

Sustainable Management of Peatland Ecosystems in Mekong Countries

GUIDELINES OF SATELLITE IMAGE CLASSIFICATION WITH ArcGIS (Supervised)

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Executing Partners: The Regional Coordination Unit and Global Environment Centre



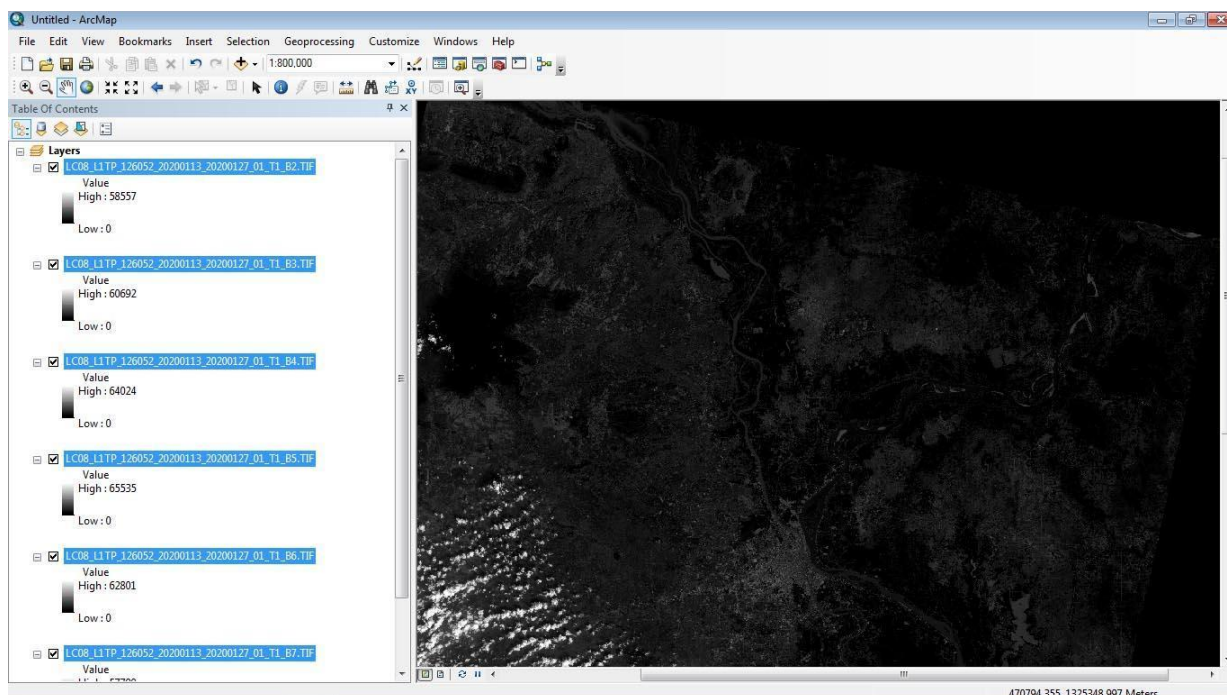
Guidelines of Satellite Image Classification with ArcGIS (Supervised)

1. Open satellite image in ArcGIS

- Open ArcGIS, then open satellite image by clicking at “Add” on the Menu to open bands of satellite image.

- In Add Data Box, select the bands that we need, normally B2, B3, B4, B5, B6, and B7.

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2. Create composite image

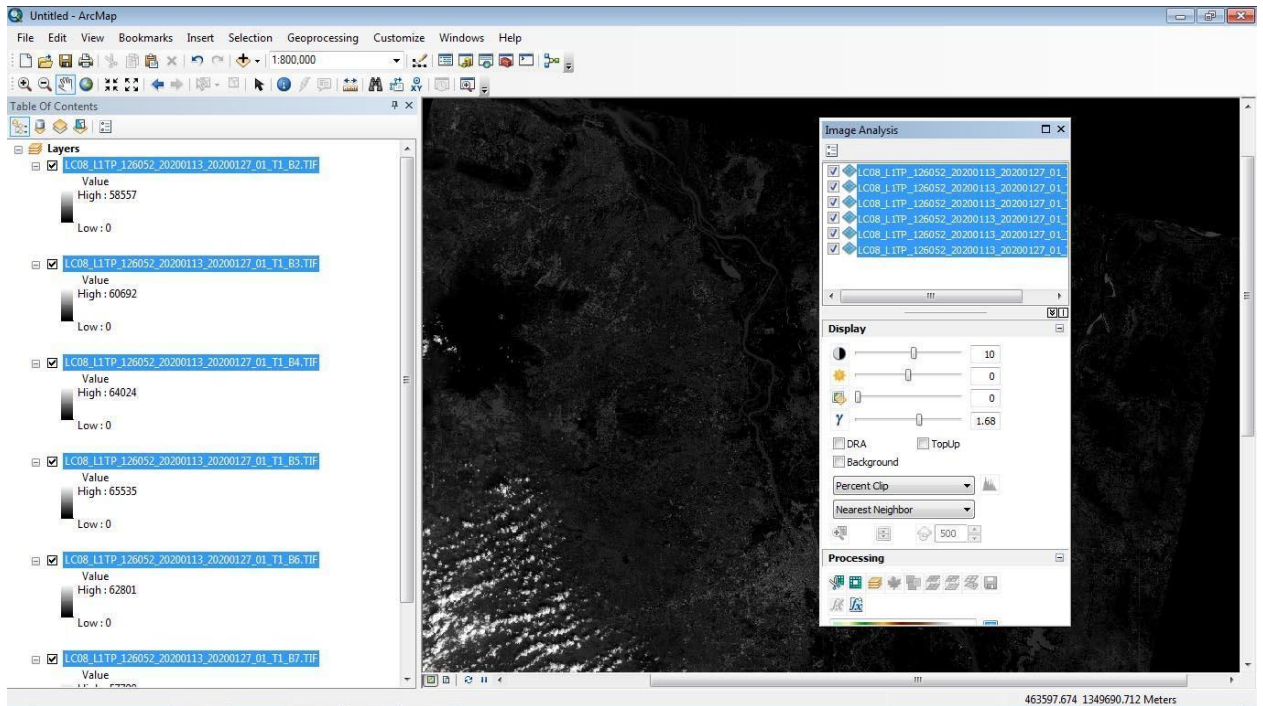
This a process of combination of bands together. If you want to do this, first, go to **Window** at menu, and to click on **Image Analysis**. Then you can see **Image Analysis** box that shows all the bands. Note: The size of box is small, so you can resize it for easy to see the list of the bands.

