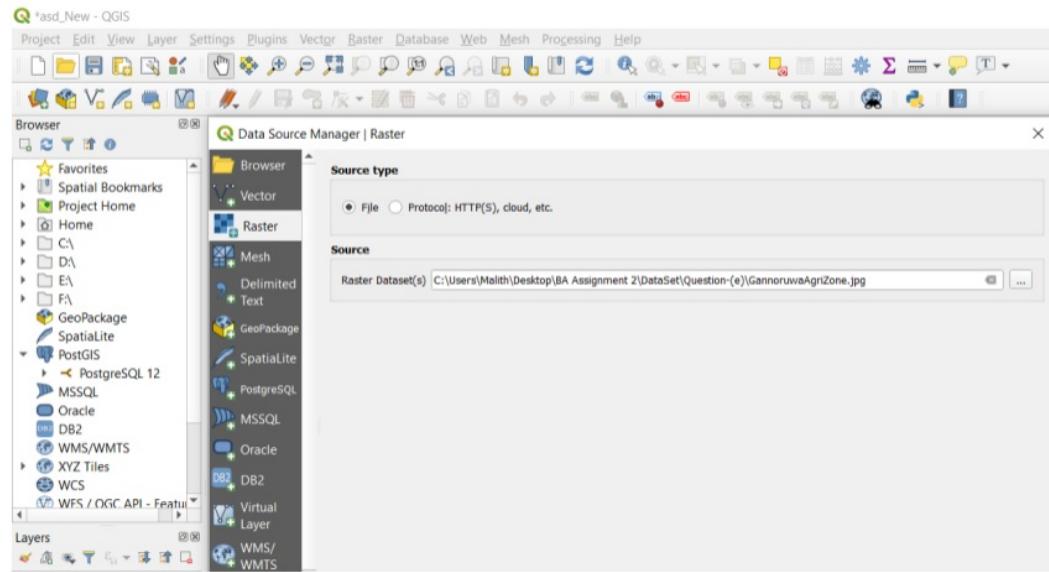
1 I have to Develop a digitized informative area map with suitable information provided. The map should contain separate new vector layers of the natural and manmade land covers such as buildings, roads, rivers, streams, vegetation etc. in “Gannoruwa Agricultural Zone” and its suburbs area developed by digitization process. The provided google earth areal image should be used to support digitization with QGIS open layer plugins/Google Earth/Google maps.
1 Every vector layer attribute table should contain id, name and type fields and associated data. The developed map should be well explained. (Use coordinate reference system as WGS84-EPSG4326).

Steps

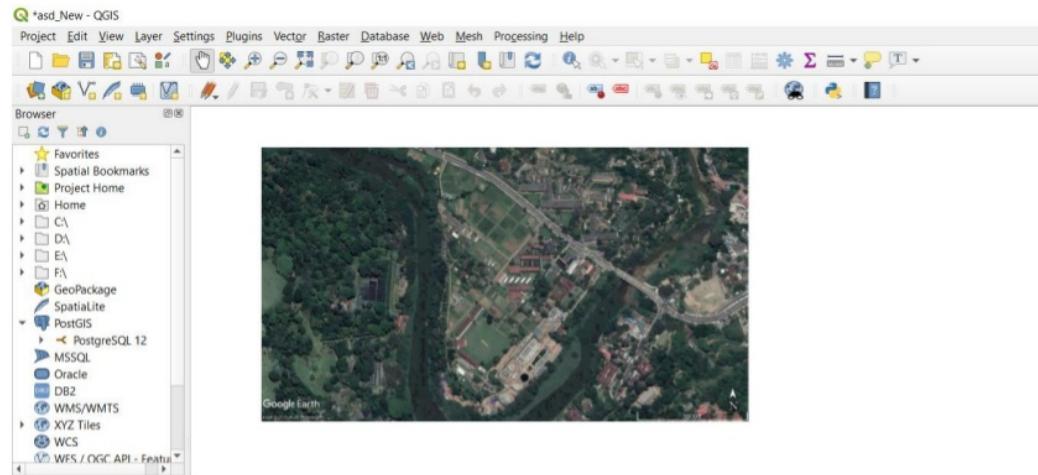
1 First, we have to import the map “GannoruwaAgriZone.jpg” file to the QGIS. To do go to the QGIS. Now we need to click on the layer tab and go to the add layer and click on Add Raster Layer.



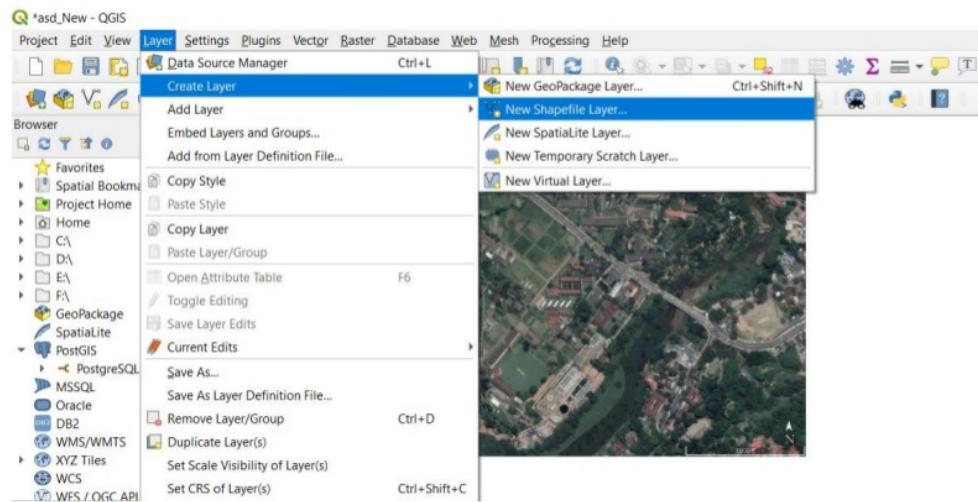
Then it will show up a new window named Data source manage. Then browse and select “GannoruwaAgriZone.jpg” The jpg file. Click the Add button to import the image.



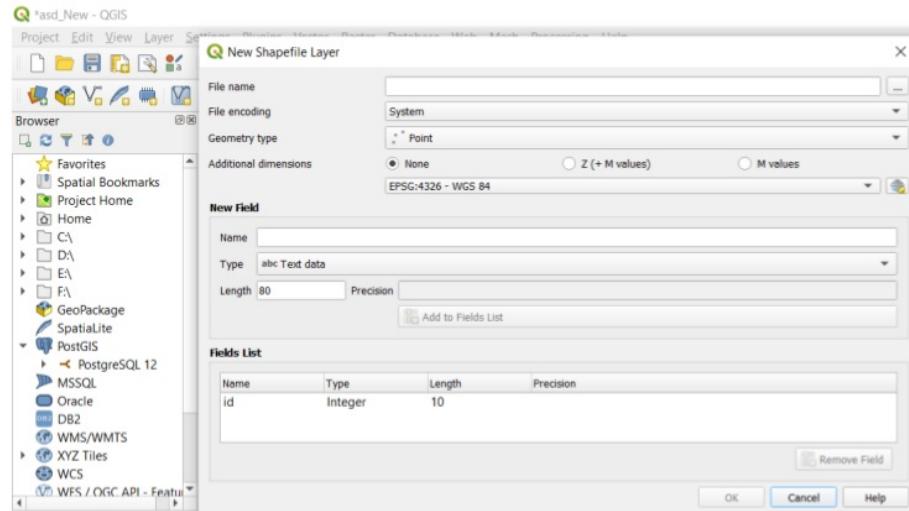
Now you can see the added file on the screen like this.



Now we need to develop the digitized informative area map. To do that we have to add some layers like Locations, Buildings, Roads, Lands, Forest, Vegetation and River. To add layers go to the “Layers” tab “click on **create layer**” and select “**New Shapefile layer**” like in the figure below.



It will open a window like the figure below

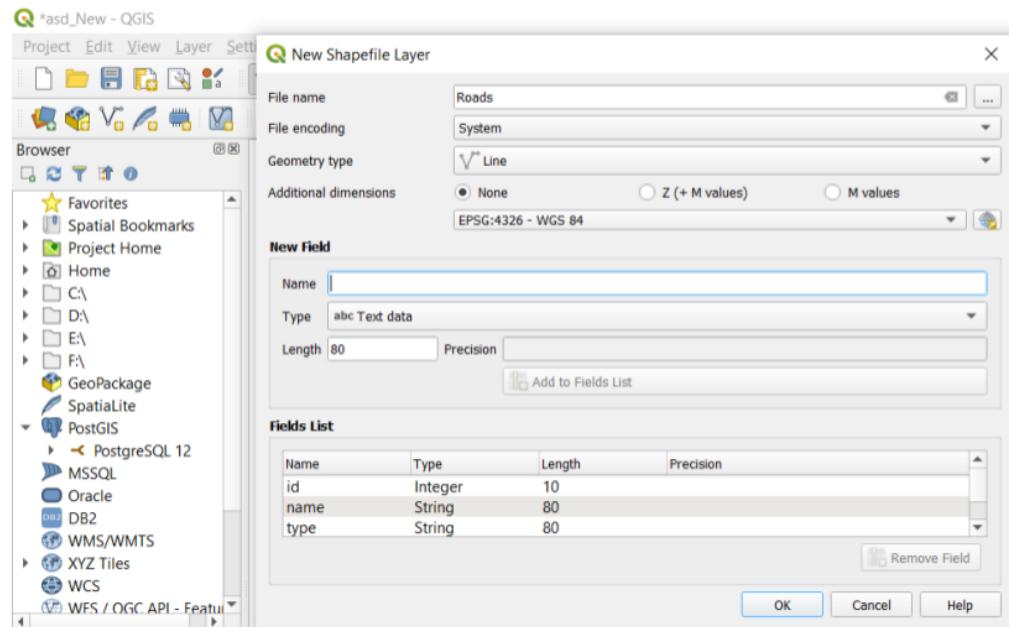


Now this is very important part. The name field should be fill by Locations, Buildings, Roads, Lands, Forest, Vegetation and River. According to that for each one, we need to select the geometry type. See below each name what would be the geometry type.

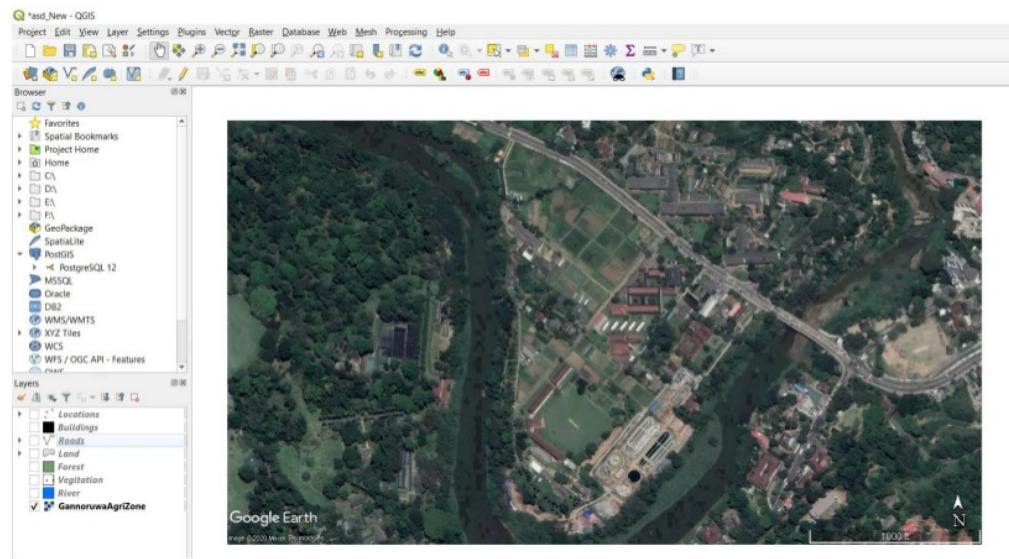
- Locations - Point
- Buildings - Polygan
- Roads - Line
- Lands - Polygan
- Forest - Polygan
- Vegetation - Polygan
- River – Polygan

In addition, another thing is File encoding field should be “system”.

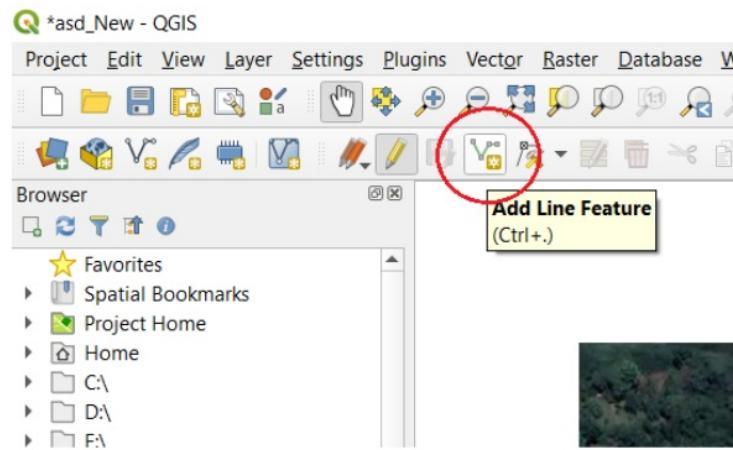
When we are adding each one we need to create tables for every “Shapefile”. To do that we need to go to the new field and add two field as name and type. This process need for the all seven “Shapefiles”. See the example below.



This is how it shows after adding all seven “Shepefiles”. You can see all the below left side.

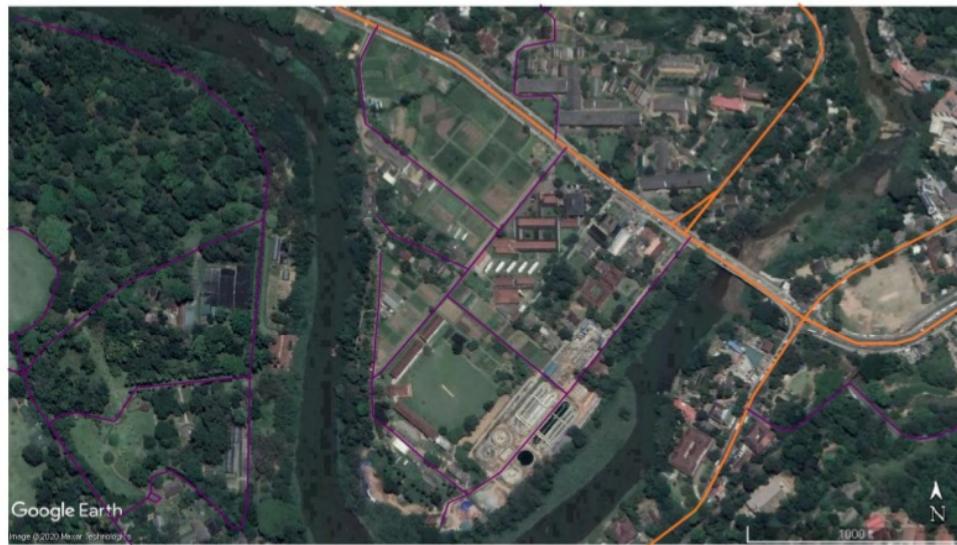


After that, we have to draw all the information on this map layer. To do that first select a shape file and right click and there is a tab called “Toggle Editing” and go to the this icon.

