
Getting Oriented in ArcGIS

OBJECTIVE

In this exercise, you'll learn how to display and navigate data in ArcMap.

Before you can get started, you need to download the data for the exercise:

If you are working on a lab computer, go to our course Moodle site and navigate to Week 1. Open the folder named Getting Oriented in ArcGIS and download the GettingOriented_1_Data.zip file. Save the zip file on your H drive or personal storage device and extract (or “unzip”) it.

If you are working via Apporto, connect to Apporto, then use Chrome within Apporto to go to our course Moodle site and navigate to Week 1. Open the folder named Getting Oriented in ArcGIS and download the GettingOriented_1_Data.zip file. Save the zip file to your City 201 folder on the Apporto desktop and extract (or “unzip”) it.

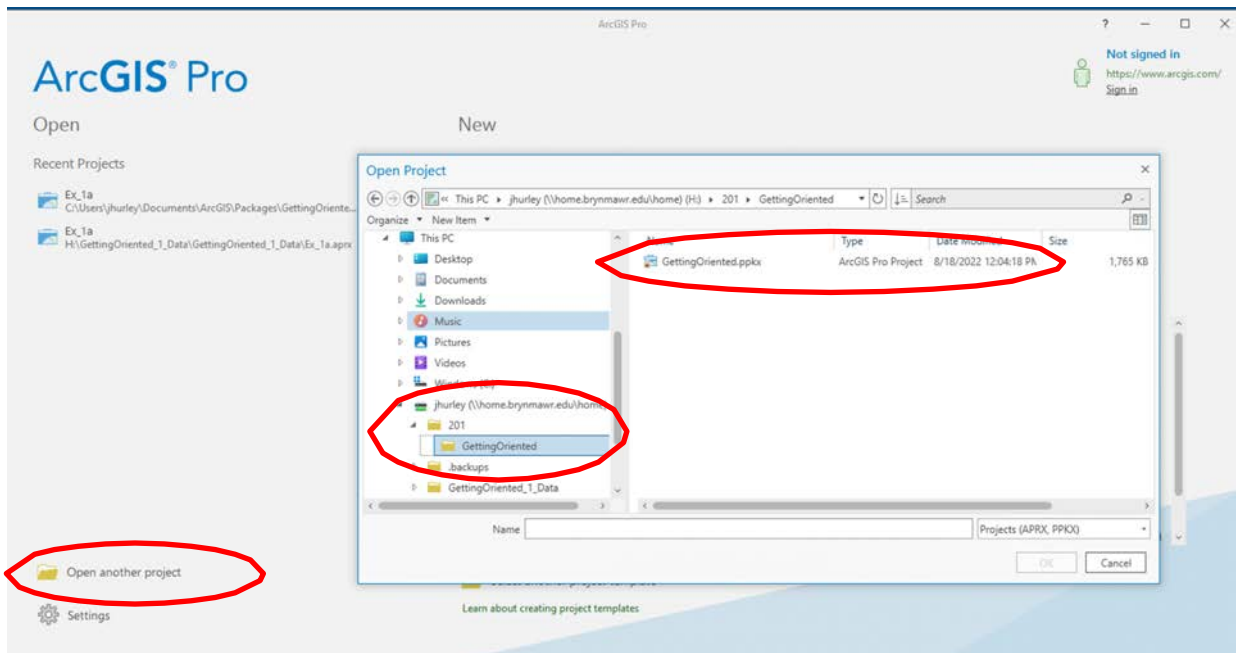
If you are working via LabStats, connect to LabStats, then use Chrome within LabStats to go to our course Moodle site and navigate to Week 1. Open the folder named Getting Oriented in ArcGIS and download the GettingOriented_1_Data.zip file. Save the zip file on your H drive and extract (or “unzip”) it.

