

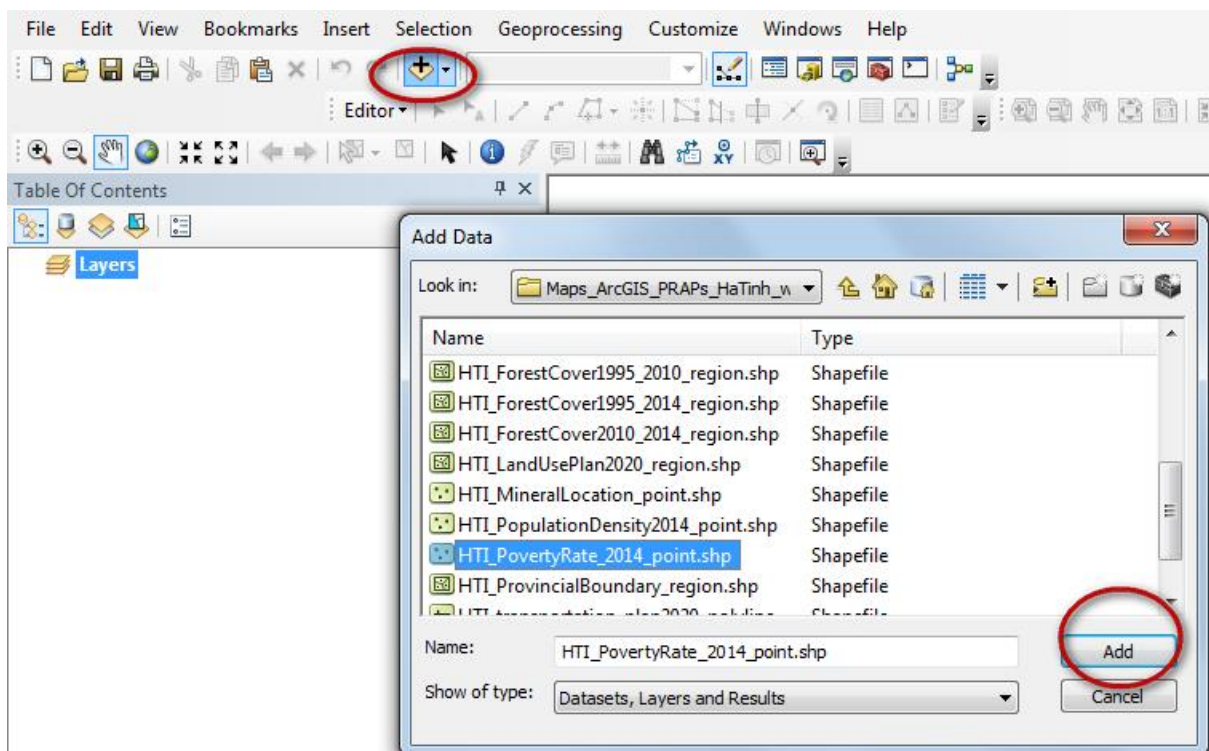
(B) Identify areas where REDD+ could result in poverty alleviation:

Option 3: Identify areas where a REDD+ action to undertake community forestry which may result in improved local livelihoods and poverty alleviation

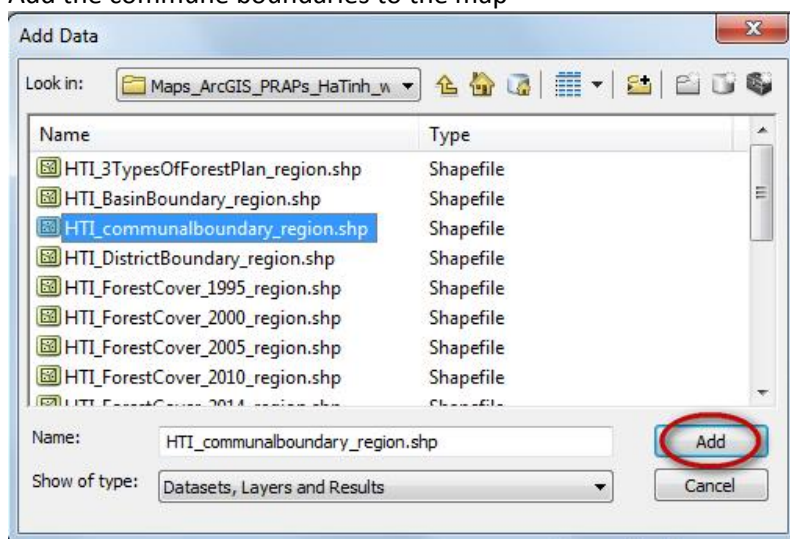
Before you start make a new folder called 'Day2' so that GIS analysis outputs can be stored here and a subfolder called 'optionB_poverty_alleviation'

1) Join the poverty rate points to commune boundaries

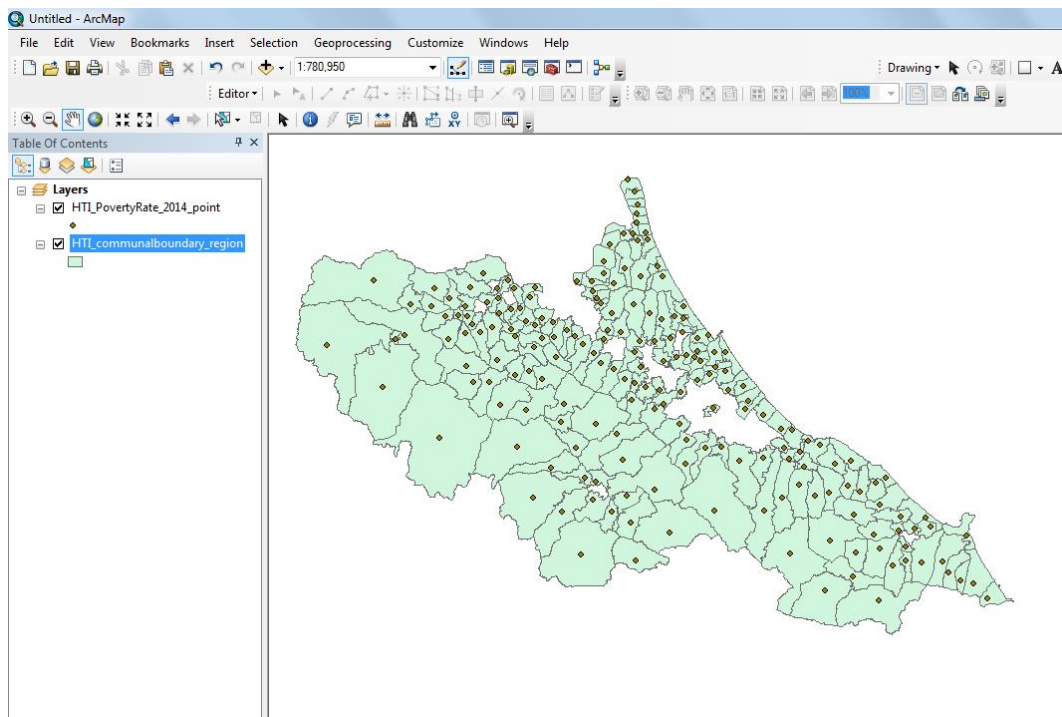
- a. Add the HTI_PovertyRate_2014_point layer to ArcMap from the folder
....\HaTinh_EN\Maps_ArcGIS_PRAPs_HaTinh_wgs84_EN