Then, you select all of the bands. After doing that, go to **Processing** at the bottom of the box, and lick at **Composite Bands**.

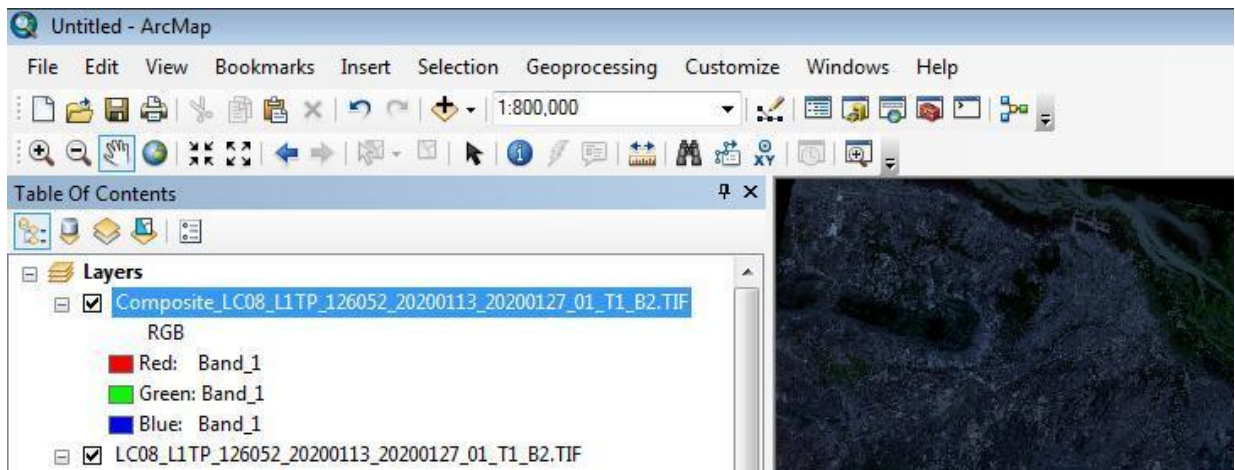
When you click on that, you will see the file of composite bands at the top of **Table of content** (below Layer at the left of screen). It also shows category of Red (R), Green (G), and Blue (B). Then you do not need the bands that opened previously by clicking (mark) all of them and then remove.

Now, we created composite image using different seven bands that we actually have freedom to select different combination of different landsat bands.

Before conduct processing of composite bands, you have to adjust the region of interest (ROI) fixed inside the window frame.

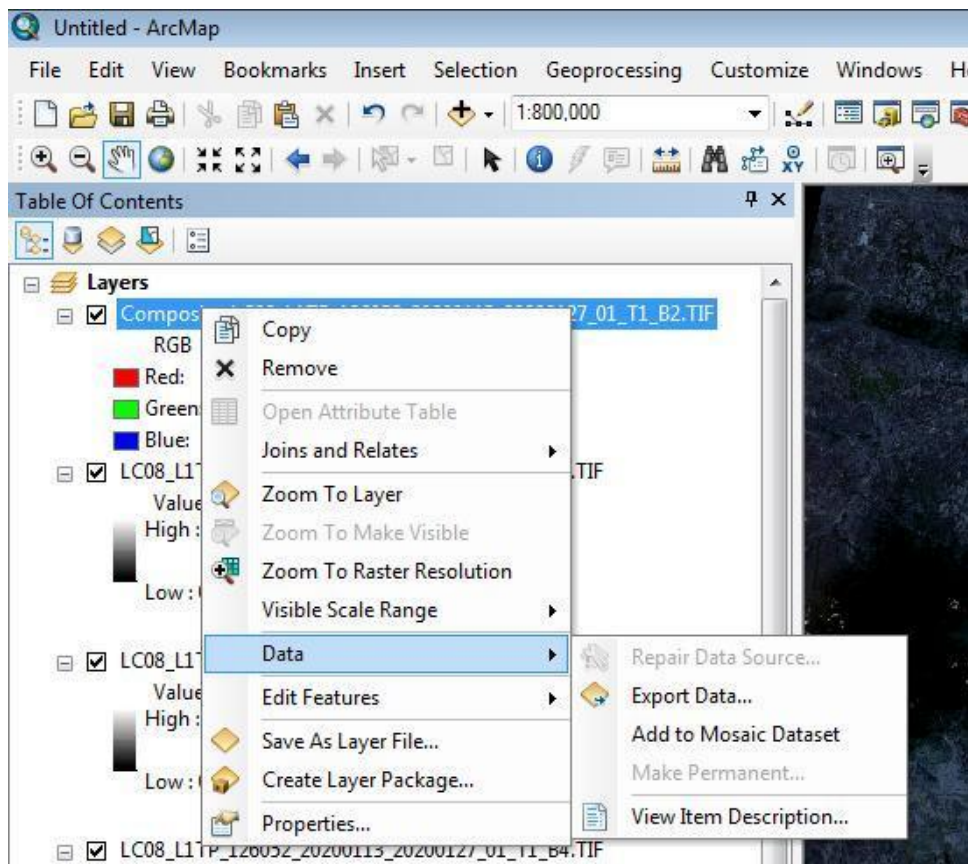


After selecting all bands and press button of **Processing**, there is a composite band shows in layer (see in left side).