TUTORIAL

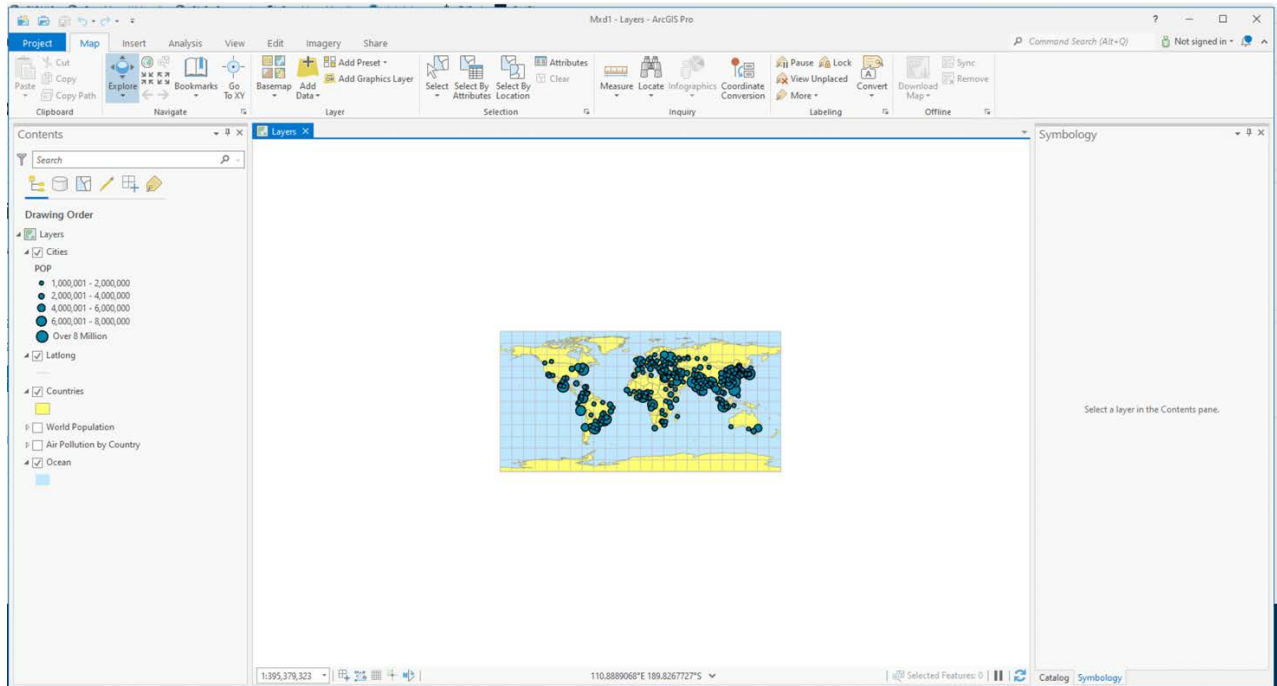
1. **Start ArcMap:** *On the lab computers or LabStats*, click the Start button on the taskbar, then type Arcgis in the search bar. Click on ArcGIS Pro. ***On Apporto***, open the ArcGIS folder on the Apporto desktop to find ArcGIS Pro.

The ArcGIS Pro Start Page allows you to quickly start a new map or open an existing map or template.

Click the “Open another project” folder on the bottom left, then use the file tools to navigate to the folder where you stored your downloaded files. In the Getting Oriented folder, open the GettingOriented.pptx file – this is an ArcGIS Pro Project package. [See the image on the next page.]



2. When the map document is open, **observe the display area** (in the center where you see the map - a map of the world, in this case), the toolbar and the table of contents on the left, and the catalog on the right.



You see a world map with grid lines and dark-blue circles. Taking a quick look at the table of contents and with some modest deciphering, you can surmise that the dark-blue circles represent cities with population greater than 1 million (with

increasingly larger circles representing increasingly larger populations), and the grid lines represent lines of latitude and longitude. Countries are yellow, and oceans are light blue.

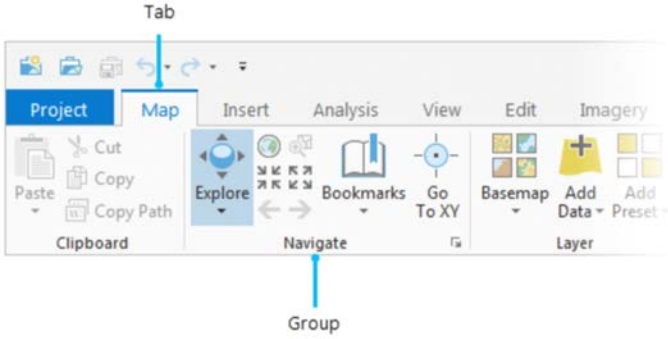
The visible layers on this map are named Cities, Latlong, Countries, and Ocean.

Recall that a layer is a spatial dataset represented by symbols on a GIS map. You also see additional layers in the table of contents (World Population and Air Pollution by Country), although they aren't visible on the map at the moment.

3. First, Let's make sure you can **move around the map** by getting to know the tools in the Navigate Group on the tool ribbon.

