Step-by-step guide: From Table to Map (DRAFT)

Contents:

1. Putting a GIS project together

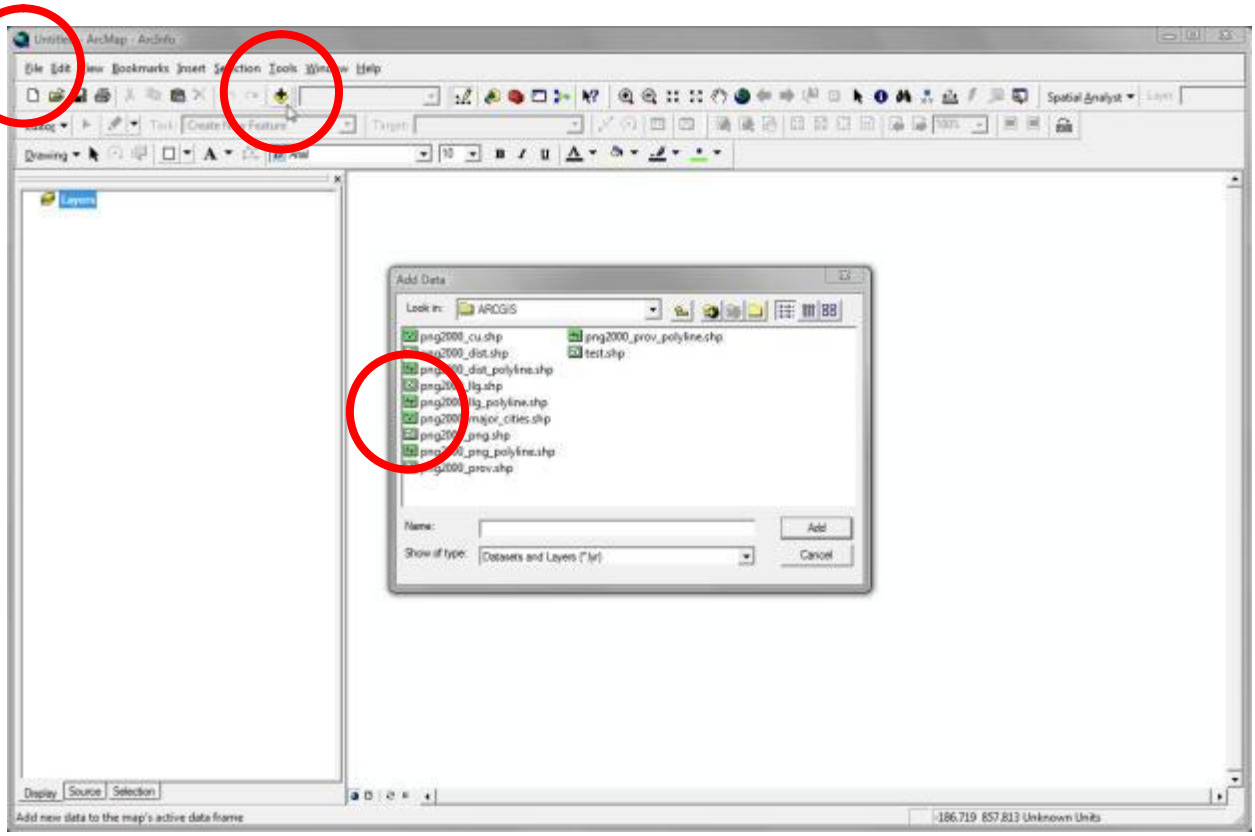
Before we can start importing the DHS 2006 data table and making a map from it, we need to do two things:

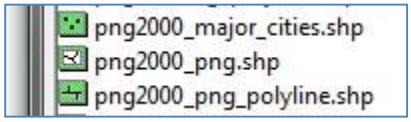
- Load the spatial data layers we need to make a simple map
- Organize the spatial data

You can add spatial (GIS) datasets in ArcGIS in two ways:

- Browse menu *File* → *Add Data*, or
- Click on the  symbol in the toolbar menu

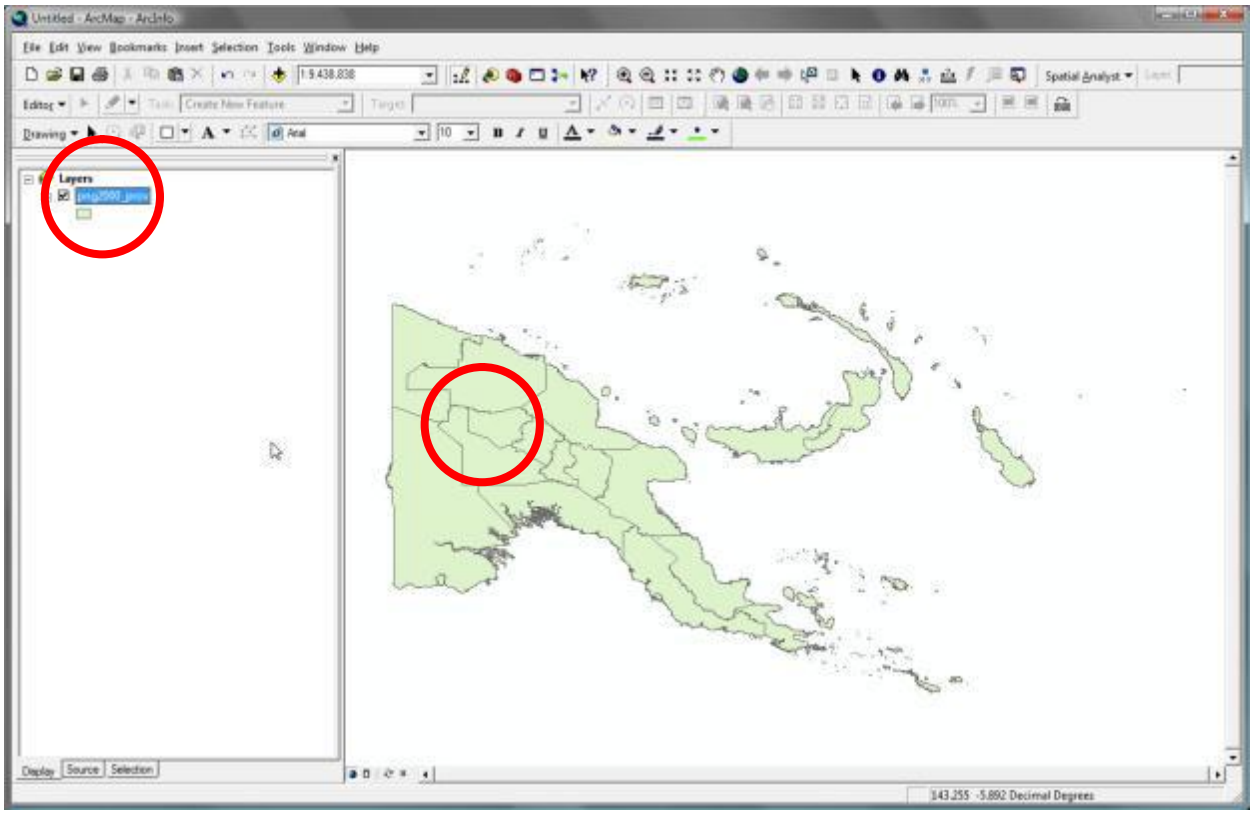
NOTE: You can't open GIS files with the  button. This one is reserved to open map project files, which are containing individual layers, their layout, etc.



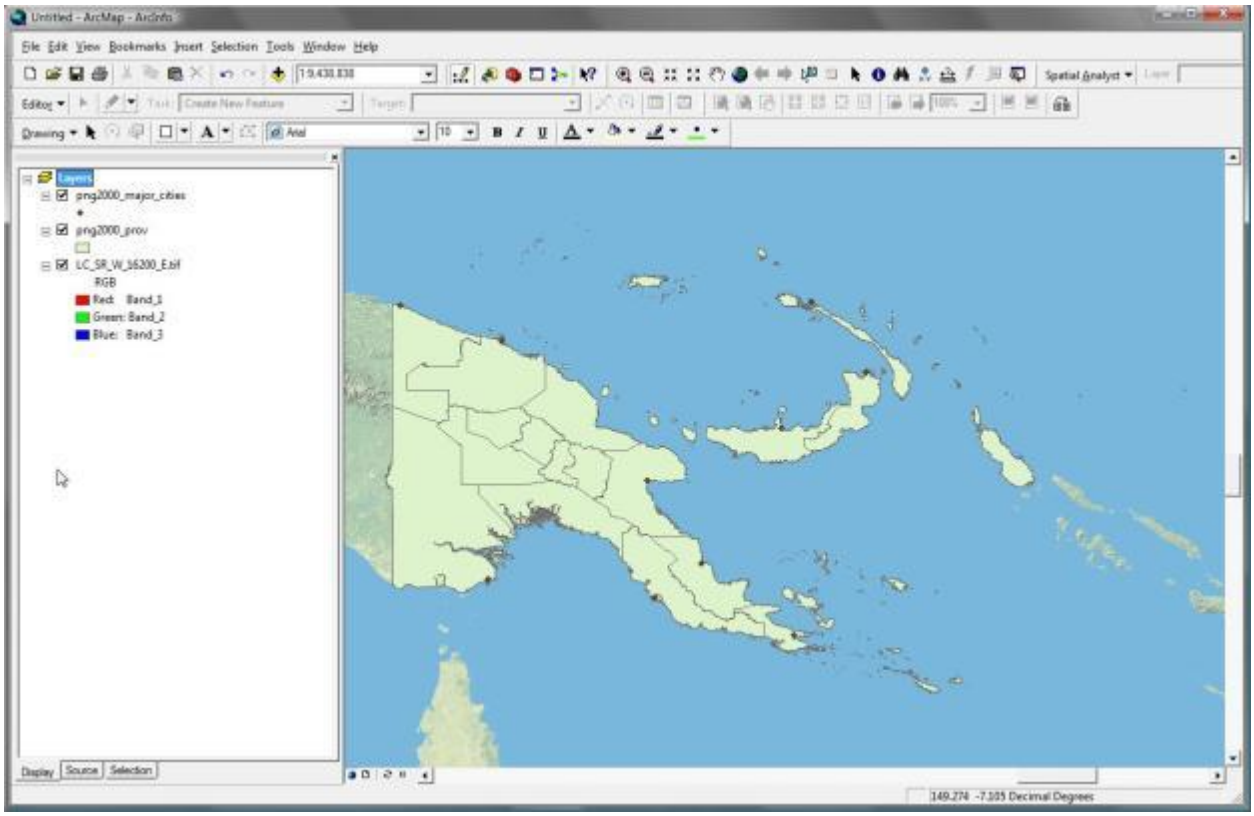


The symbols indicate point, polygon, and polyline files, respectively.