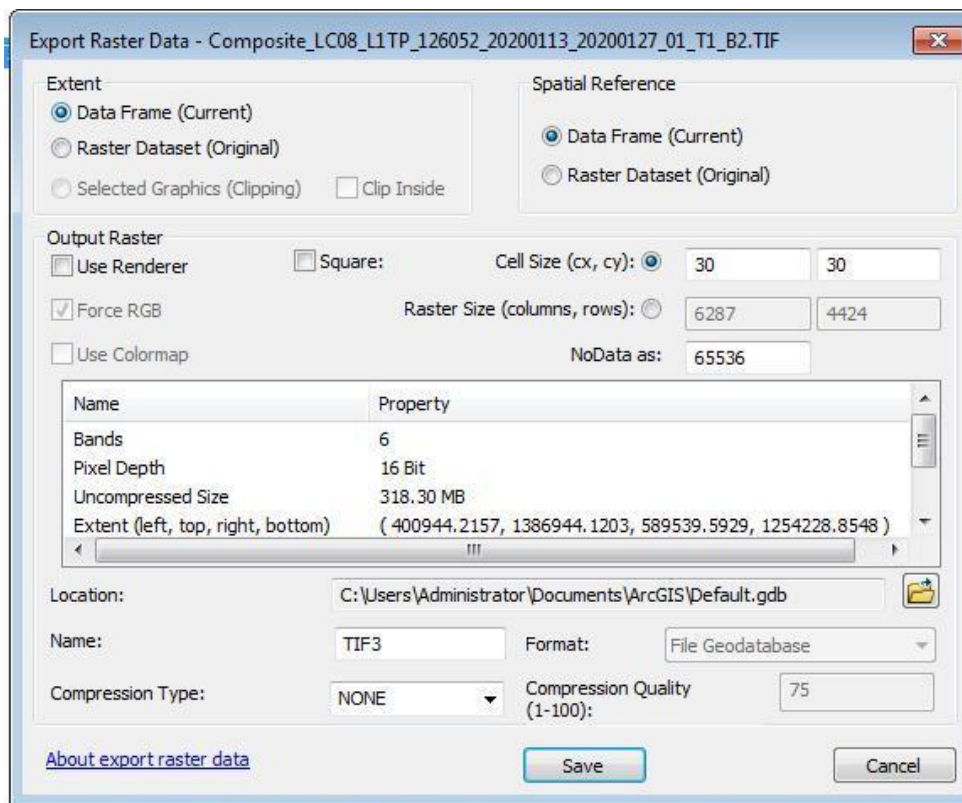
You can see something is very strange because Red, Green, and Blue are the same band 1. However, no worries. You can continue.

Then, you have to save it by putting the cursor at it and right click ---> Data ---> Export Data.

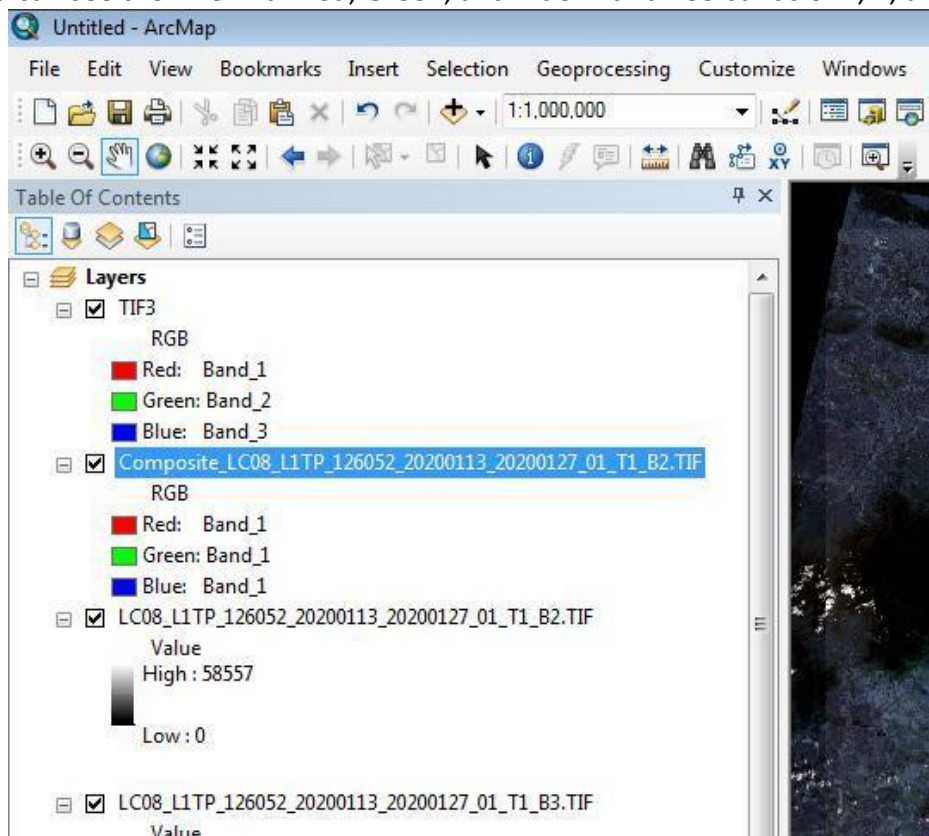


Export Raster Data box appears. You can choose **Data frame** to get raster image of the composite band inside the frame showed in window. Then click **Save**. It takes a while.