Above the map view is the ribbon. The ribbon has a set of core tabs—**Map**, **Insert**, **Analysis**, **View**, **Edit**, **Imagery**, and **Share**—that are always present when a map view is active. Each tab has its own set of tools, organized in groups. The **Map** tab has tools for interacting with the map. On the **Map** tab, the **Explore** tool is selected in the **Navigate** group.

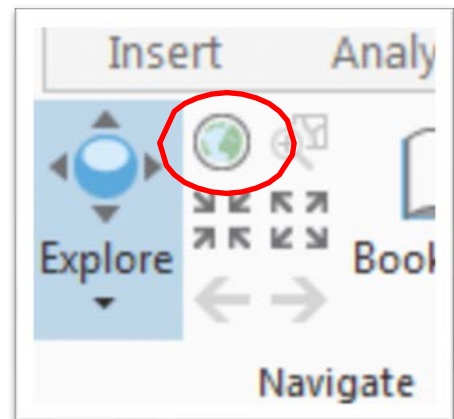
To get started, you'll use tools in the **Navigate** group. The **Explore** tool allows you to move around the map and to read information about map features of interest.



The screenshot shows the ArcGIS ribbon with the **Map** tab selected. The **Navigate** group is highlighted, containing the **Explore** tool (a blue circle with four arrows) and the **Full Extent** tool (a globe icon). A blue arrow points to the **Map** tab, and another blue arrow points to the **Navigate** group.

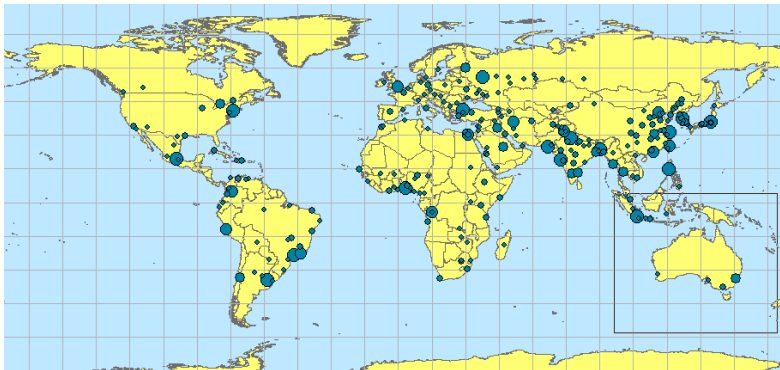
Click the button with the globe to zoom to the full extent of the map. Then try the buttons with the arrows facing in and out to see what they do.

On your own, use the following tools and move around the map, until you are comfortable with ArcGIS navigation: **Zoom In**, **Zoom Out**, **Pan** (this is active anytime the Explore button is active), **Full Extent**, **Fixed Zoom In**, **Fixed Zoom Out**, **Previous Extent**, and **Next Extent**.

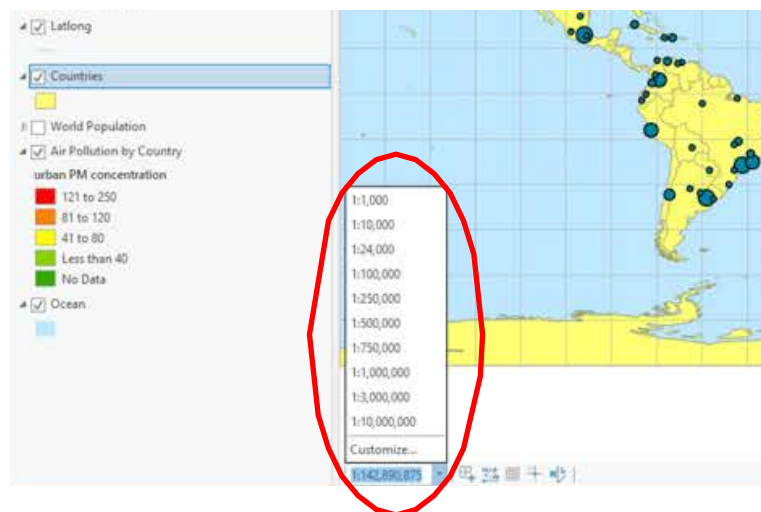


You can easily **zoom in or out by rotating the wheel of the computer mouse**. Try it to see how it works.