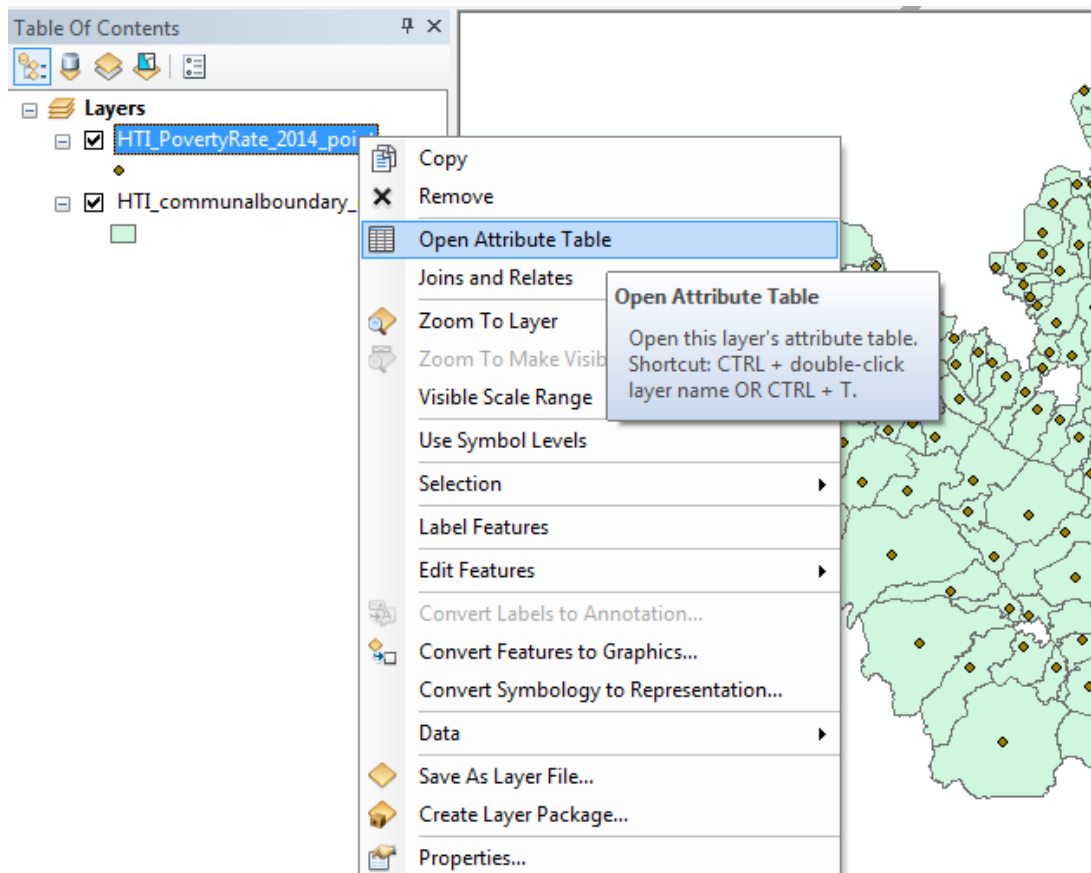
- b. Add the commune boundaries to the map



- c. In the table of contents, move the poverty point layer above the commune boundaries. You will see that the poverty points fall each within a commune so indicates that the poverty data may be poverty per commune.



- d. Right click on the poverty points dataset and click open attribute table



FID	Shape	District	DistrictCo	Commune	CommunalCo	CommunaNa	NumberOfPo	TheRateOfP
140	Point ZM	THACHHA	445	THACHDIEN	18667	Xã Thạch Điện	0	0
173	Point ZM	VUQUANG	441	TTVUQUAN	18313	Thị trấn Vũ Quang	0	0
2	Point ZM	TXHONGLIN	437	BACHONG	18115	Phường Bắc Hồng	39	1.66
58	Point ZM	HUONGKHE	444	HUONGTRA	18550	Xã Hương Trà	9	2.04
174	Point ZM	DUCTHO	440	TUNGANH	18259	Xã Tùng ánh	42	2.15
170	Point ZM	HUONGSON	439	TTTAYSON	18136	Thị Trấn Tây Sơn	26	2.31
96	Point ZM	TXHONGLIN	437	NAMHONG	18118	Phường Nam Hồng	68	2.89
24	Point ZM	TXHONGLIN	437	DAULIEU	18127	Xã Đậu Liêu	45	3.13
187	Point ZM	KYANH	447	TTKYANH	18754	Thị trấn Kỳ Anh	102	3.18
53	Point ZM	VUQUANG	441	HUONGMIN	18340	Xã Hương Minh	25	3.27
114	Point ZM	HUONGSON	439	SONKIMII	18197	Xã Sơn Kim 1	43	3.31
139	Point ZM	LOCHA	438	THACHCHA	18583	Xã Thạch Châu	58	3.55
72	Point ZM	KYANH	447	KYLAM	18838	Xã Kỳ Lâm	47	3.75
143	Point ZM	TPHATINH	436	THACHHA	18100	Xã Thạch Hà	27	3.84
10	Point ZM	CAMXUYEN	446	CAMLAC	18748	Xã Cẩm Lạc	76	3.85
99	Point ZM	TPHATINH	436	PDAINAI	18082	Phường Đại Nài	56	3.93
31	Point ZM	DUCTHO	440	DUCHOA	18280	Xã Đức Hòa	37	3.94

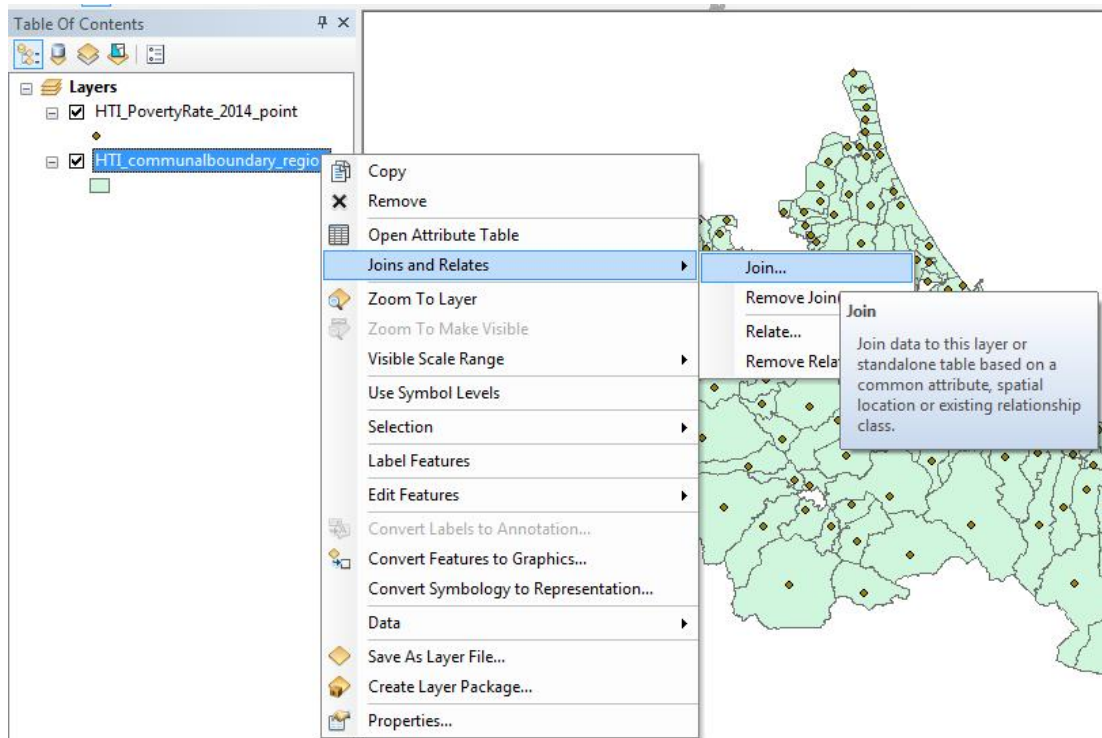
See that there are two fields containing the commune name and a commune code and two fields containing information about the poverty.