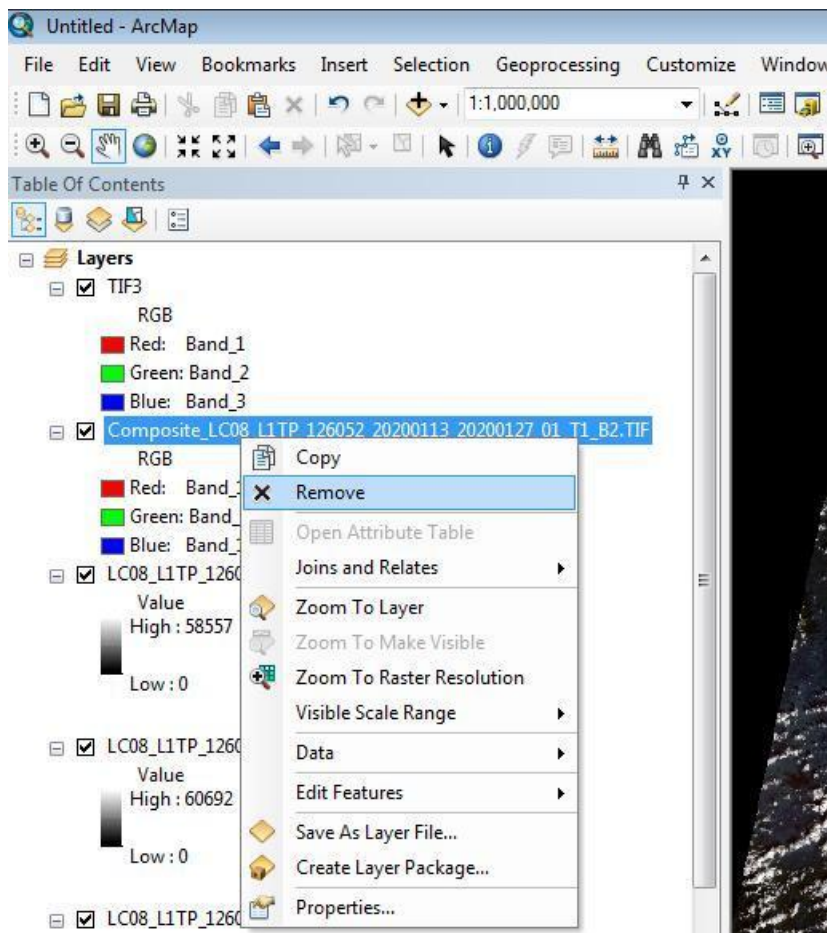
After process is completing, there are box appears *“Would you like to add the exported data to the map as layer”*. Press **Yes**.



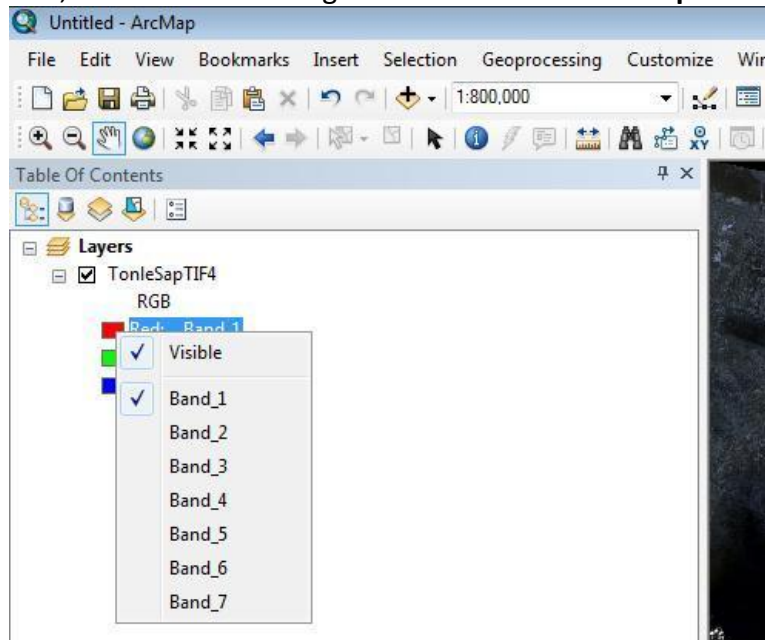
Now, you can see the TIF3 with Red, Green, and Blue with three bands of 1, 2, and 3.



Now you just use layer TIF3, remove all other layers. Right-click on the layer you want to remove, a dialog box will appear and then click remove. Continue until all layers removed.



Then, you need to change the bands accordingly to get the desired color combination and a composite layer. Click at the **red rectangle box** and select the desired band. Do the same thing for the GREEN, BLUE. Note: I changed name **TIFF3** to **TonleSapTIFF4**.

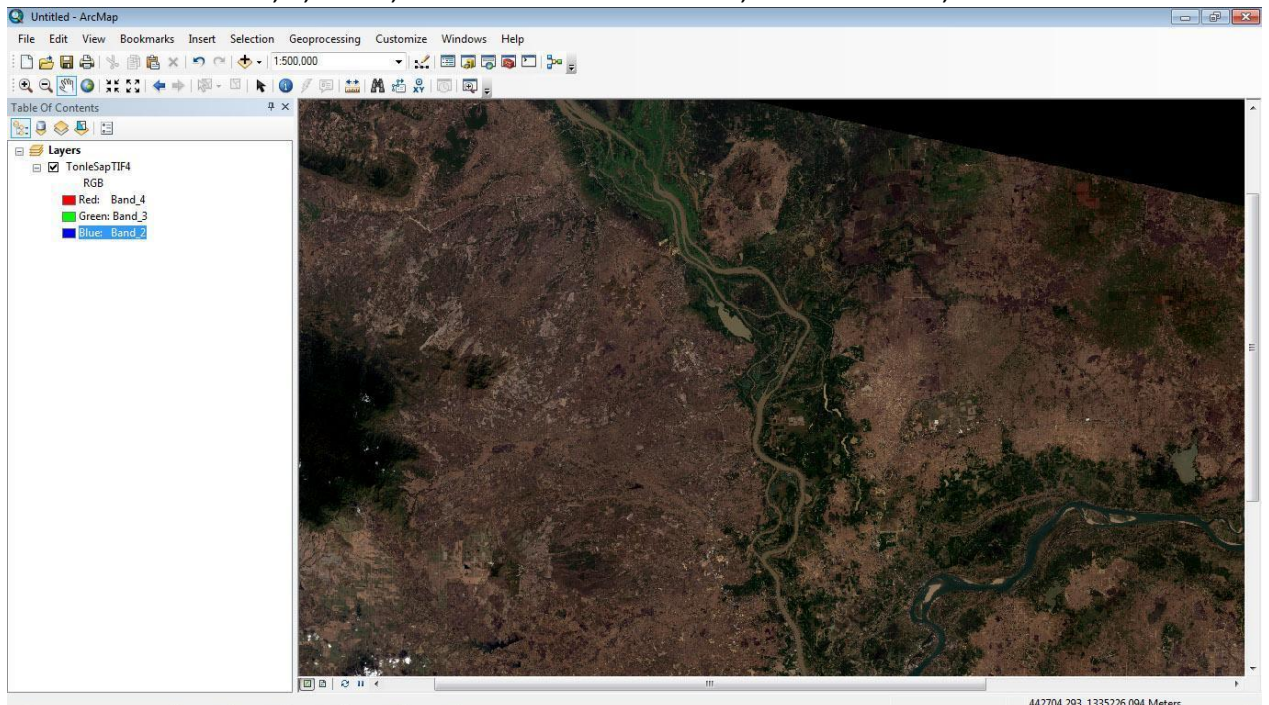


For now, let's pause for a moment to take a look at the list of band combinations for Landsat 8 (Table 1). You can see a table of the band combination for Landsat 8 that is useful of using multi-bands of Landsat image for image classification. Based on composite name, you can select bands for combination to identify the objects on the image (earth).