Another way to navigate is the Rectangle Zoom tool. **Hold down the shift key and use the left mouse button to click an area of the map. You will see a rectangle appear. Drag your mouse to the size you want, then let go.** The map zooms to the area of the rectangle.

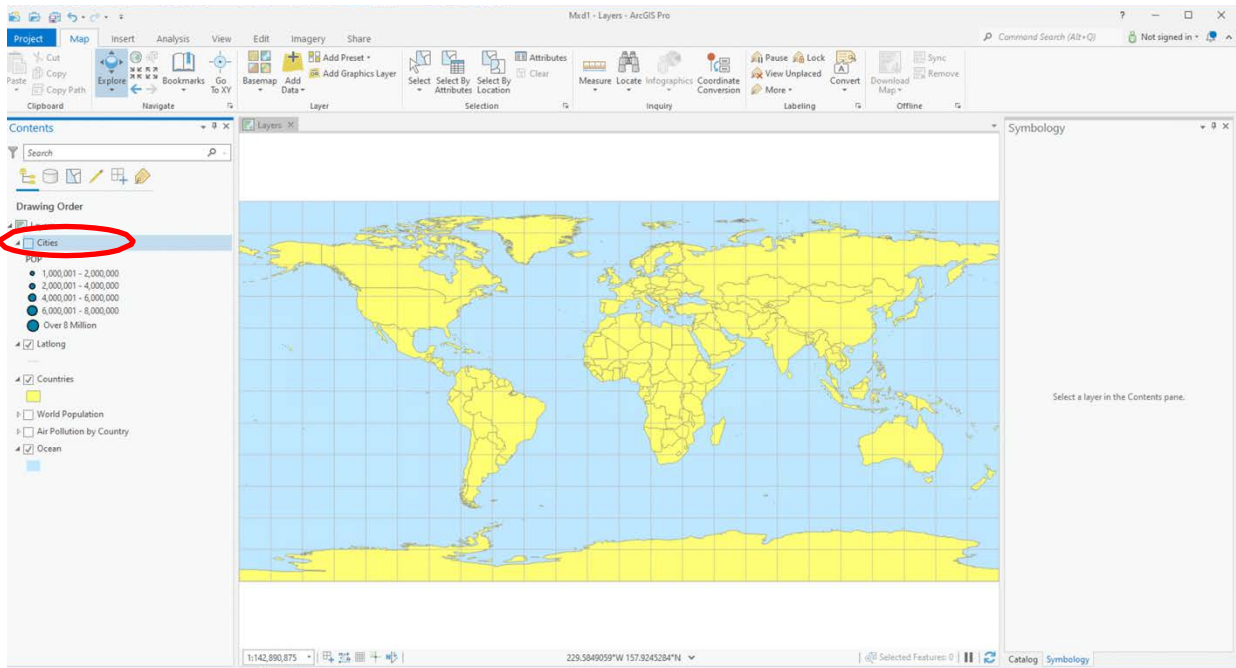


Zooming in or out changes the display scale, which is shown on the bottom toolbar. When the map showed the entire world, the **scale** was approximately 1:200,000,000. This means that map features are displayed at 1/200,000,000th of their actual size. When you zoom IN, do the scale numbers get larger or smaller? And what happens when you zoom OUT?



When you are done navigating, **zoom to the full extent of the map**

4. Now, let's **explore our layers**. In the table of contents, select the check box next to Cities to turn the layer off. The cities disappear from the map.



Turn Cities back on. In the same way, turn the following layers off and then back on: Latlong, Countries, Ocean. All map layers in ArcMap can be turned off and on with a click.

Next, you will **observe the effects of changing the layer drawing order**. Layers are drawn, one on top of the other, like sheets of paper stacked together. Imagine that the layers you are looking at are actually opaque symbols drawn on transparent sheets of paper (just like in our classroom mapping exercise). If you placed cities, drawn as filled-in dots, below the countries, which are filled-in blocks of color, you wouldn't see them. You can experiment with this concept in ArcMap.

In the table of contents, **drag Cities to the bottom of the list of layers, below Ocean**. As you drag the layer, a horizontal black bar indicates its position in the list. When you let go of the mouse button, Cities is at the bottom of the table of contents and is no longer visible on the map. The polygon layers using solid fill colors obscure the point layer of cities.



Lines and points should always be layered on top of polygons to avoid this problem. When you add data to ArcMap, the software automatically places points and lines above polygons.

Move Cities back to its original location at the top of the table of contents. On your own, experiment by moving the Latlong layer to different locations in the table of contents.