- e. Now right click on the commune boundary dataset and open the attribute table

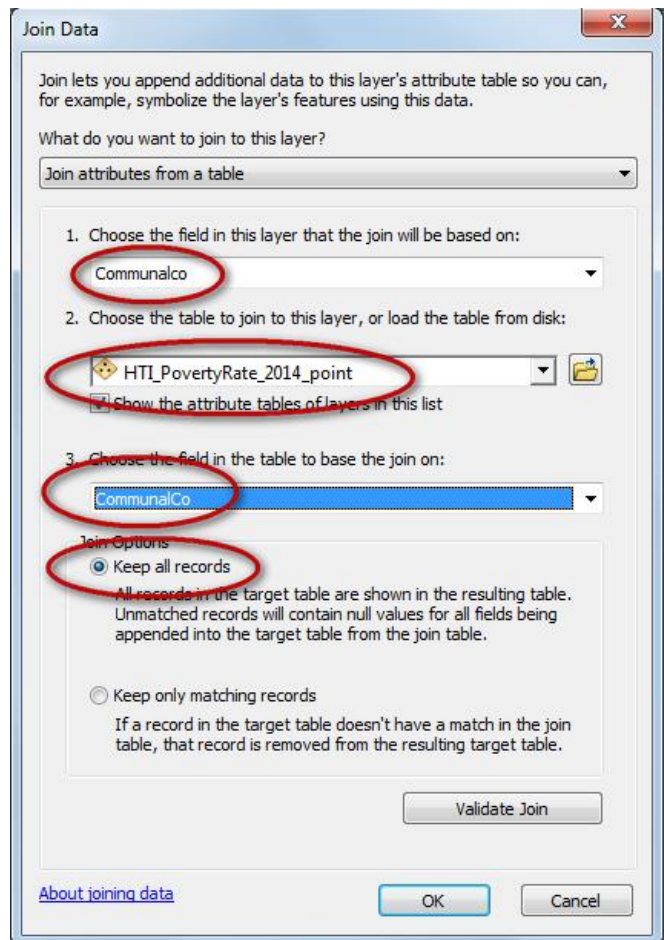
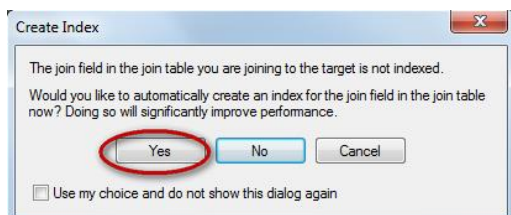
FID	Shape	District	Districtco	Commune	CommuneAbb	Communalco
0	Polygon ZM	LOCHA	438	Xã An Lộc	ANLOC	18450
1	Polygon ZM	VUQUANG	441	Xã Ân Phú	ANPHU	18316
2	Polygon ZM	TXHONGLIN	437	Phường Bắc Hồng	BACHONG	18115
3	Polygon ZM	THACHHA	445	Xã Bắc Sơn	BACSON	18646
4	Polygon ZM	LOCHA	438	Xã Bình Lộc	BINHLOC	18448
5	Polygon ZM	CAMXUYEN	446	Xã Cẩm Duệ	CAMDUE	18715
6	Polygon ZM	CAMXUYEN	446	Xã Cẩm Dương	CAMDUONG	18682
7	Polygon ZM	CAMXUYEN	446	Xã Cẩm Hà	CAMHA	18727
8	Polygon ZM	CAMXUYEN	446	Xã Cẩm Hòa	CAMHOA	18679
9	Polygon ZM	CAMXUYEN	446	Xã Cẩm Hưng	CAMHUNG	18733
10	Polygon ZM	CAMXUYEN	446	Xã Cẩm Lạc	CAMLAC	18748
11	Polygon ZM	CAMXUYEN	446	Xã Cẩm Lĩnh	CAMLINH	18721
12	Polygon ZM	CAMXUYEN	446	Xã Cẩm Lộc	CAMLOC	18730
13	Polygon ZM	CAMXUYEN	446	Xã Cẩm Minh	CAMMINH	18751
14	Polygon ZM	CAMXUYEN	446	Xã Cẩm Mỹ	CAMMY	18739
15	Polygon ZM	CAMXUYEN	446	Xã Cẩm Nhung	CAMNHUONG	18709
16	Polygon ZM	CAMXUYEN	446	Xã Cẩm Phúc	CAMPHUC	18718

See that this dataset contains the same fields containing the commune name and commune code. This means that we can join the two datasets together.

- f. Right click on the commune boundary dataset and click **joins and relates>>join**



- g. Select **communCo** as the field in the commune boundary dataset to join with
- h. Select the poverty rate dataset as the dataset to join to the commune boundaries
- i. Select the **communCo** as the field in the poverty rate dataset to join with
- j. Select **keep all records**
- k. Click okay to perform the join.
- l. Click yes when it asks you if you want to create an index. This helps the data to join more quickly and efficiently.



- m. Right click on the commune boundaries dataset again and open the attribute table. See that it now contains the attributes of both the commune boundaries dataset and the poverty rate dataset.

Table

HTI_communalboundary_region

FID	Shape	District	DistrictCo	Commune	CommuneAbb	CommunaCo	FID	District	DistrictCo	Commune	CommunaCo *	CommunaNa	NumberOfPo	TheRateOfP
0	Polygon ZM	LOCHA	438	Xã An Lộc	ANLOC	18430	0	LOCHA	438	ANLOC	18430	Xã An Lộc	119	13.83
1	Polygon ZM	VUQUANG	441	Xã Ân Phú	ANPHU	18318	1	VUQUANG	441	ANPHU	18318	Xã Ân Phú	22	4.18
2	Polygon ZM	TXHONGLIN	437	Phường Bắc Hồng	BACHONG	18115	2	TXHONGLIN	437	BACHONG	18115	Phường Bắc Hồng	39	1.88
3	Polygon ZM	THACHHA	445	Xã Bắc Sơn	BACSON	18646	3	THACHHA	445	BACSON	18646	Xã Bắc Sơn	116	12.8
4	Polygon ZM	LOCHA	438	Xã Bình Lộc	BINHLOC	18448	4	LOCHA	438	BINHLOC	18448	Xã Bình Lộc	152	11.83
5	Polygon ZM	CAMXUYEN	446	Xã Cẩm Duệ	CAMDUE	18715	5	CAMXUYEN	446	CAMDUE	18715	Xã Cẩm Duệ	103	4.67
6	Polygon ZM	CAMXUYEN	446	Xã Cẩm Dương	CAMDUONG	18682	6	CAMXUYEN	446	CAMDUONG	18682	Xã Cẩm Dương	190	11.24
7	Polygon ZM	CAMXUYEN	446	Xã Cẩm Hà	CAMHA	18727	7	CAMXUYEN	446	CAMHA	18727	Xã Cẩm Hà	134	9.58
8	Polygon ZM	CAMXUYEN	446	Xã Cẩm Hòa	CAMHOA	18679	8	CAMXUYEN	446	CAMHOA	18679	Xã Cẩm Hòa	139	10.29
9	Polygon ZM	CAMXUYEN	446	Xã Cẩm Hưng	CAMHUNG	18733	9	CAMXUYEN	446	CAMHUNG	18733	Xã Cẩm Hưng	99	5.2
10	Polygon ZM	CAMXUYEN	446	Xã Cẩm Lạc	CAMLAC	18748	10	CAMXUYEN	446	CAMLAC	18748	Xã Cẩm Lạc	76	3.85
11	Polygon ZM	CAMXUYEN	446	Xã Cẩm Lĩnh	CAMLINH	18721	11	CAMXUYEN	446	CAMLINH	18721	Xã Cẩm Lĩnh	165	10.36
12	Polygon ZM	CAMXUYEN	446	Xã Cẩm Lộc	CAMLOC	18730	12	CAMXUYEN	446	CAMLOC	18730	Xã Cẩm Lộc	122	9.58
13	Polygon ZM	CAMXUYEN	446	Xã Cẩm Minh	CAMMINH	18751	13	CAMXUYEN	446	CAMMINH	18751	Xã Cẩm Minh	216	18.27
14	Polygon ZM	CAMXUYEN	446	Xã Cẩm Mỹ	CAMMY	18739	14	CAMXUYEN	446	CAMMY	18739	Xã Cẩm Mỹ	119	7.08
15	Polygon ZM	CAMXUYEN	446	Xã Cẩm Nhung	CAMNHUONG	18709	15	CAMXUYEN	446	CAMNHUON	18709	Xã Cẩm Nhung	152	5.54
16	Polygon ZM	CAMXUYEN	446	Xã Cẩm Phúc	CAMPHUC	18718	16	CAMXUYEN	446	CAMPHUC	18718	Xã Cẩm Phúc	57	4.96

(0 out of 195 Selected)

HTI_communalboundary_region

- n. Close the attribute table
- o. Double click on the commune boundaries dataset
- p. Change the symbology by clicking on **Quantities>>graduated colors**
- q. Change the **value** field to **TheRateOfPov**
- r. Change the number of classes (e.g. I have selected 10)
- s. Choose a colour ramp to symbolise the data

Layer Properties

General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates Time HTML Popup

Show:

- Features
 - Categories
 - Quantities**
 - Graduated colors
 - Graduated symbols
 - Proportional symbols
 - Dot density
 - Charts
 - Multiple Attributes

Draw quantities using color to show values. Import...