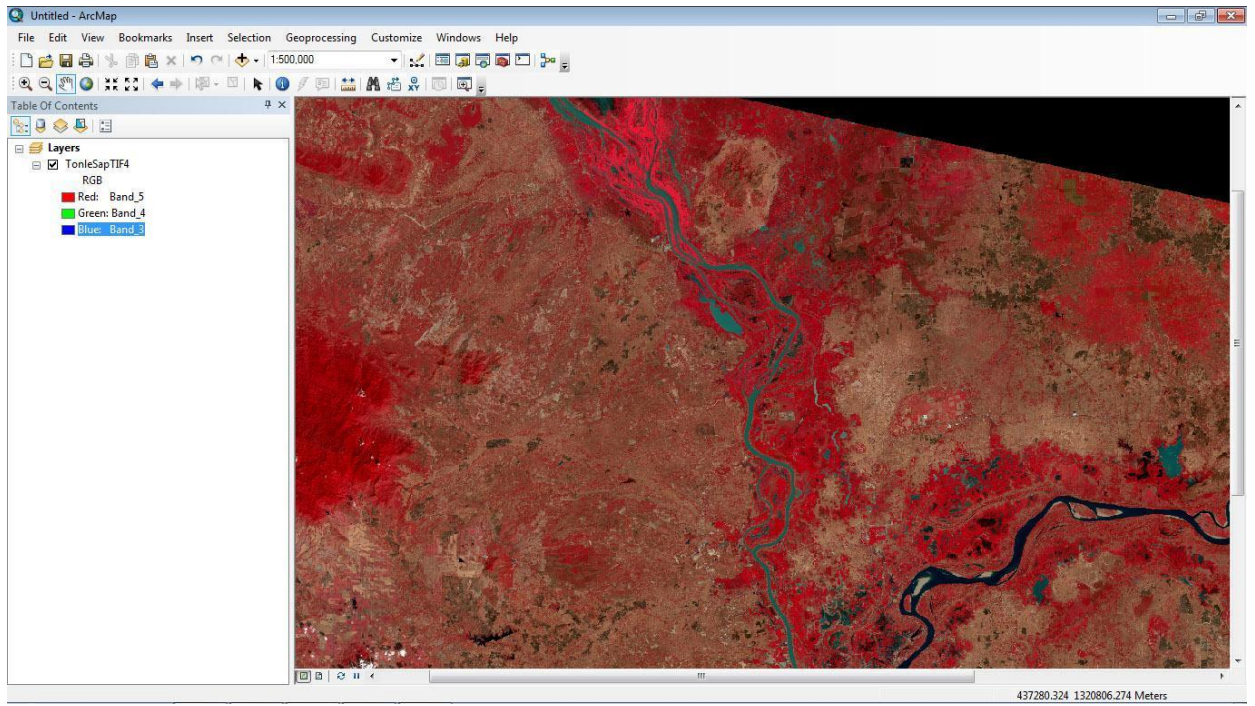
Table 1. Band Combination for Landsat 8

Composite name	Bands (R, G, B)
Natural Colour	4, 3, 2
False Colour (Urban)	2, 6, 4
Colour Infrared (Vegetation)	5, 4, 3
Agriculture	6, 5, 2
Healthy Vegetation	5, 6, 2
Land/Water	5, 6, 4
Natural with Atmosphere Removal	7, 5, 3
Shore-wave Infrared	7, 5, 4
Vegetation Analysis	6, 3, 4

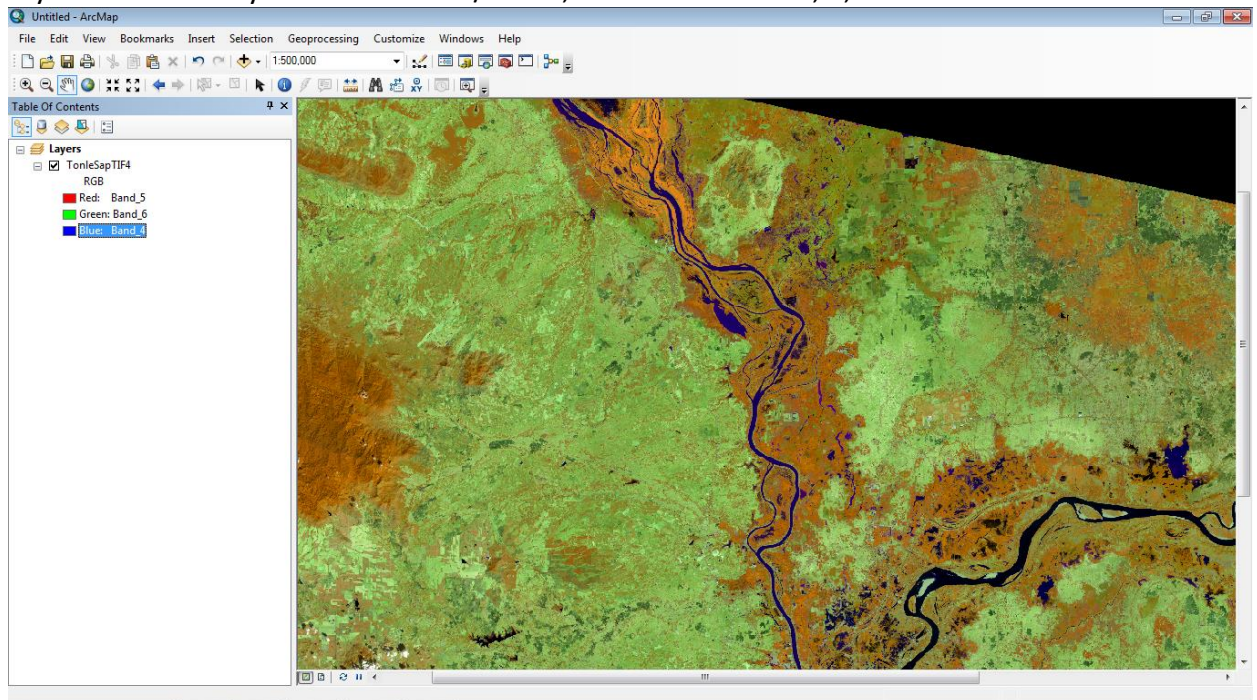
For example, if you want to see the natural color (true color) to identify water body, choose the order of bands 4, 3, and 2, which means **Red: Band 4**, **Green: Band 3**, and **Blue: Band 2**.