Choose a file and double click it. The file is loaded into the **Table of Contents** on the left, and the data is displayed in the **Data View** on the right side:



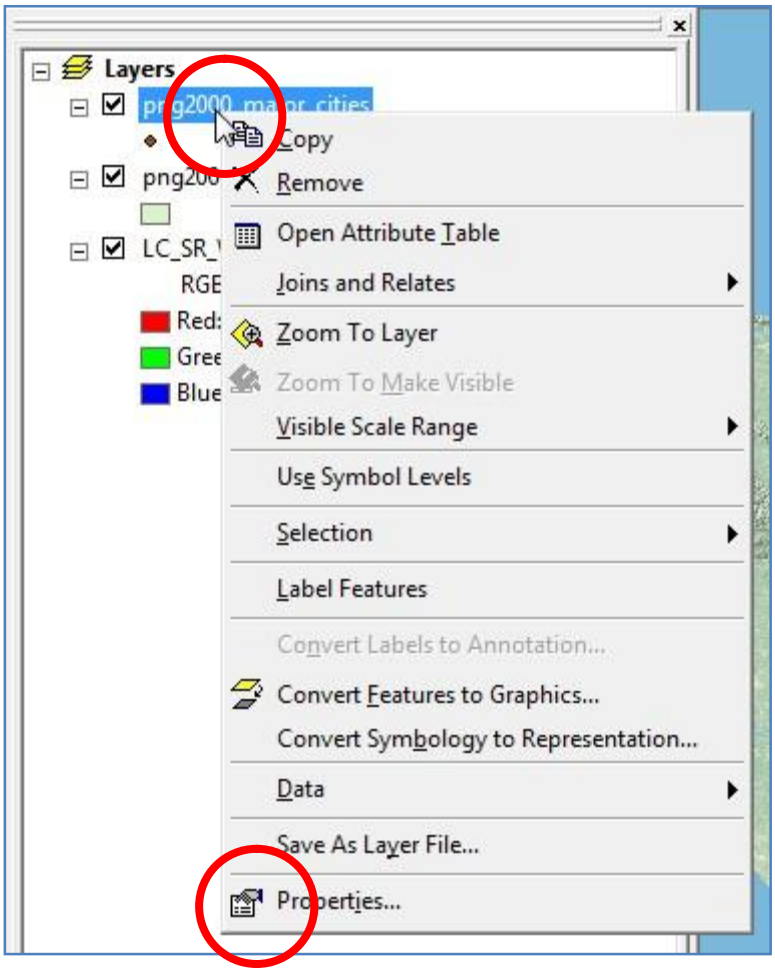
Repeat these steps to load additional data:



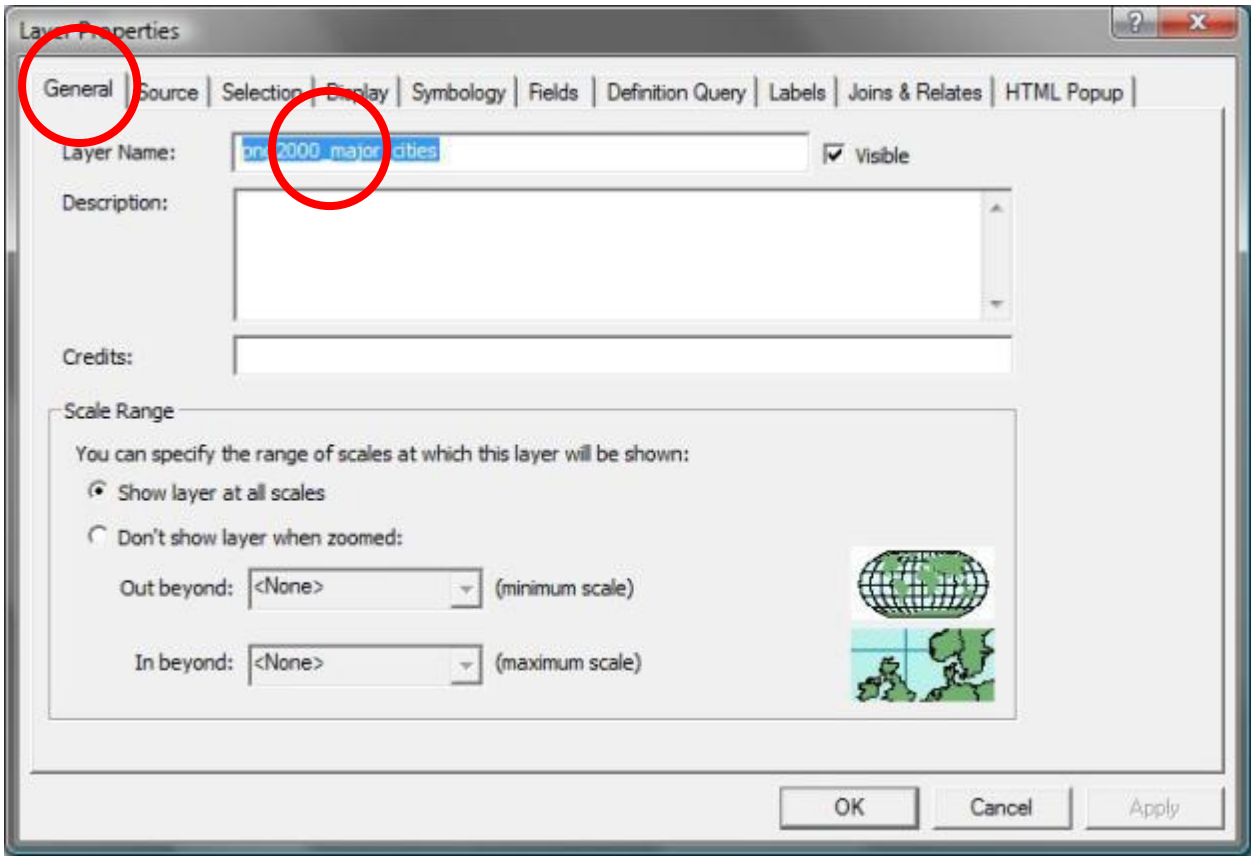
Now, let's organize the data! We will do 3 things:

1. Rename items – to improve understanding of the contents of layers
2. Create folders – to increase order with many layers involved
3. Rearrange order of layers and folders: to achieve best visibility of individual layers

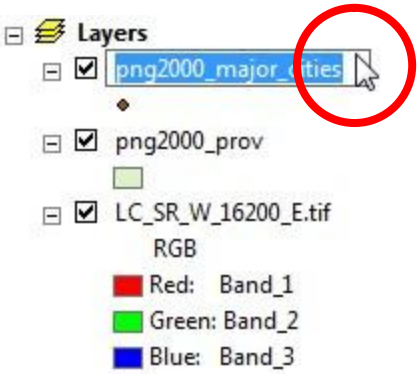
1. Rename items: by default, ArcGIS displays the layer with its file name. As these are often abbreviations, you might want to give the layer the full name of the content, to make it easier to recognize later. You can rename each layer by clicking on it with the right mouse button, go to "properties" and choosing "rename" from the menu that appears.



In the “General” tab of the properties, you can rename the layer under “Layer name”:



As a shorter alternative you can also simply mark the layer with a single left mouse click, and then click it once more – it will allow you to edit the name then. This is similar to the Windows File Explorer:

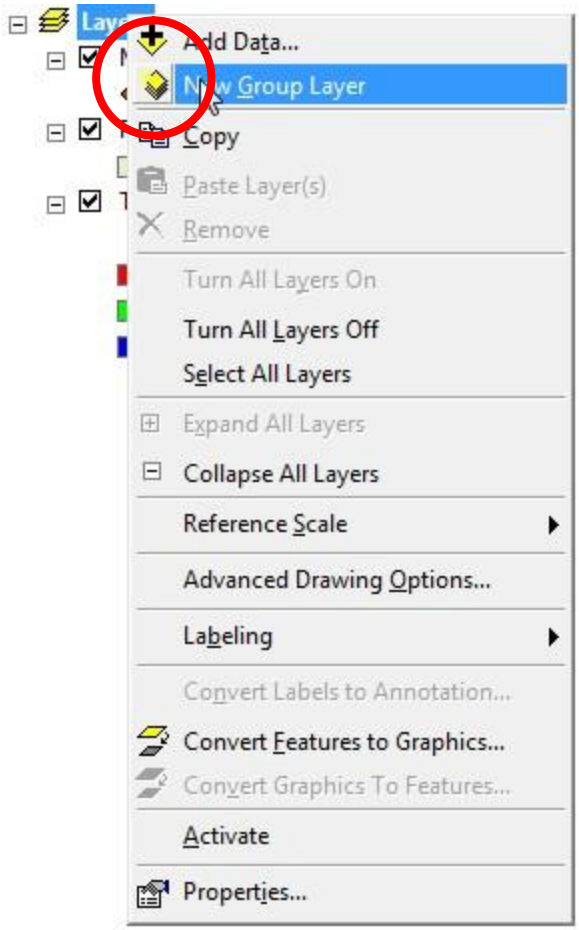


Rename the layers as follows:

- Png2000_major_cities → Major Cities
- Png2000_prov → Provinces
- LC_SR_W_16200.tif → Terrain

NOTE: Renaming the *layers* in ArcGIS does not rename the corresponding GIS *files* on your hard disk! If you want to rename the files, you need to use ArcCatalog.

2. Create folders: Folders are there to thematically group your information, e.g. district, province and national boundaries into a folder "ADMIN". This can help increase clarity and overview as your layer list can grow quite long for more complex maps. Right mouse click on the item "Layers", choose "create group" – a new group appears. Rename it "ADMIN".



Create 3 groups and rename them as follows:

- ADMIN
- DHS2006
- TOPOGRAPHY

3. Rearrange the order of the data: Now we just have to order the data into the groups. This is done by simple "drag-and-drop": Click on the layer, hold the left mouse button down, drag the layer up or down in the list to a position where you want it, release left mouse button.

Your display should look like this now:

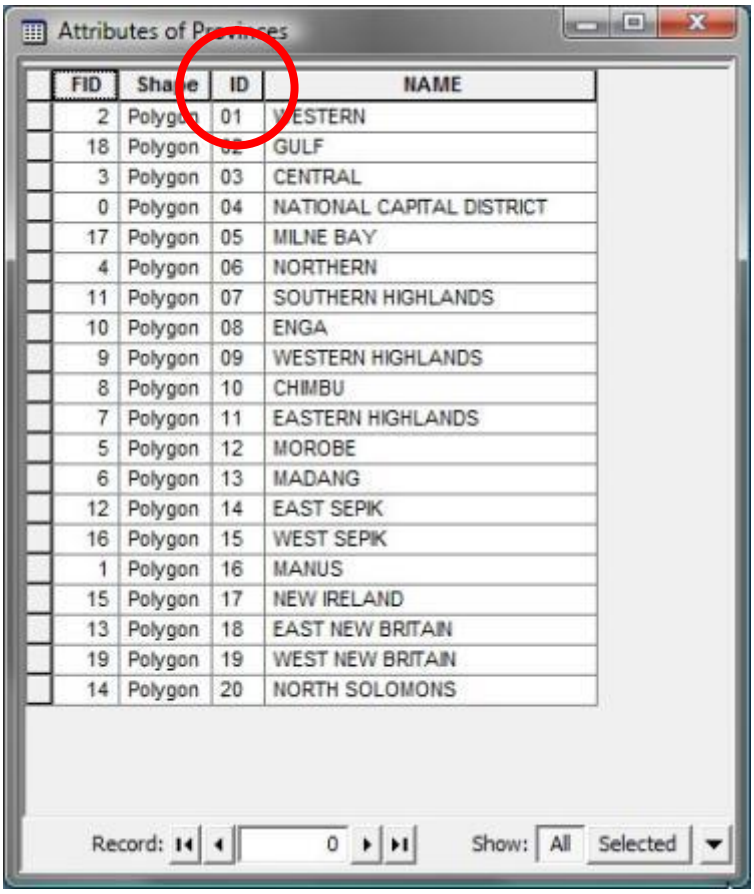
NOTE: When you arrange data, keep in mind that your GIS layer list represents a stack of information – what is on top covers what is on the bottom. Consequently, polygon and raster layers cover everything that is underneath (e.g. roads, village points) – if you want to show that, you need to put it on top of these layers!