Fields

Value: **TheRateOfP**

Classification

Natural Breaks (Jenks)

Classes: 10 Classify...

Color Ramp:

Symbol	Range	Label
	0.00 - 2.31	0.00 - 2.31
	2.32 - 4.18	2.32 - 4.18
	4.19 - 5.54	4.19 - 5.54
	5.55 - 7.41	5.55 - 7.41
	7.42 - 9.06	7.42 - 9.06
	9.07 - 11.24	9.07 - 11.24
	11.25 - 13.23	11.25 - 13.23
	13.24 - 15.44	13.24 - 15.44

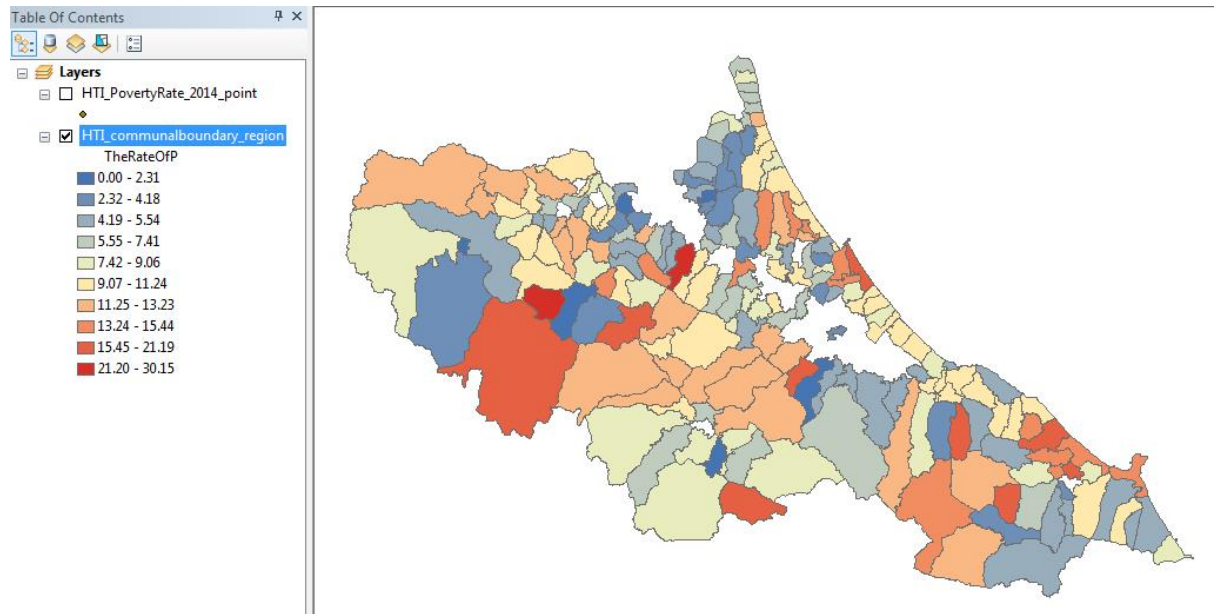
Show class ranges using feature values

Advanced

OK Cancel Apply

- t. Click OK

You can see on the map produced which communes have the highest poverty rate

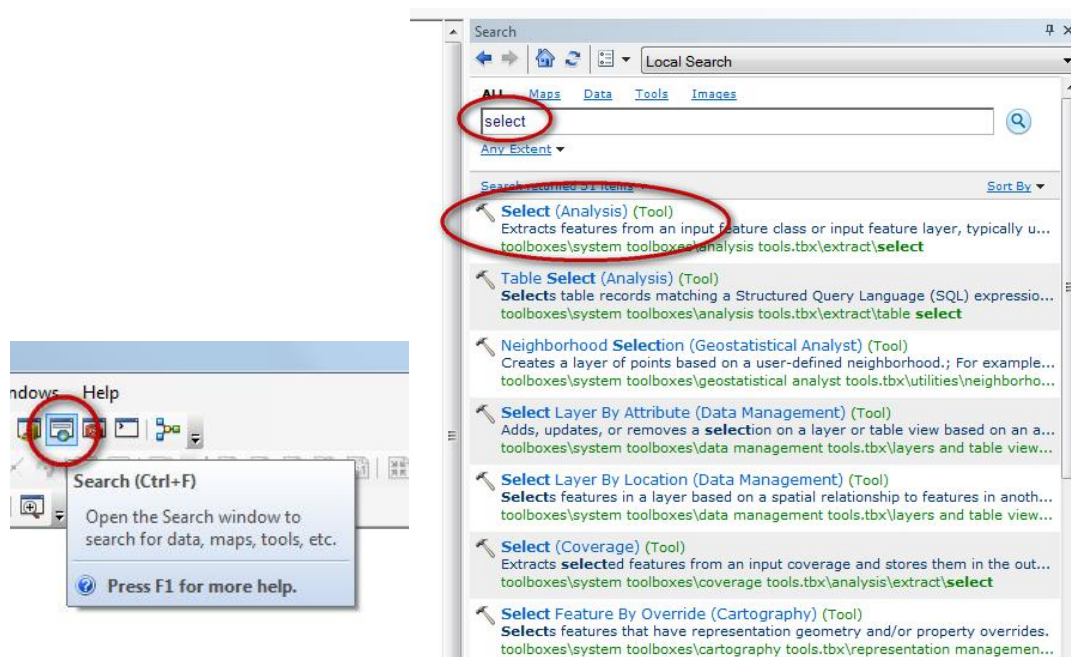


2. Select communes that have high poverty (you may need to select a threshold for high poverty).

- a. Now you need to decide what threshold you want to pick as high poverty rate. You can chose what rate you wish but in reality you would want to look at country legislation to see if high poverty rate is defined and/or consult different stakeholders.