- What happens when you drag it below the Countries layer?
- What happens when you drag it below the Ocean layer?

When you're done, move the layer back to its original position, below Cities.

5. The layer name Cities isn't ideal, since it might imply that all cities of the world are included in the dataset. Next, you will **give the layer a more descriptive name**.

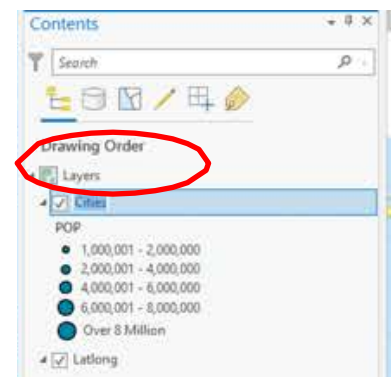
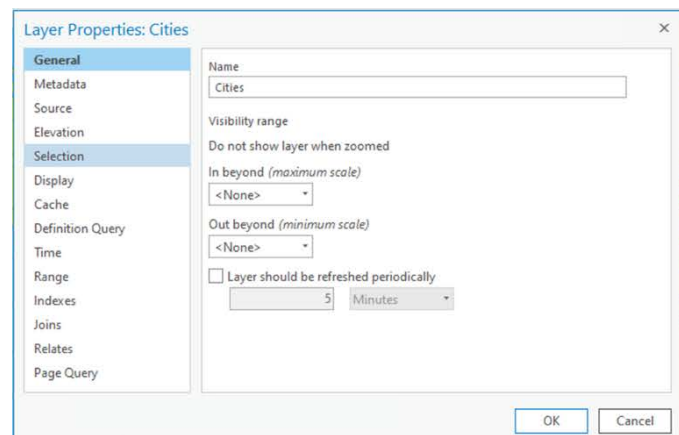
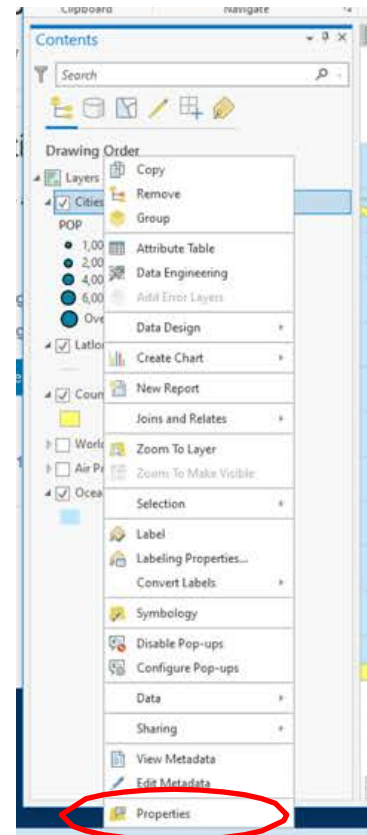
In the table of contents, right-click the Cities layer name.

This opens a shortcut (context) menu. Many ArcMap operations are started from these shortcut menus. On the shortcut menu, **click Properties to open the Layer Properties dialog box.**

On the Layer Properties dialog box, **click the General tab if it's not already active.** (ArcMap remembers the last tab used and makes this the active tab.) The Layer Properties dialog box has several tabs for setting layer properties, most of which you'll get to know this semester.

In the Layer Name text box, the name "Cities" is highlighted. Type Cities > 1 Million in its place. Make sure the dialog box matches the graphic, and then click OK. The layer is renamed in the table of contents.

Tip: There is another way to **rename a layer**: just click the layer name in the table of contents to highlight it, click again to activate the cursor, and then type the new name.