2. Importing a table into a GIS layer

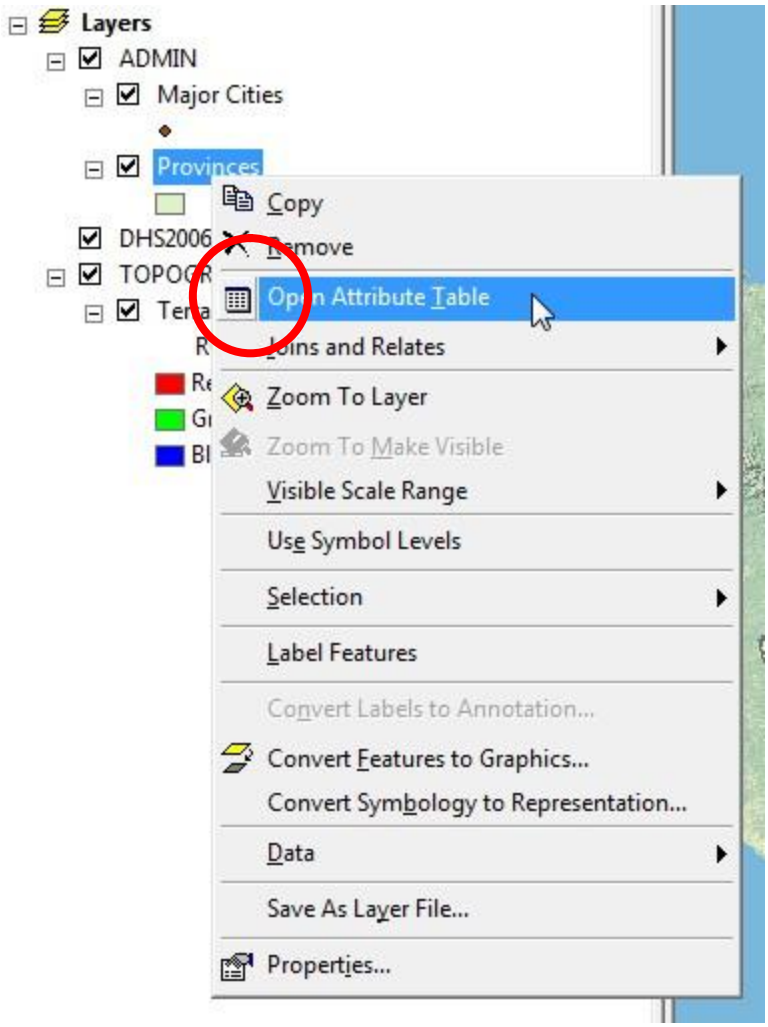
After we have prepared a basic map project, we are ready to attach our DHS 2006 statistical information which we have prepared for ArcGIS before (see step-by-step guide: Statistical Data Preparation).

This process is called JOIN in ArcGIS – it attaches tabular information to a GIS layers' attribute table based on a common denominator. In our case, these are the province codes:

	A	B	C
1	Province	no	yes
2	01	41	59
3	02	51	49
4	03	41	59
5	04	44	56
6	05	43	57
7	06	55	45
8	07	58	42
9	08	57	43
10	09	55	45
11	10	53	47
12	11	50	50
13	12	48	52
14	13	53	47
15	14	52	48
16	15	46	54
17	16	34	66
18	17	41	59
19	18	50	50
20	19	57	43
21	20	41	59



NOTE: You browse the attribute table of the GIS file by right mouse click on the layer (Provinces) and selected "Attribute Table" from the menu.


Layers
ADMIN
Major Cities
Provinces
DHS2006
TOPOGR
Copy
Remove
Open Attribute Table
Joins and Relates
Zoom To Layer
Zoom To Make Visible
Visible Scale Range
Use Symbol Levels
Selection
Label Features
Convert Labels to Annotation...
Convert Features to Graphics...
Convert Symbology to Representation...
Data
Save As Layer File...
Properties...

After we have checked that we have a common geographic reference layer with identical records and codes, we can use these attributes to import our DHS statistical data into the GIS file. This is done with the **JOIN** function.

There are two ways to join the Excel table:

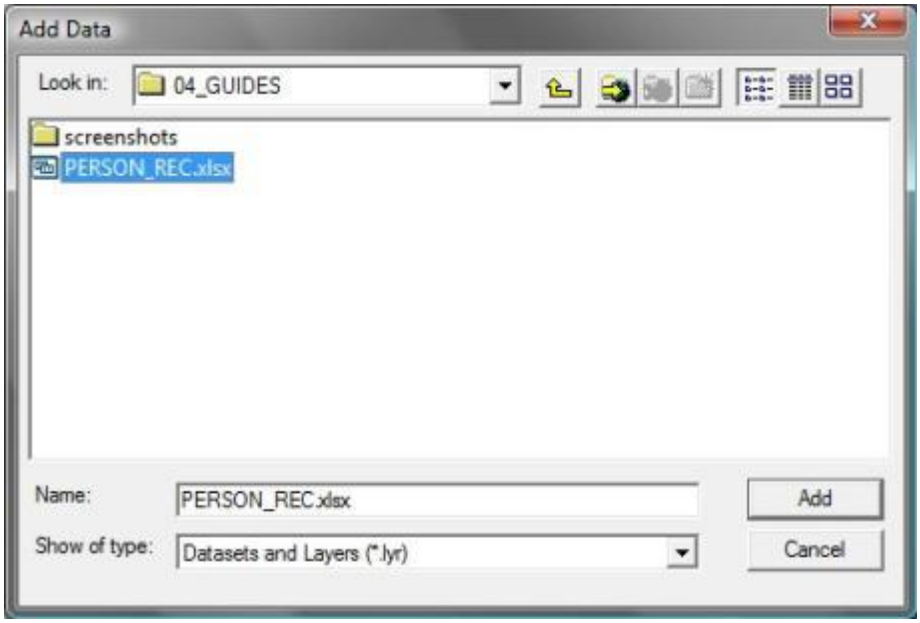
1. Loading the Excel table into ArcGIS before JOIN
2. Browse to the Excel table externally during the JOIN process

Option 1 has the advantage that you can see the Excel table in ArcGIS before you run JOIN, and check it for potential compatibility issues. We will therefore use this option.

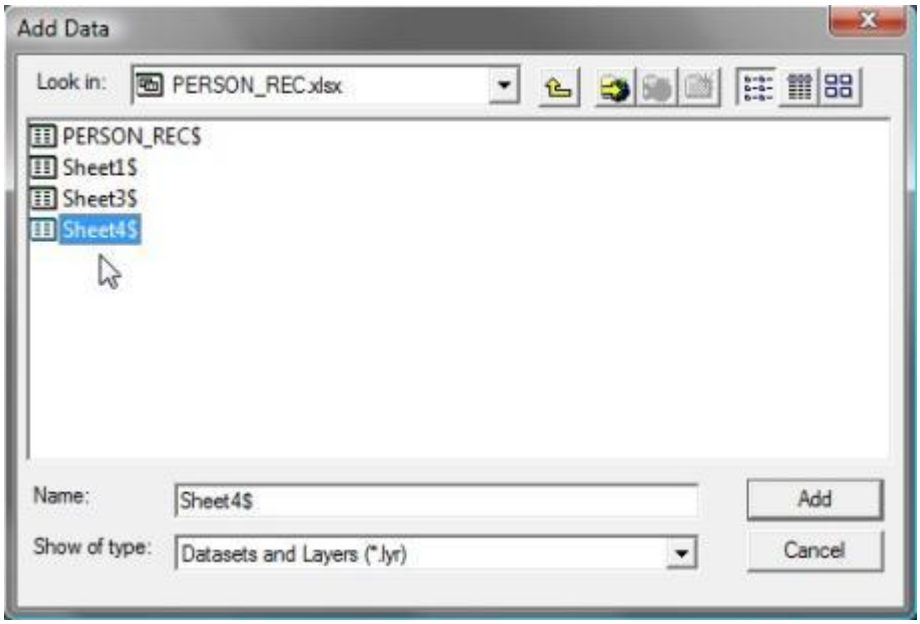
You can add statistical tables in ArcGIS the same way you add spatial (GIS) layers:

- Browse menu *File* → *Add Data*, or
- Click on the  symbol in the toolbar menu

Browse to the Excel file:

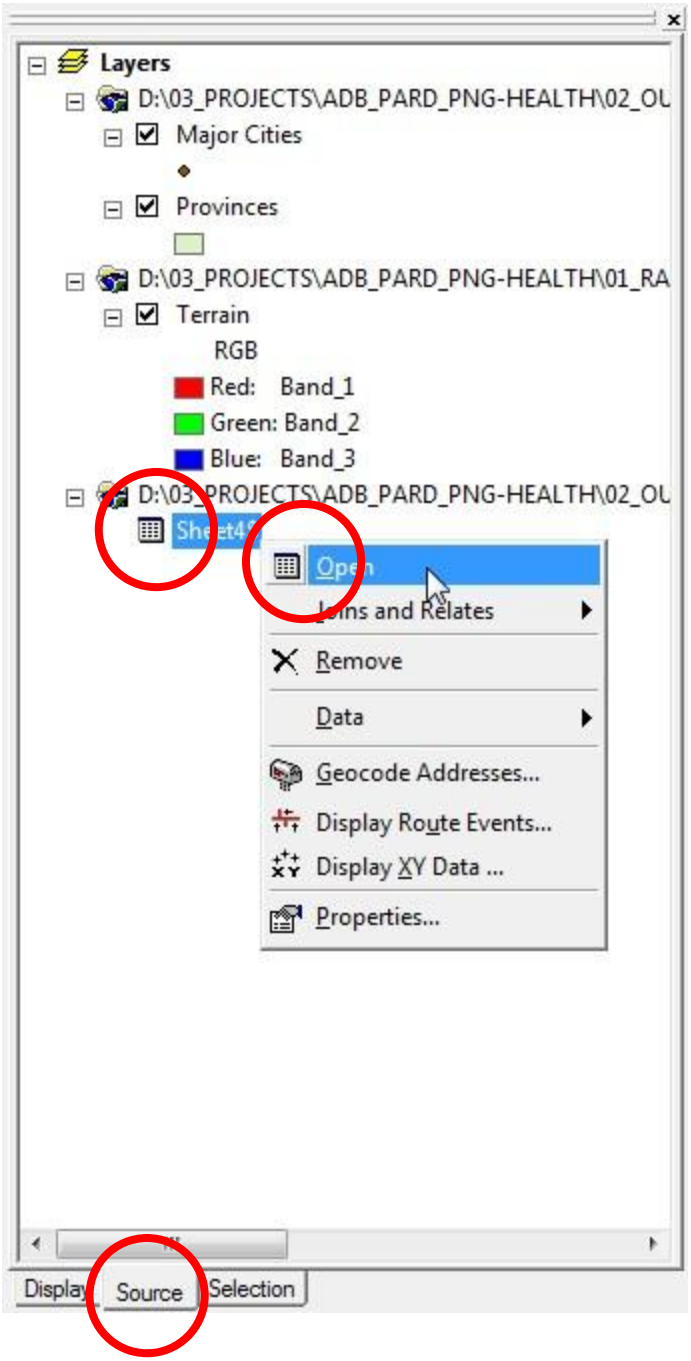


Double clicking on the Excel file shows you all the worksheets it contains. We need only the final worksheet we formatted for ArcGIS (Sheet4):