In this example I am going to pick communes in the top 3 classes so those with poverty rate of > 13.23

- b. Click on the Search button to bring up the search window. Type 'Select' to search for the tools. Then click 'Select (Analysis)'

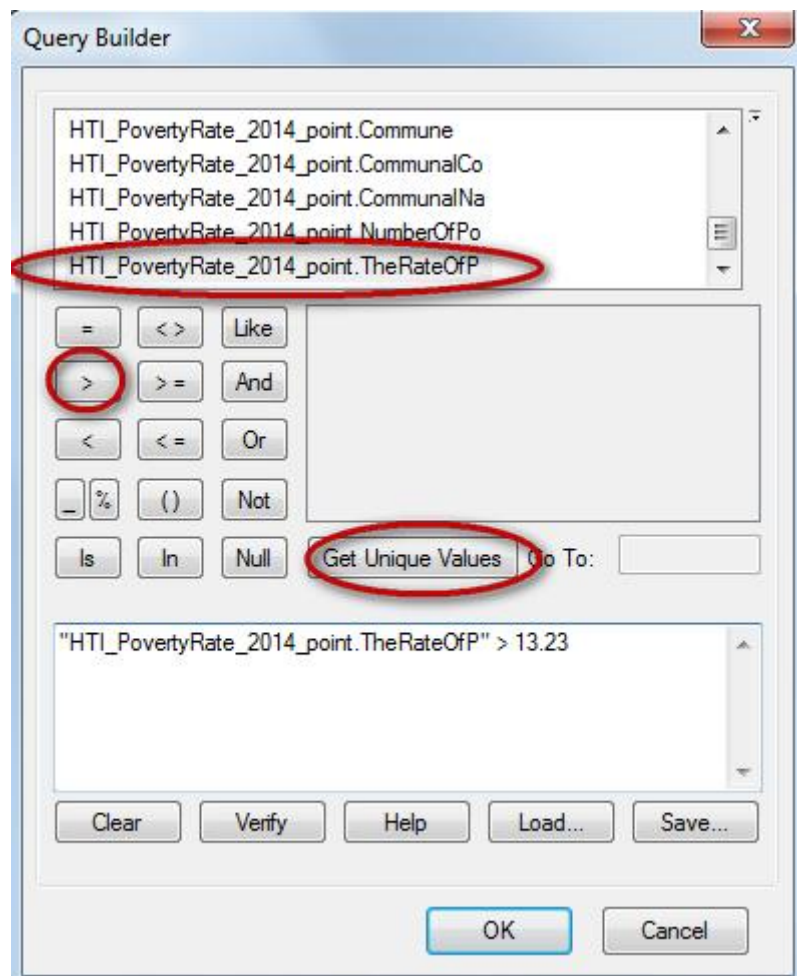


- c. Click on 'Select (Analysis)' to open the tool

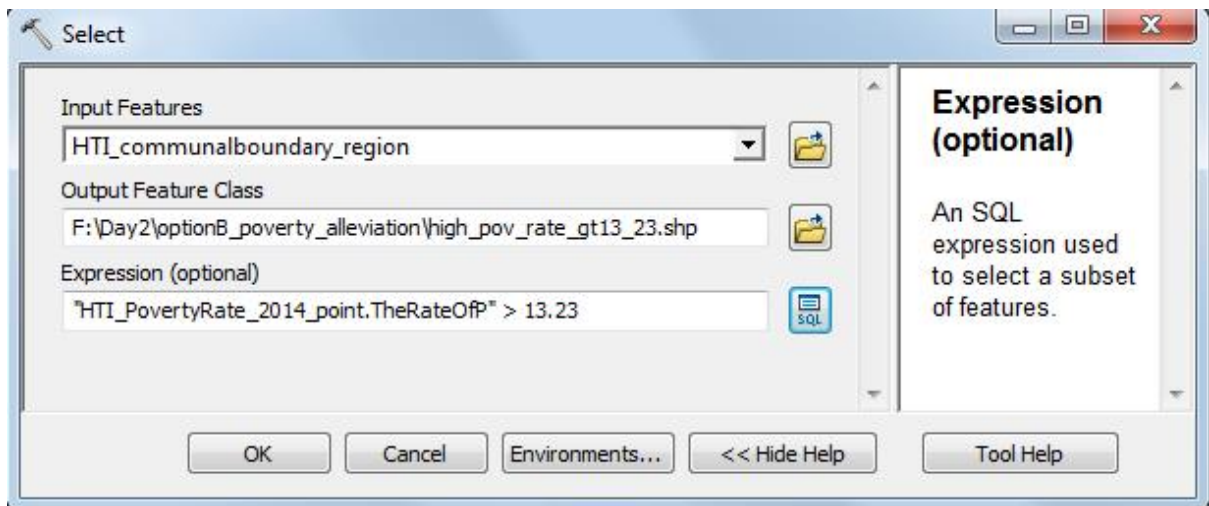


- d. Drag the commune boundaries into the input feature box
- e. Navigate to your ...Day2\optionB_poverty_alleviation folder to save the output as a new file e.g.Day2\optionB_poverty_alleviation\high_pov_rate_gt13_23.shp. Put the threshold used in the name so that you can clearly see which threshold were used to select high poverty.

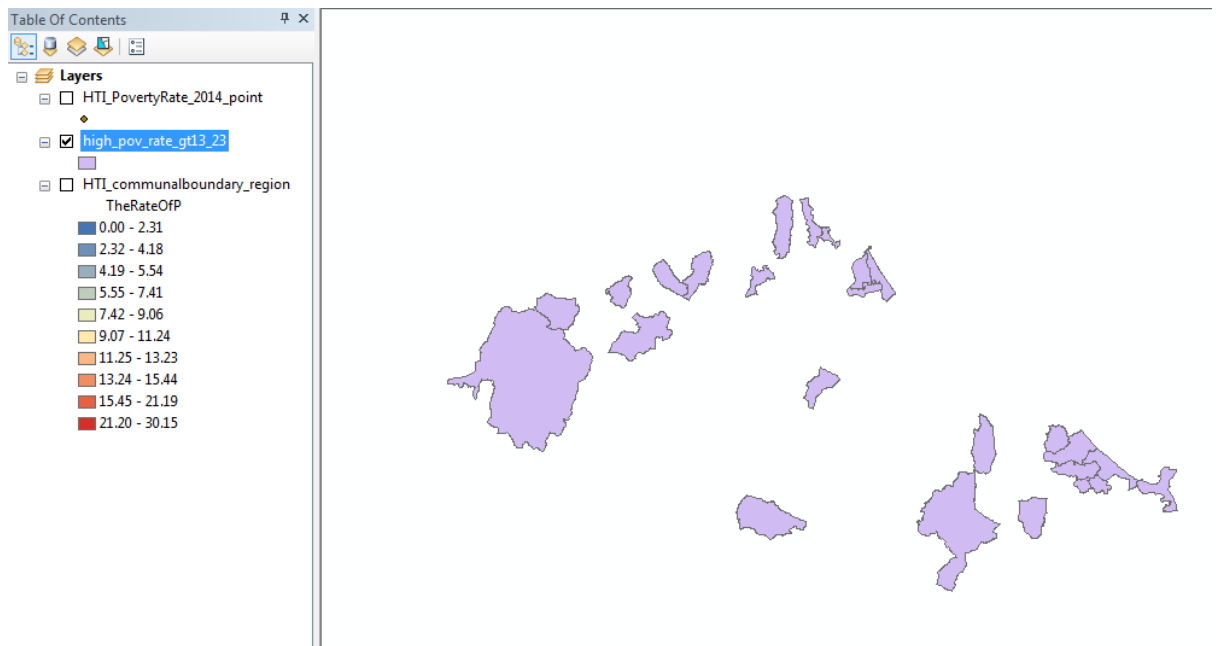
- f. Click on the SQL button and the Query builder window will appear:



- g. Double click on the RateOfPov field to bring it down into the bottom panel.
- h. Click on the > symbol
- i. Type in **13.23** after the > symbol.
- j. Click **OK** to close the Query builder