If you want to have false colour image of Colour Infrared to identify Vegetation, choose bands of 5, 4, and 3 (Red: band 5, Green: band 4, and Blue: band 3).



If you want identify features of land/water, choose bands of 5, 6, and 4.



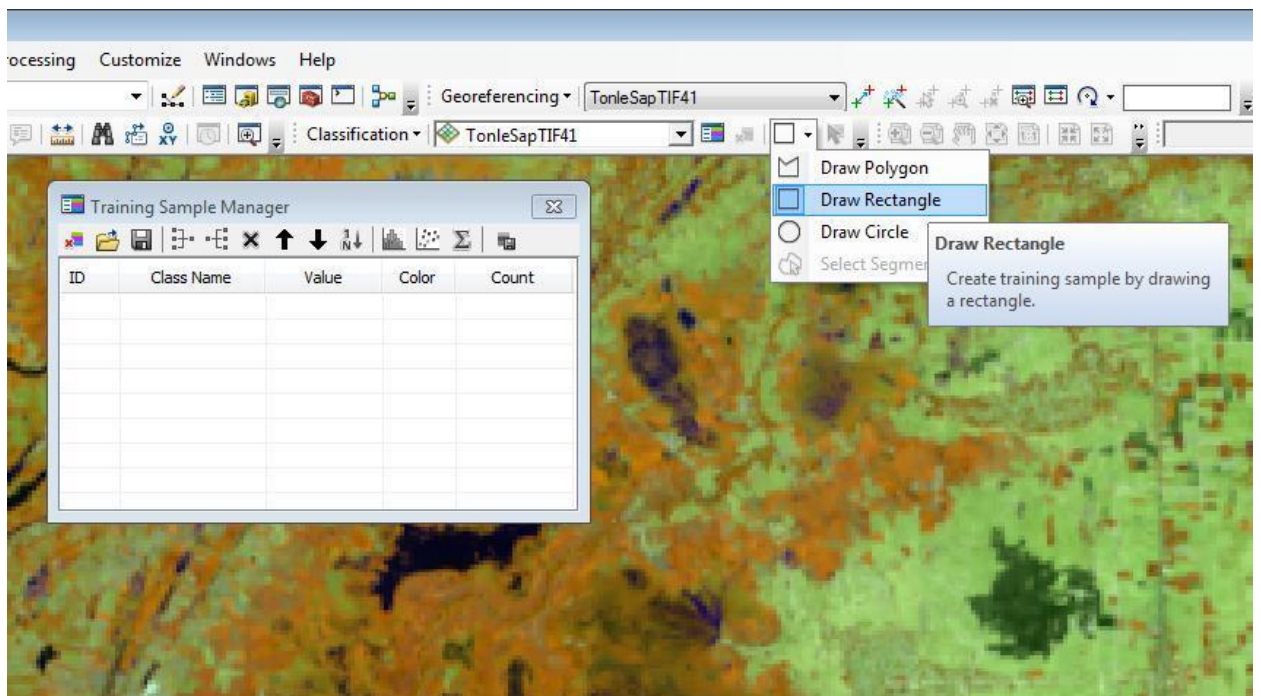
Remember that depending on the need to find the objects on the image, we can use different color combinations to create different composite images.

Classification

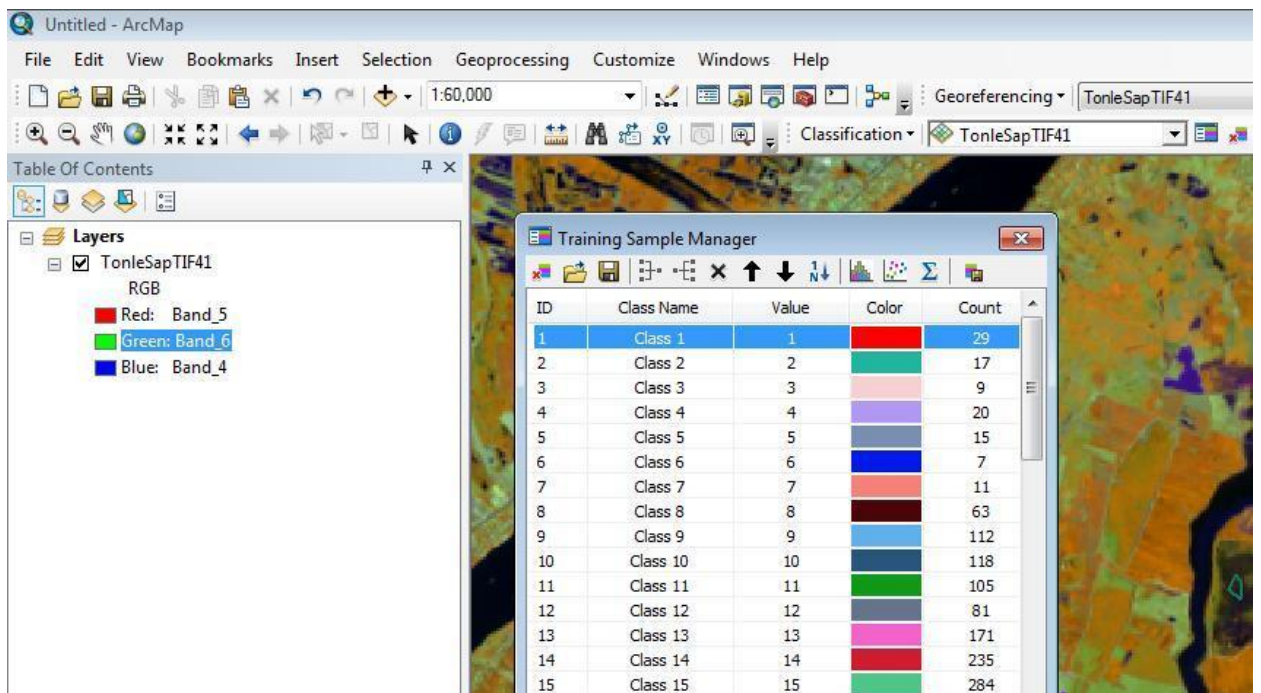
First, you have to active Image classification by click in **Menu** bar, then a Toolbox appears from that you click **Image classification** to active it, then move it to menu toolbar.