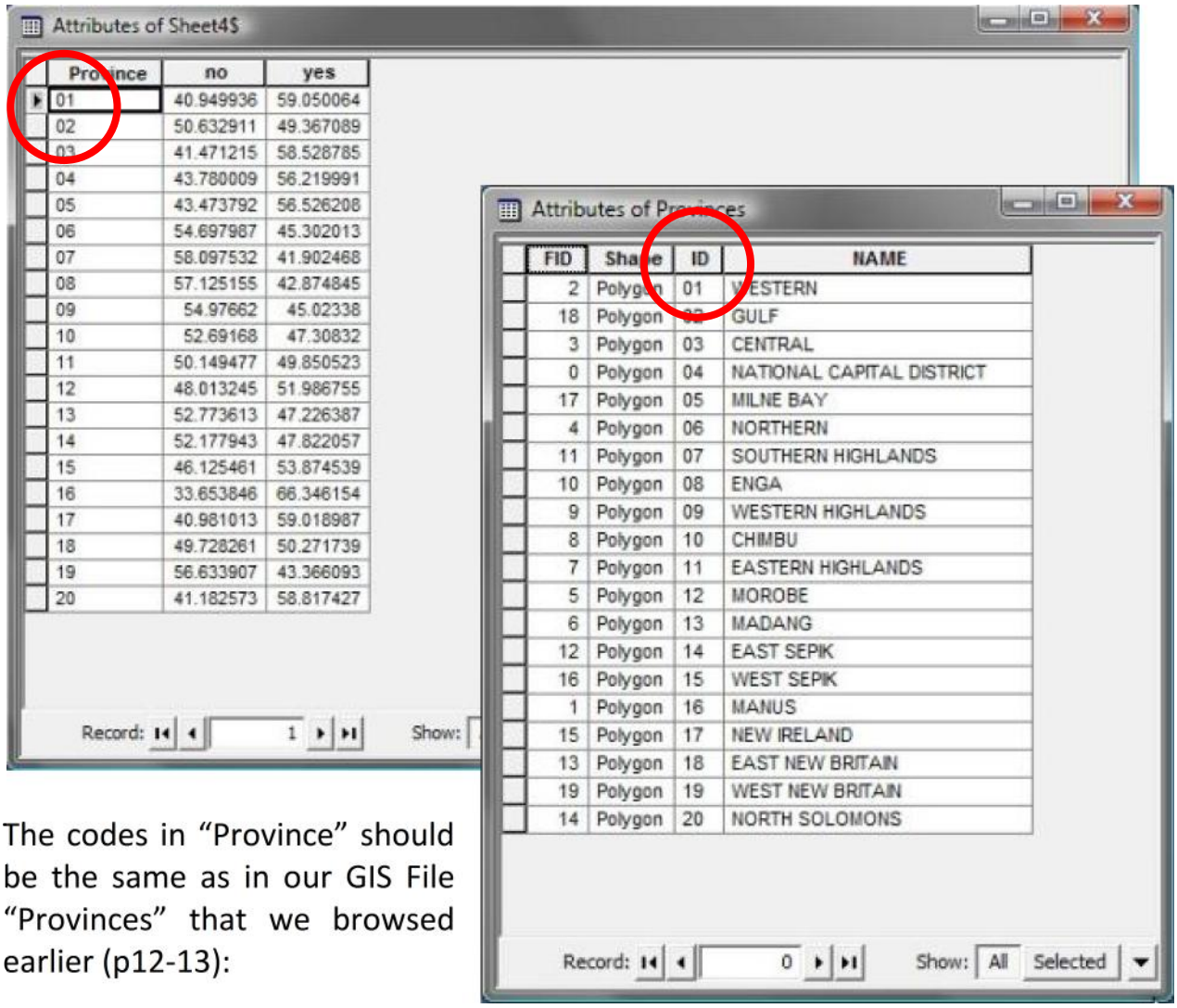


The Excel table is loaded into ArcGIS. You can open and browse it by right mouse click on the layer → open.

NOTE: ArcGIS automatically switches from Display to Source View. You can't see the Excel table in Display View. (See screenshot on the next page)


Layers
D:\03_PROJECTS\ADB_PARD_PNG-HEALTH\02_OU
Major Cities
Provinces
D:\03_PROJECTS\ADB_PARD_PNG-HEALTH\01_RA
Terrain
RGB
Red: Band_1
Green: Band_2
Blue: Band_3
D:\03_PROJECTS\ADB_PARD_PNG-HEALTH\02_OU
Open
Joins and Relates
Remove
Data
Geocode Addresses...
Display Route Events...
Display XY Data ...
Properties...
Display
Source
Selection

You Excel file should look like this:



Attributes of Sheet4$

Province	no	yes
01	40.949936	59.050064
02	50.632911	49.367089
03	41.471215	58.528785
04	43.780009	56.219991
05	43.473792	56.526208
06	54.697987	45.302013
07	58.097532	41.902468
08	57.125155	42.874845
09	54.97662	45.02338
10	52.69168	47.30832
11	50.149477	49.850523
12	48.013245	51.986755
13	52.773613	47.226387
14	52.177943	47.822057
15	46.125461	53.874539
16	33.653846	66.346154
17	40.981013	59.018987
18	49.728261	50.271739
19	56.633907	43.366093
20	41.182573	58.817427

Record: 1 Show:

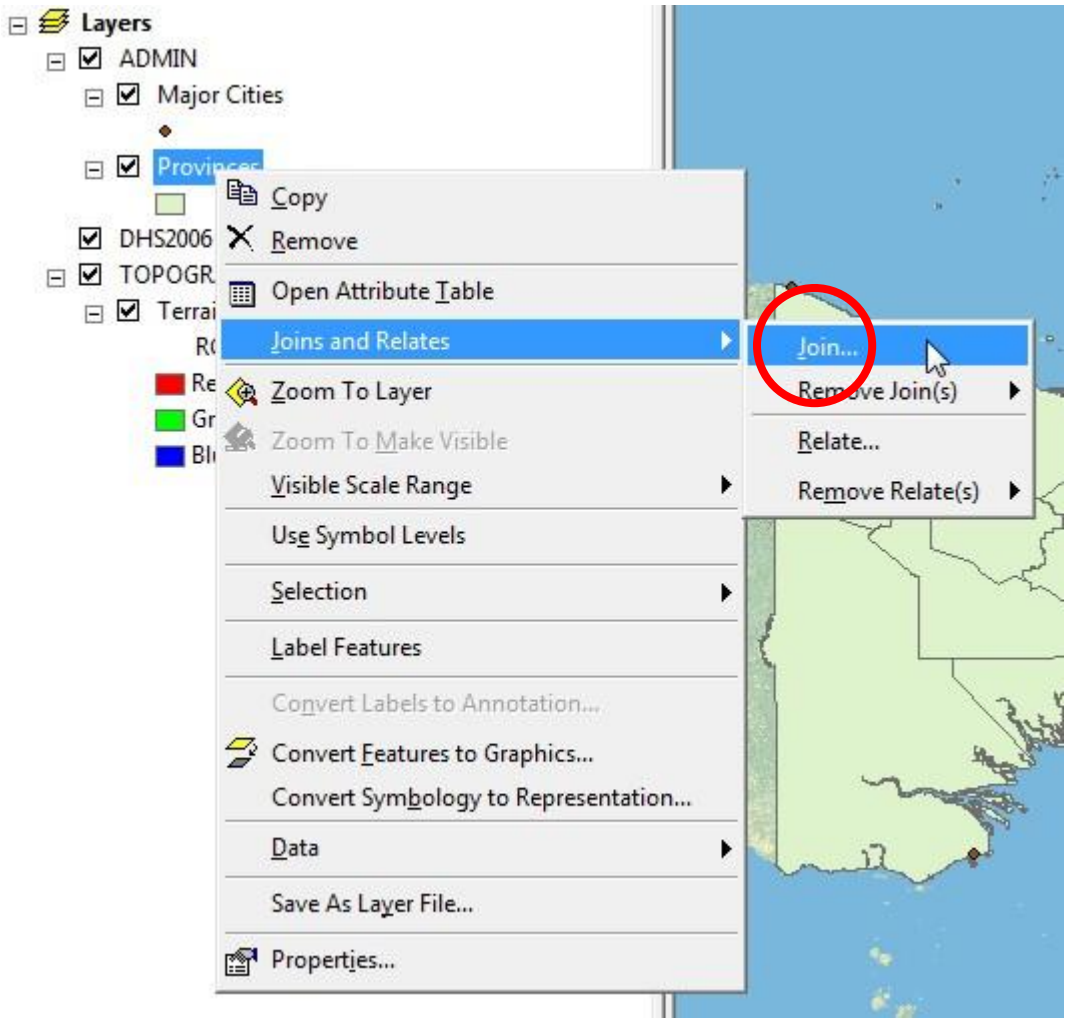
Attributes of Provinces

FID	Shape	ID	NAME
2	Polygon	01	WESTERN
18	Polygon	02	GULF
3	Polygon	03	CENTRAL
0	Polygon	04	NATIONAL CAPITAL DISTRICT
17	Polygon	05	MILNE BAY
4	Polygon	06	NORTHERN
11	Polygon	07	SOUTHERN HIGHLANDS
10	Polygon	08	ENGA
9	Polygon	09	WESTERN HIGHLANDS
8	Polygon	10	CHIMBU
7	Polygon	11	EASTERN HIGHLANDS
5	Polygon	12	MOROBE
6	Polygon	13	MADANG
12	Polygon	14	EAST SEPIK
16	Polygon	15	WEST SEPIK
1	Polygon	16	MANUS
15	Polygon	17	NEW IRELAND
13	Polygon	18	EAST NEW BRITAIN
19	Polygon	19	WEST NEW BRITAIN
14	Polygon	20	NORTH SOLOMONS