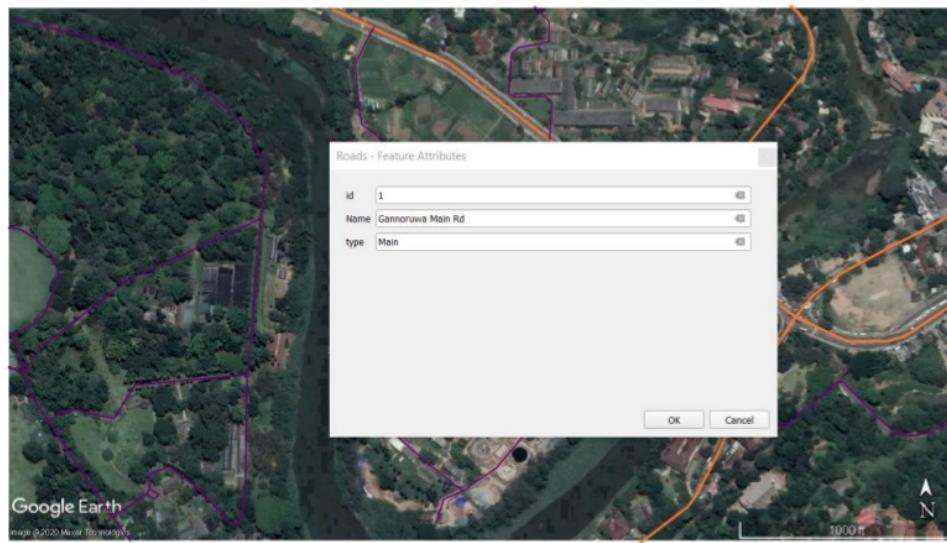


From this we can draw the information on the map by using mouse by click on points

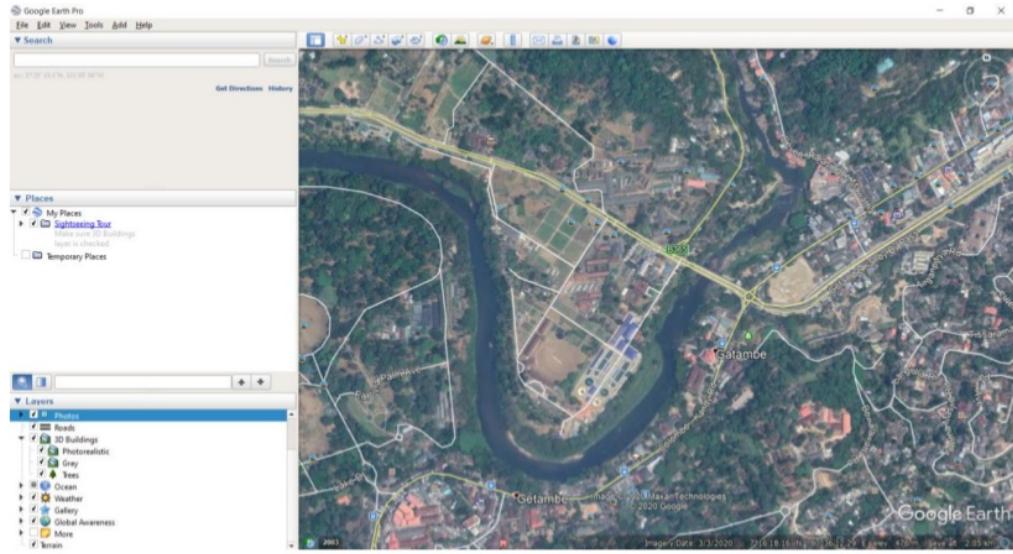
This is how draw roads on the map.



The each record should be added to the table that we make with the shape file. Like the figure below



We can get help by Google Earth software by given coordinate reference system as “WGS84-EPSG4326” to draw these things on the map such as Locations, Buildings, Roads, Lands, Forest, Vegetation and River like this.



We need to use different “types” for each different data saving in attribute table we make. For roads I used main and sub roads, for land I use ground and field, for locations I use “location”, “park” and “building”. From it make that we can get different colours and symbols for different data on the map. In order do that go to the each “shape file properties” and go to the “symbology” and select the “rule based field”. We can do that like figures in below.

Layer Properties - Roads | Symbology

Label	Rule	Min. scale	Max. scale	Count	Duplicate count
<input type="checkbox"/> Main Roads	"type" = 'Main'				
<input type="checkbox"/> Sub Roads	"type" = 'Sub'				

Layer Properties - Locations | Symbology

Label	Rule	Min. scale	Max. scale	Count	Duplicate count
<input type="checkbox"/> Location	"type" = 'Location'				
<input type="checkbox"/> Parks	"type" = 'Park'				
<input type="checkbox"/> Buildings	"type" = 'Building'				

Layer Properties - Land | Symbology

Label	Rule	Min. scale	Max. scale	Count	Duplicate count
<input type="checkbox"/> Ground	"type" = 'Ground'				
<input checked="" type="checkbox"/> Land	"type" = 'Field'				

Once we done drawing the Main and Sub roads. The “Attribute Table” It will display like this.

The screenshot shows the QGIS interface with the 'Roads' layer selected in the layers panel. The attribute table displays 18 features, each with an ID, Name, and type. The types are categorized as Main or Sub.

ID	Name	Type
1	Gannoruwa Road	Main
2	Colombo - Kandy Rd	Main
3	Sirimawo Bandaranaike Mawatha	Main
4	Peradeniya - Halloluwa - Katugastota	Main
5	NULL	Sub
6	NULL	Sub
7	NULL	Sub
8	NULL	Sub
9	NULL	Sub
10	NULL	Sub
11	Gatambé Kandy By Pass	Main
12	NULL	Sub
13	NULL	Sub
14	Dangolla Rd	Sub
15	NULL	Sub
16	Pamrya Palm Ave	Sub
17	NULL	Sub
18	NULL	Sub

Once we done drawing the Location, Park and Building. The “Attribute Table” It will display like this.

The screenshot shows the QGIS interface with the 'Locations' layer selected in the layers panel. The attribute table displays 10 features, each with an ID, name, and type. The types are categorized as Park, Building, or Location.

ID	Name	Type
1	Royal Botanic Gardens	Park
2	Department of Animal Production & Health	Building
3	National Water Supply & Drainage Board	Building
4	Temple	Location
5	ISTI Gannoruwa	Building
6	ISTI Gannoruwa	Building
7	Veterinary Research Institute	Building
8	Children Park	Park
9	Plant Genetic Resources Centre	Building
10	Rana wiru smarakaya	Location

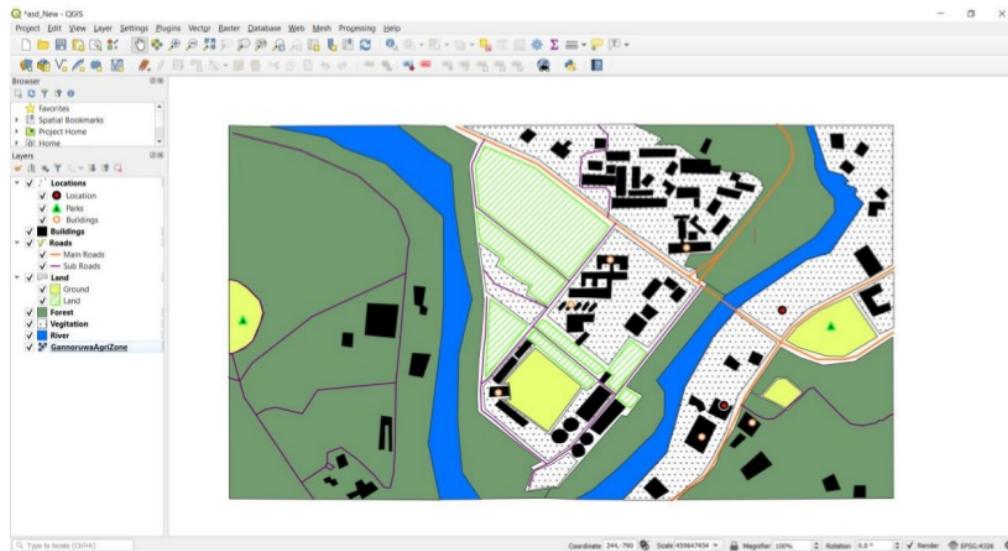
Once we done drawing the Ground, and Field. The “Attribute Table” It will display like this.

The screenshot shows the QGIS interface with a project titled "asd_New - QGIS". The "Layers" panel on the left lists various data sources, including Spatial Bookmarks, Project Home, Home, and several database connections like PostgreSQL 12, MSSQL, Oracle, DB2, WMS/WMTS, XYZ Tiles, WCS, and WFS / OGC API - Features. The "Browser" panel shows a tree view of the project structure. On the right, the "Land :: Features Total: 11, Filtered: 11, Selected: 0" attribute table is displayed. The table has three columns: id, name, and type. The data is as follows:

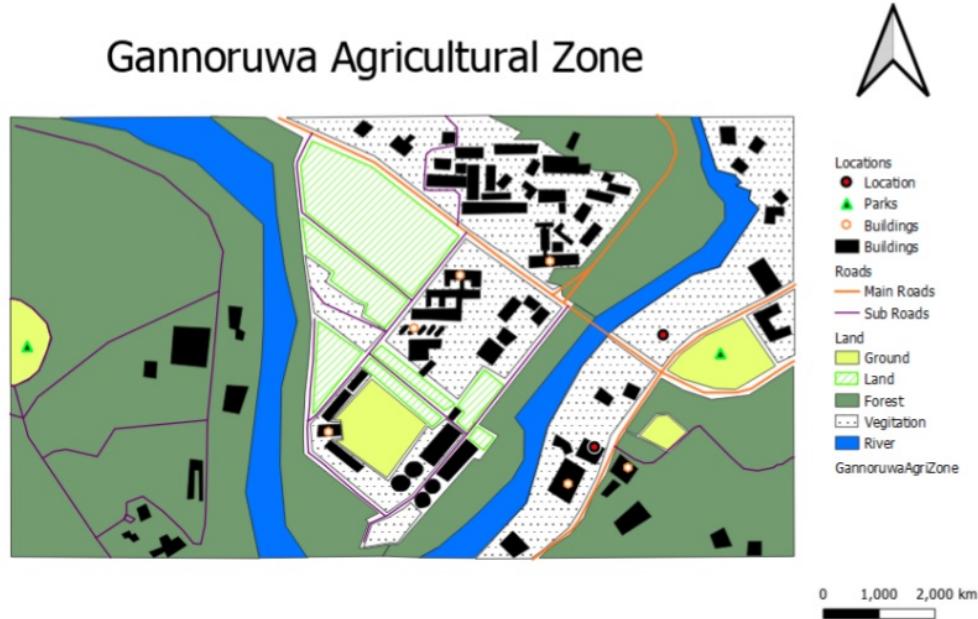
	id	name	type
1	1	NULL	Ground
2	2	NULL	Field
3	3	NULL	Field
4	4	NULL	Field
5	5	NULL	Ground
6	6	NULL	Field
7	7	NULL	Field
8	8	NULL	Ground
9	9	NULL	Ground
10	10	NULL	Field
11	11	NULL	Field

This is very important process because we need show different kinds of data on the map so it is necessary to give unique symbols and colours.

Now we can see all the required information, like Locations, Buildings, Roads, Lands, Forest, Vegetation and River in the map.



Finally, I am adding the North Arrow, Map Scale, Map title, Map legends to the created map using print layout function.



Task F

1 Develop a PostgreSQL Geospatial database named “CeylonTeaStat” to include data provided by the Table: H04-4: Total Extent under Tea by District in the Tea Survey report published (provided as TeaSurvey.pdf) by the department of Census and Statistics, Sri Lanka. The database should contain both aforementioned data and the shape files provided. Using CeylonTeaStat geospatial database, develop a classified thematic map by Total Extent in Hectares (both holdings and extent) by district to visualize following information.

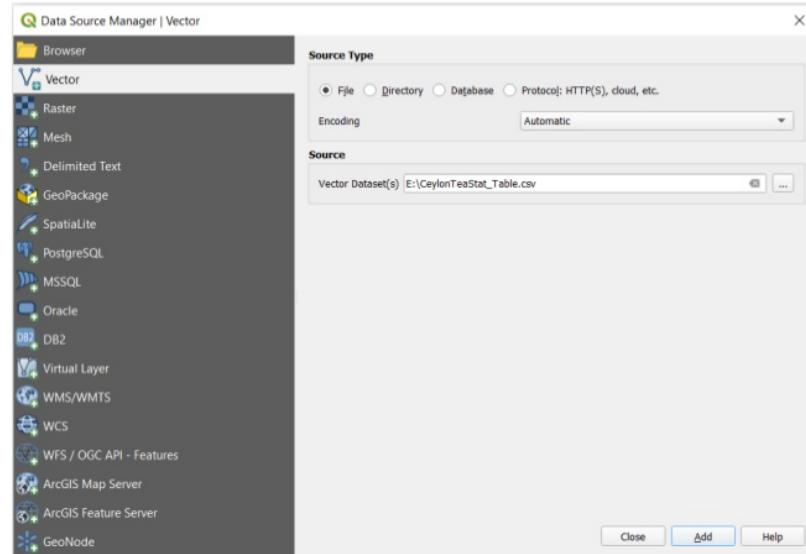
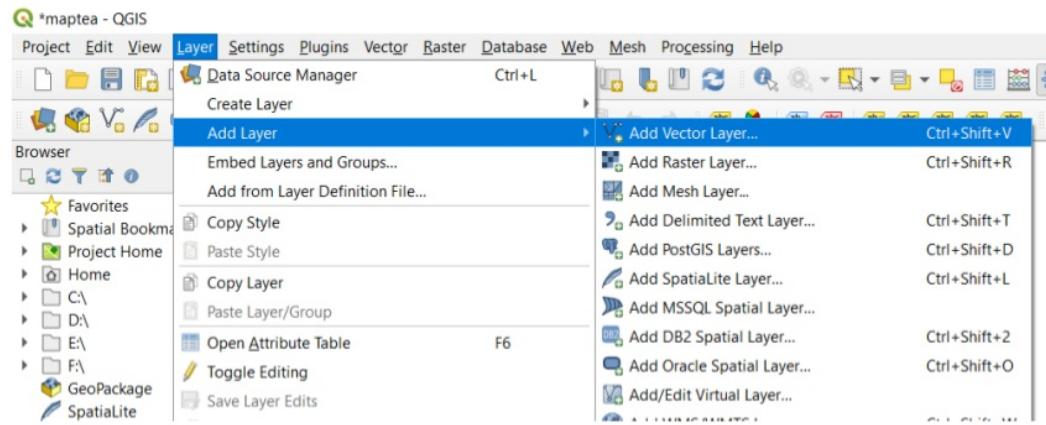
- i) District Name
- ii) Total *holdings* reporting tea
- iii) Total *extent* under tea
- iv) Total Extent (*both holdings and extent*)

Steps

First, we need to open the Tea Survey Report and find the table “H04-4: Total Extent under Tea by District”. Then open a new excel file and copy that table in to the excel file and give it a name and save it as a CSV file. In my case I saved it as **CeylonTeaStat_Table.csv** as the figure below.

