

Creating a Smaller Data Set from a Larger Data Set – Raster Data

Written by Barbara Parmenter, Revised by Carolyn Talmadge on January 14, 2016

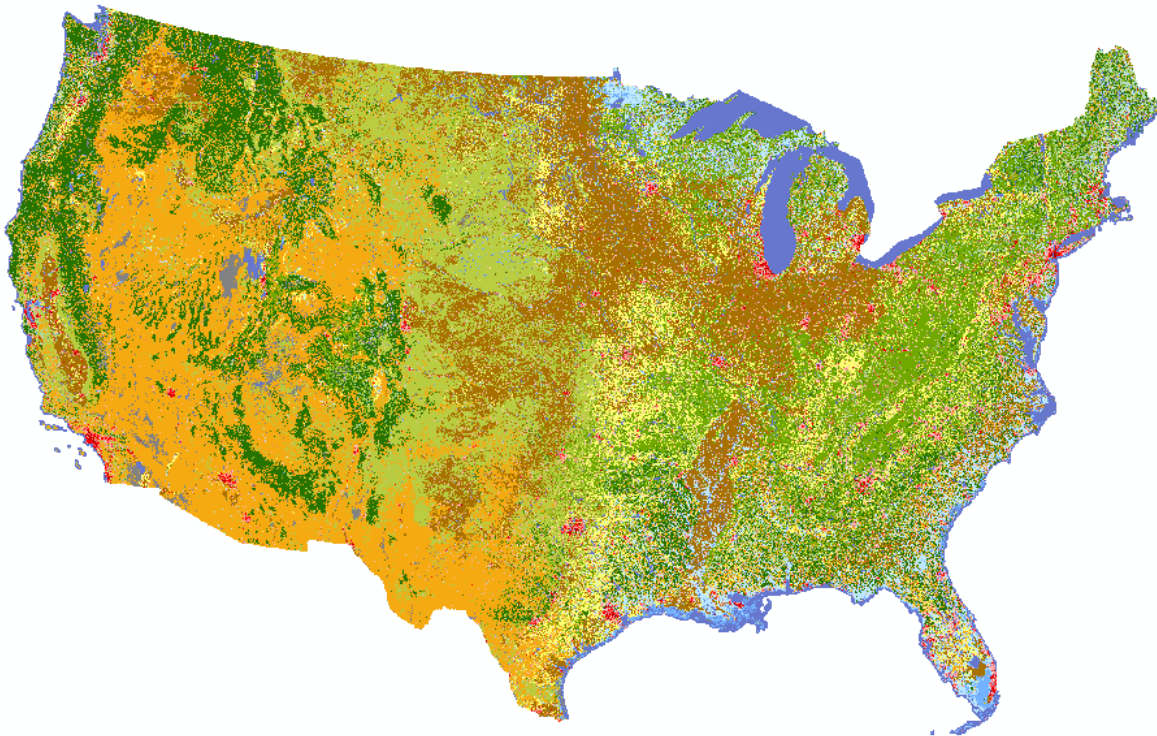
Raster data sets can be quite large and often you just need the data for a small area within the larger data set. This tip sheet discusses how to **clip** raster data to a smaller area. If you need to clip a **vector data** set, please see the tip sheet for vector data.

There are several ways to create a smaller raster data set from a larger one. Here we will look at four methods. The first three are good for creating a new subset dataset for your project, one that you will use repeatedly. The third is good during the actual analysis phase of a project and if all you need to maintain are the analysis results.

[ArcGIS 10.3 Online Help](#) has a discussion of the other extraction tools which can come in handy in different situations, so you should become familiar with these.