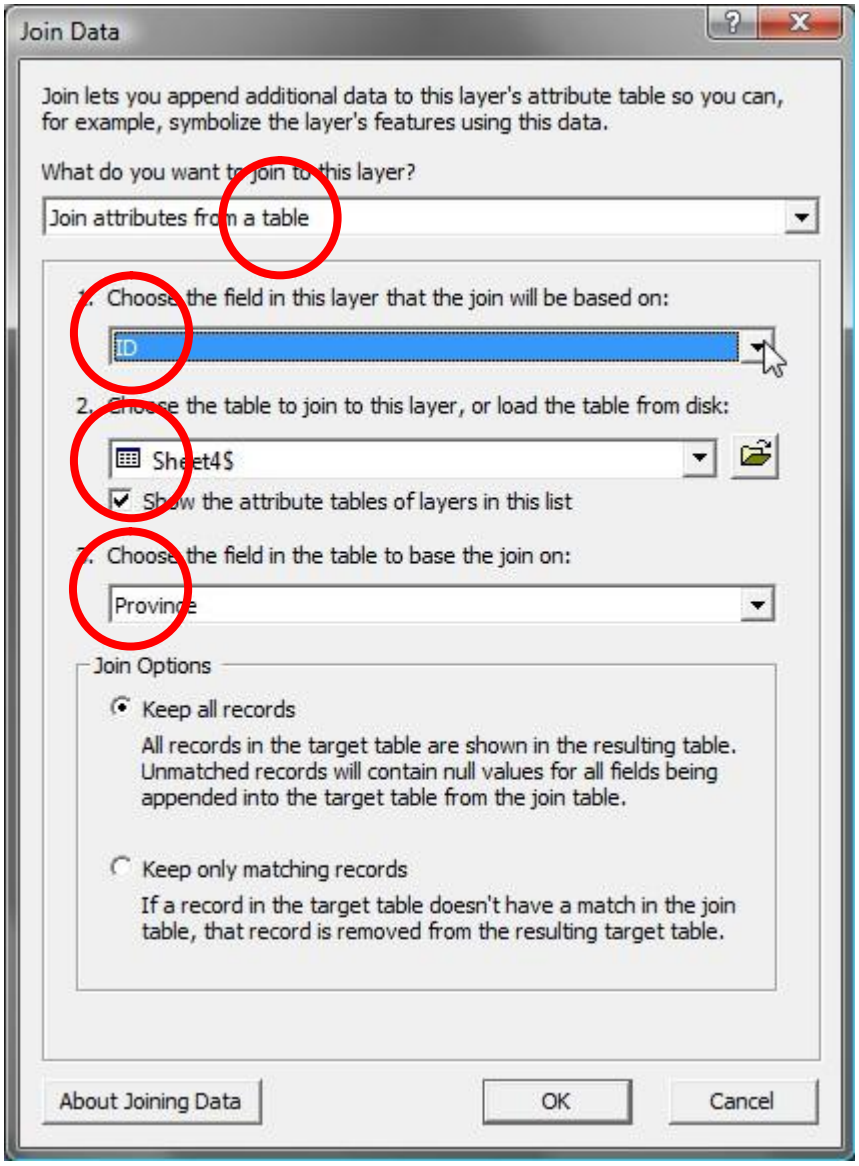
Record: 0 Show: All Selected

The codes in “Province” should be the same as in our GIS File “Provinces” that we browsed earlier (p12-13):

We can now join the Excel table into the GIS layer attribute table. Right mouse click on the “Provinces” layer → Joins and Relates → Join…



The following dialogue appears:



Choose “Join attributes from a table”.

NOTE: The dialogue directly refers to the “Provinces” layer from which we started it from, so you don’t need to select the GIS layer.

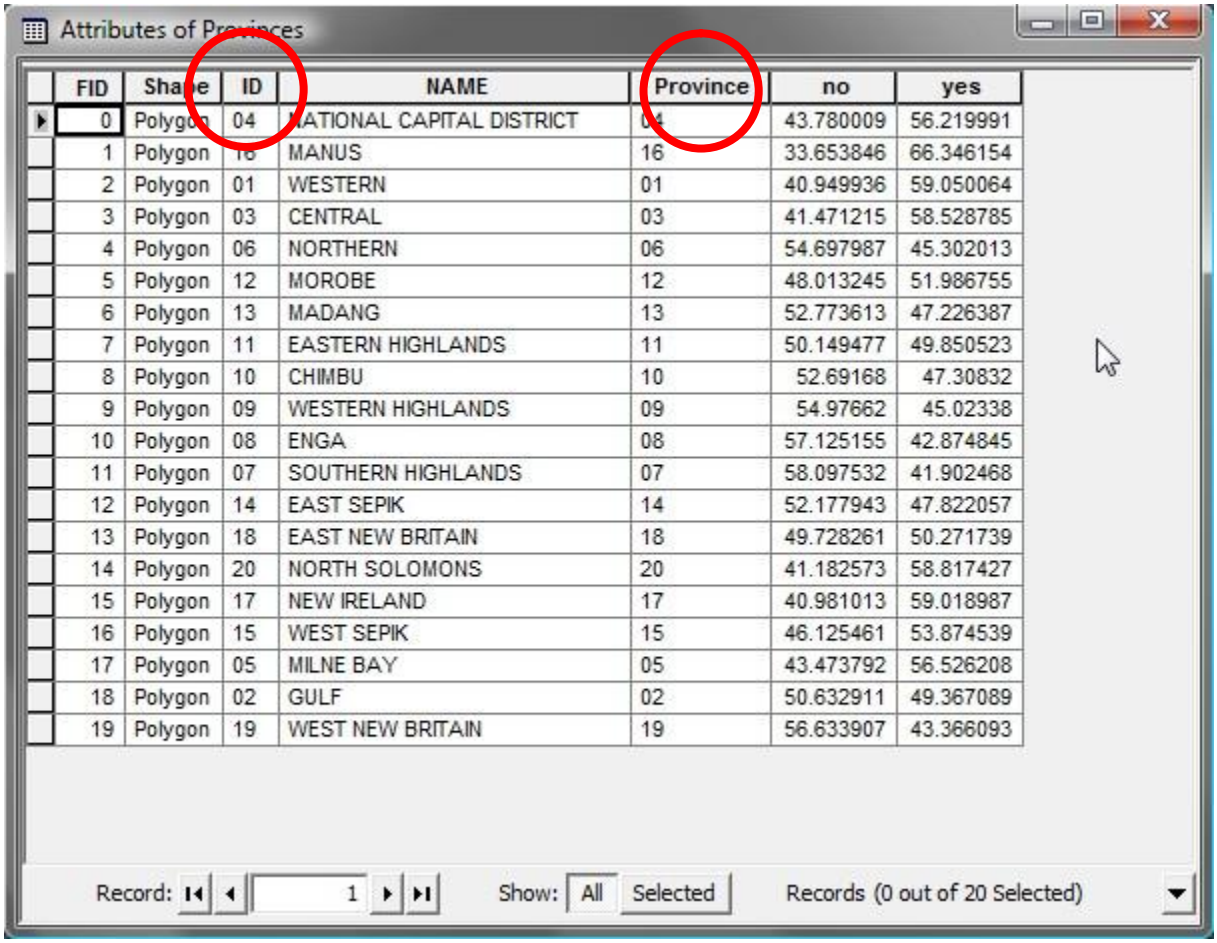
Choose the filed in the “Provinces” layer that the join will be based on. In our exercise this is the “ID” field.

Choose the table to join to the “Provinces” layer. In our exercise this is the “PERSON_REC Sheet4$” that we have just loaded into ArcGIS in the previous steps.

Now select which field in our Excel table is identical with the GIS layers ID field. In our exercise this is the column “Province”.

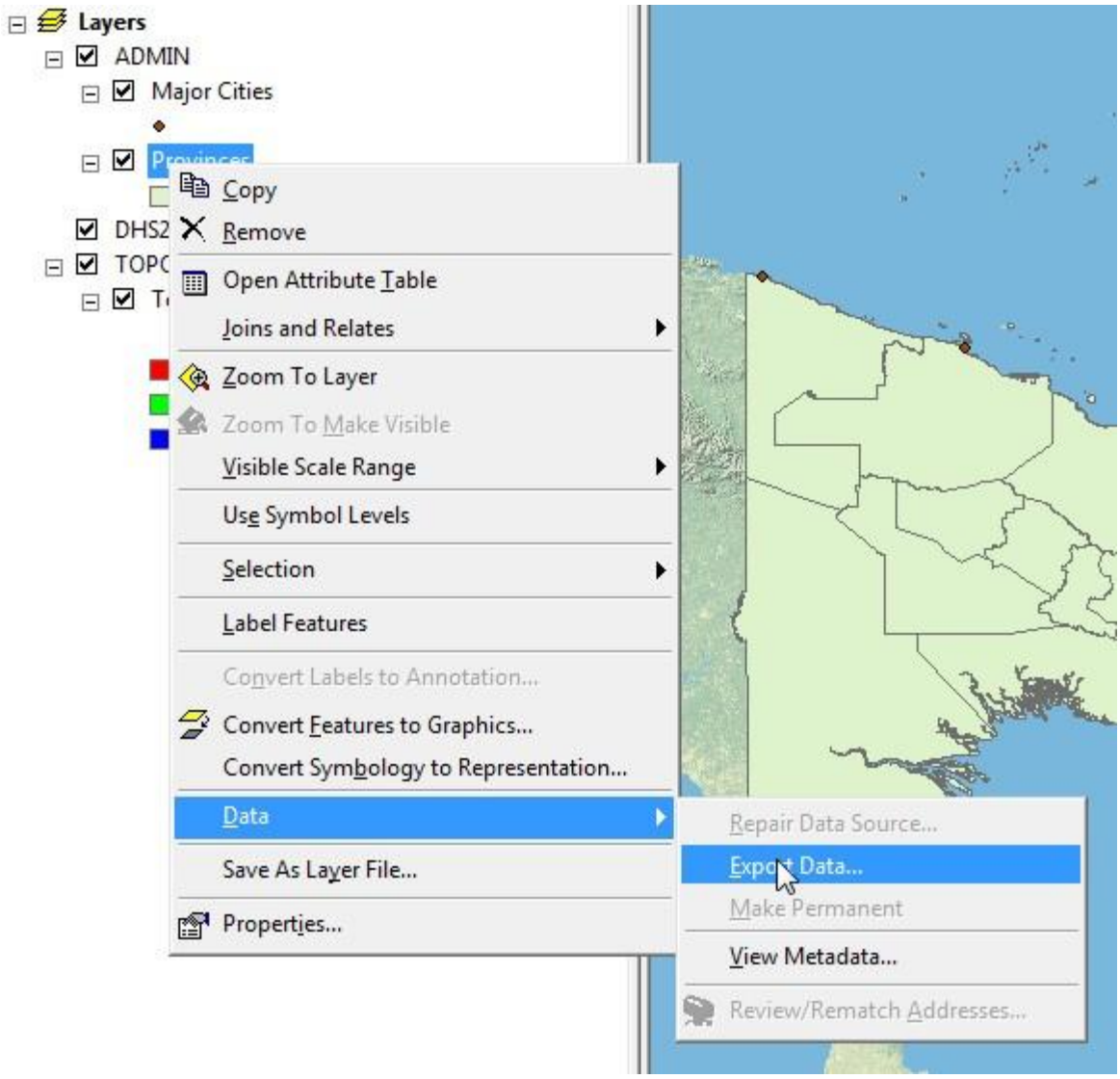
Click OK.

Your “Provinces” GIS file now contains the contents of our Excel table:



NOTE: You can see how the columns “ID” (from the GIS file) and “Province” (from the Excel file) are identical.

NOTE: In order to permanently save the imported statistics with the GIS file, you need to export the file into a new file. This is done through right mouse click → Data → Export Data. The new file contains the statistical data permanently.

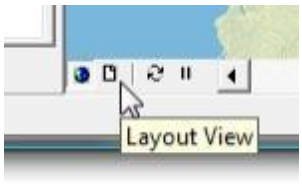


Add the file to ArcGIS and place it under the group DHS2006.