At Image classification tool, open **Training Sample Manager**.

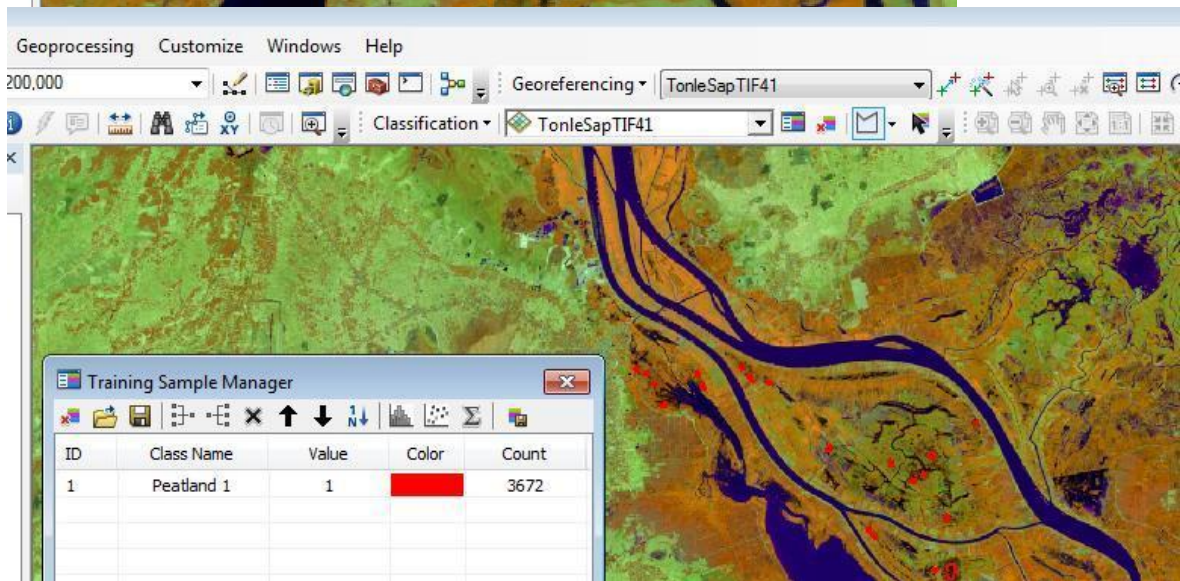
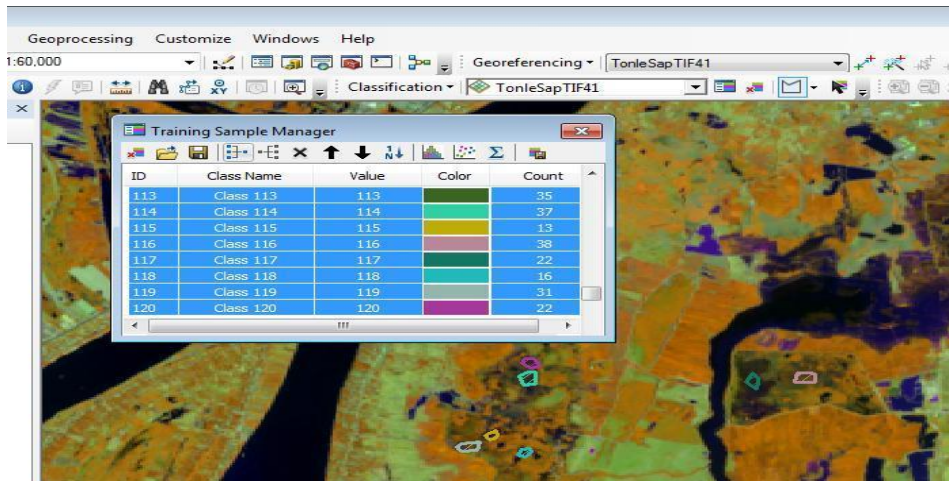
Choose types of drawing: Polygon, rectangle, circle. Then, chose **Polygon** and capture many samples in area selected.