Clipping a Raster Dataset using the Data Export Option

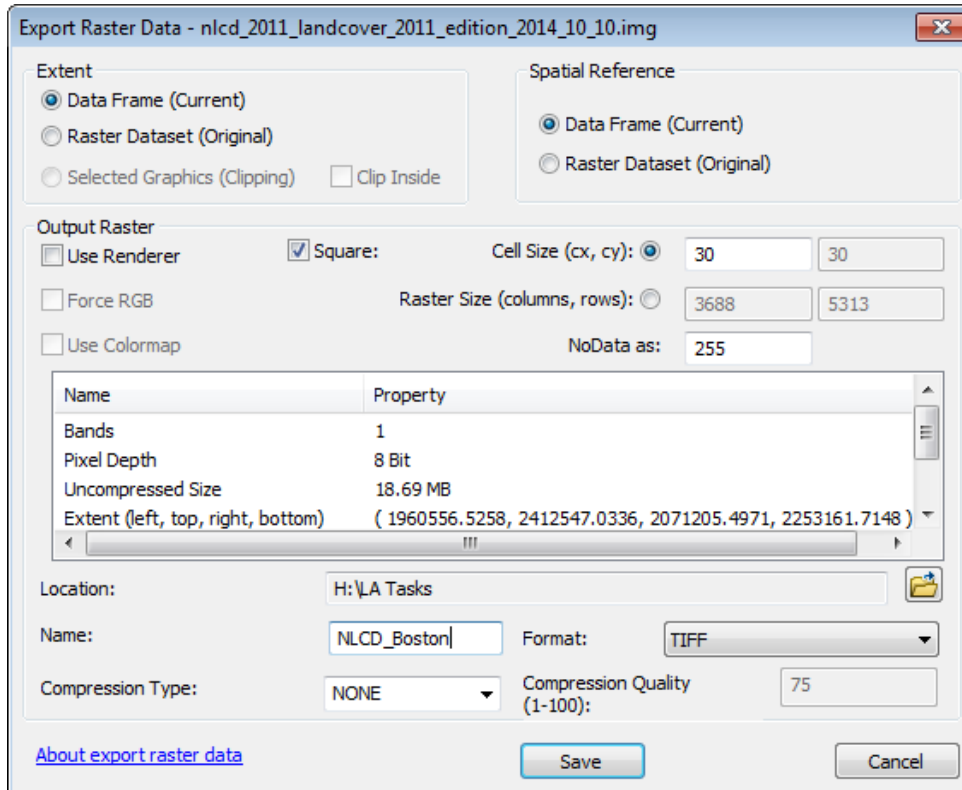
The easiest way to reduce a raster data set is to zoom in to the area you want to examine and export just that extent to a new raster data set. You do this in ArcMap. In this example, we will reduce the 2011 National Land Cover Data set (NLCD) to the Boston metro area. The [original data set](#) covers all of the United States, as shown below.



1. Add the raster data of interest (in this example, nlcd_2011_landcover_2011_edition_2014_10_10.img) to your ArcMap session (it should have a defined coordinate system, and your data frame should also have a defined coordinate system appropriate for the location you want to clip to.)

Note that you can size the ArcMap window so that it better contains the area you want (e.g., is more square or more rectangular – whatever you need it to be) .

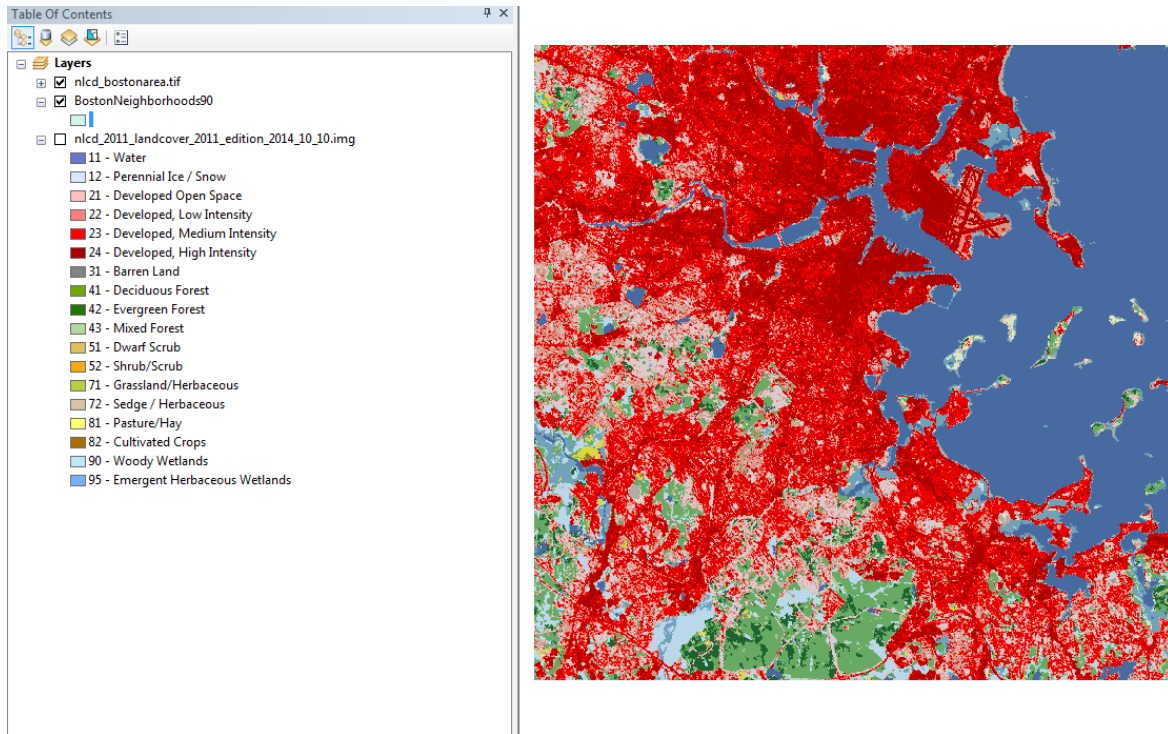
2. Right-click on the Raster Layer and choose **Data → Export Data**.
3. There are several items you need to carefully fill in the Export dialog box – here is my example for the NLCD file – the items are explained below:



- a. For **Extent**, set it to the **Data Frame** – this is critical for getting the smaller clip!
- b. For **Spatial Reference**, this example sets it to the Data Frame which is in the Massachusetts State Plane Mainland, NAD 83, matching data from MassGIS. This is not critical for you, but it is good practice to get all your data sets into a common coordinate system before analysis.
- c. The original cell size for the NLCD data is 30 meters by 30 meters. If the calculated cell size when the dialog box comes up is slightly different, set it back to 30 by 30 under the Cell Size option. Setting the cell size is a good option if you know what cell size your analysis will be working with.
- d. Check mark “square” to enforce a square cell size.
- e. Next to Location – you need to click on the FOLDER where this data set is going to go (don’t specify a name here) – It’s recommended that you create a separate folder for your data layer (e.g., create an NLCD folder ahead of time), then navigate to this Folder, highlight the folder, and press add.
- f. Next to Name – here is where you specify the name. **IMPORTANT!** Your name must not have spaces in it, and it has to be less than 13 characters!

- g. For format, TIFF is regularly used. A GRID format is another good option.

That's it – the data set can then be added to your map. The finished product would look similar to the image shown below.

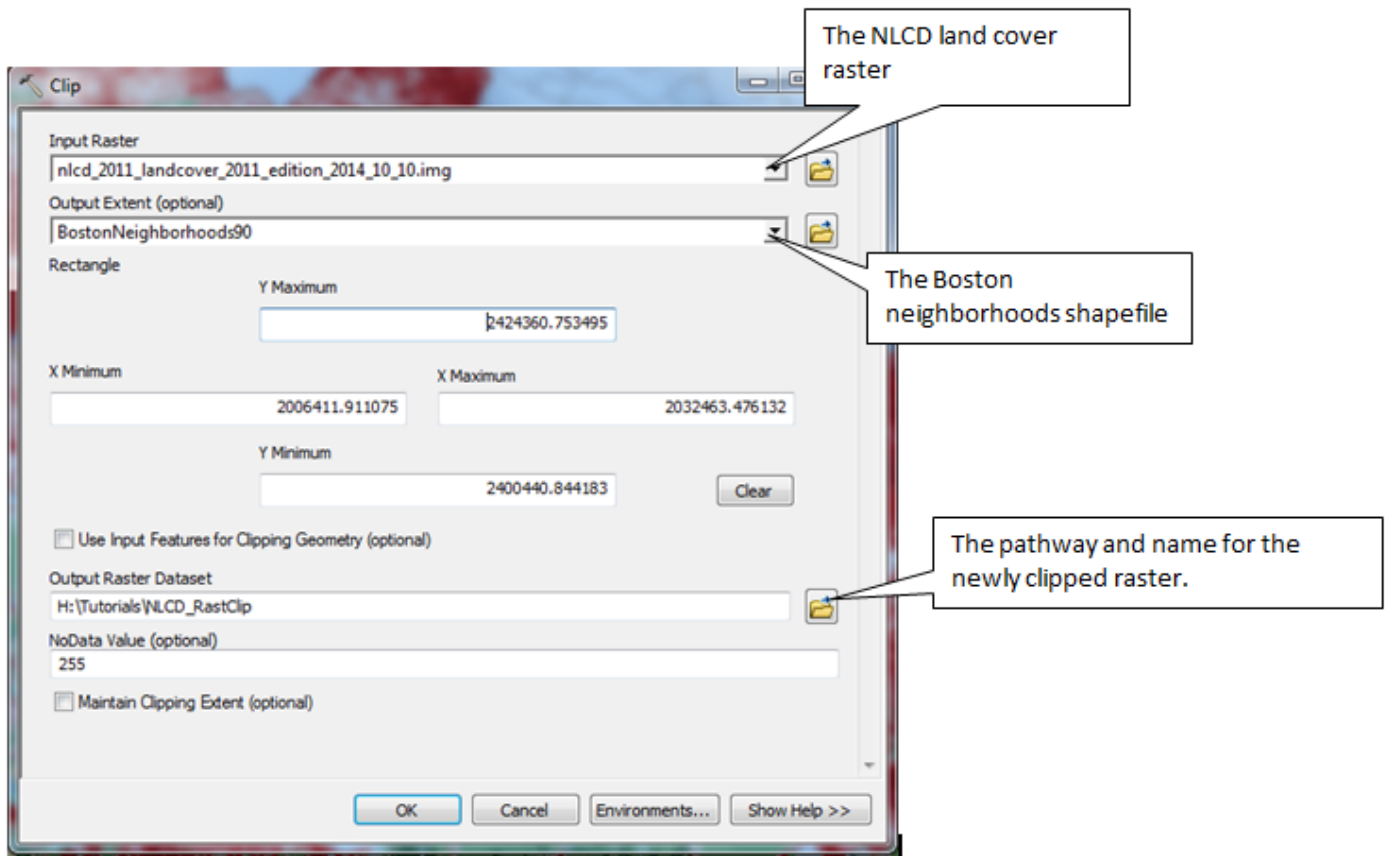


Clipping a Raster Dataset using the Clip Raster Tool

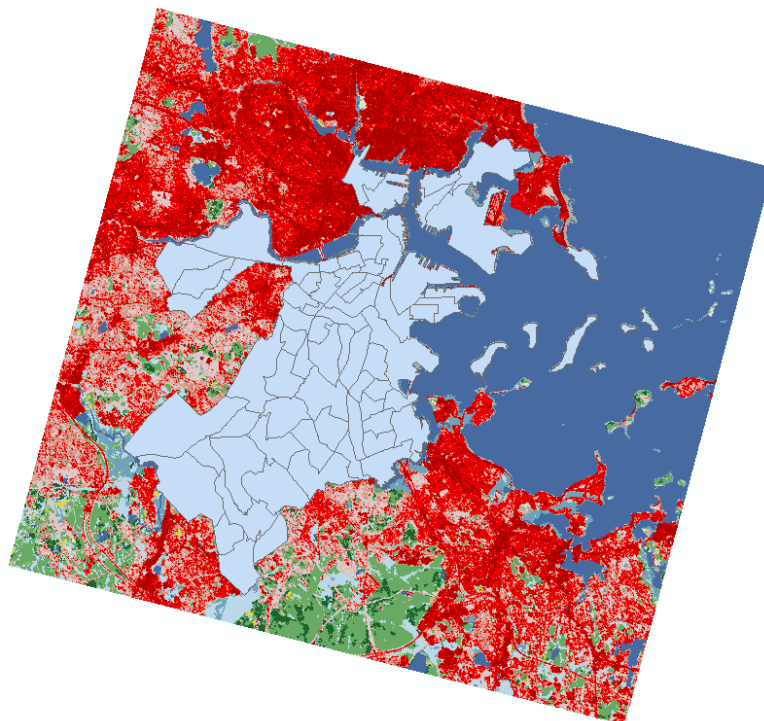
There is a **Clip** tool for **raster datasets** that is different from the regular CLIP tool for vector data. This is a good tool if you have a polygon data set to act as the clip feature (e.g. the cookie cutter). The clip feature is the boundary to which you want your raster data clipped. In the example below, we have a polygon layer for neighborhoods in Boston, and we will clip the NLCD land cover raster to the boundary extent.

