

## Tutorial Set 3: Spatial data analysis

### Exercise Site20\_3-1 Developing a P fertilizer prescription map

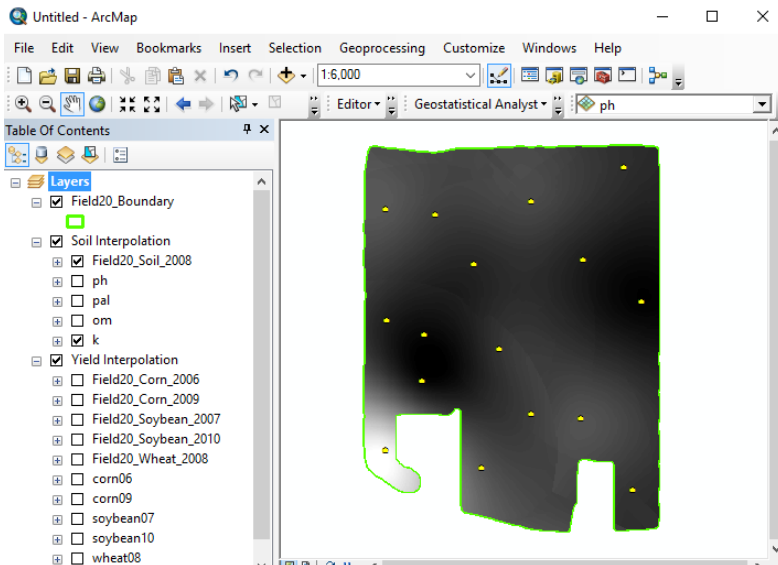
**Learning objective:** Generating a phosphorus ( $P_2O_5$ ) prescription variability map (raster) and converting it to a classified polygon layer

**Techniques:** ArcToolbox – Spatial Analyst – Map Algebra – Raster Calculator  
 ArcToolbox – Spatial Analyst – Reclass – Reclassify  
 ArcToolbox – Conversion Tools – From Raster – Raster to Polygon

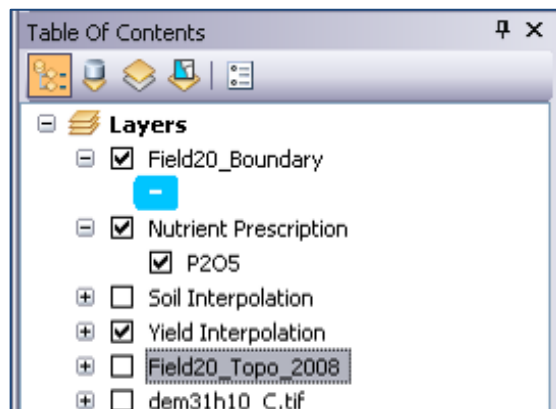
**Data Source:** Dataset3

#### Part 1: Layer management

1. Unzip *Dataset3.zip*, bring in data layers into ArcMap, set layers extent to field20 boundary and arrange them as shown below:

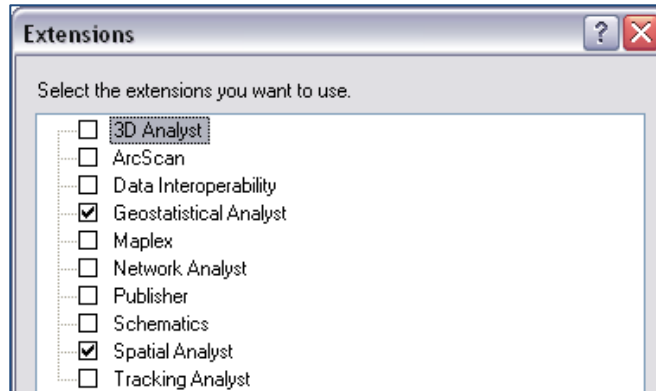


2. Right click on **Layer** in **Table of Contents** to add the **New Group Layer**, name it “**Nutrient Prescription**”. Then add a subgroup named “**P2O5**” under the group “**Nutrient Prescription**”.