	A	B	C	D	E	F	G	H
1	COLOMBO	366	93	7	60	373	154	
2	GAMPaha	38	12	0	0	38	12	
3	KALUTARA	22,967	6,117	78	1,054	23,045	7,170	
4	KANDY	18,432	7,609	235	14,990	18,667	22,599	
5	MATALE	747	356	87	4,774	834	5,130	
6	NUWARA ELIYA	11,936	4,045	195	46,222	12,131	50,266	
7	GALLE	58,314	22,062	235	3,568	58,549	25,629	
8	MATARA	45,863	17,326	289	6,378	46,152	23,704	
9	HAMBANTOTA	1,619	440	0	0	1,619	440	
10	KURUNEGALA	95	31	1	10	96	41	
11	BADULLA	17,553	5,616	161	25,024	17,714	30,639	
12	MONERAGALA	247	70	7	852	254	922	
13	RATNAPURA	70,752	25,433	331	12,918	71,083	38,352	
14	KEGALLE	14,089	4,551	114	3,107	14,203	7,658	
15								

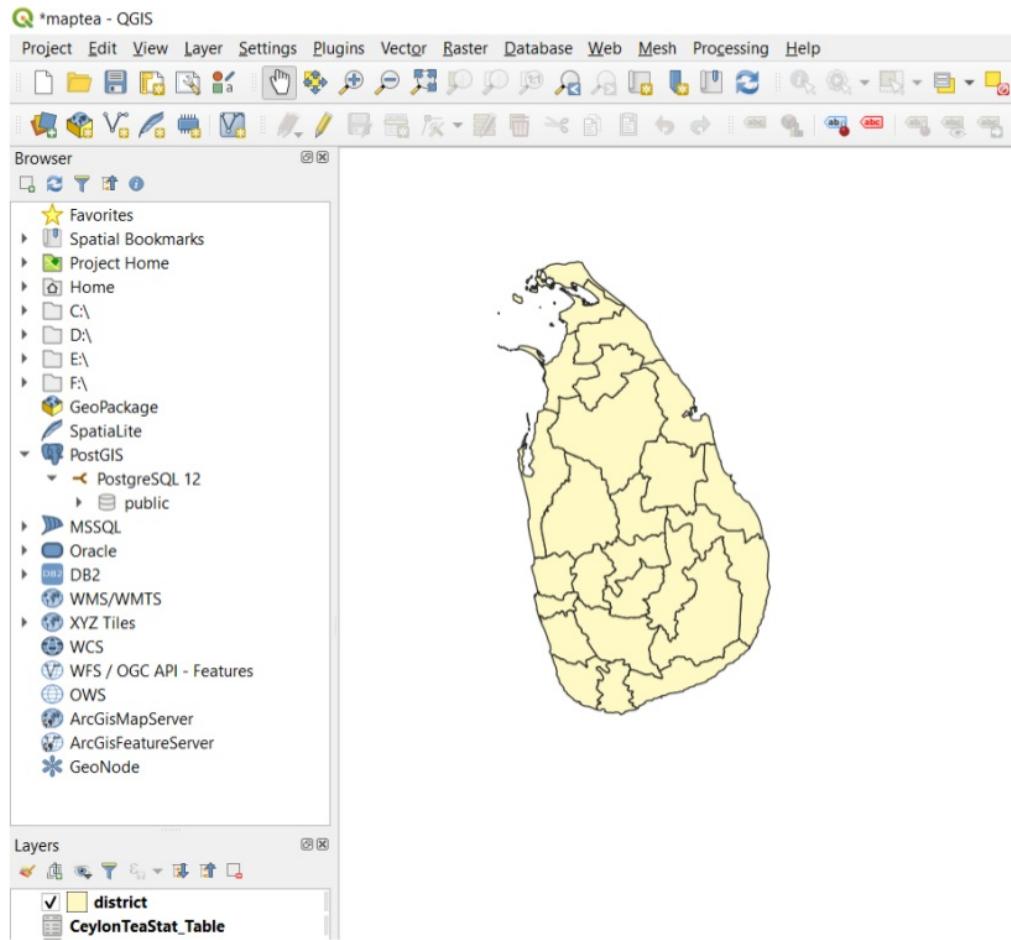
1 Then we have to import that **CeylonTeaStat_Table.csv** CSV file into the QGIS. In order to do that open QGIS, Click the Layer tab and go to the add layer in drop down menu and select the Add Vector Layer. Then it will show up a new window named Data source manage. Then browse and select **CeylonTeaStat_Table.csv** The csv file you created before and Click the ADD button to import the file.



After this, we have to import the Sri Lankan district map. It is similar to previous one, go and

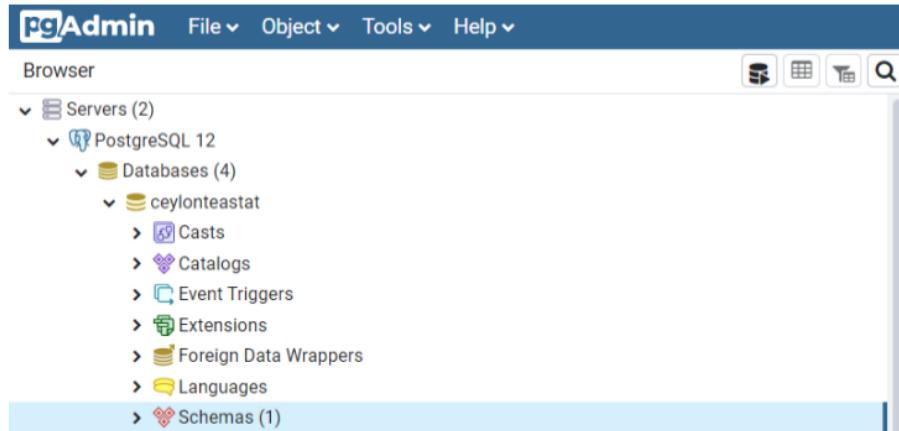
Click the Layer tab and go to the add layer in drop down menu and select the Add Vector

Layer. Then it will show up a new window named Data source manage. Then browse and select the given district shape file **District.shp** Click the ADD button to import the file. It will show up like the figure below.

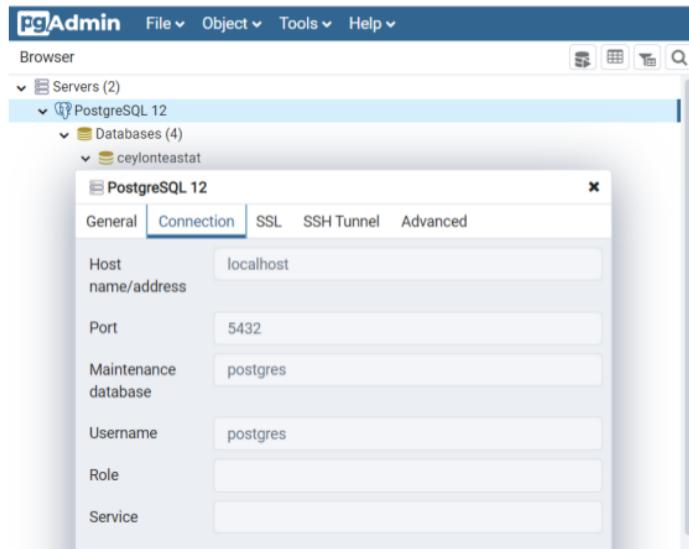


We can see the imported layers by left corner below like the figure above.

After this, we have to import **CeylonTeaStat_Table.csv** file in to the PostgreSQL by pgAdmin. Before that first open the pgAdmin select the exiting sever PostgreSQL 12, right click, and connect the server. Then select create database and give a name to the database. In my server, I created a database named “ceylonteastat” like in the image below.



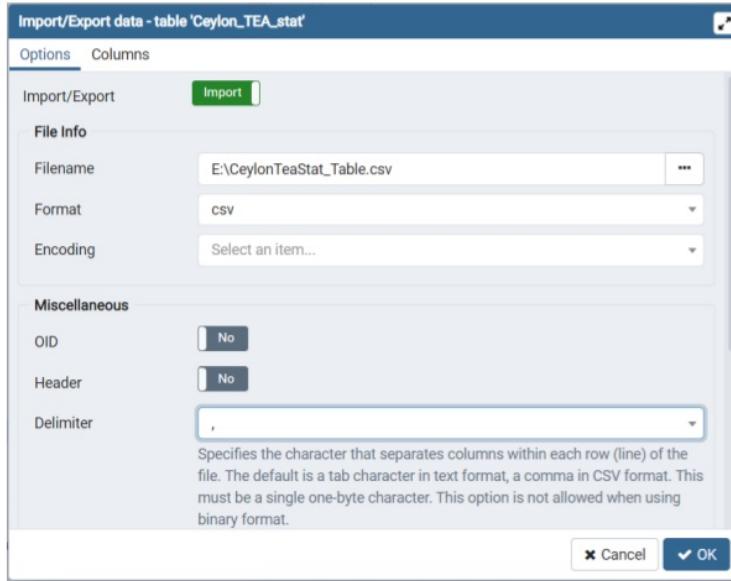
We can check the server details like server host name, port name, user name by the server properties



Then we have to create a table with seven columns to import the **CeylonTeaStat_Table.csv** CSV file. For do that go to the database you named as “ceylonteastat”, for that drop down; go to the Schemas, and select the public then you find tab named Tables. Right click on tables and select the create table and it will show up a popup window. Inside that windows give a name to the table first (Ceylon_TEA_stat) then create the seven columns to add CSV dataset file like figure below.

Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?
District	character	1,000		No	No
Small Holding sector1 No. of holdings rep.	character	1,000		No	No
Small Holding sector1 Extent under Tea	character	1,000		No	No
Estate Sector2 No. of holdings reporting ...	character	1,000		No	No
Estate Sector2 Extent under Tea	character	1,000		No	No
Total No. of holdings reporting Tea	character	1,000		No	No
Total Extent under Tea	character	1,000		No	No

Now we can import the **CeylonTeaStat_Table.csv** CSV file by right click on the table name (Ceylon_TEA_stat) and selecting the import/Export. It will show up a pop up window again as in the figure below. Select import, give the path to the file name field and select the delimiter to the as “,” comma, it's very important thing. In addition, click OK to import CSV file.



To check whether the record successfully add to the table click on the “view” data icon in the top of the left side. It will appear the table with all records you imported as a CSV file. As in the figure below.

District	Small Holding sector1 No. of holdings reporting Tea	Small Holding sector1 Extent under Tea	Estate Sector2 No. of holdings reporting Tea	Estate Sector2 Extent under Tea	Total No. of holdings reporting Tea	Total Extent under Tea
COLOMBO	366	93	7		366	
GAMPHA	38	12	0		38	
KALUTARA	22,967	6,117	78		22,967	
KANDY	18,432	7,609	239		18,432	
MATALE	747	356	87		747	
NUWARA ELIYA	11,936	4,045	195		11,936	
GALLE	58,314	22,062	235		58,314	
MATARA	45,863	17,326	289		45,863	
HAMBANTOTA	1,619	440	0		1,619	
KURUNEGALA	95	31	1		95	
BADULLA	17,553	5,616	161		17,553	
MONERAGALA	247	70	7		247	
RATHNAPURA	70,752	25,433	331		70,752	
KEGALLE	14,089	4,551	114		14,089	

After this step, we have to create the connection to connect QGIS with the pgAdmin. Then go the QGIS right click on PostGIS tab in the left side and click on “New Connection”. As in the figure below.

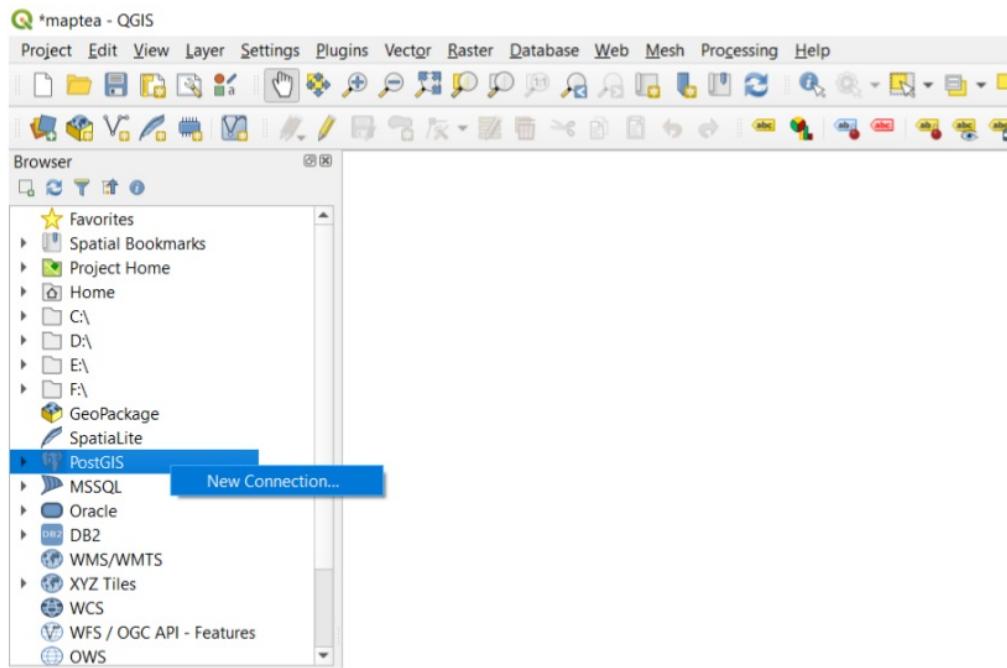
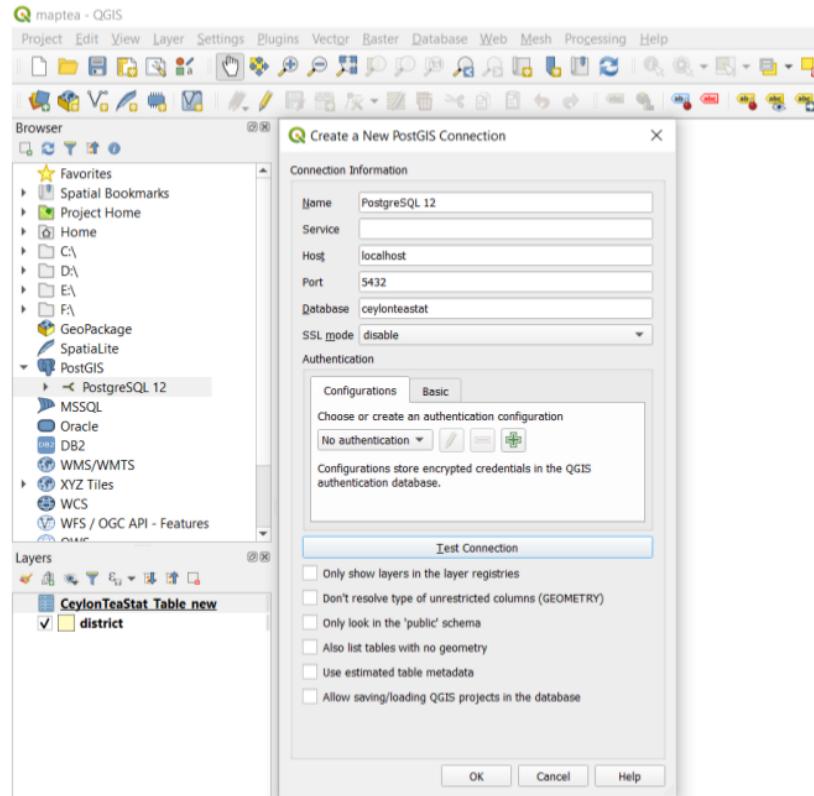