Follow these directions to use the Raster Clip Tool:

1. Open **ArcToolbox** and expand **Data Management** → **Raster** → **Raster Processing**.
2. Double click on **Clip**.
3. Fill out the tool as follows:



You will see that the CLIP RASTER tool clips the raster data set to the EXTENT of the bounding polygon, not to the boundary itself. This is only useful sometimes.

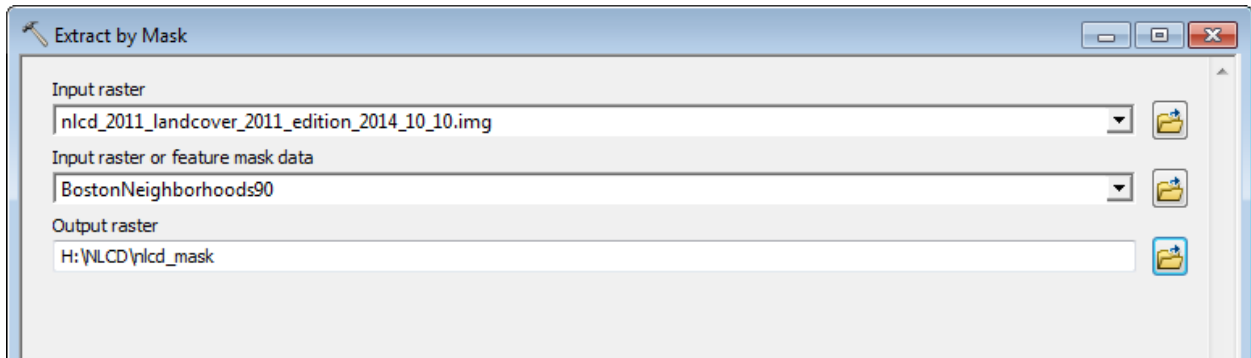


Clipping your Raster using Extract by Mask

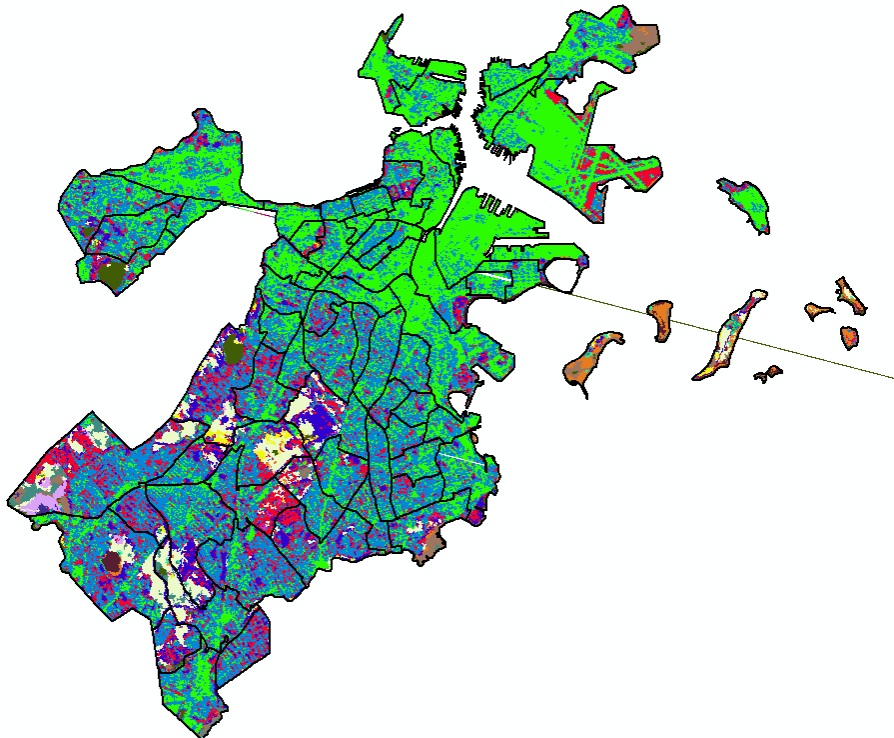
If you are looking for a tool that “clips” the data to a shape or boundary (in this case Boston Neighborhoods), there is a tool called **Extract by Mask**. This tool works very similarly to the vector clip tool, as in the final output will be a raster in the shape of Boston neighborhoods.