**Part 2: Activating Spatial Analyst**

1. Go to **Customize > Extensions** to launch **Extension** dialog window and the select **Spatial Analyst** and **Close**. (By default, the Spatial Analyst is not activated in ArcGIS. You need to activate only once.)

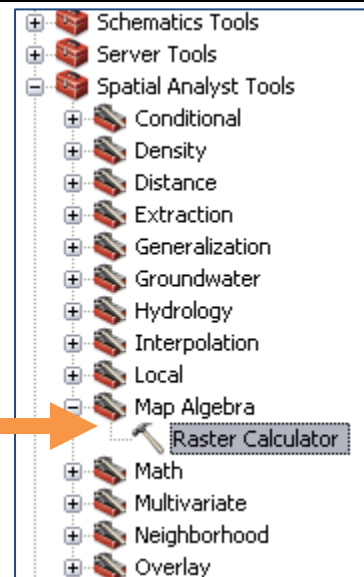
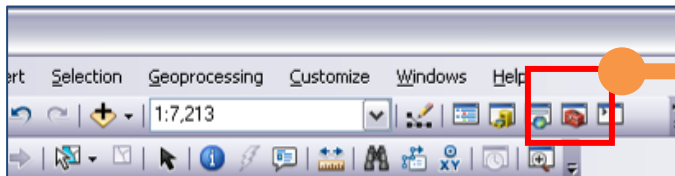


**Part 3: Creating a P<sub>2</sub>O<sub>5</sub> prescription map using the ArcToolbox -> Raster Calculator**

1. Understand the formula used to estimate the P<sub>2</sub>O<sub>5</sub> prescription

$$\begin{cases} \text{if } \frac{P}{AI} > 20 \rightarrow P_2O_5 \text{ rate} = 0 \text{ kg/ha} \\ \text{if } \frac{P}{AI} \leq 20 \rightarrow P_2O_5 \text{ rate} = (20 - P/AI) \times 4 \text{ kg/ha} \end{cases}$$

2. Launch the **ArcToolbox** by clicking on the **ArcToolbox** button. Go to **ArcToolbox > Spatial Analyst Tools > Map Algebra > Raster Calculator**.