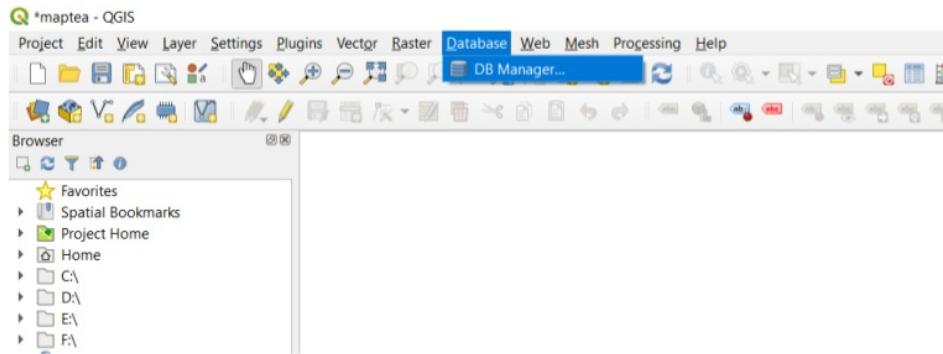
Figure 1

After we clicked on the new connection, it will appear popup windows named “Create a New PostGIS Connection”. Then we have to fill some fields to make the connection. So I gave my PostgreSQL sever details to make the connection. I gave the name as “PostgreSQL 12”, host as “localhost”, port as “5432”, and database as “ceylonteastat”. Click ok to make the connection. The created connection can find from left side in the QGIS named as PostgreSQL 12.

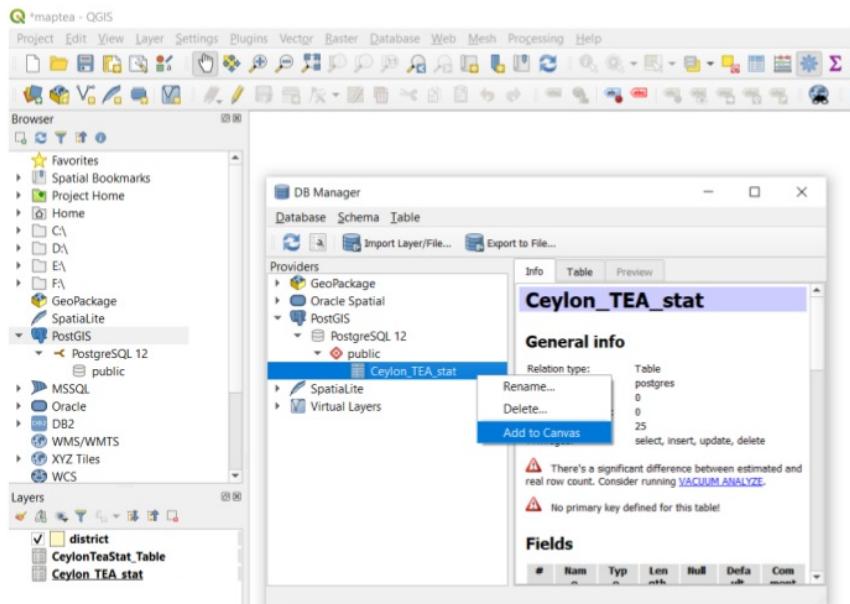


1

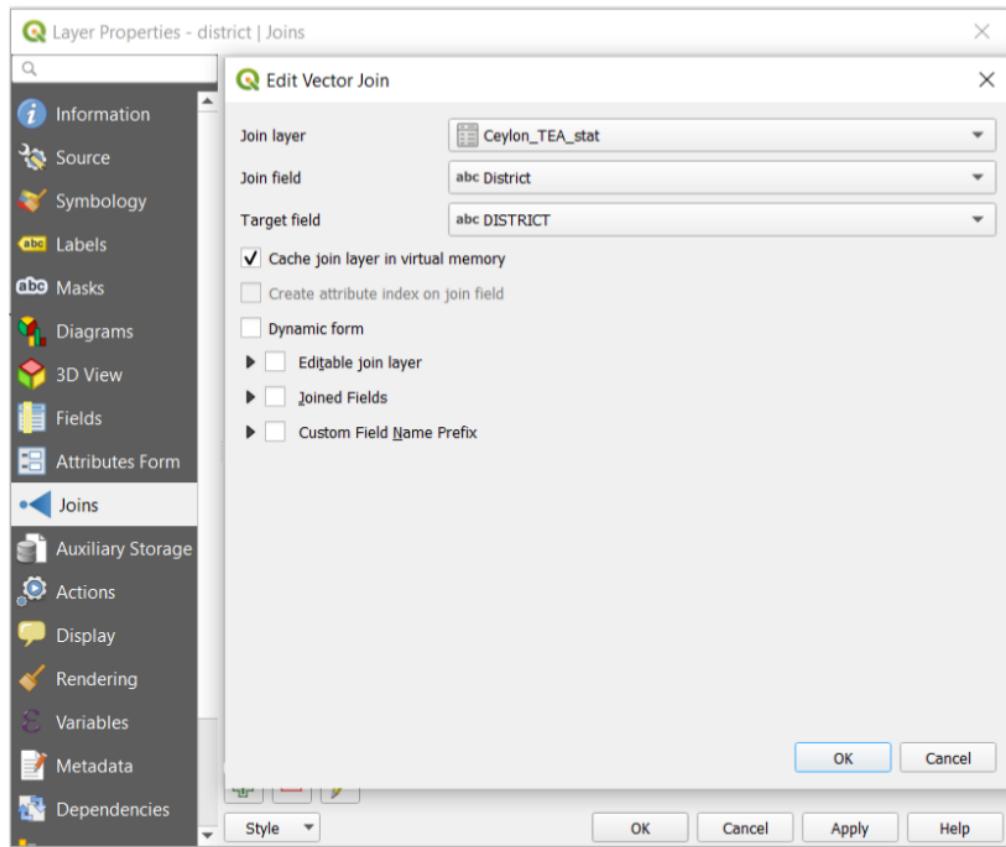
After that go to the tab called database and click “DB Manager”.



Now it will open up a window called DB manager, go to the PostGIS drop down it select the connection you created “PostgreSQL 12” drop down the public and right click on “Ceylon_TEA_stat” and click add to the Canvas. Then that Ceylon_TEA_stat table will appear on “Layers” section as in the figure below



After this, we have to connect/join the canvas District.shp shape file with “districts” file in the pgAdmin. To do that go to canvas, right click, and go to the “properties” after that select the “joins” it will pop and a window like figure below. Then give the join layer as the table from the pgAdmin named “Ceylon_TEA_stat”, give the join field as District according to the column in the table in pgAdmin, give the target field as “DISTRICT” that is the shape file we imported. After that, click ok to apply the join.

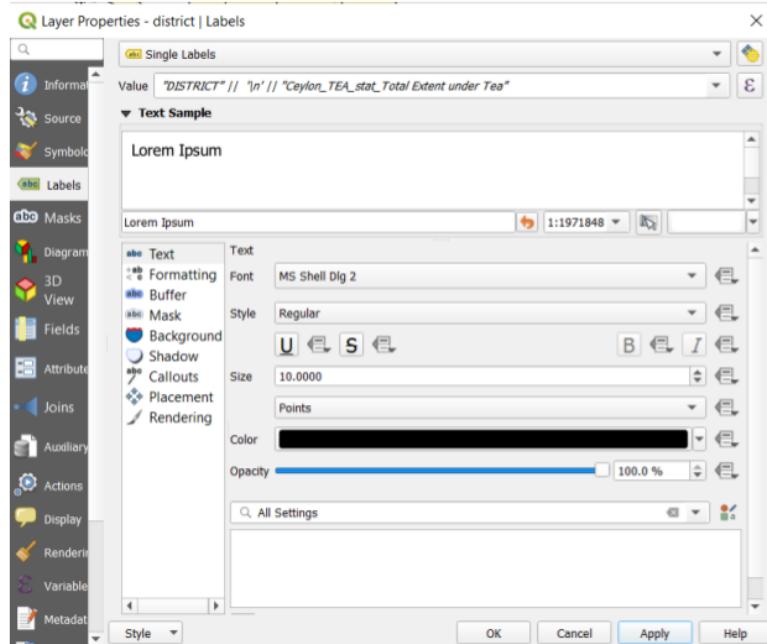


To check whether join is done successfully Open the attribute table and see all the information are same. As in the image below.

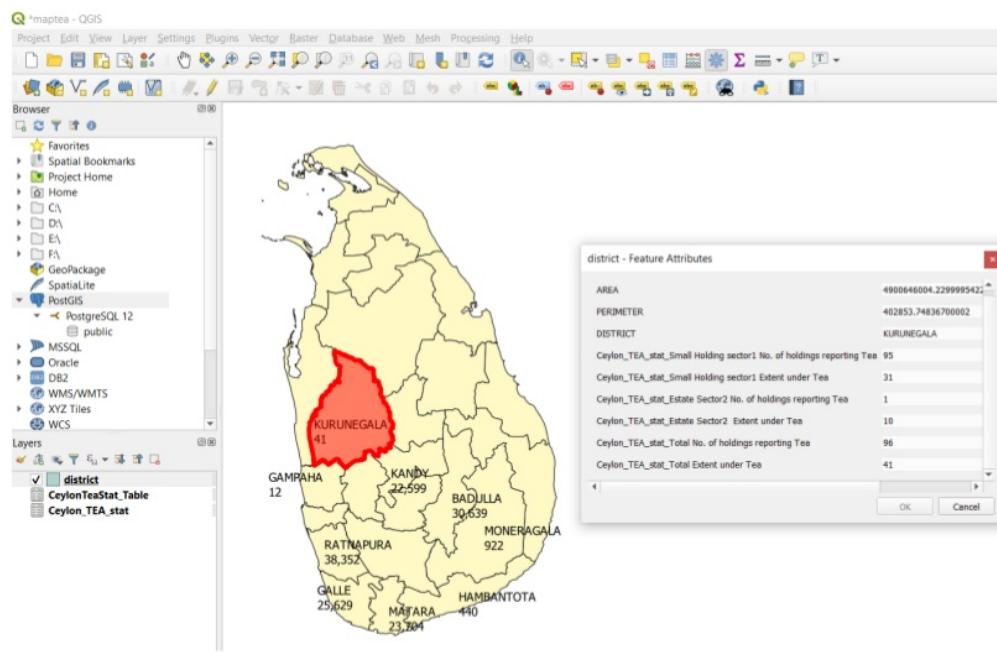


	AREA	PERIMETER	DISTRICT	$\lambda_{stat_Small Holding sector1}$	No. of holdings reg	$\lambda_{stat_Small Holding sector1 Extentate Sector2}$	No. of hol	$\lambda_{EA_stat_Estate Sector2}$	Extent ur	$\lambda_{TEA_stat_Total No. of holdings report}$	Ceylon_TEA_stat_Total Extent under Tea
1	5751780583.72...	517975.362337...	MONERAGALA	247	70	7	852	254	922		
2	1663221178.08...	249713.542116...	KEGALLE	14,089	4,551	114	3,107	14,203	7,658		
3	1644986343.54...	217995.340258...	KALUTARA	22,967	6,117	78	1,054	23,045	7,170		
4	1744634232.44...	277857.861913...	NUWARA ELIYA	11,936	4,045	195	46,222	12,131	50,266		
5	2058649164.76...	287297.889771...	MATALE	747	356	87	4,774	834	5,130		
6	2625617925.73...	396193.047112...	HAMBANTOTA	1,619	440	0	0	1,619	440		
7	4900646004.22...	402853.748367...	KURUNEGALA	95	31	1	10	96	41		
8	3288868919.78...	367724.256250...	RATNAPURA	70,752	25,433	331	12,918	71,083	38,352		
9	2871168963.19...	424854.515131...	BADULLA	17,553	5,616	161	25,024	17,714	30,639		
10	1612851246.76...	270757.720797...	GALLE	58,314	22,062	235	3,568	58,549	25,629		
11	1308765205.23...	259040.401157...	MATARA	45,863	17,326	289	6,378	46,152	23,704		
12	1922975620.63...	331791.603246...	KANDY	18,432	7,609	235	14,990	18,667	22,599		
13	682478635.310...	182151.666615...	COLOMBO	366	93	7	60	373	154		
14	1417049524.34...	205291.34411...	GAMPHA	38	12	0	0	38	12		

1
After that, we need to label the map. To do that right click on “district” canvas and go to the properties and go to the “labels” after that give the first field as “single label” and in the second drop down field choose label values you need to show on the map. In here, I choose “District and Total extent under tea” to appear data on the map. In addition, click Apply.



Now all the given values “District and Total extent under tea” are showing in the map. As in the figures below. By clicking, you can see the all information from the database.