To use the Extract by Mask tool:

1. Open **ArcToolbox** and expand **Spatial Analyst Tool** → **Extraction**
2. Double click on **Extract by Mask**.
3. Fill out the tool. The **input raster** is the raster to be “clipped” or masked and the **Input raster or feature mask data** is the boundary or the shape that will determine how the raster is clipped. Give it an appropriate name and save it in your h drive.



4. Now, the output is a raster in the shape of Boston Neighborhoods. All other cells have been removed.

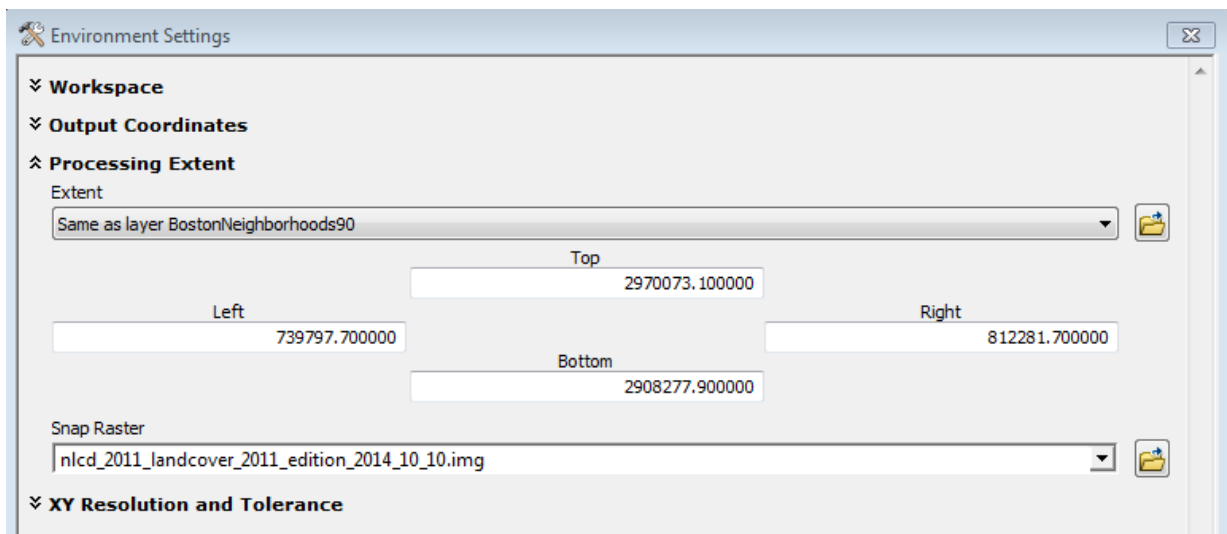


Limiting the Extent of your raster data during analysis operations

If you are using a large raster data set, and you want to limit your analysis to a smaller region, you can do this by setting the **Extent** and **Mask** when setting up for spatial analysis. This is appropriate if you don't need a smaller copy of the original data set – you just need the analysis results for the area in question.

For example, suppose you simply want to reclassify the National Land Cover Data set for the Boston area, so that all development is coded as 1, water is coded as 0, and all other land covers are coded as 2. It's not necessary to clip this data first, but you want the new reclassified layer to only be the shape and size of Boston Neighborhoods. We can do that by setting the **Environment Settings**.