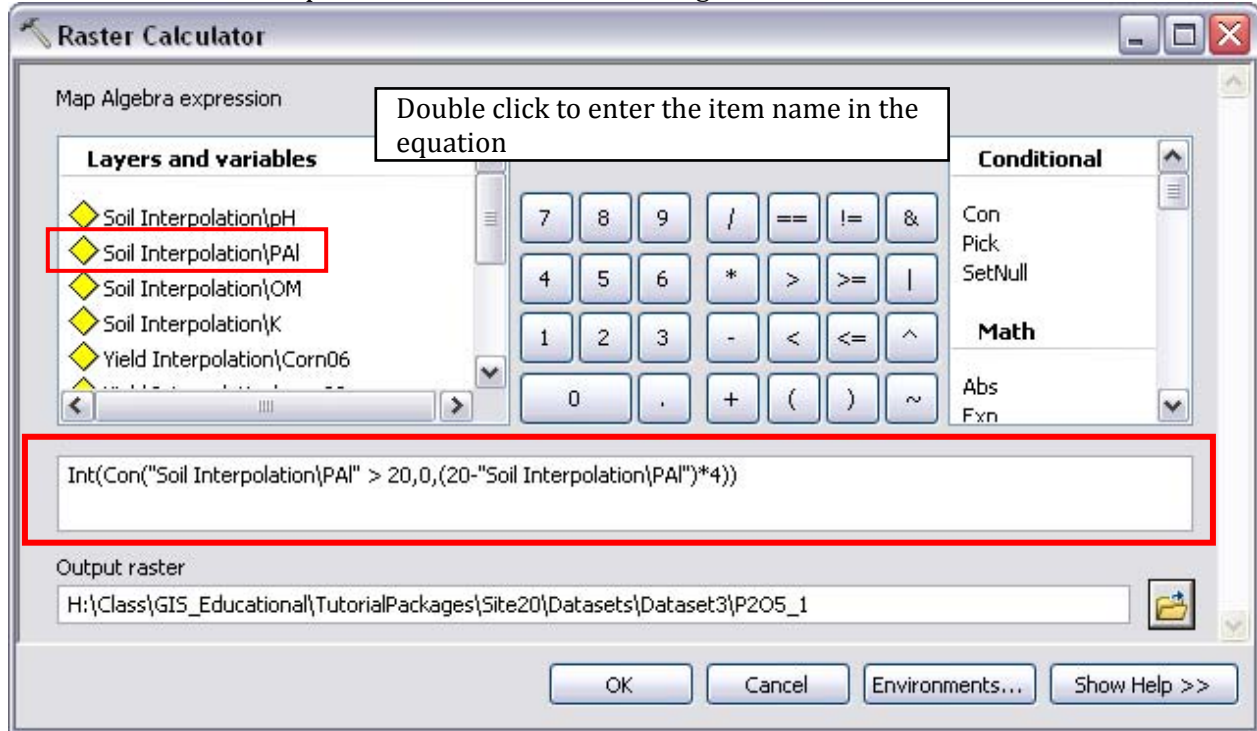


3. Generate a P<sub>2</sub>O<sub>5</sub> prescription map by entering the following map algebra expression in the **Raster Calculator** dialog window. A new raster **P205\_1** is added to **Table of Contents**.