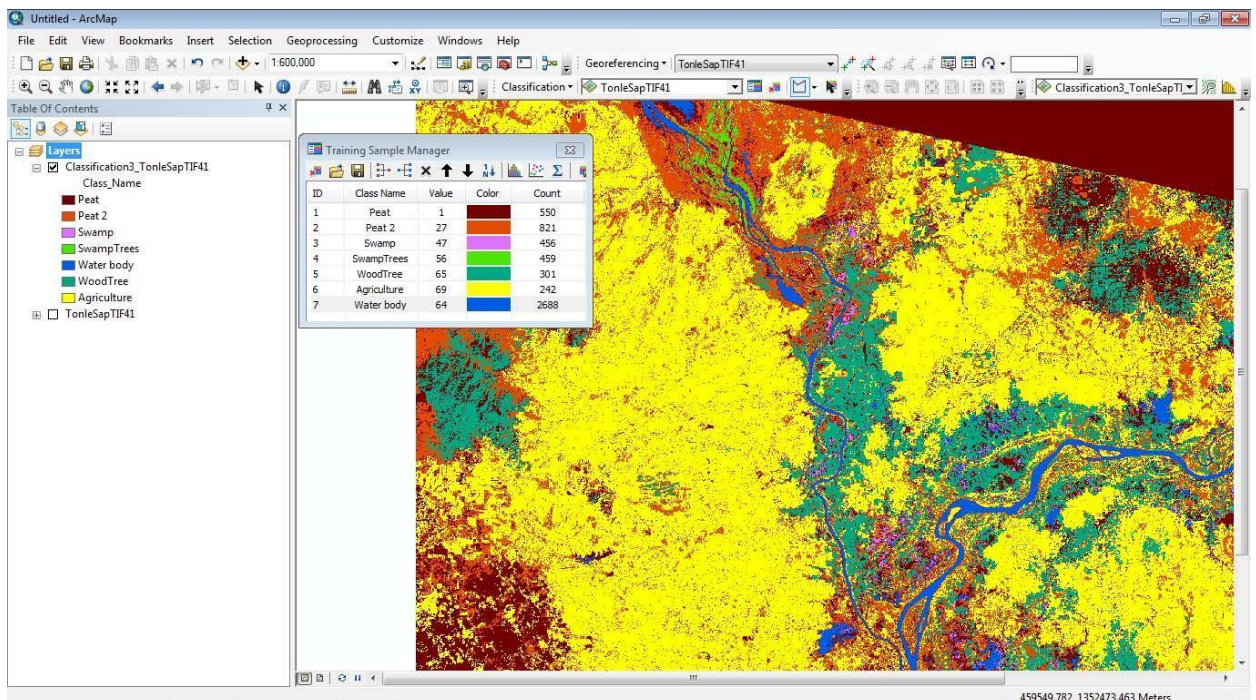
Then, select samples. The more samples selected the more accurate the image to be.



Select all of samples in the box, then merge them together to one class, and then name it.



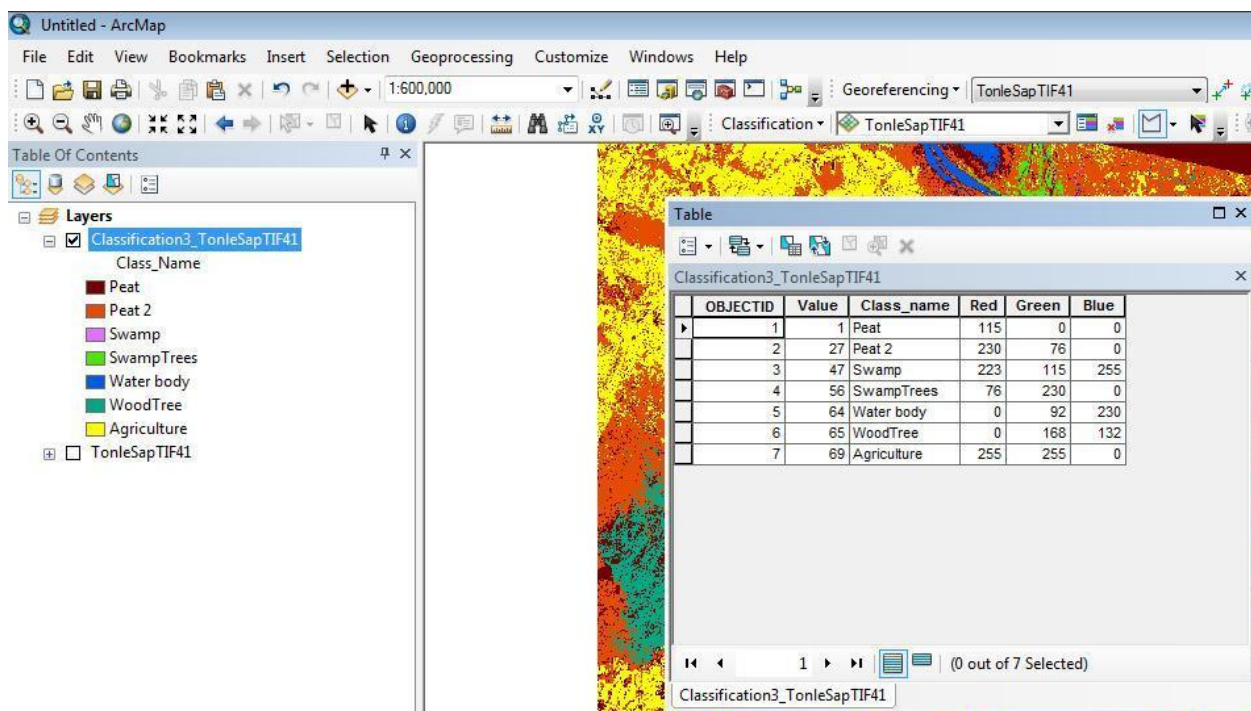
After defining and selecting the training samples on the image for an interesting object, proceed to merge them together into a layer (e.g. peat layer, swamp layer, etc.).



Converting raster classed layer to vector layer

Click **Layer of Classification3_TonleSapTiff**, select **Open Attribute Table** then a **Tab** appears showing the units classified and the basic attributes.

Open Search box, then input **“Raster to Polygon”** --- > Output file: (name of vector file). Finally you can get vector file of layer with all classes including attribute data.



Remote sensing interpretation of images Sentinel 2

Similar to the Landsat 8 image processing, Sentinel 2 images are also used for interpretation.

For Sentinel 2, should pay attention to the band combination used in classification. The suitable band combination helps to classify objects according to requirements.

Table 2. List of main band combinations in Sentinel 2

Combinations	R	G	B
Natural Colors	4	3	2
False color Infrared	8	4	3
False color Urban	12	11	4
Agriculture	11	8	2
Atmospheric penetration	12	11	8a
Healthy vegetation	8	11	2
Land/Water	8	11	4
Natural Colors with Atmospheric Removal	12	8	3
Shortwave Infrared	12	8	4
Vegetation Analysis	11	8	4

The example below uses the image of Sentinel 2 captured in the lower part of the Tonle Sap lake. The band combination is Red: 8, Green: 3, and Blue: 2 (the numbers in Table of content are just the order number of the band in the combination).