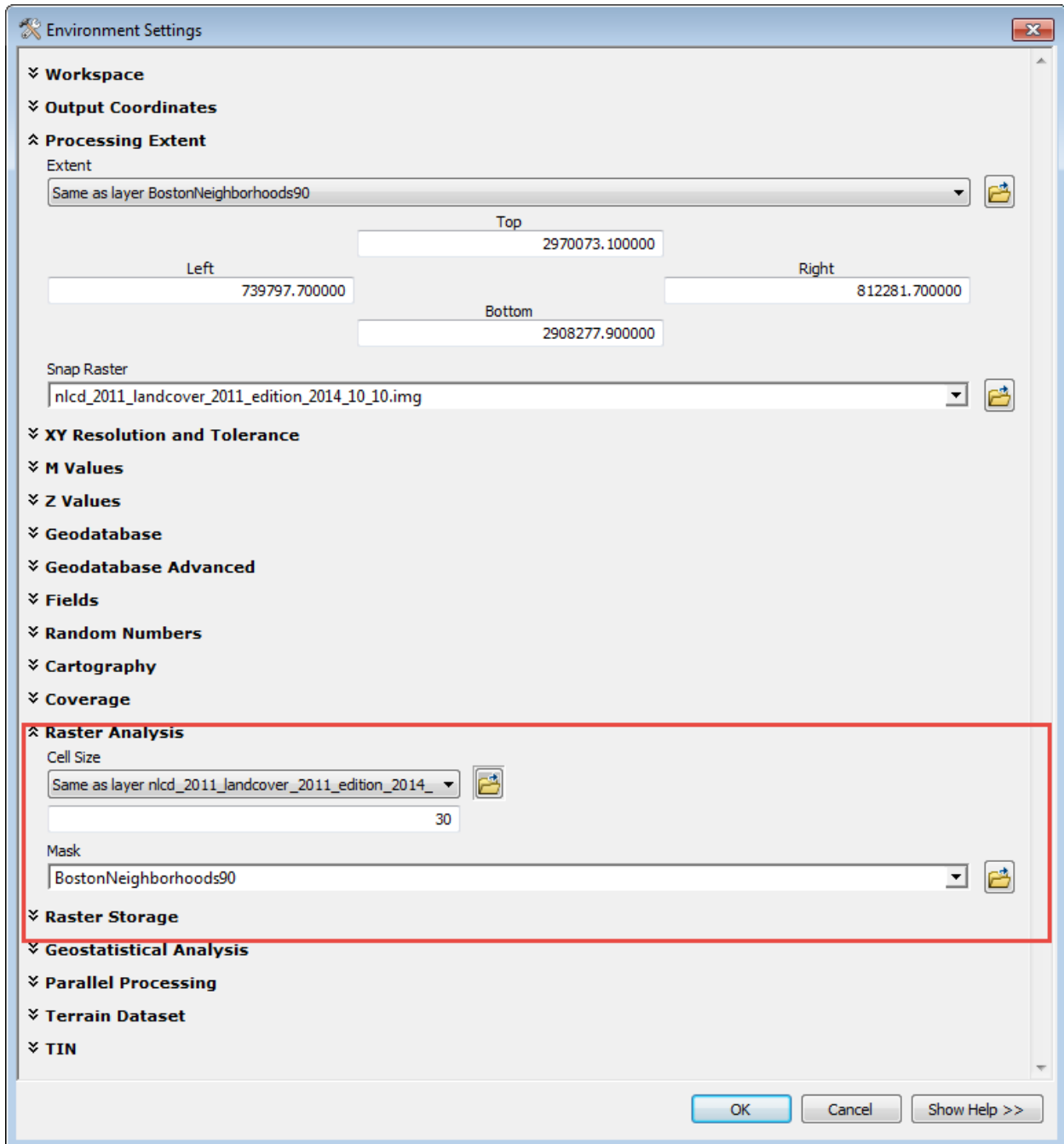
1. To set the extent for ALL your analyses during your session, click on the **Geoprocessing** in the top menu bar.
2. Click on the **Environments...** button to set the environment settings.
3. Click on the Show Help button in the bottom right corner to see general information about the Environment Settings, as well as a link to the larger help category.
4. In the **Processing Extent** section, fill the Extent. The **Extent** is how far the data will extend. It will also be in the shape of a square.
 - a) In this example, the Extent is set to "Same as layer BostonNeighborhoods90". This will ensure that a raster grid (square) is generated so that it covers entirely over Boston Neighborhoods. If you were to leave it with just this setting, you would end up with a new raster in the shape of a square, similarly to how the raster clip tool worked.
 - b) The **Snap Raster** option is important for analysis because you want all your raster data sets to overlay each other so each cell line up perfectly with other cells. If you have a raster that will form the basis of your analysis, you can specify it here, and then any analysis results overlay properly.