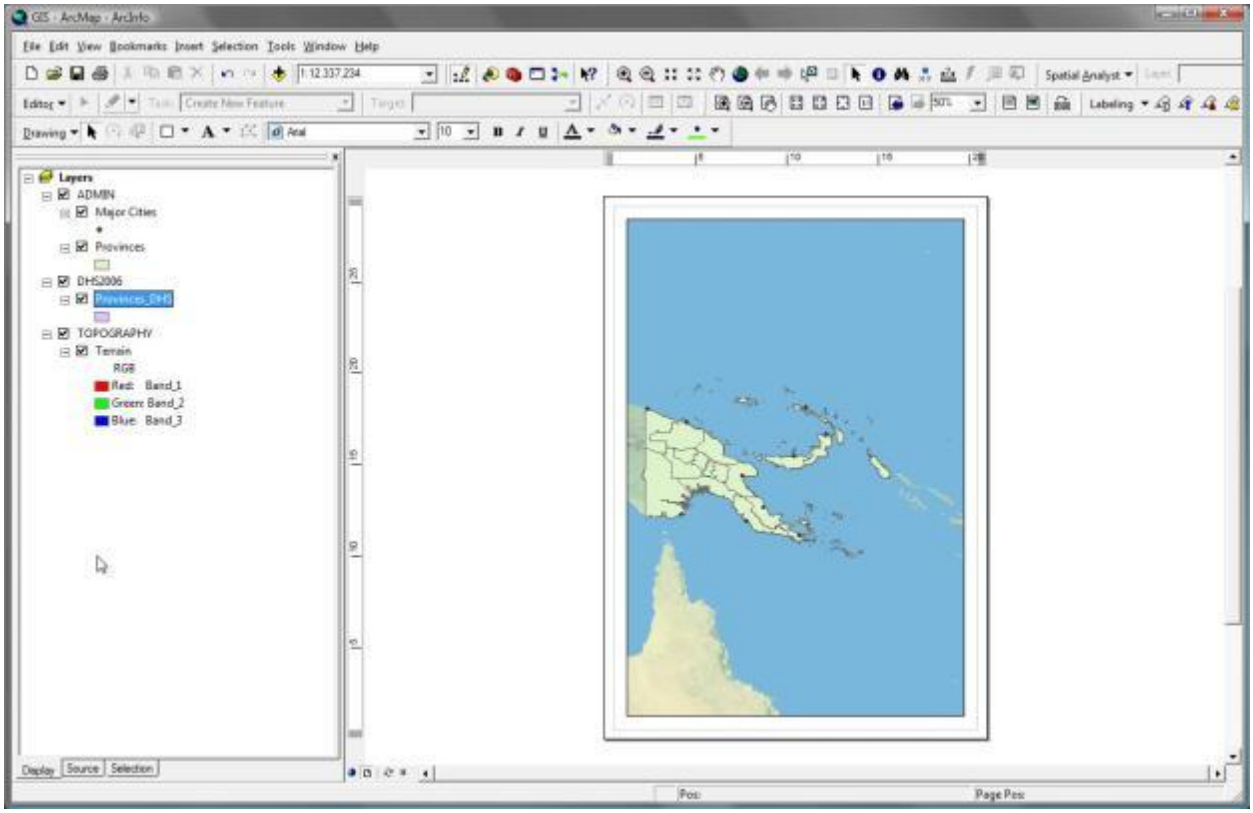
3. Creating a Map

Now we are ready to produce a map based on the DHS 2006 statistics.

The first step is to move the main window (that displays the data) from the *Data View* to the *Layout View*.



Your ArcGIS window looks now like this:



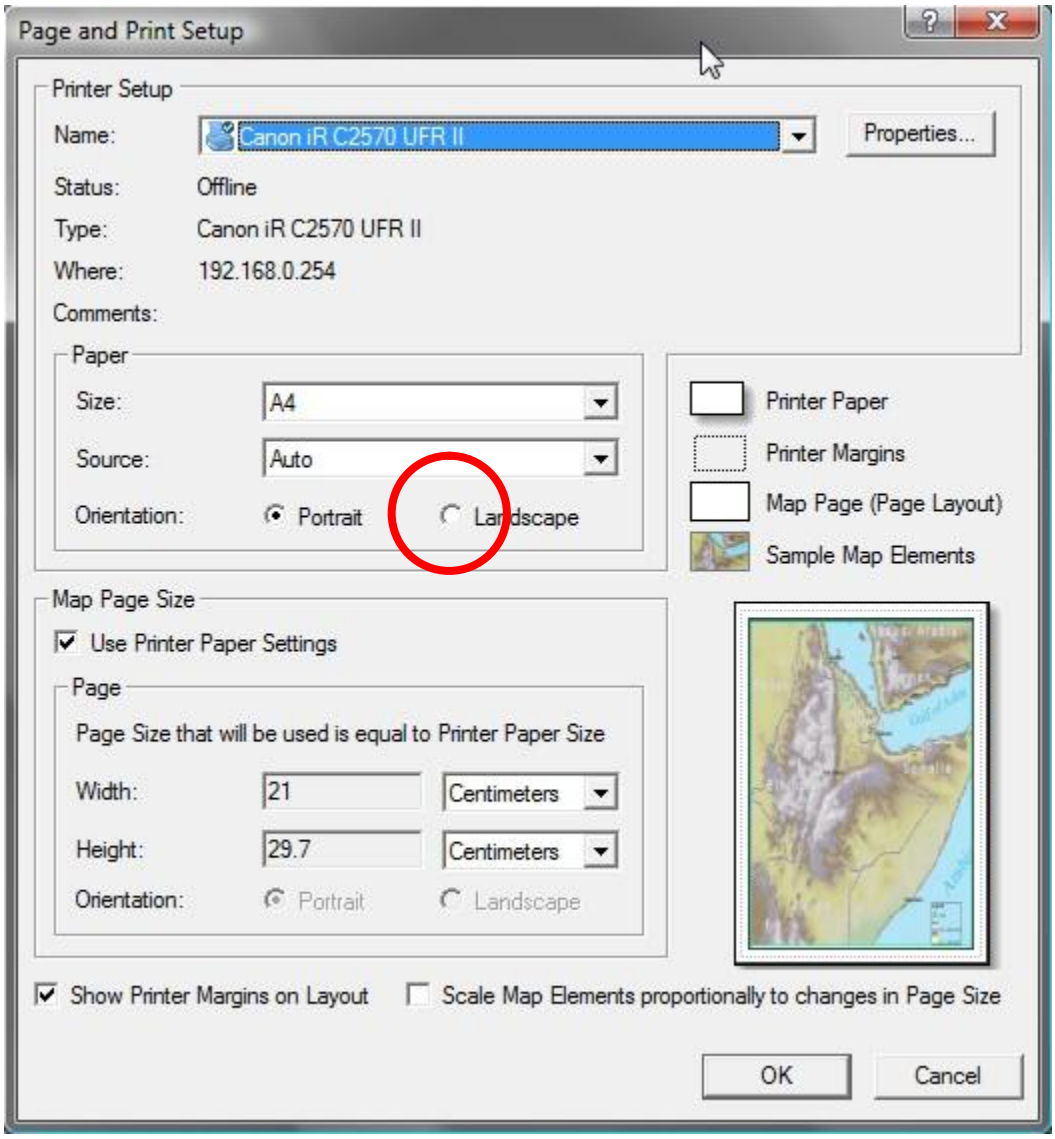
To produce a ready map, we need to do two things:

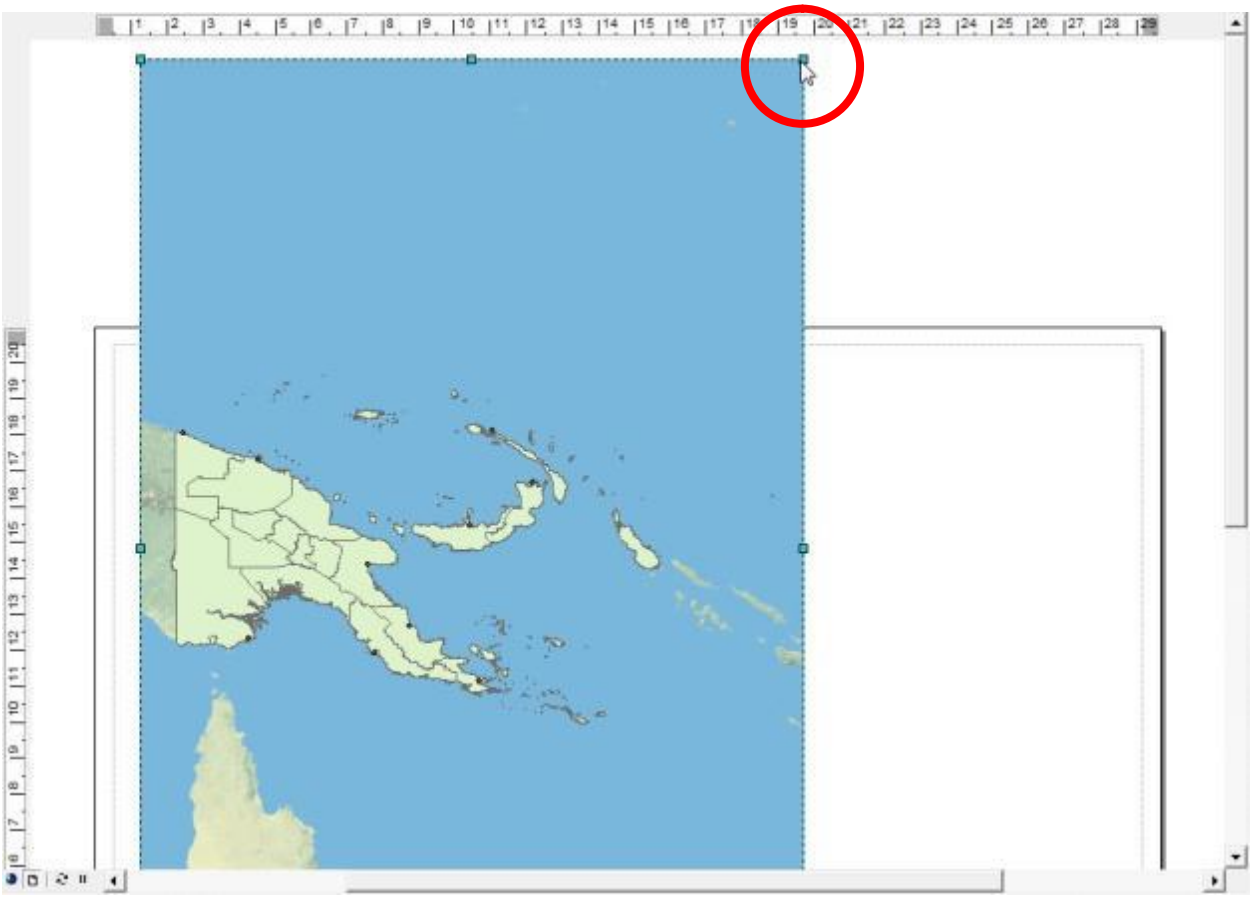
1. Layout the map template (everything around the actual map window)
2. Change the symbology in the map window