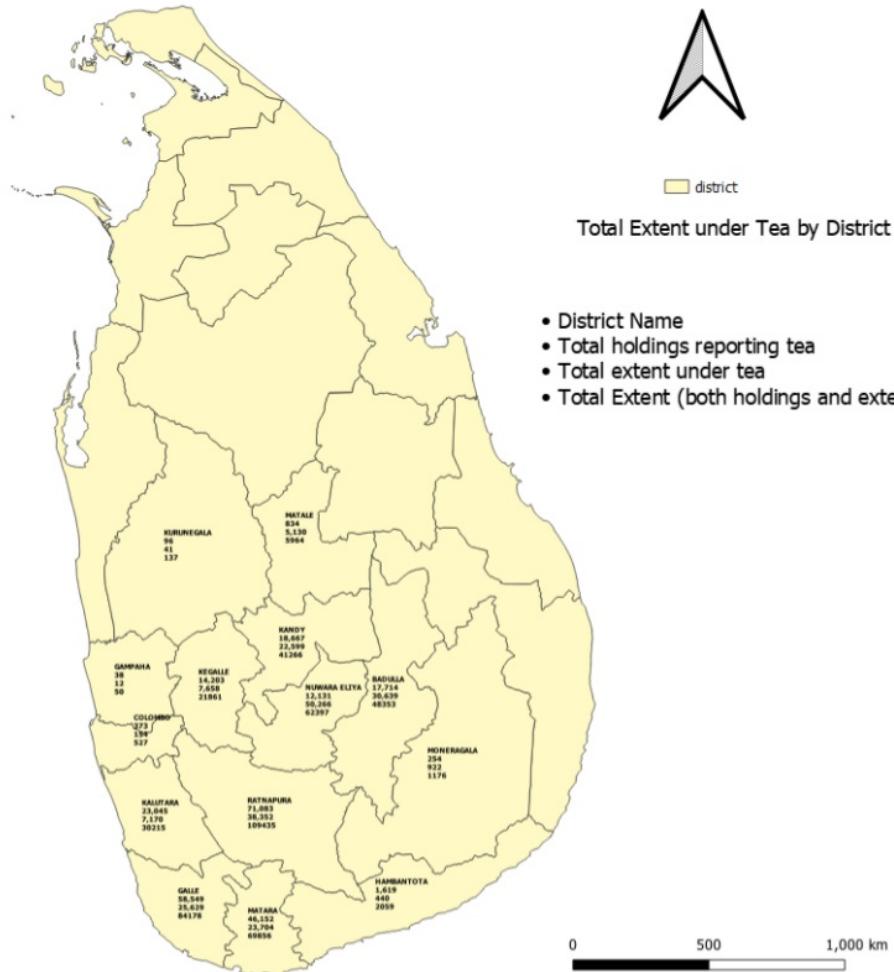
Now we have to visualize following information on the created map.

- District Name
- Total *holdings* reporting tea
- Total *extent* under tea
- Total Extent (*both holdings and extent*)

Now we can see all the required information, District Name, Total holdings reporting tea, Total extent under tea and Total Extent (both holdings and extent) in the map.



Finally, I am adding the North Arrow, Map Scale, Map title, Map legends to the created map using print layout function.



Task G

1 Create a Sri Lanka map contains Three major Agro Technology Parks declared by the Department of Agriculture in Sri Lanka (as at 2/20/2020) in order to promote Agro Tourism within the island. The map should visualize the information such as Name of Agro Park, District Name, Latitude and Longitude. The exact GPS locations should be retrieved via Google Earth with the support of a KML/KMZ file. A Comprehensive description should be included about all identified Agro Technology Parks and their importance in the perspective of Ceylon Agro Tourism. (The official online information can be accessed via the departments' website)

Steps

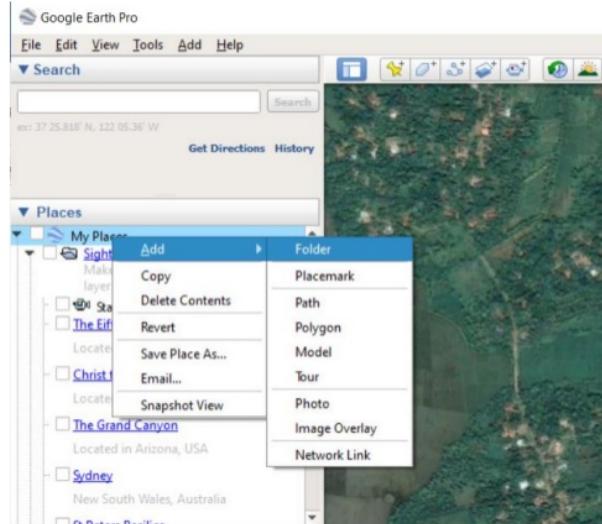
1 First, we have to open Google Earth Pro and need to find thee Agro Technology parks declared by the Department of Agriculture in Sri Lanka. Those are,

Agro Technology Park - Hambanthota

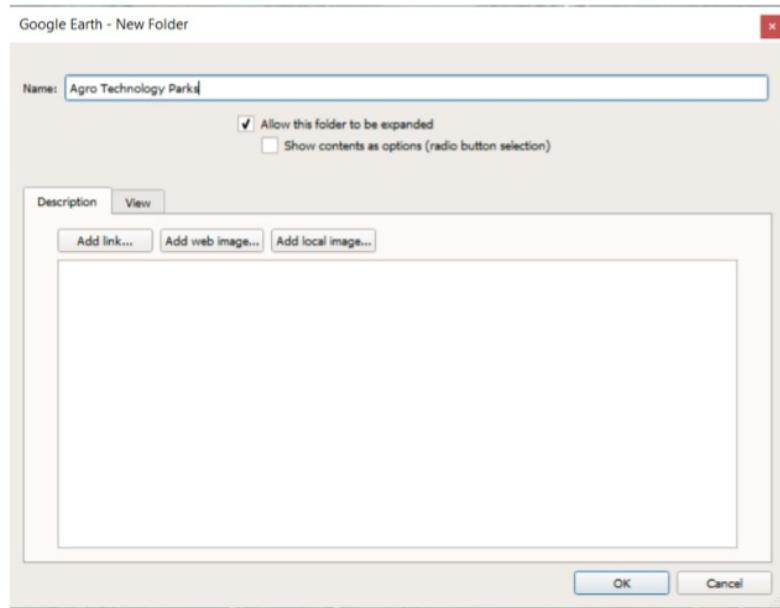
Agro Technology Park - Seetha Eliya

Agro Technology Park – Gannoruwa

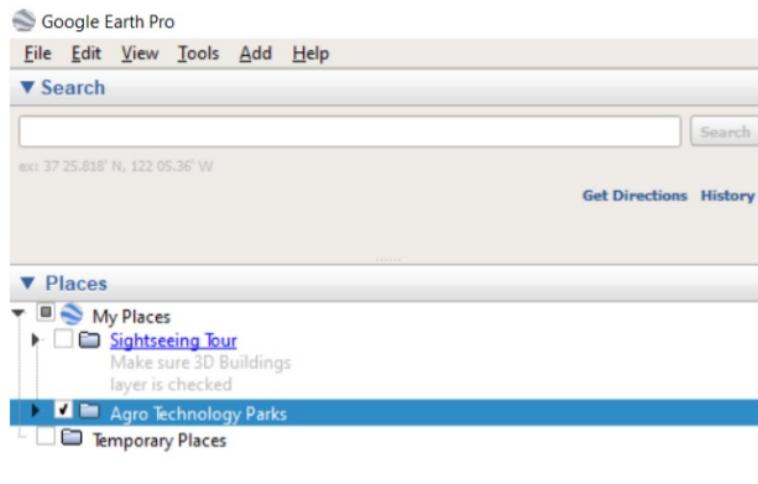
1 After that in google earth, we need to create a folder. To do that right click on “My Places” and click the “Add” and select on “Folder” and name it as “Agro Technology Parks Sri Lanka”.



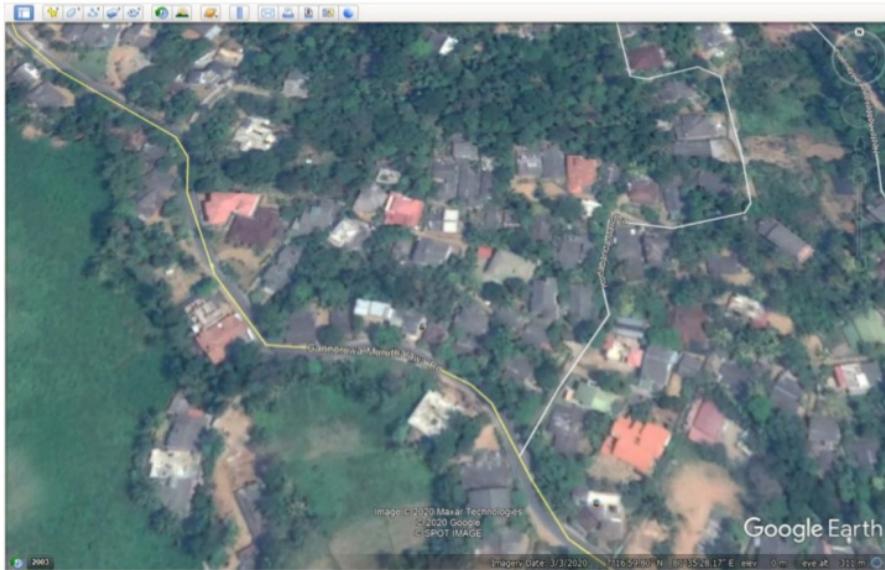
Now name it as “Agro Technology Parks Sri Lanka” Type the name and click ok button.



Now the folder has been created as below.



Now we have to go the locations we that mentioned before.



After that select “Add Polygon icon” icon and save the three locations in folder we created before.



By drawing a polygon button in mention locations. We can to save the locations in folder that we created in my places. And also we need to give a name for a location in here it is “Agro Technology Gannoruwa” as well as click the View button and click on snapshot current view. Then it will show up “Latitude”, “Longitude” and and more information in the fields.We need to do the same process to all three loaction we mention before as images below.