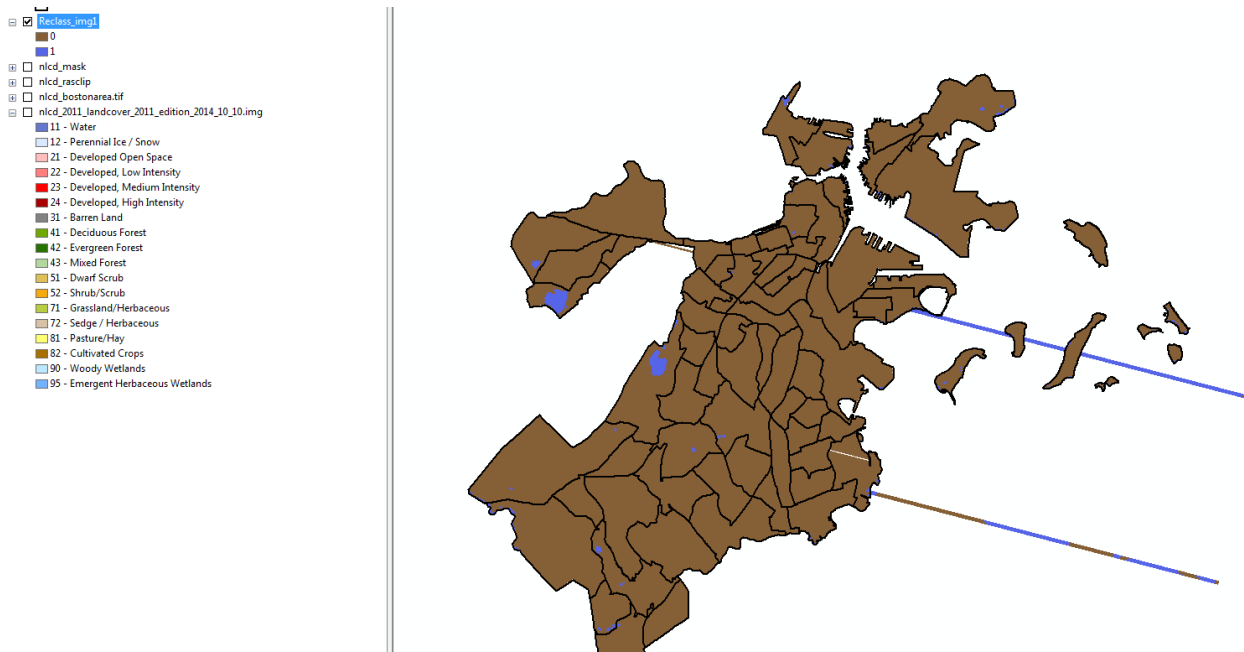
5. Now all analysis functions you perform in this ArcMap session will have the extent you set here.

Note there is another section of the environments settings that you should set before you do raster analysis - **the Raster Analysis Settings**.

6. In the environments setting window, scroll down and click on **Raster Analysis**. Here you can set the cell size and mask.
 - a) Cell Size: You should keep the same cell size throughout your analysis steps. If you snapped to a raster, you should also set the cell size to be the same as that raster. This will ensure all raster cells are the same size and line up on top of each other.
 - b) The mask is optional, but it is how you “clip” to a shape our boundary without having to run “extract by mask” everytime. The mask can be a polygon feature, and all cells outside the polygon boundaries will be set to No Data in the results. In this example, we set it to click to Boston Neighborhoods so all data outside of Boston will be excluded.



Now, when you run the reclassify tool, your output raster will automatically be “clipped” to Boston and have the same cell properties as the original dataset.



Alternatively, you can set the Environments each time you run a tool instead of through the Environments Settings. But, if you are going to be doing a lot of analyses, it makes sense to set it once at the beginning rather than every time you run a tool.

For more tips and tutorials, please visit our [website](#)