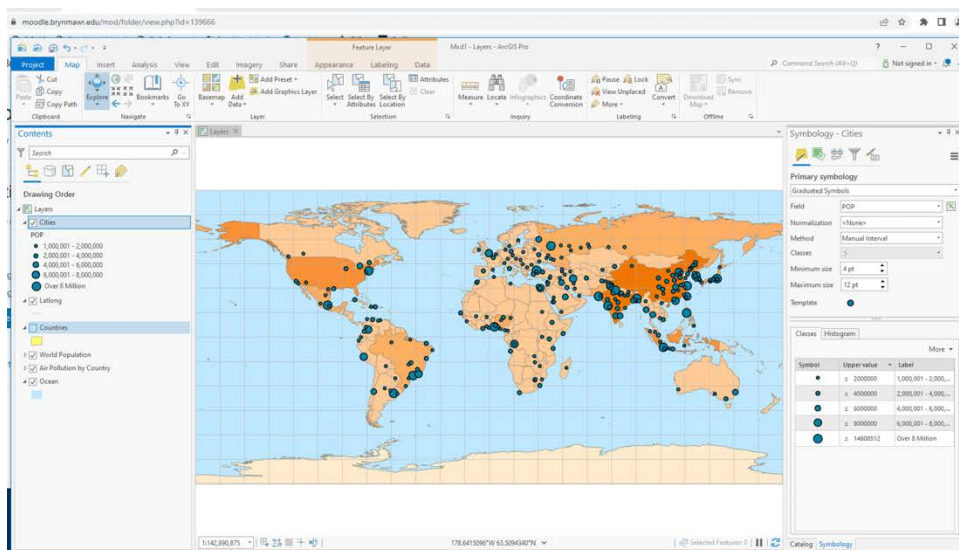
You should know that when you change a layer name in a map document, you are not changing the name of the underlying source dataset. A layer name does not have to match the name of the source dataset. You'll learn more about the connection between a layer and its source data shortly.

Using the method taught in the preceding tip, in the table of contents, below Cities > 1 Million, change the legend name "POP" to Population. This makes it clear that the size of a blue circle corresponds to the size of a city's population. On your own, Change the Latlong layer name to **Graticule**, the technical name for lines of latitude and longitude on a map.

6. In the table of contents, **select the check box next to World Population to turn the layer on**. Nothing is changed in the display.
 - Can you figure out why?

If you think it may have something to do with the **drawing order**, discussed earlier in the exercise, you are correct. The World Population layer is composed of polygons that are the same shape as those in the Countries layer. Since Countries is the first polygon layer in the list of layers, it is obscuring the World Population layer below it.

Turn off the Countries layer. The World Population layer is now visible.



Now you can see something new on the map - in the World Population layer, countries appear in different colors. To understand what the colors mean, you will examine the layer's legend. But first, you will turn off the points and lines to get a clearer picture.

Turn off the layers Cities > 1 Million and Graticule.

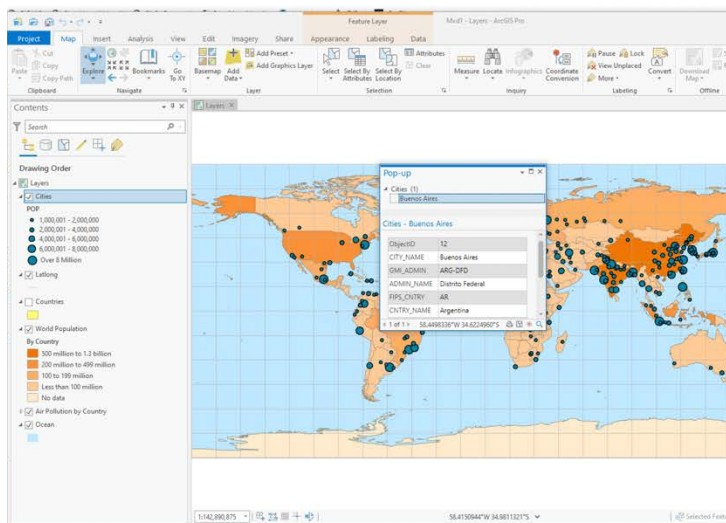
7. Click the triangle next to World Population to **expand the legend for this layer**. Examine the colors on the map and compare them with the legend.

Two countries display populations greater than 499 million.

- Can you name them?

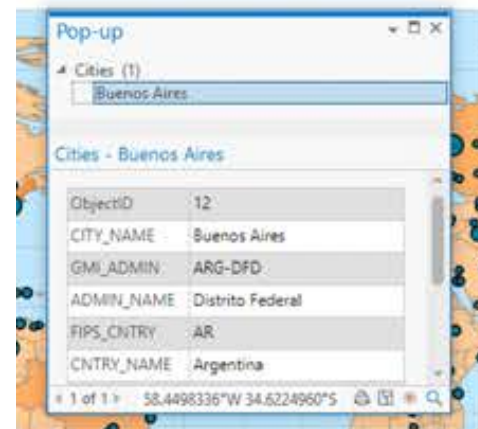
To make sure you answered the preceding question correctly, you will next use the Identify tool.

8. **Hover your mouse over the map and click on one of the countries.** When you click a feature, it opens the **Identify window**.