**Meaning of the operators:**

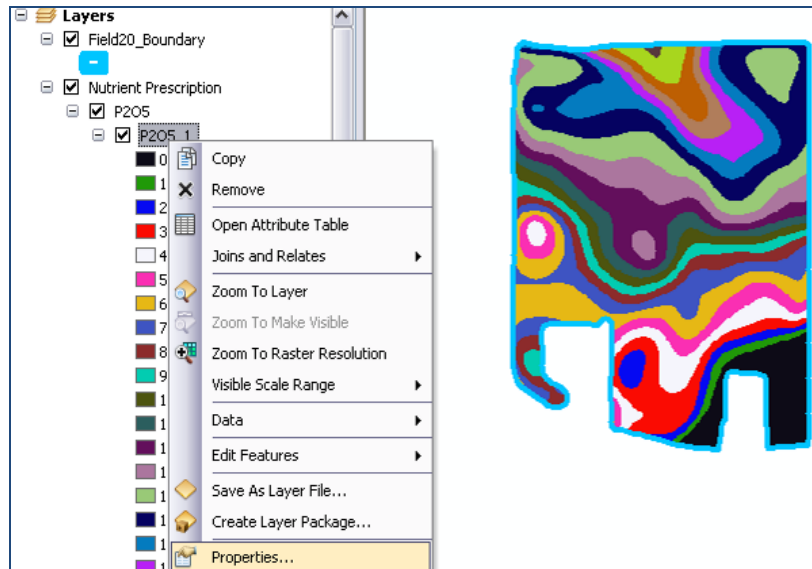
**Con:** an operator for IF statement

**Int:** an operator to convert value to integer

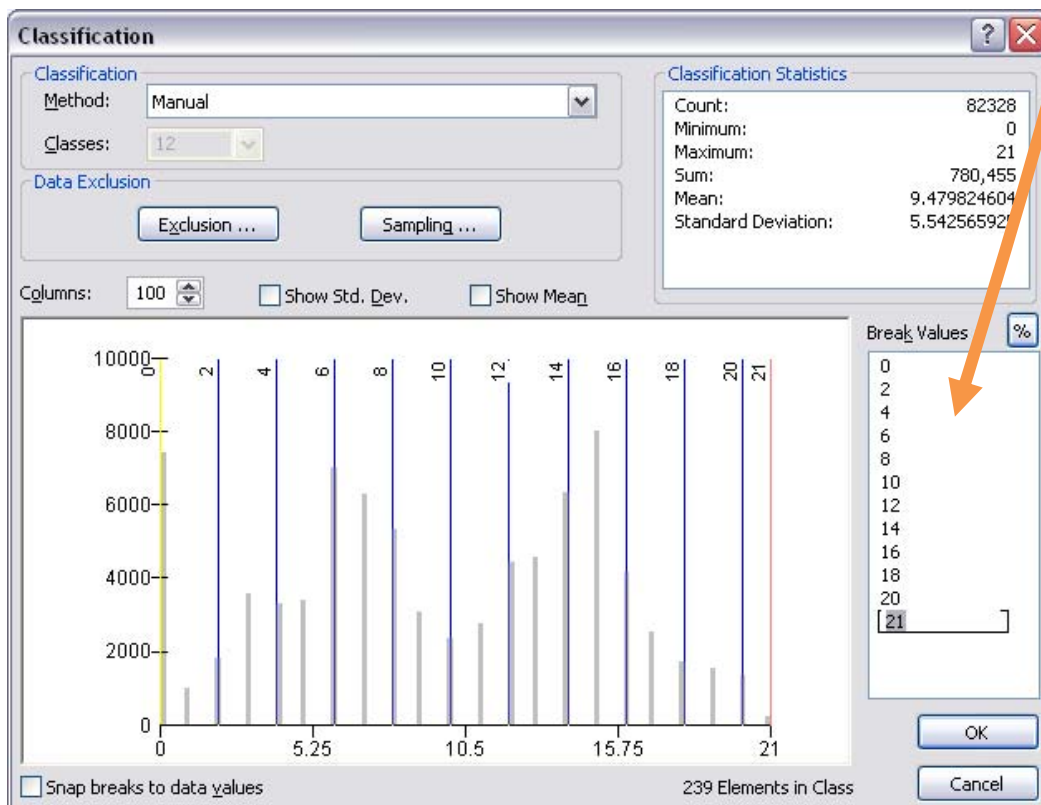
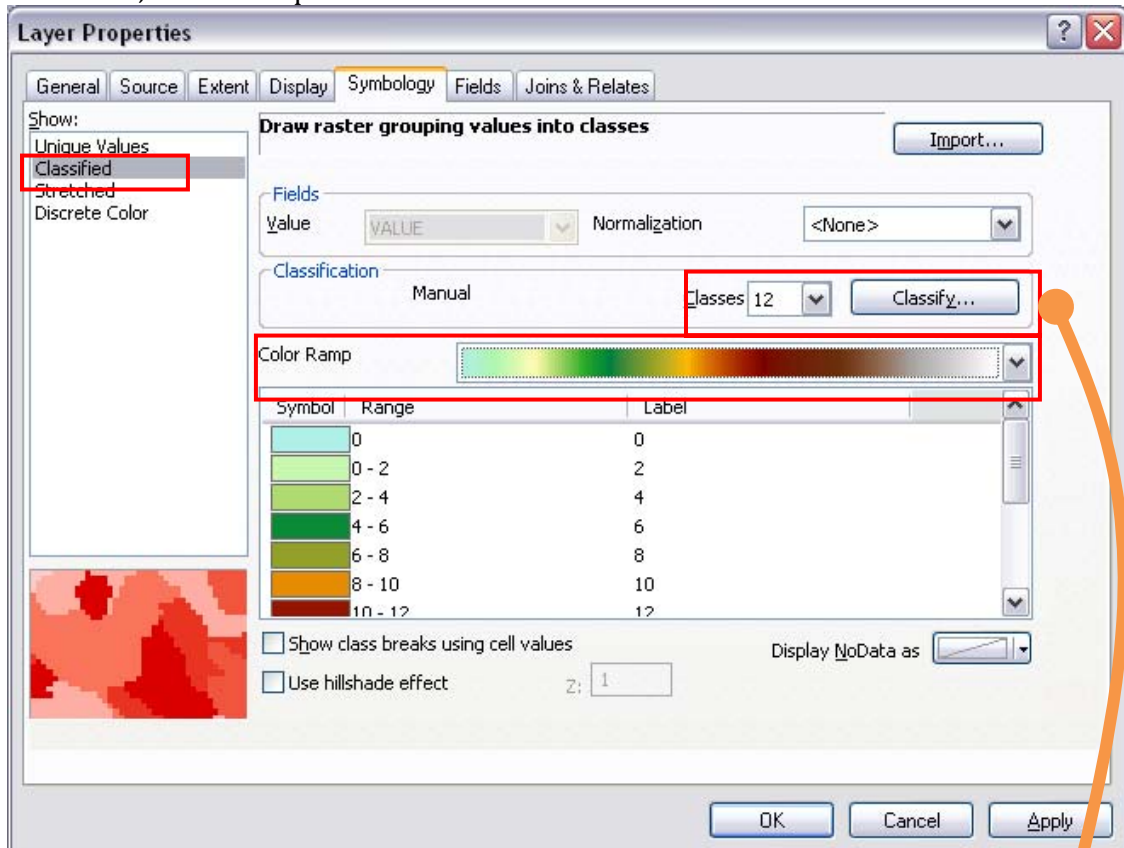