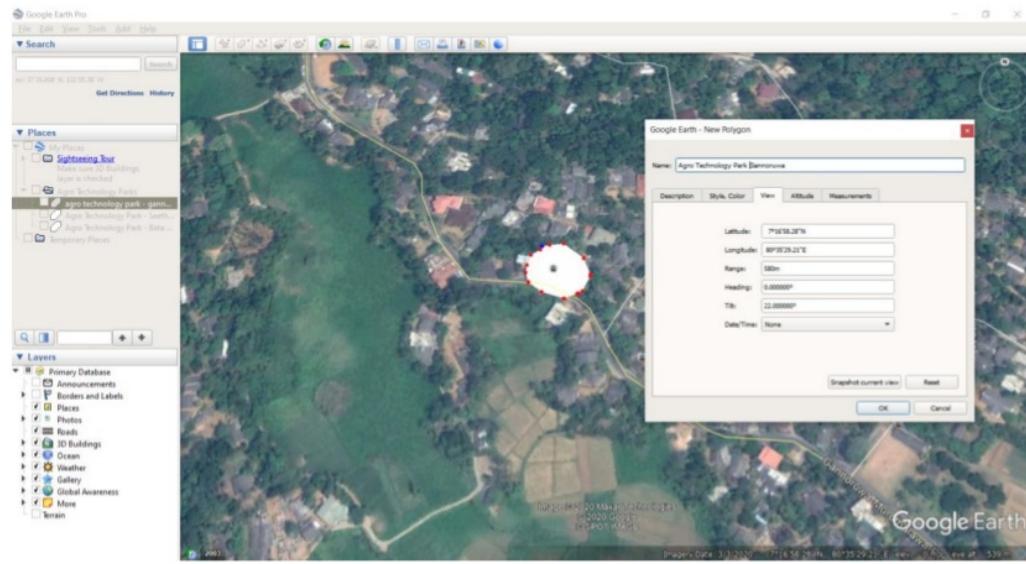


Image - Agro Technology Park – Gannoruwa

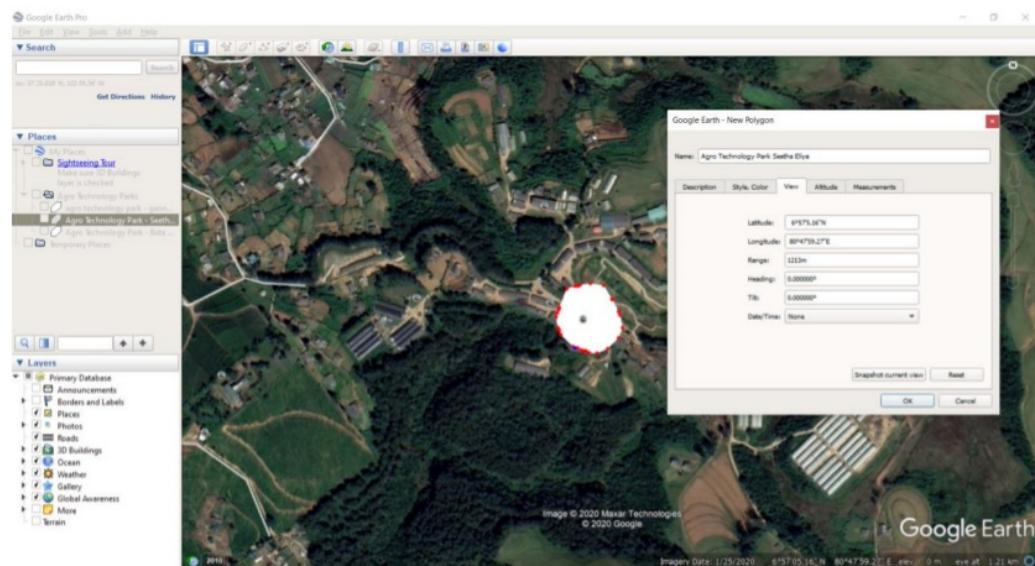


Image - Agro Technology Park - Seetha Eliya

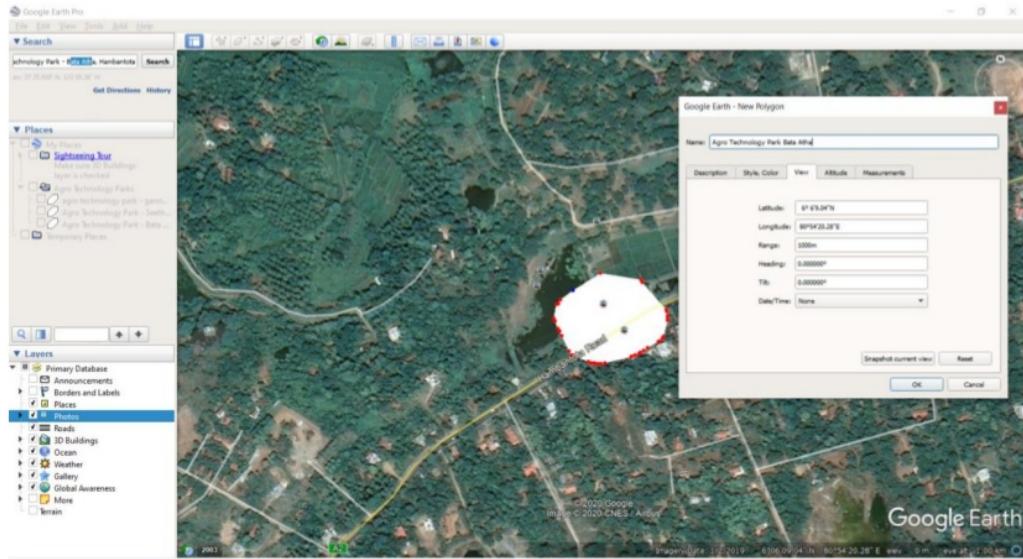
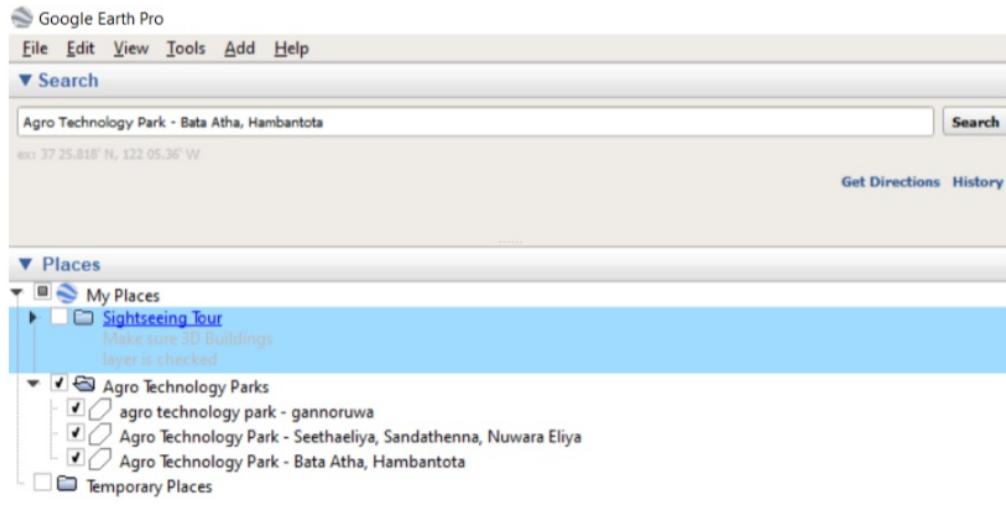
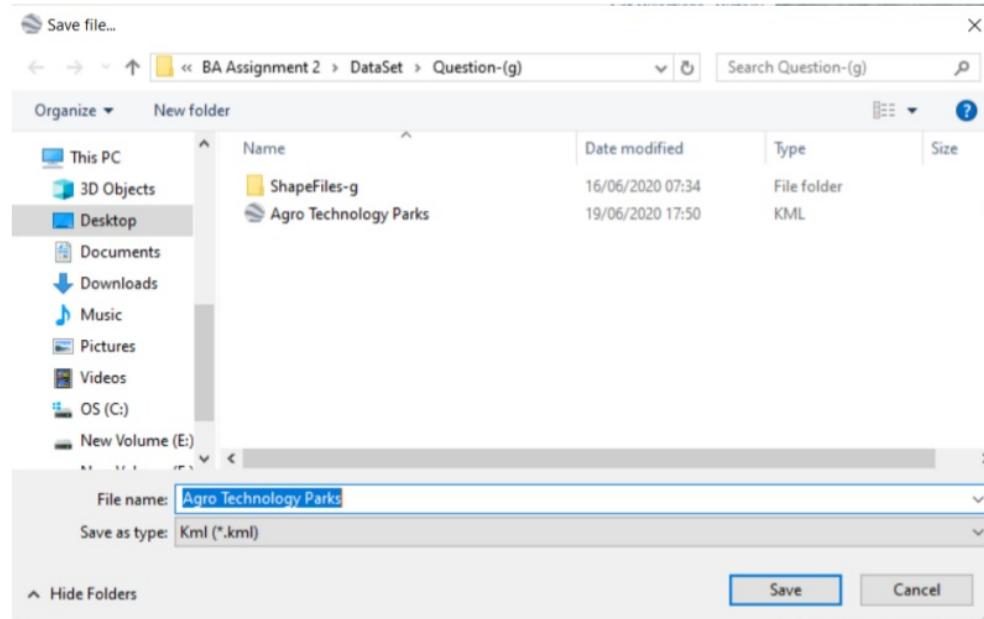
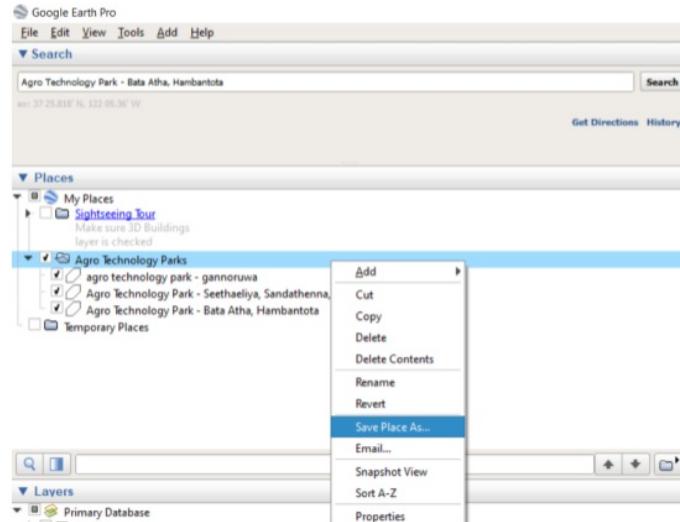


Image - Agro Technology Park - Hambanthota

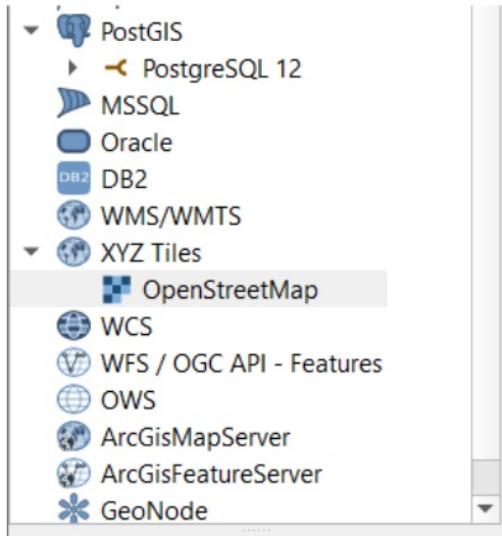
Now we have three polygon for the three locations.



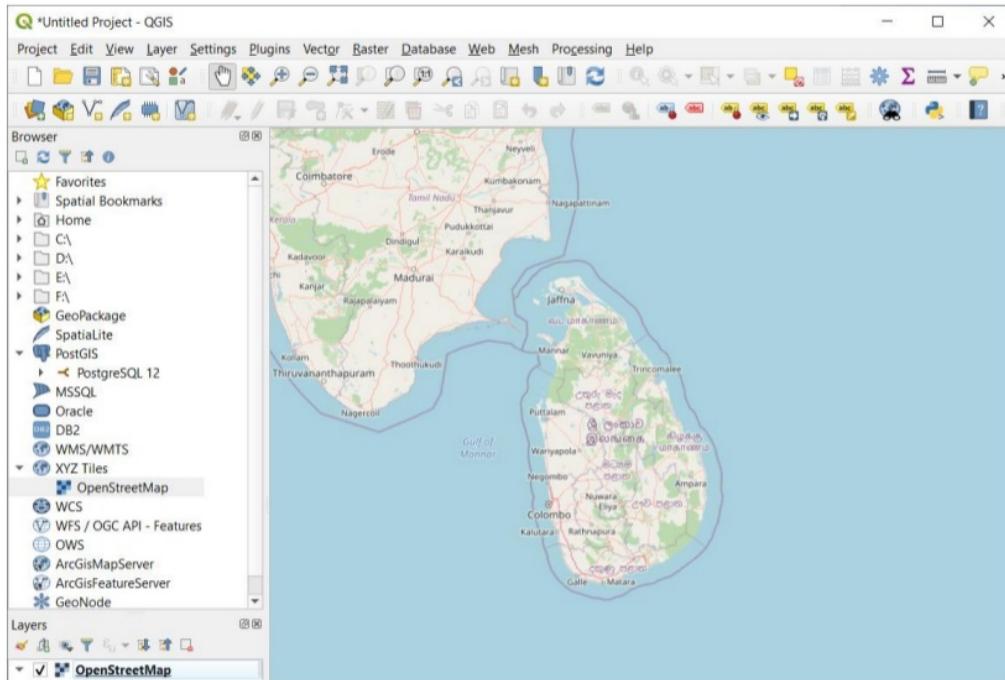
1
After that step right click on Agro Technology Park and click on “Save Place As” and save it as “kml” file as the images below.



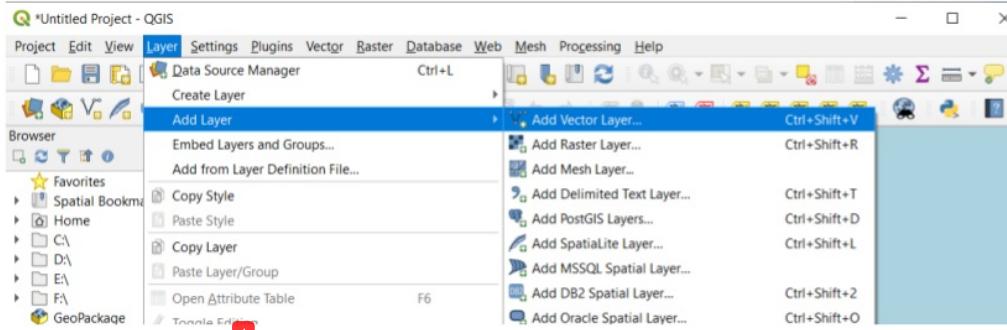
After saving, the “kml” file. Go to the QGIS and select “XYZ Tiles” and drop down it and dual click on “OpenStreetMap”.



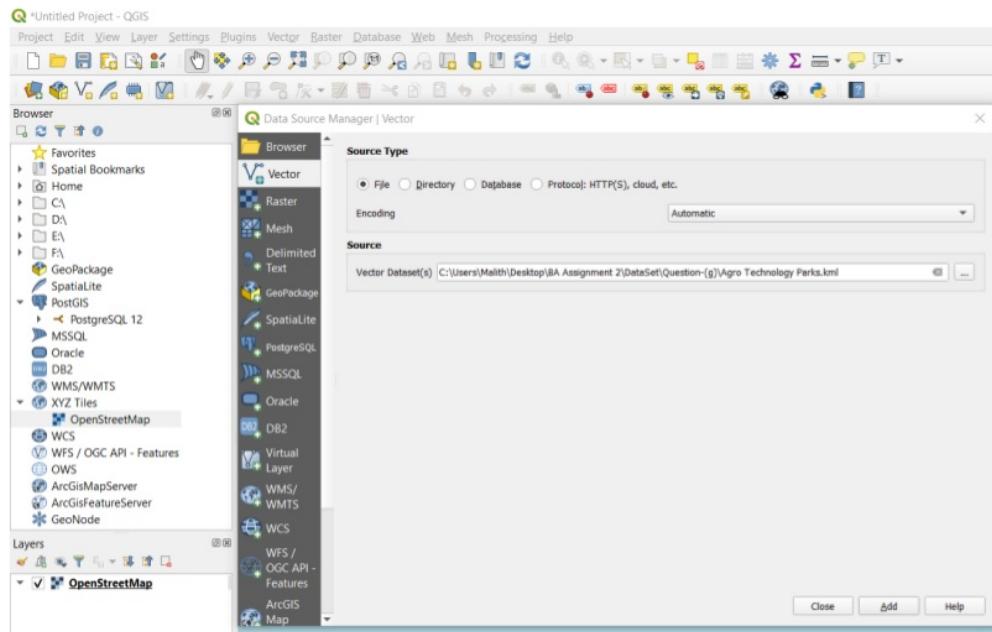
After that Sri Lankan map is, appear like this in “QGIS”.



1
After this step, we need to import the KML file we save before. In order to do that click on “Layer” tab select “Add Layer” and click on “Add Vector Layer”.
1



Then it will show up a new window named Data source manage. Then browse and select “Agro Technology Parks.kml” The KML file you saved before and Click the ADD button to import the file.
1



After this step, to find selected polygons. We need to go the attribute table of “Argo Technology Parks” and right click on each Name and select the “Zoom to Feature” option. Then we can find drawn polygon locations on map.

Name	description	timestamp	begin	end	altitudeMode	tessellate	extrude	visibility	drawOrder	icon
1 Agro technology park - gannoruwa			NULL	NULL	NULL / NULL	1	0	-1	NULL / NULL	
2 Agro Technology Park - Seethael			NULL	NULL	NULL / NULL	1	0	-1	NULL / NULL	
3 Agro Technology Park - Bata Atm			NULL	NULL	NULL / NULL	1	0	-1	NULL / NULL	

By clicking on each name we can find each polygon we drawn as the figure below.

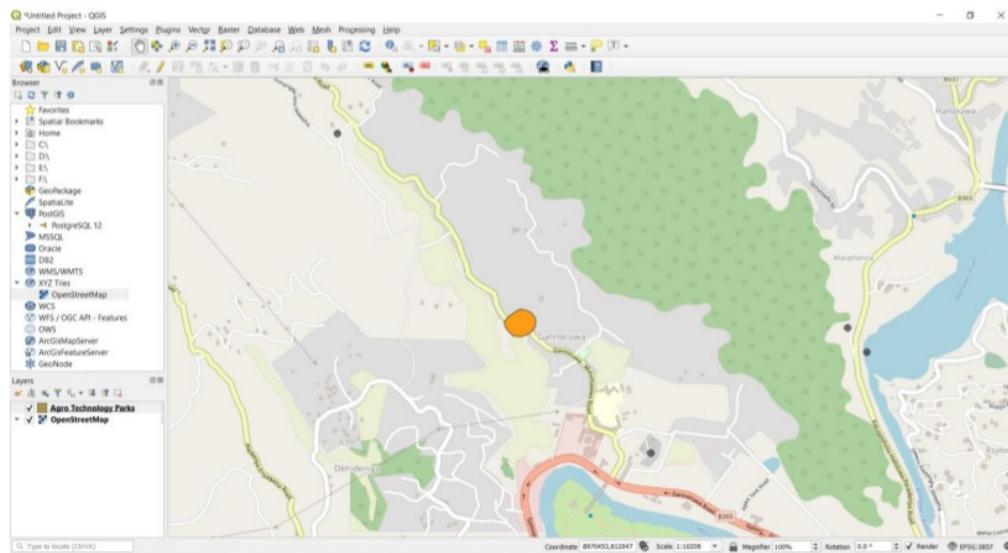
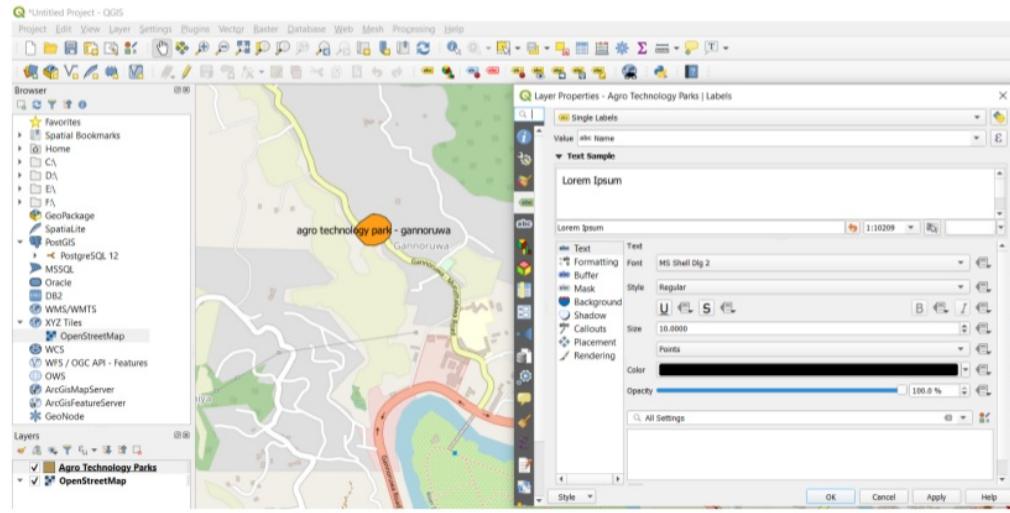