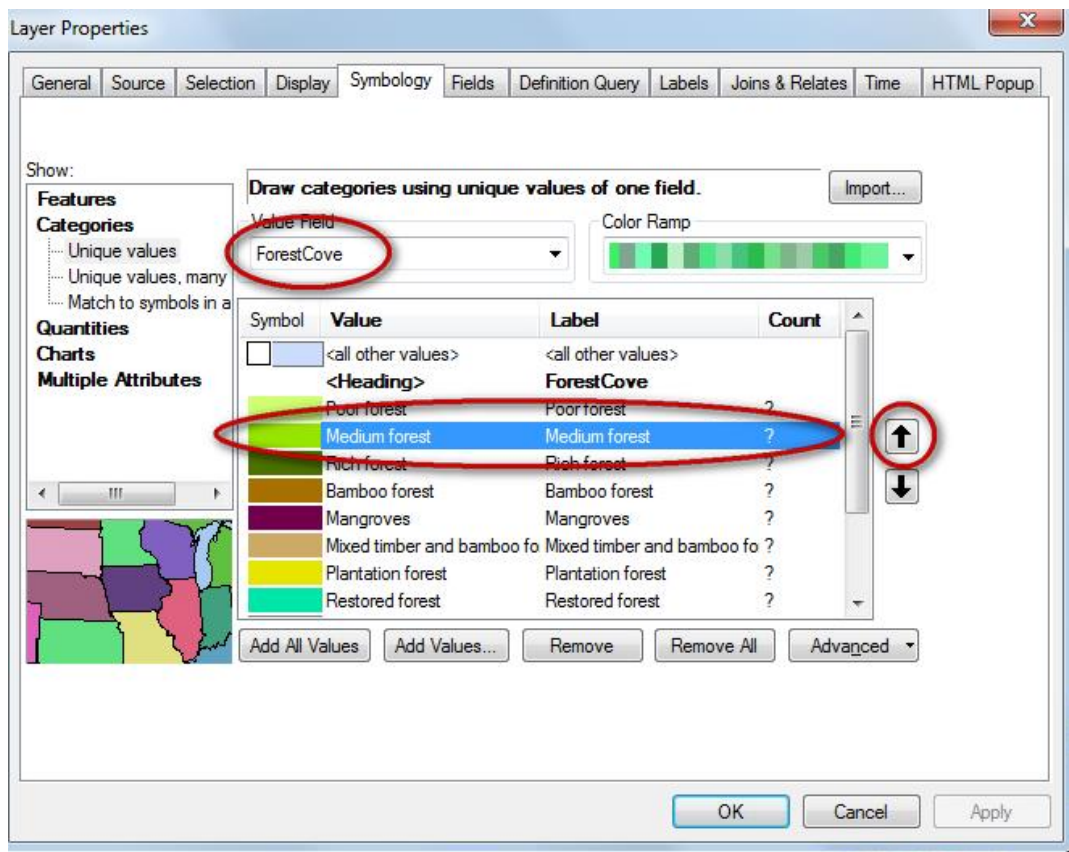
- k. Click **OK** to run the **Select (Analysis)** tool.
- l. The new high poverty layer is added to the map. Untick the commune boundaries layer to see which ones have been selected.



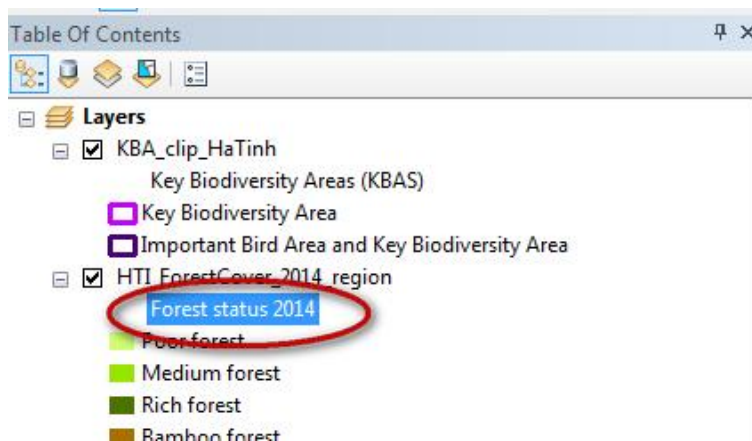
3. Select forest type/cover layer(s) to select areas of forest areas that have potential for community based forest management.

- a. Add the forest status map (HTI_ForestCover_2014_region) to ArcMap from the folder \HaTinh_EN\Maps_ArcGIS_PRAPs_HaTinh_wgs84_EN and symbolize according to the field 'forestCove'

If you want you can click on a forest class and move it further up the legend. E.g. Move 'Poor forest', 'medium forest' and 'Rich forest' up so that they appear at the top of the map legend.



- b. In the Table of Contents change 'ForestCove' to 'Forest status 2014'



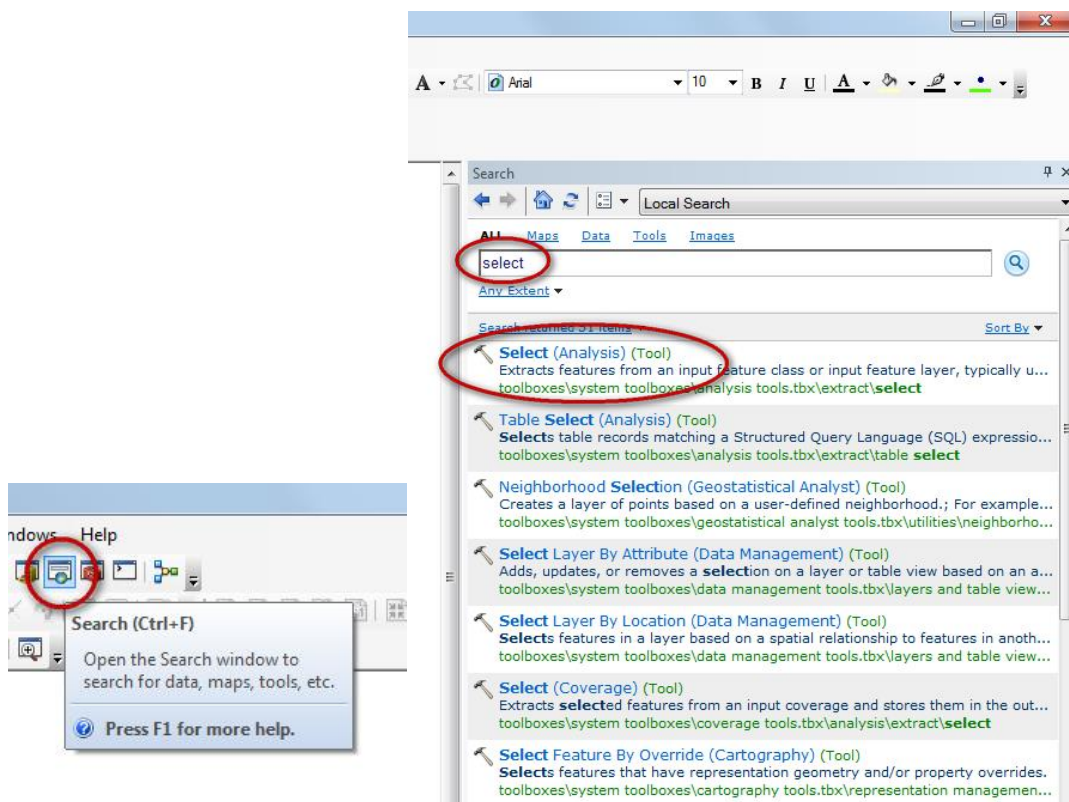
- c. Add the forest status map (HTI_3TypesOfForestPlan_region) to ArcMap from the folder\HaTinh_EN\Maps_ArcGIS_PRAPs_HaTinh_wgs84_EN and symbolize according to the field 'Function'
- d. Next we will select out those areas we may want to prioritise.