**Part 3: Converting P<sub>2</sub>O<sub>5</sub> prescription map (raster) into a classified polygon layer**

1. In **Table of Contents**, right click on **P205\_1** layer and then click **Properties**. Change **Symbology** to show the values as **Classified**.

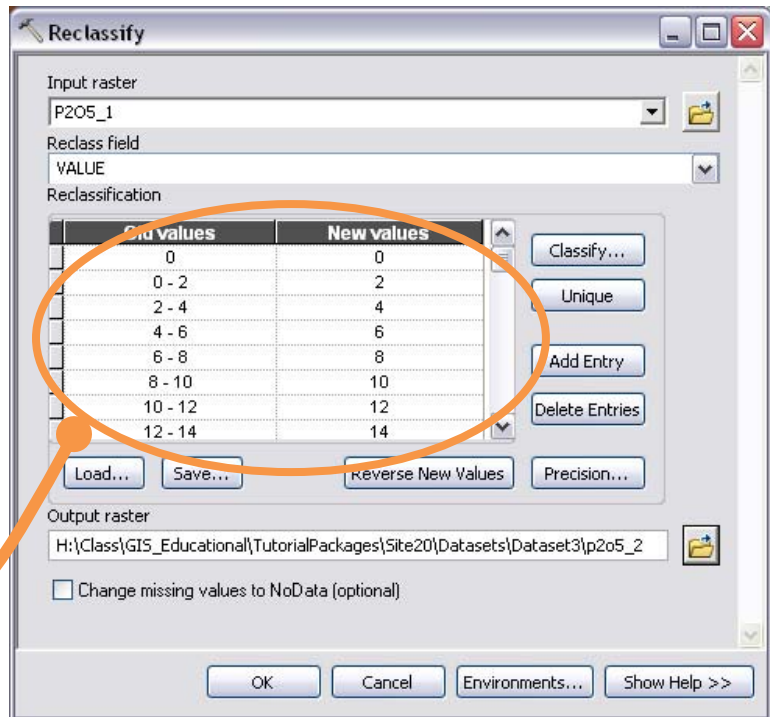


- Click **Classify** and choose classification method as **Manual**. Set **Break Values** as shown. Once done, click **OK** to proceed.