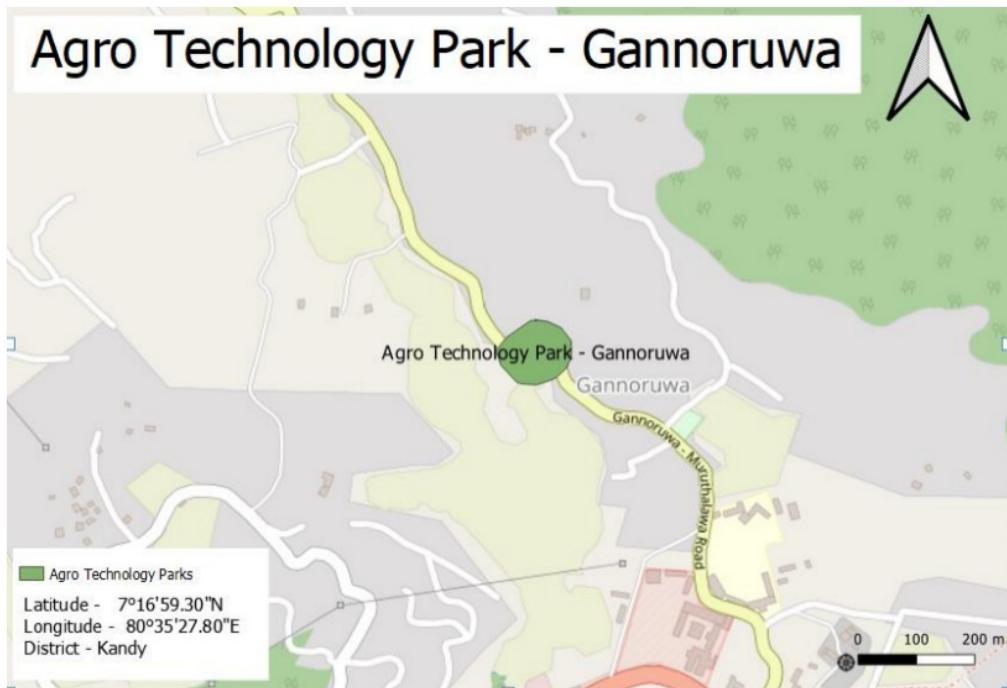
Image - Agro Technology Park – Gannoruwa

To show the names right click on “Agro Technology Parks” and go the “control feature labelling” give the value as name. Then we can show the name on our polygon drawn locations.



1

Finally, I am adding the North Arrow, Map Scale, Map title, Map legends to the all three maps using print layout function.

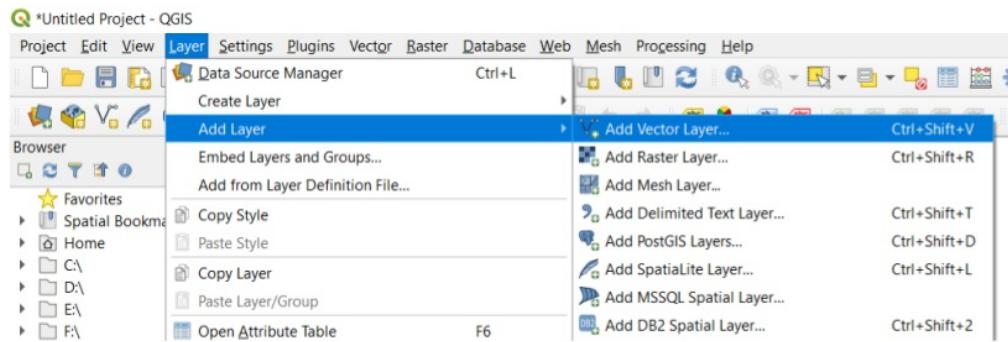




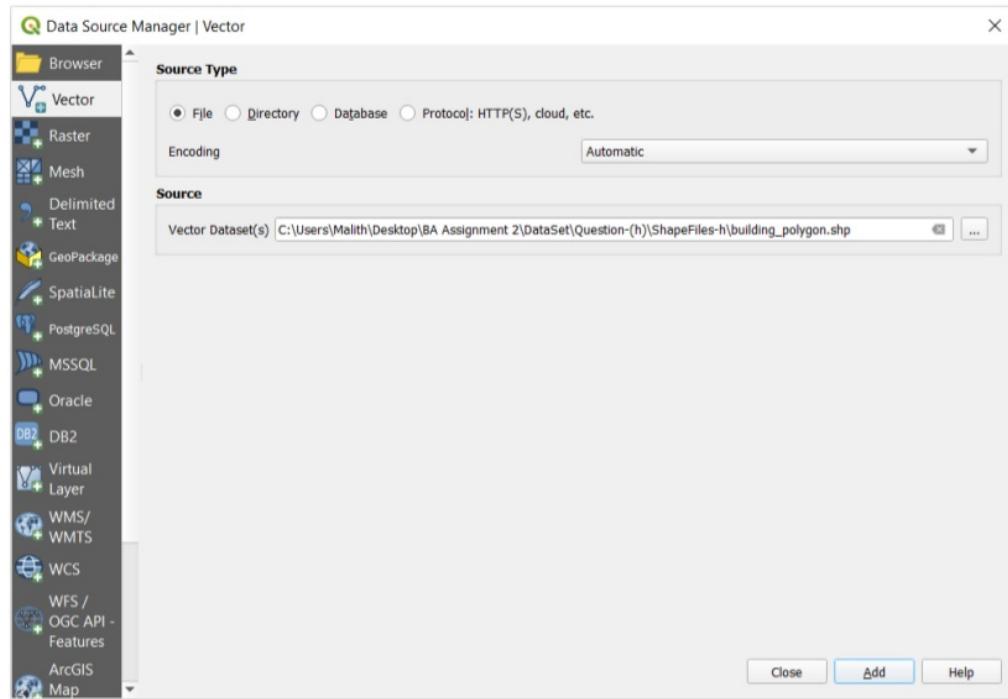
Task H

Find a suitable land for new establishing Modern Agricultural Research center in the Peradeniya.

1 In this, we have to calculate area and number of buildings and lands by given building polygon the shape file. To do that first go to the Go to the QGIS and go to the layer tab and add vector layer. It will open up window named Data Source “Manager” and select the given polygan file named “building_polygon.shp” as the figure below

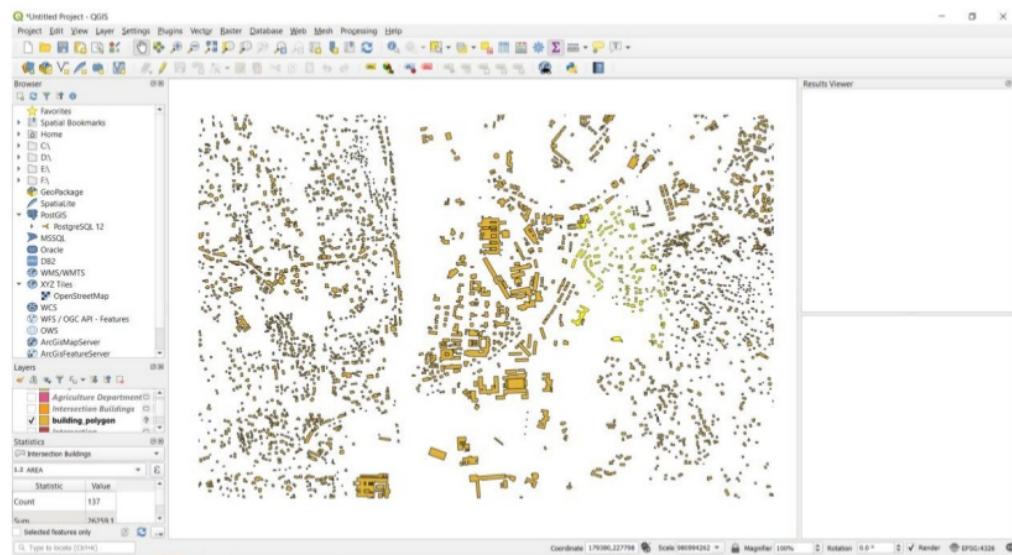


Select Add “Vector Layer”



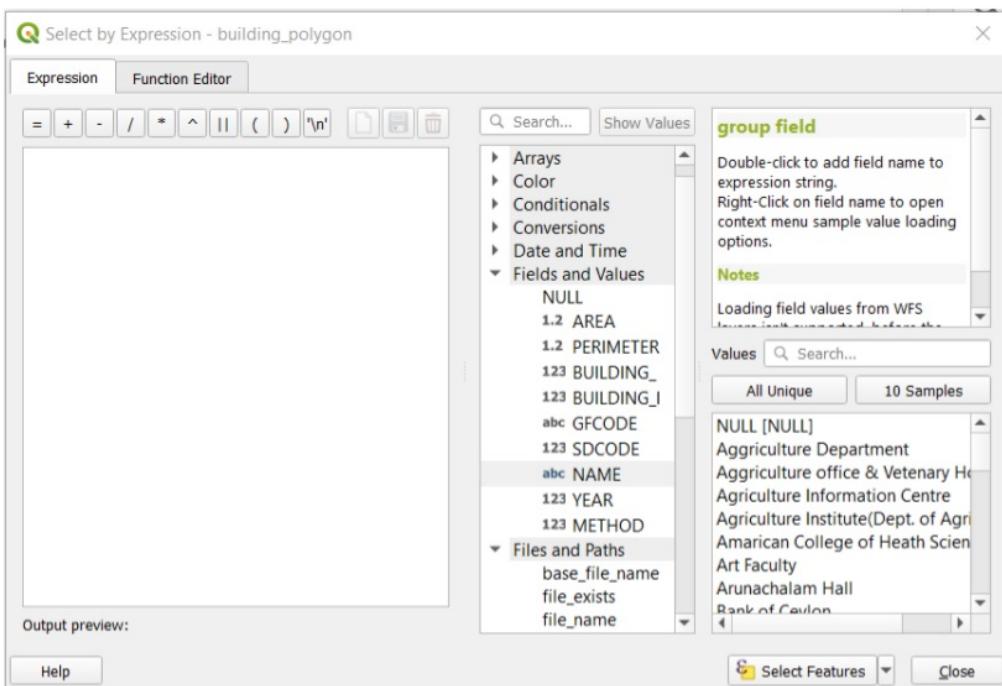
Select the building_polygon.shp

It will open up like the image below.

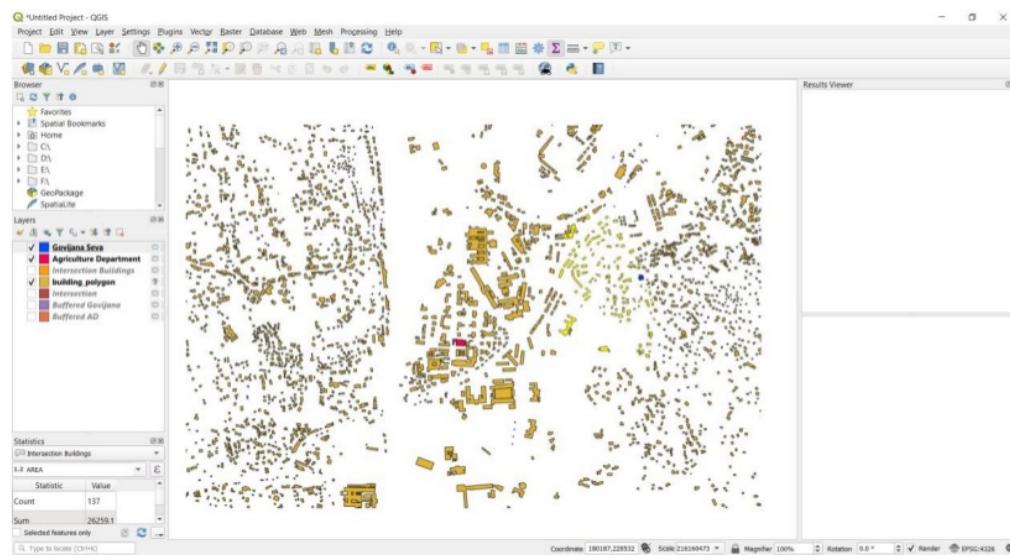


1

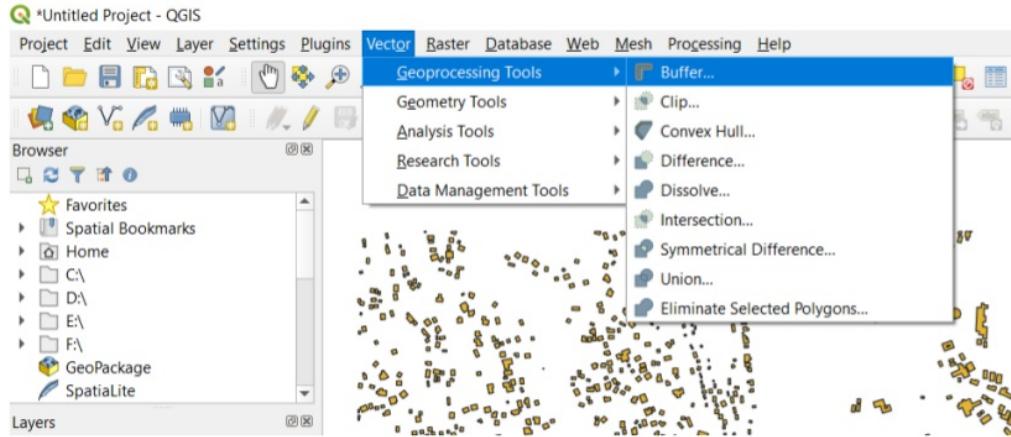
After that open, the attribute table of “building polygon” then click the select features using expression icon. After that click on Field and values, go to the “Name”, and select “ALL Unique” button on the right side. It will show up like this.