For example:

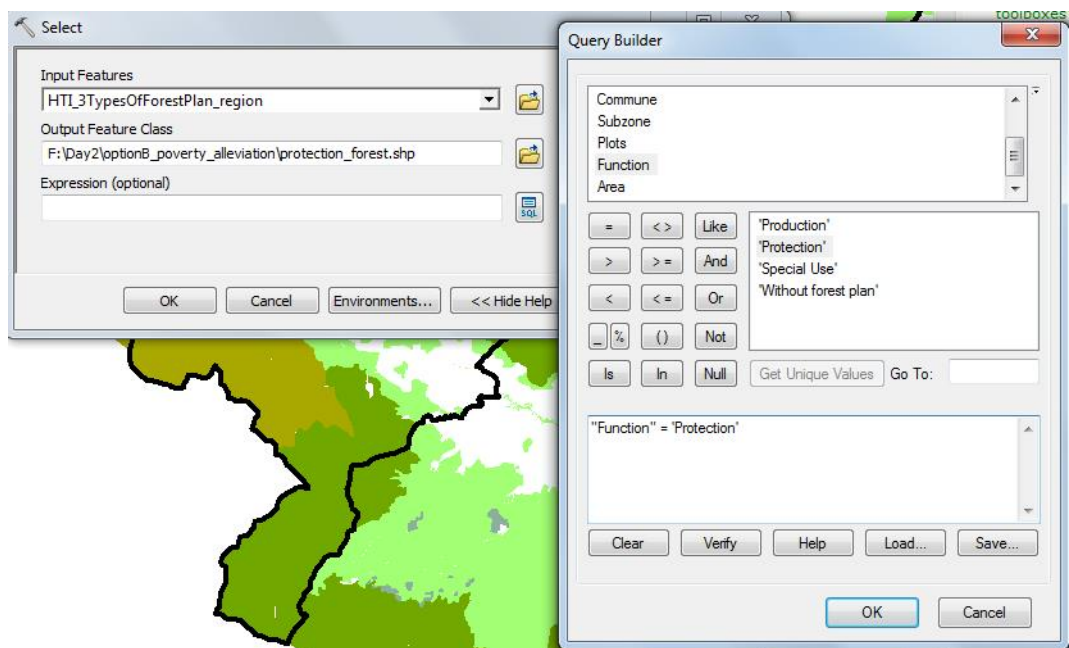
- Forest management category: would you prioritise a management category?
- Forest quality: would you prioritise certain quality of forest (e.g. degraded forest, rich forest)?

I have chosen in this demo to select protection forest and medium quality forest areas. You may chose to select different criteria to me.

- a. Click on the Search button to bring up the search window. Type 'Select' to search for the tools. Then click 'Select (Analysis)'

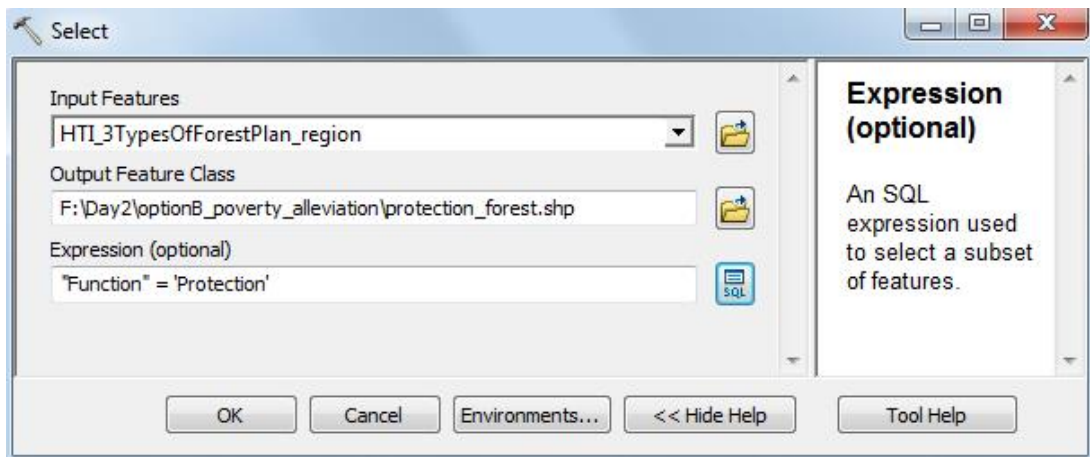


- a. Click on 'Select (Analysis)' to open the tool

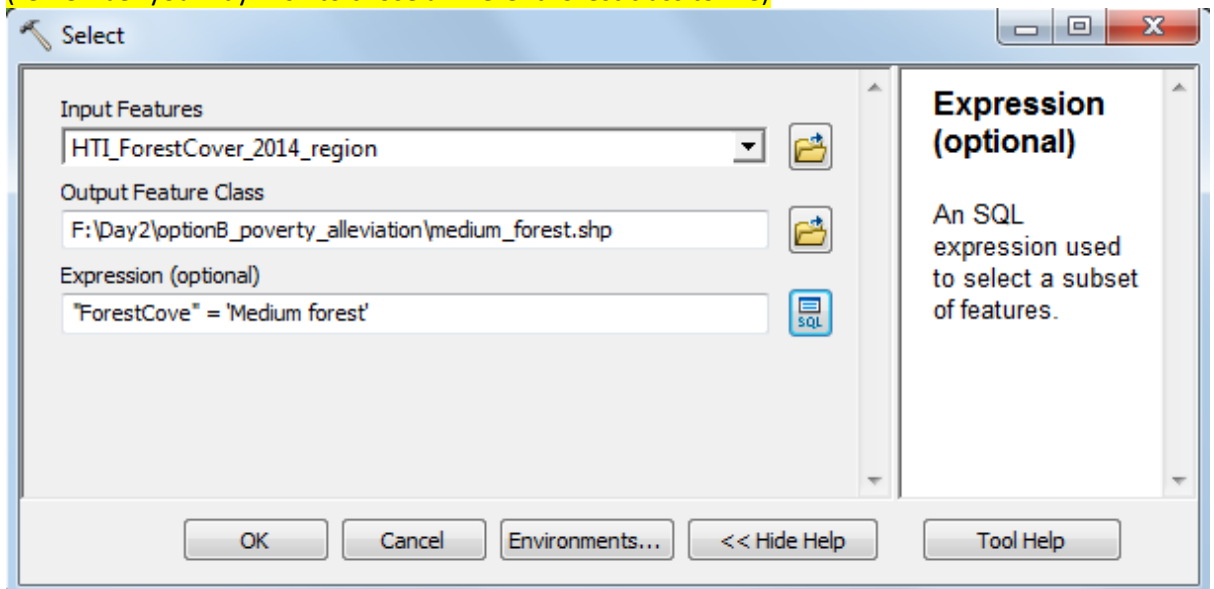


- b. Drag the HTI_3TypesOfForestPlan_region dataset into the Input Features box
- c. Navigate to your Day2/option2_KBA folder and give your output dataset a name e.g. protection_forest.shp

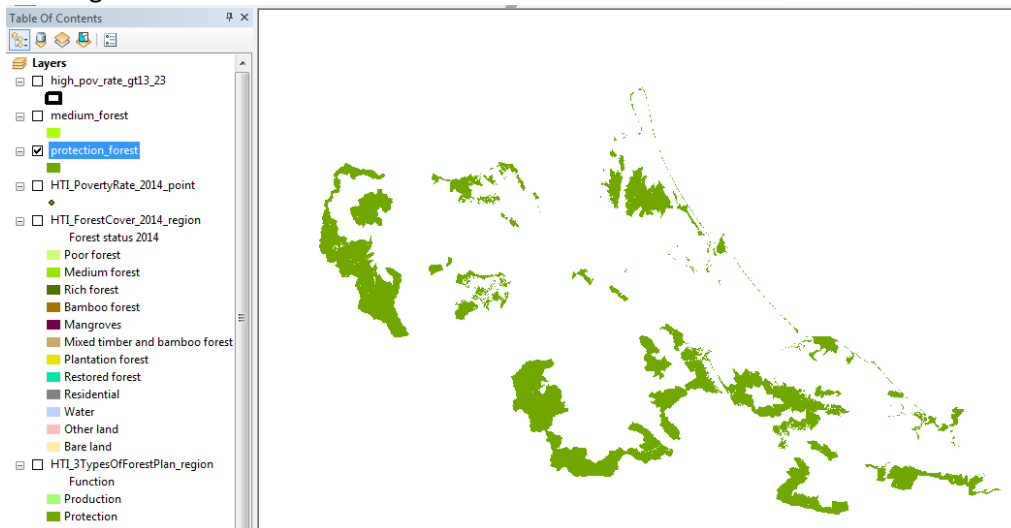
- d. Click OK to run the tool.