The Identify window shows the name of the country you clicked, as well as other information, called **attributes or attribute data**, which are stored in a table that is part of this **dataset**. (Depending on which country you clicked, you may have different results, of course.)

You can see by the scroll bar on the right that not all of the data is showing in the pop-up window. You can **expand the window** by hovering your mouse over any edge until an arrow appears and then dragging to change the size of the pop-up.



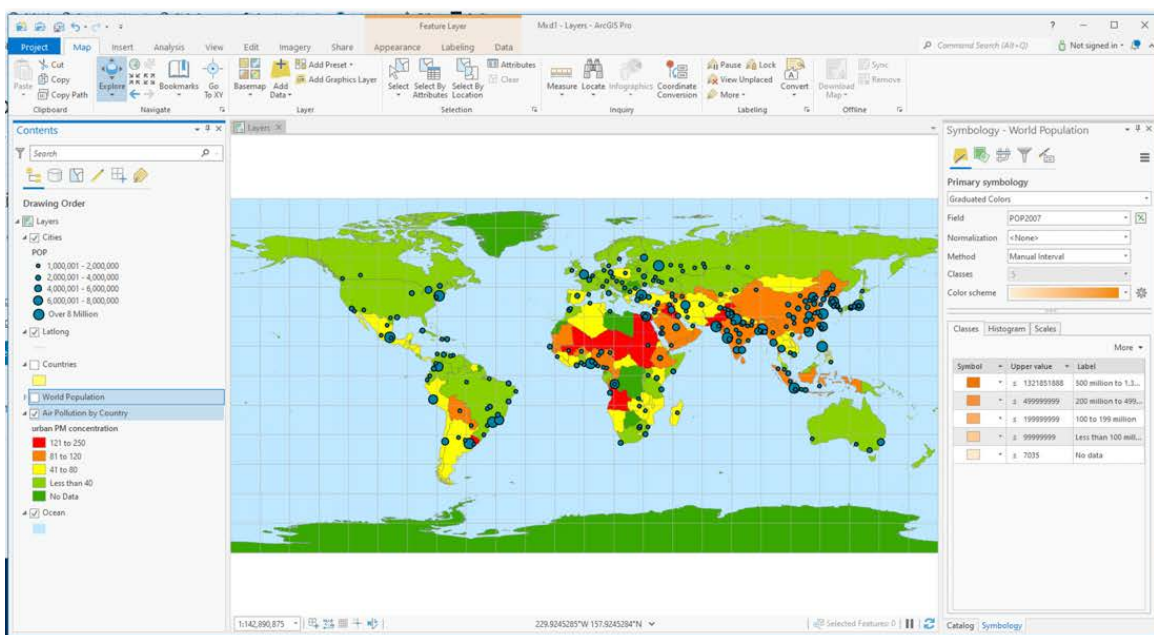
Notice that the feature flashes a color when you click it.

In the Identify window, you will find feature-specific information that is stored with the Countries dataset, including ISO (International Organization for Standardization) numbers and codes, population, area, and many other statistics.

- What is the ISO number for Iran?

With the Identify window still open, **click several other countries in the display area.** Notice that the information in the Identify window is updated automatically as you click different features. You don't have to close the window and reopen it each time you want to identify a new feature.

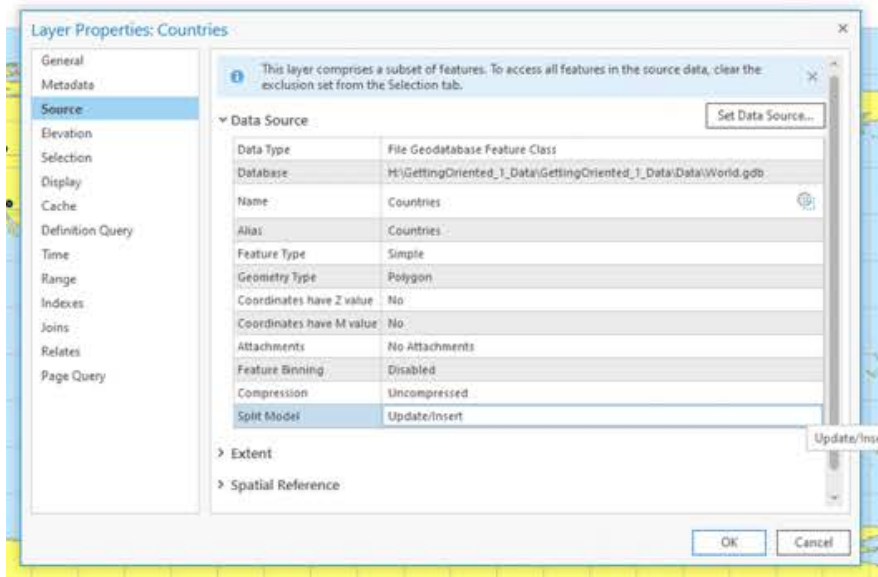
Close the Identify window and turn off the World Population layer. Turn on the Air Pollution by Country layer and expand its legend. This layer shows concentrations of particulate matter (PM) in the air. Data was gathered for urban areas, from which countrywide estimates were calculated.