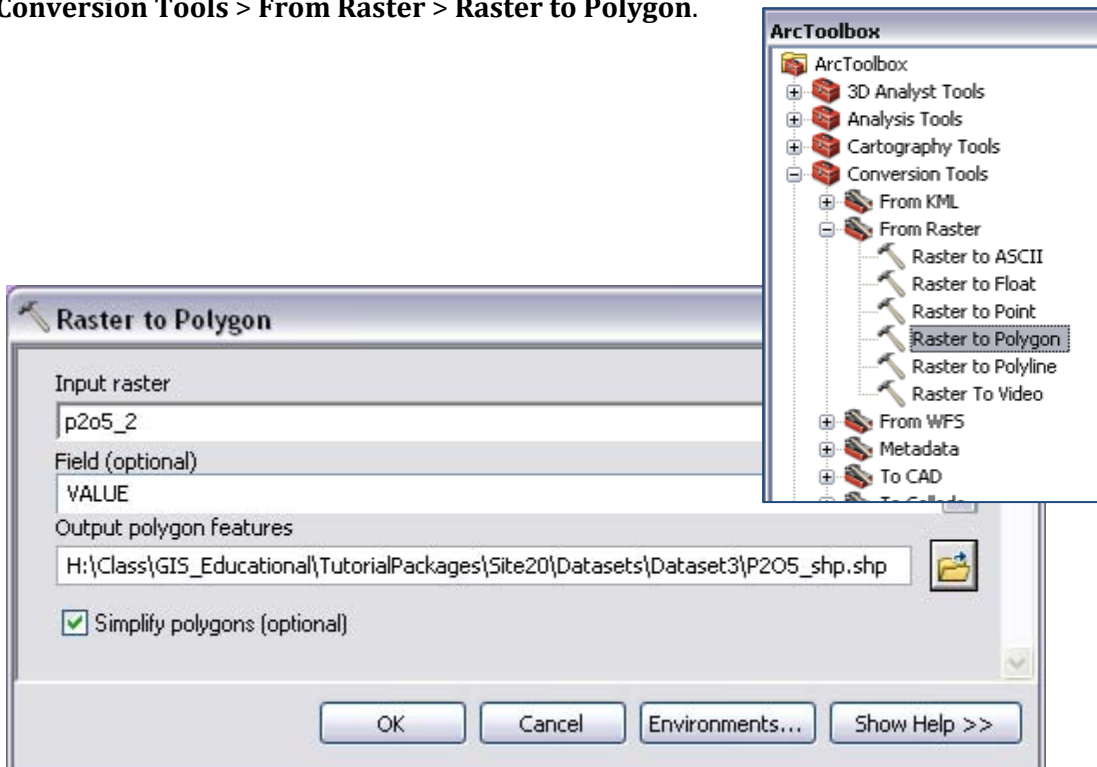


- Reclassify the raster layer **P205\_1** to a new raster containing pixels with integer values. Go to **ArcToolbox > Spatial Analyst Tools > Reclass > Reclassify**. Assign new values to reclassify **P205\_1** and save it as **P205\_2**.

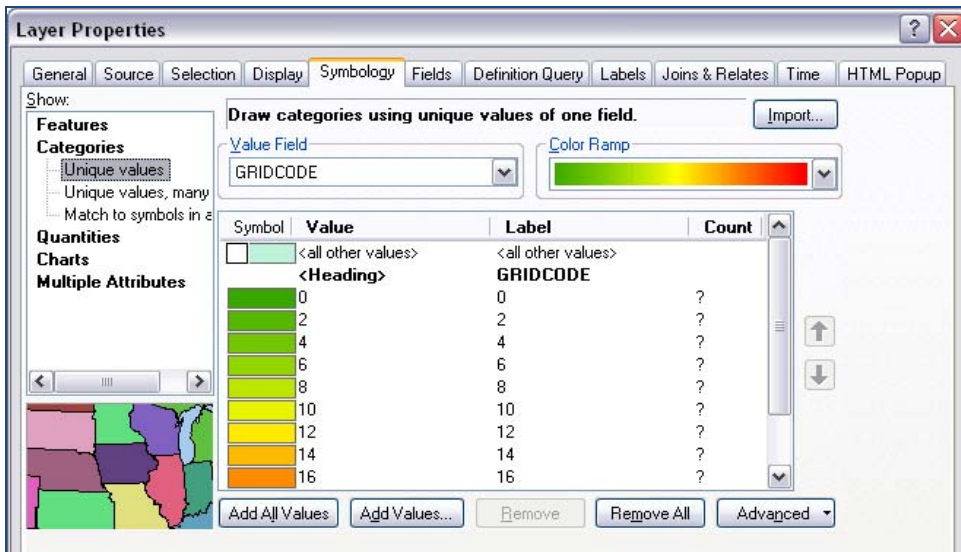
Old values	New values
0	0
0-2	2
2-4	4
4-6	6
6-8	8
8-10	10
10-12	12
12-14	14
14-16	16
16-18	18
18-20	20
20-21	21