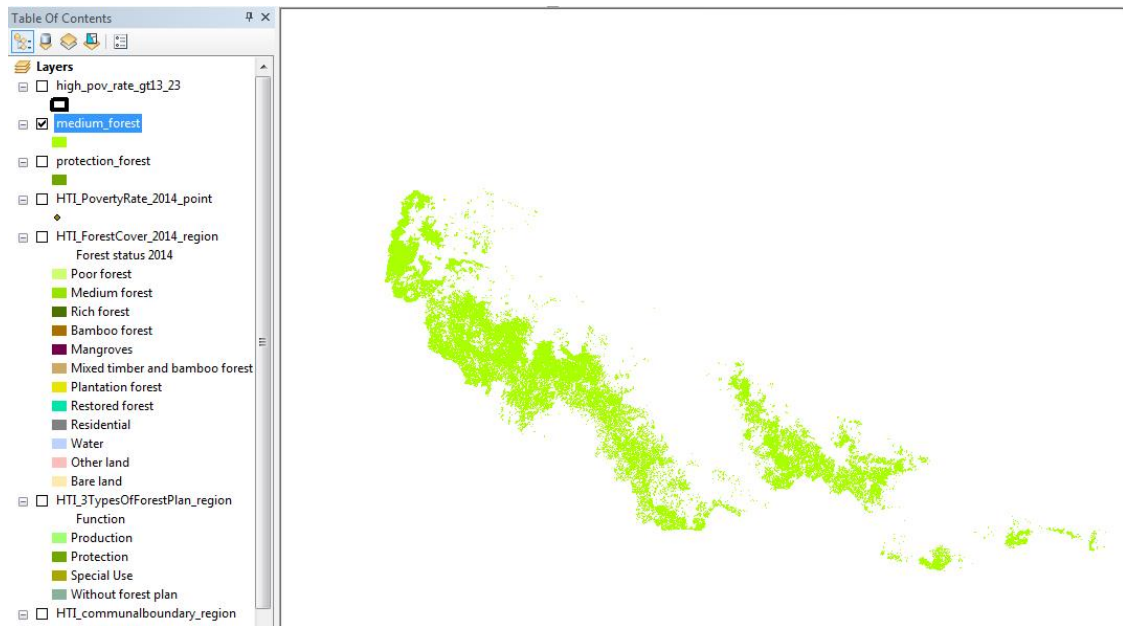
- e. Run the select tool again but this time to select out medium quality forest (remember you may wish to chose a fifferent forest class to me)



- f. Change the symbology on the protection forests layer so that the polygon outlines are not drawing

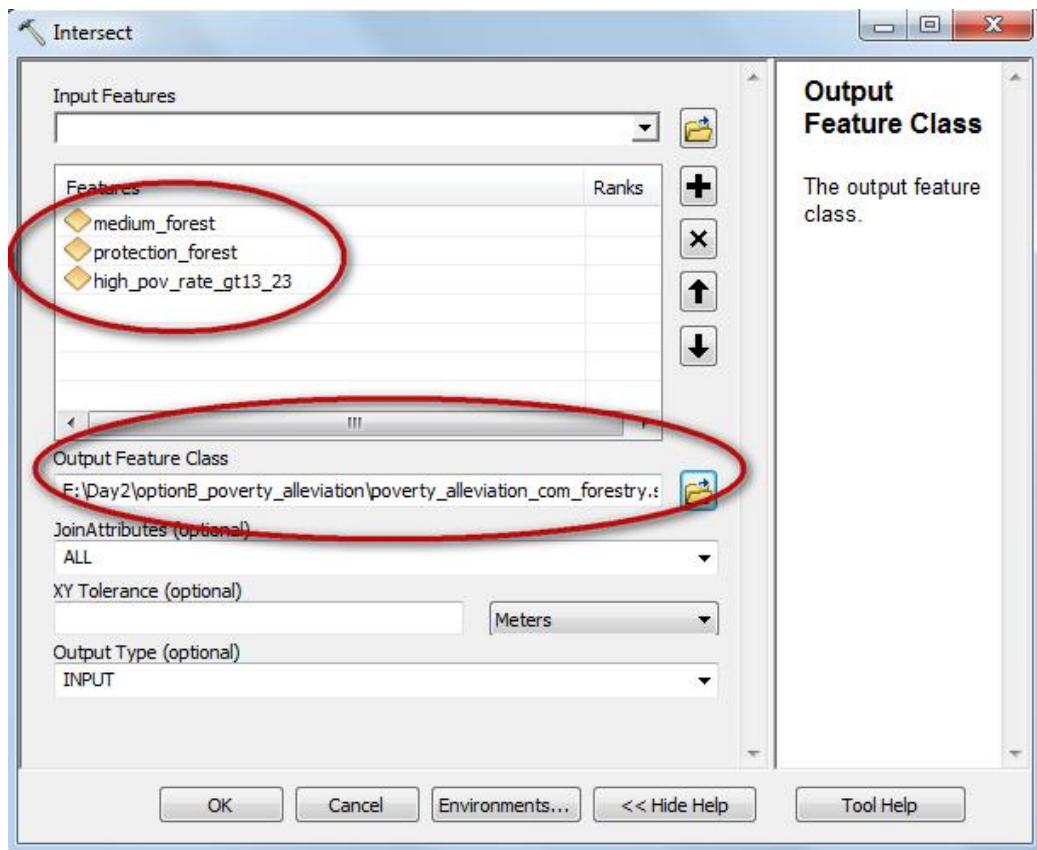


- g. Change the symbology on the medium quality forests layer so that the polygon outlines are not drawing

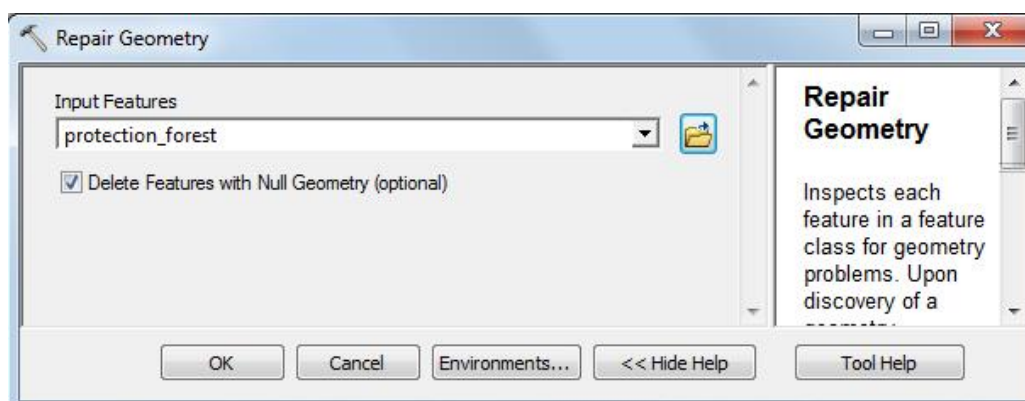


4. *Overlay the forest selections with information on Poverty to highlight those areas of high poverty may benefit from the REDD+ action.*

- a. Next search for the 'Intersect tool'
Drag the medium_forest, protection_forest and high_pov_rate_gt13.23 into the Input layers box.
Save the output as 'poverty_alleviation_com_forestry in your ...Day2/optionB_poverty_alleviation folder.



- b. You will find that the tool gives you a warning that it may have generated an empty output. This is because ArcGIS is very fussy and wants to have 'clean' data. The 'protection_forest' has some geometry errors so we need to run the 'Repair Geometry' tool to fix the errors.
- c. Search for 'Repair Geometry'
- d. Drag the 'protection_forest' layer into the tool and click ok to run the tool.



- e. Now run the 'Repair Geometry' tool on the 'medium_forest' layer
- f. Now try running the 'Intersect' tool again

5. *Present the information clearly on a map. Think about how the information can be presented for a policy maker to understand and use. Think about how you will label your legend and give the map a clear title*

g. Symbolise the new layer and display it along with the medium forest, protection forest and high poverty rate layers.

The map below is a quick output. How could you improve the map cartography?