Turn the World Population on and off to compare it with Air Pollution.

- Does high pollution correlate with high population? What might be some reasons for this?
9. Now that you have seen some examples of various types of data being displayed on a map, you will next **investigate the connection between source data and map layers.**

In the table of contents, **right-click Countries and click Properties**. On the Layer Properties dialog box, **click the Source tab and examine the Data Source information**. Notice that a layer does not have to be visible on the map to see its properties.



[Note: Later in the semester, you may simply be asked to "open the layer properties." You will have to remember how to do this.]

What is the source data type?

A **feature class** is a collection of geographic features that have the same geometry type (such as point, line, or polygon), the same attributes, and the same spatial reference. Feature classes can be stored in a geodatabase or in other data formats.

A **geodatabase** is a "container" used to hold a collection of datasets.

A **file geodatabase feature class** is a feature class file stored in a file geodatabase.

- What is the name of the source feature class, and in which geodatabase is it located?

Using the same approach, look at the source dataset for World Population and Air Pollution by Country.

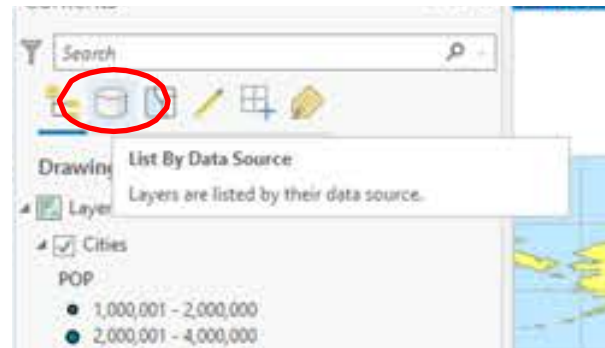
- What are the names of the source feature classes for these two layers?

It is important to understand that **a map may include multiple layers that point to the same underlying source data**. In the case of the current map document, the Countries, World Population, and Air Pollution layers are based on the same data source - a geodatabase feature class called World. (You will learn more about data types later.) Layers and source datasets sometimes have the same name, but they don't have to.

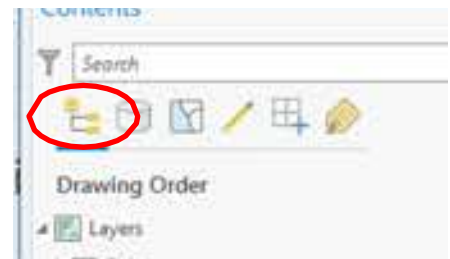
Despite sharing the same source dataset, the layers look different from each other. Why? Because they have different symbology schemes. Unlike source data, **layers store**

symbology information in a map document. For instance, the Countries layer is symbolized using a single color for all country polygons. The World Population layer has graduated colors based on population data, and the Air Pollution layer has graduated colors based on particulate matter calculations. Population and particulate matter are all stored as **attributes** of the Countries **feature class** (there are many other attributes stored with the feature class as well). You will learn more about attribute data and how to create symbology soon.

Close the layer properties. At the top of the table of contents, click the List By Source button. Pause the mouse pointer over the data path to see the path in its entirety.



Click the List By Drawing Order button contents to restore the table of contents to its default appearance.



10. To **save your work to a new file**, click the Project tab on the top left and then click Save As. **Browse to YOUR file storage location and save with a new name.**

11. Finally, let's **look at the different map views that are in this ArcGIS Project file.**

If you closed ArcMap, start it again and re-open the GettingOriented.ppkx file.

Look at the bar just above the center map display, and you will see three view tabs. The active view tab is highlighted in blue. **Click on tab Ex_1b.** This map looks similar to the one on the first tab but with fewer layers. Explore all three tabs.