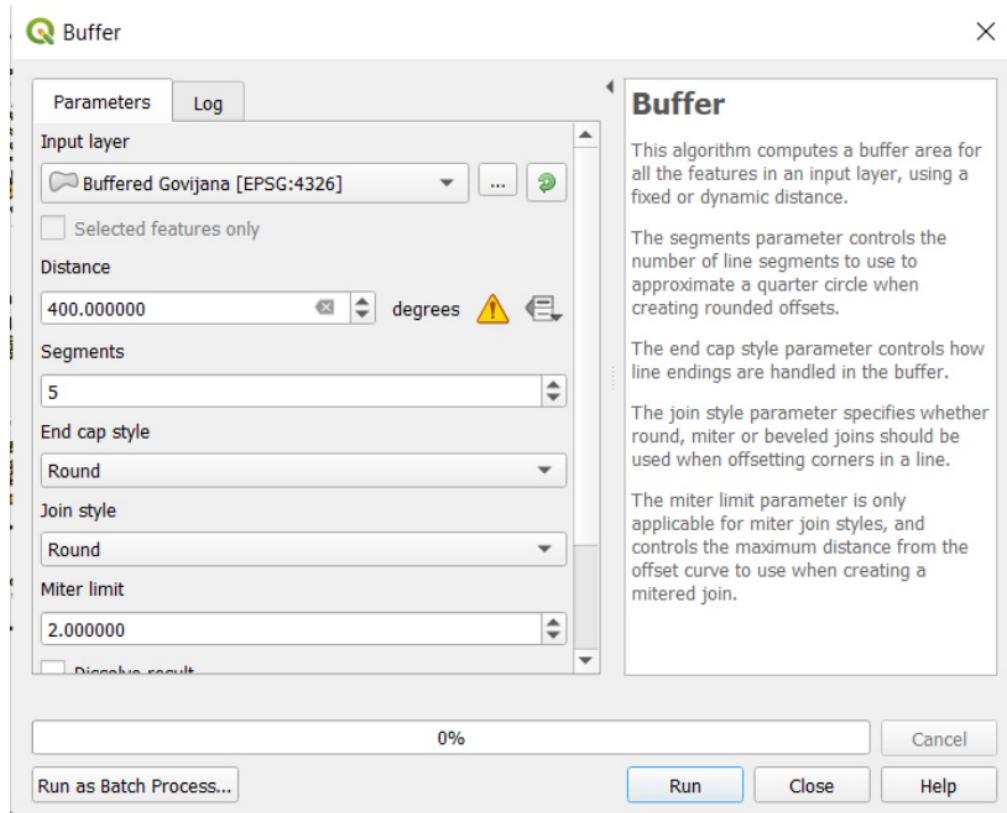
Now select “Goijana Seva” Centre and click on select feature button. In addition, do the same thing to the “Agriculture Department”. Then it will appear like the image below.



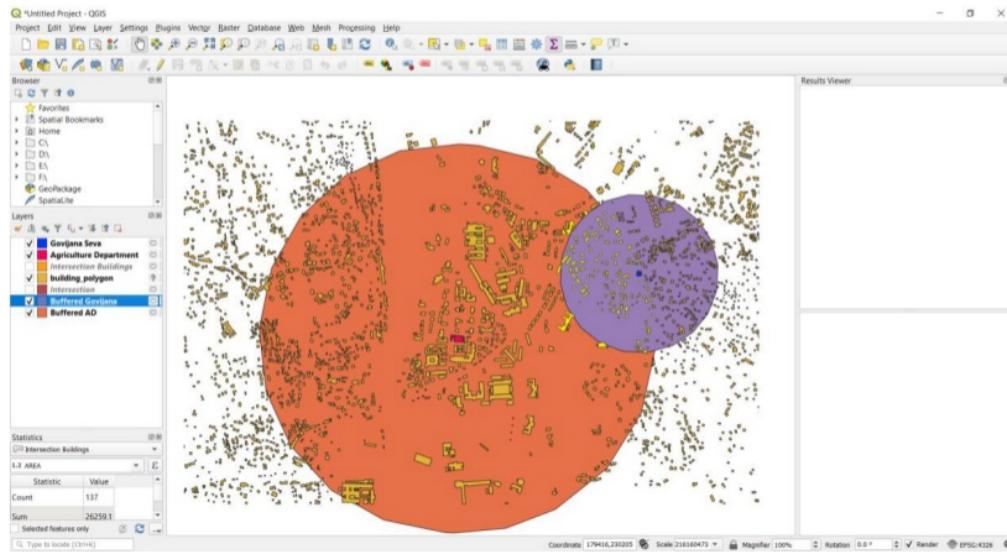
1
After this step go to the Vector tab., click on Geoprocessing Tools, and click buffer.



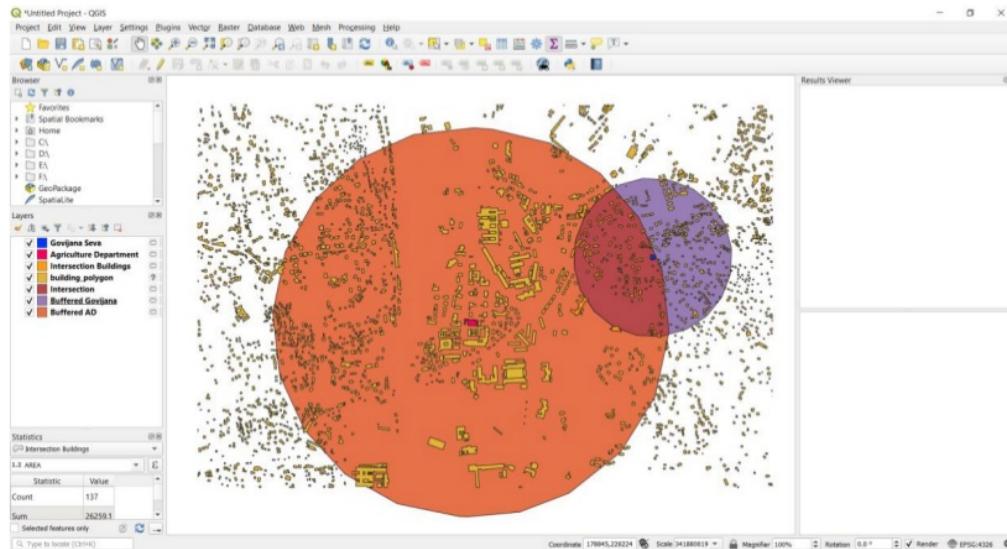
1
Then, It will open up and like the image below then select input layer as govijana seva and give the distance as 400 and click run button. In addition, do the same as Agriculture department and give the distance as 1000.



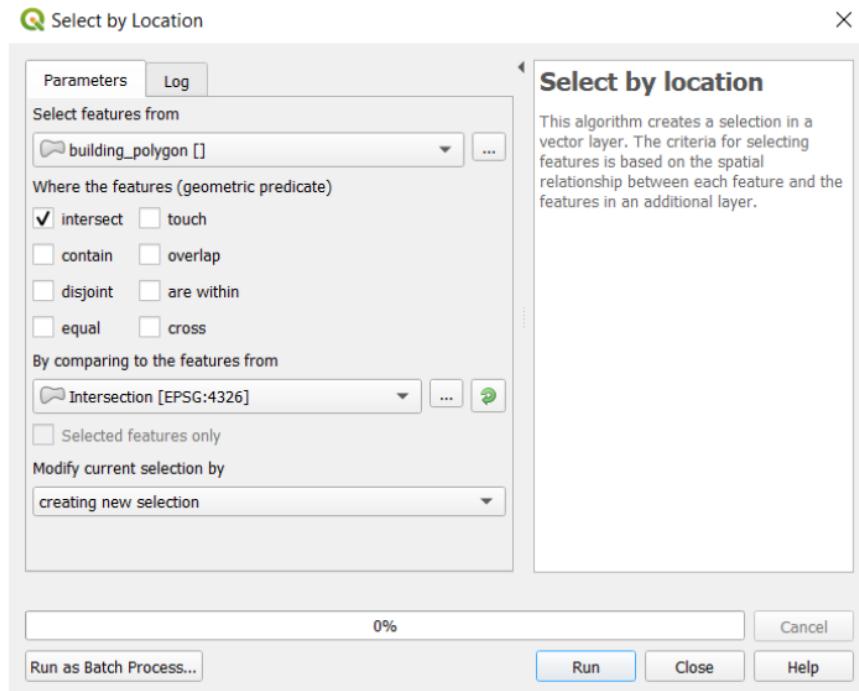
Now it will show up like the image below.



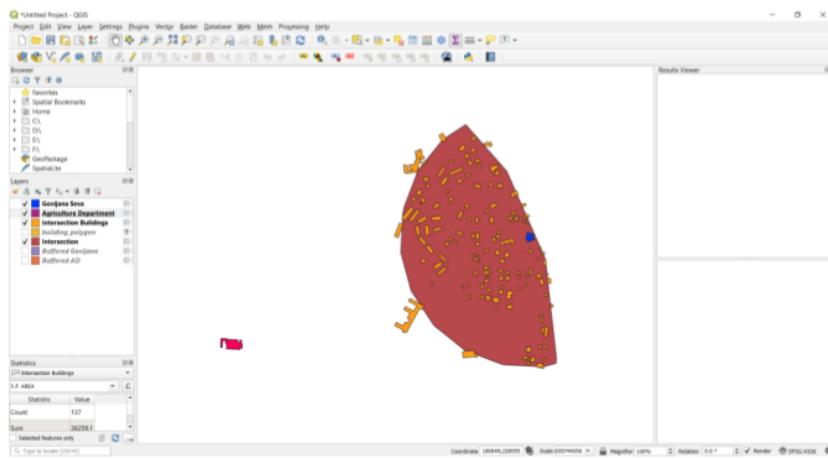
Now we need to generate intersection for both Agriculture department and govijana seva. In order to do that go to the vector tab, go to the geoprocessing tools, click on Intersection option, and give the Input Layer as buffered Govijana seva. In addition, do the same thing to Agriculture department then it will show up like the image below.



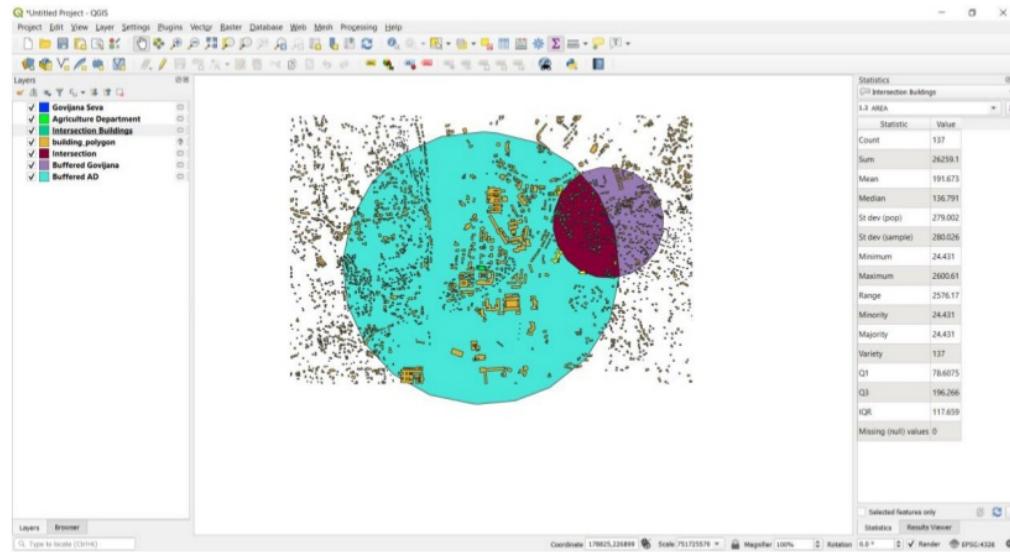
To identify the buildings in intersection area go to the vector tab and select research tools and click select by location. Then it will open up a window like this.



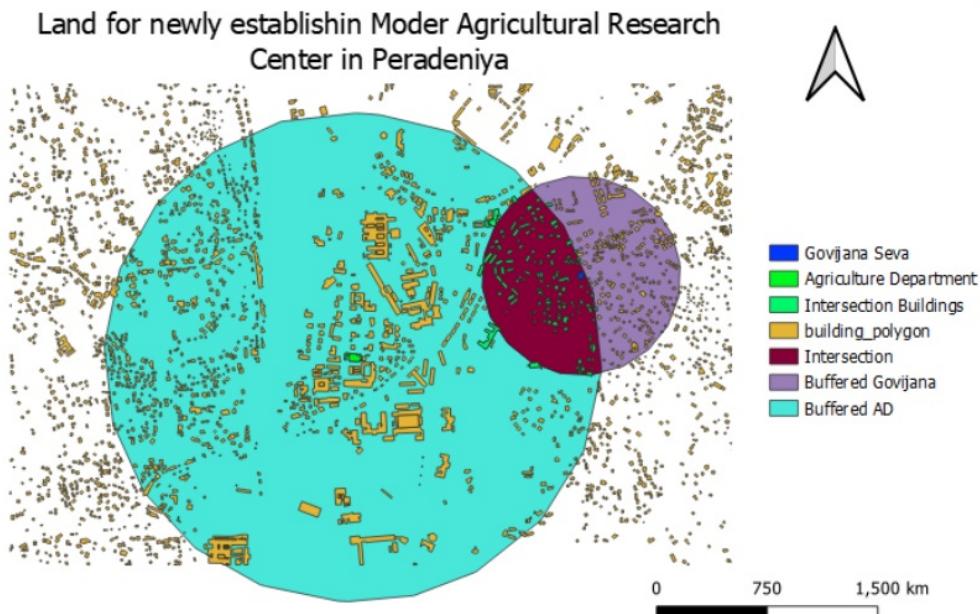
Give the “Select feature” as building_polygon and give the “By comparing to the feature from” as intersection and click on run it will show up like the image below.



Now we have all the information required on the map like Buildings in intersection area to find out suitable land to newly establishing “Modern Agricultural Research Center” in the Peradeniya area.



Finally, I am adding the North Arrow, Map Scale, Map title, Map legends to the created map using print layout function.



These are Answers by Statistics in Intersection Buildings and The AREA,

Statistics	
Intersection Buildings	
1.2 AREA	
Statistic	Value
Count	137
Sum	26259.1
Mean	191.673
Median	136.791
St dev (pop)	279.002
St dev (sample)	280.026
Minimum	24.431
Maximum	2600.61
Range	2576.17
Minority	24.431
Majority	24.431
Variety	137
Q1	78.6075
Q3	196.266
IQR	117.659
Missing (null) values	0

1. What is the total number of buildings situated in the suitability area at present?

Answer is = 137

1. What is the total land area occupied by the buildings within the suitable area?

Answer is = 26259.1

3. What is the total suitable land area for the modern agriculture research center?

Answer is = In between Sarasaviuyana maha vidyalaya, govijana seva, university cooperative shop.

Analytics and Business Intelligence Assignment.docx

ORIGINALITY REPORT



PRIMARY SOURCES

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Cardiff | 17% |
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