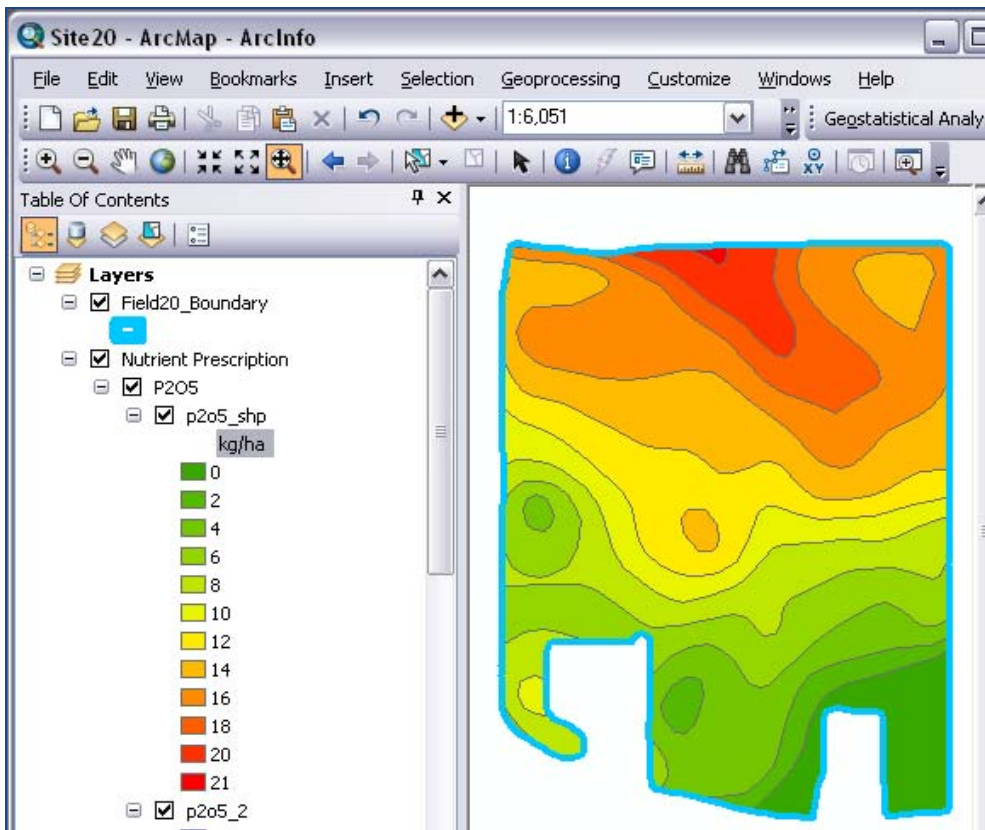
- Convert the raster layer **P205\_2** to a shapefile using the **ArcToolbox**. Go to **ArcToolbox > Conversion Tools > From Raster > Raster to Polygon**.



- Now, modify the **Symbology** of *P205\_shp* as follows.



- The map showing different zones of  $P_2O_5$  prescription is shown as follows.



- Save the project.