1. Layout the map template: Every map contains a set of standard elements:

- Map Title
- North Arrow
- Scale Bar
- Legend
- Source information
- Disclaimer

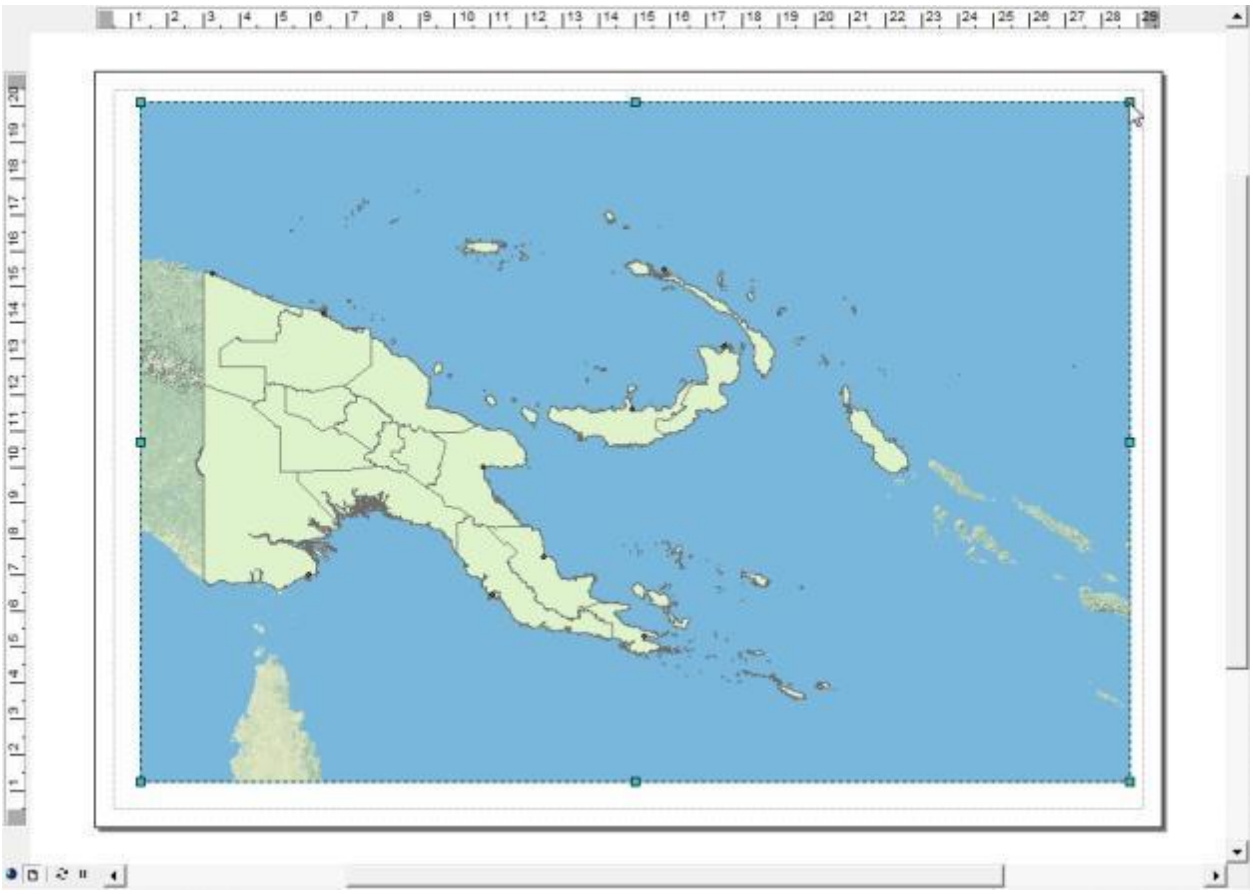
But before we add all these elements, we will arrange our template's orientation. Because of its shape, PNG is better displayed in a landscape format. See screenshot on the next page.


Page and Print Setup
Printer Setup
Name:
Canon iR C2570 UFR II
Properties...
Status:
Offline
Type:
Canon iR C2570 UFR II
Where:
192.168.0.254
Comments:
Paper
Size:
A4
Source:
Auto
Orientation:
Portrait
Landscape
Printer Paper
Printer Margins
Map Page (Page Layout)
Sample Map Elements
Map Page Size
Use Printer Paper Settings
Page
Page Size that will be used is equal to Printer Paper Size
Width:
21
Centimeters
Height:
29.7
Centimeters
Orientation:
Portrait
Landscape
Show Printer Margins on Layout
Scale Map Elements proportionally to changes in Page Size
OK
Cancel

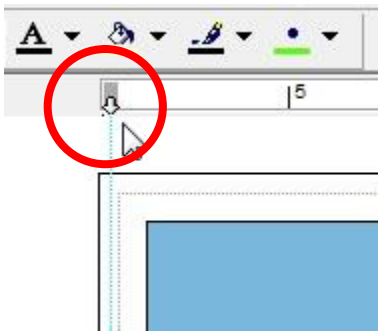


You can change the map windows size by clicking on it and dragging the corners into the right format.

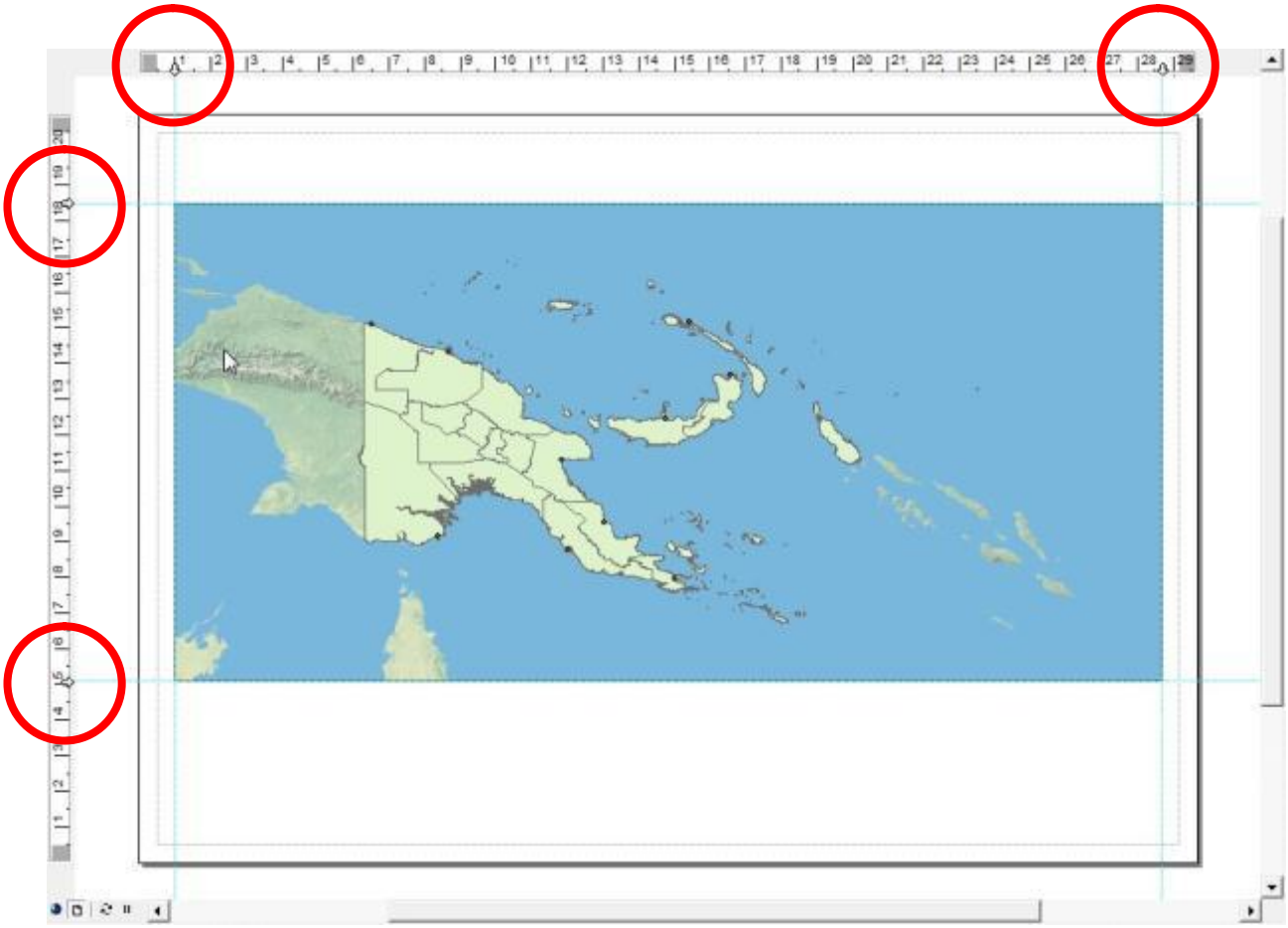
Your *Layout View* should look now like this:



In a second step, we will set guides. Guides help to align and arrange your different map elements by snapping them into guidelines. You can set these guides by clicking on the horizontal or vertical ruler at the position where you want a guide set.

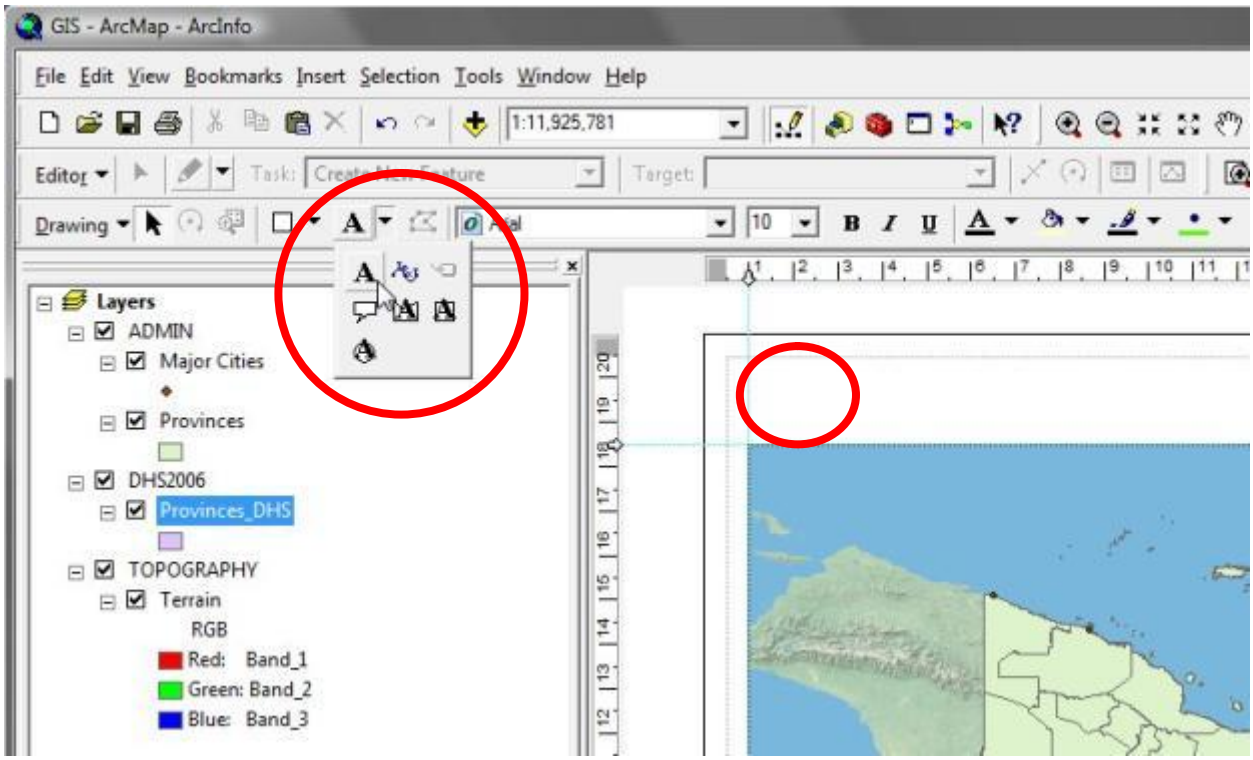


You can move the guide with the mouse to the position where you want it. Make sure you leave some space for a map title above, and the legend below:

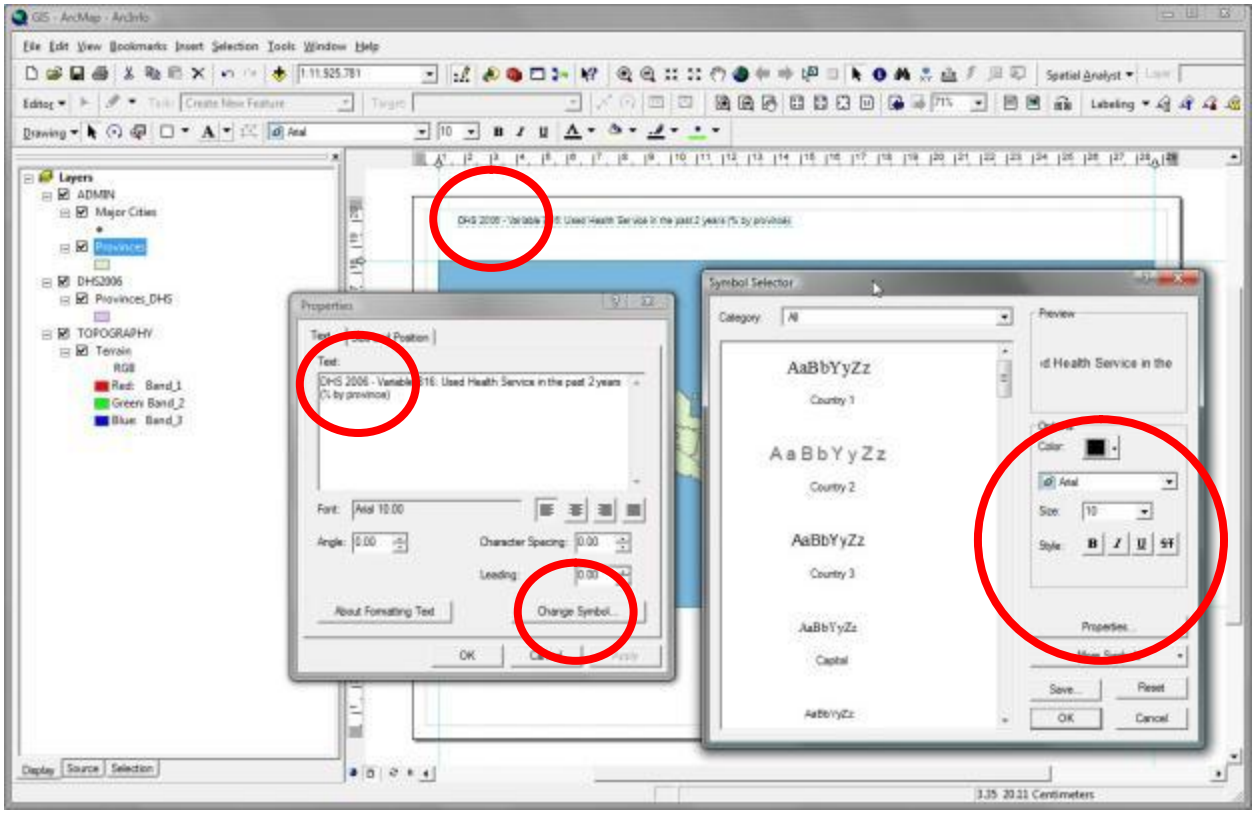


Next, we add a **title**.

Click the “A” symbol, place the cursor on an empty place on the map, and click once.

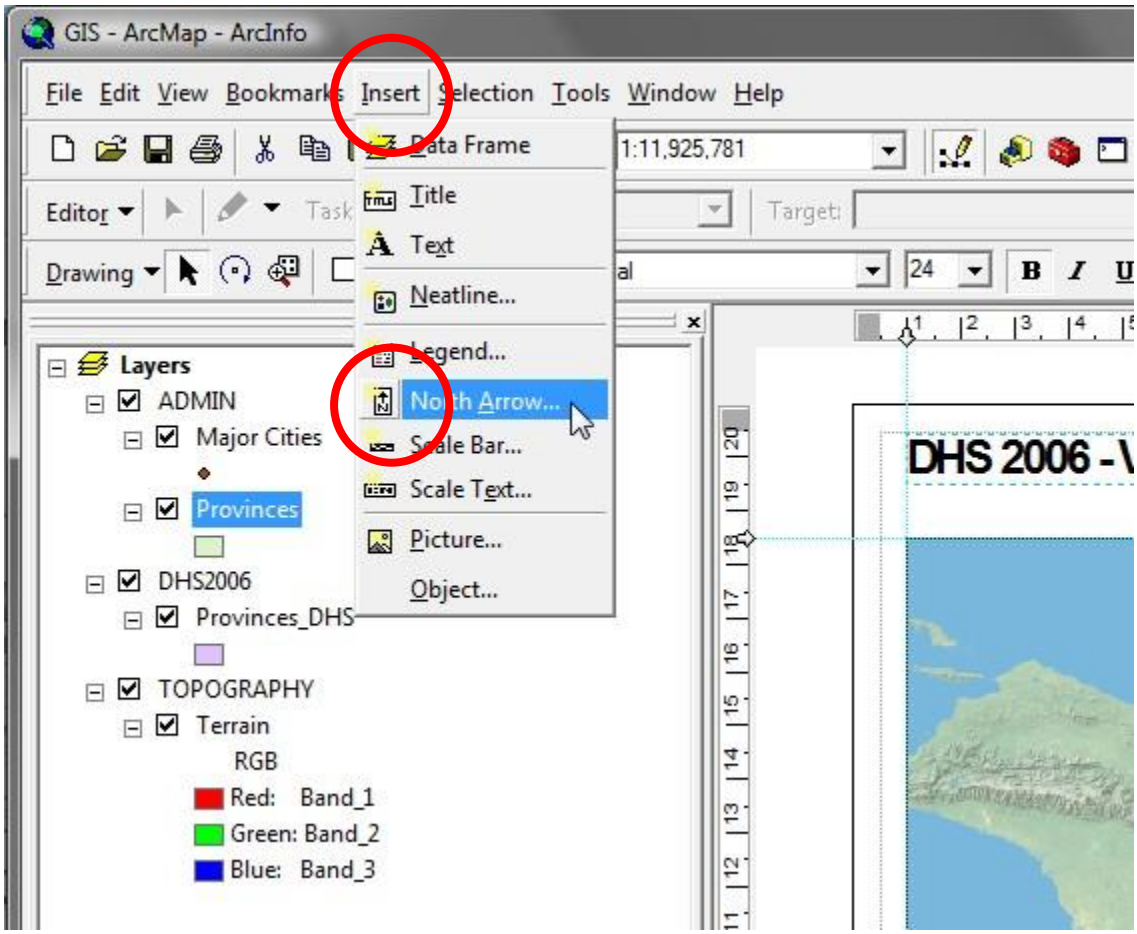


A text box appears. If you double click it, the text box "properties dialogue appears where you can input the title and change the font type and size (change symbol button):



We will call our map "*DHS 2006 - Variable B16: Used Health Service in the past 2 years (% by province)*". Choose "Arial" size 24, Bold, and reduce character spacing to -15.

Now we will add the **north arrow**. You can find the north arrow in the menu "Insert" → North Arrow:

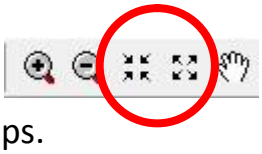


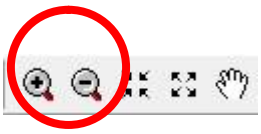
Chose a north arrow format you like and place in the corner of the map.

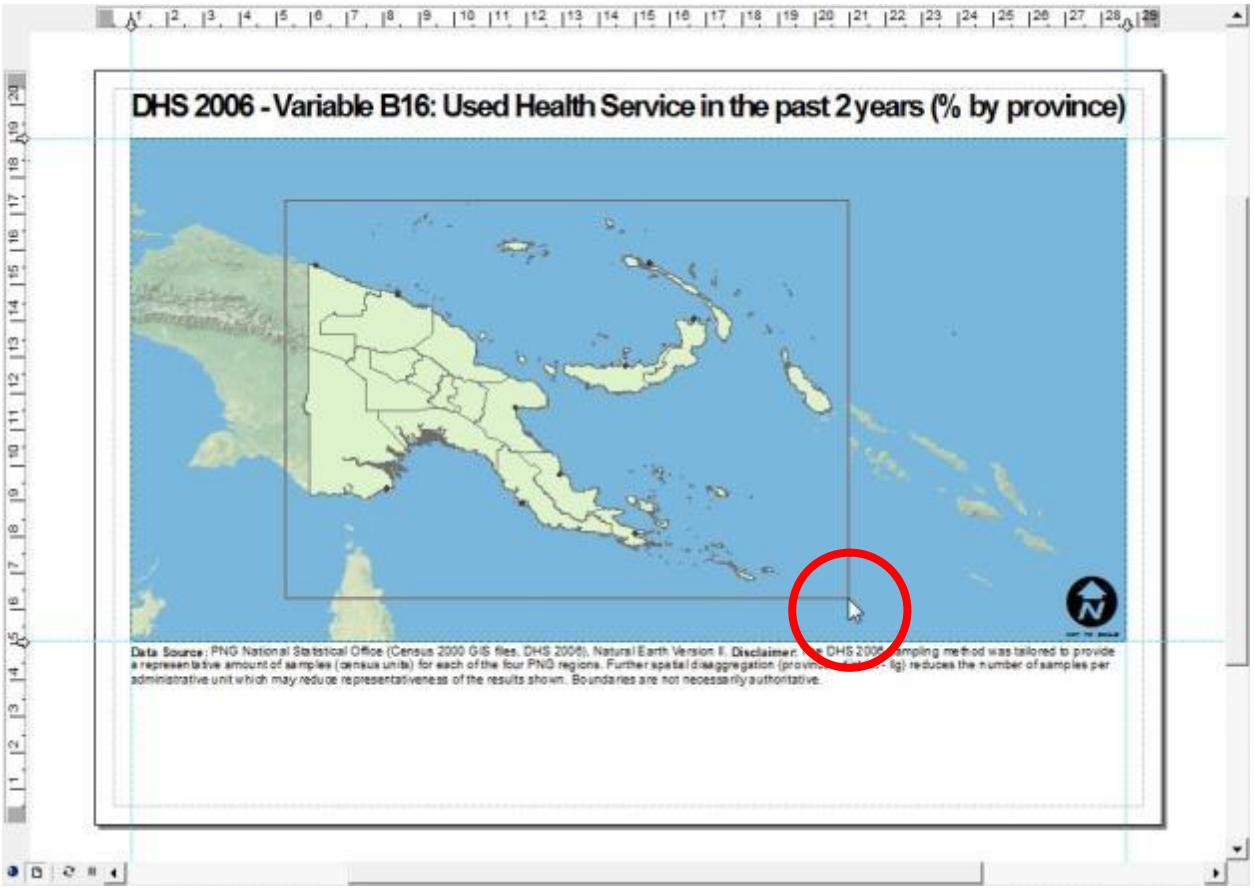
Last we add the information on the **data source** and the **disclaimer**. You use the same steps as with the title – just use a smaller font size (e.g. 12, not bold). Add it below the map window. In our case, we can use the following text:

"Data Source: PNG National Statistical Office (Census 2000 GIS files, DHS 2006), Natural Earth Version II. Disclaimer: The DHS 2006 sampling method was tailored to provide a representative amount of samples (census units) for each of the four PNG regions. Further spatial disaggregation (province - district - llg) reduces the number of samples per administrative unit which may reduce representativeness of the results shown. Boundaries are not necessarily authoritative."

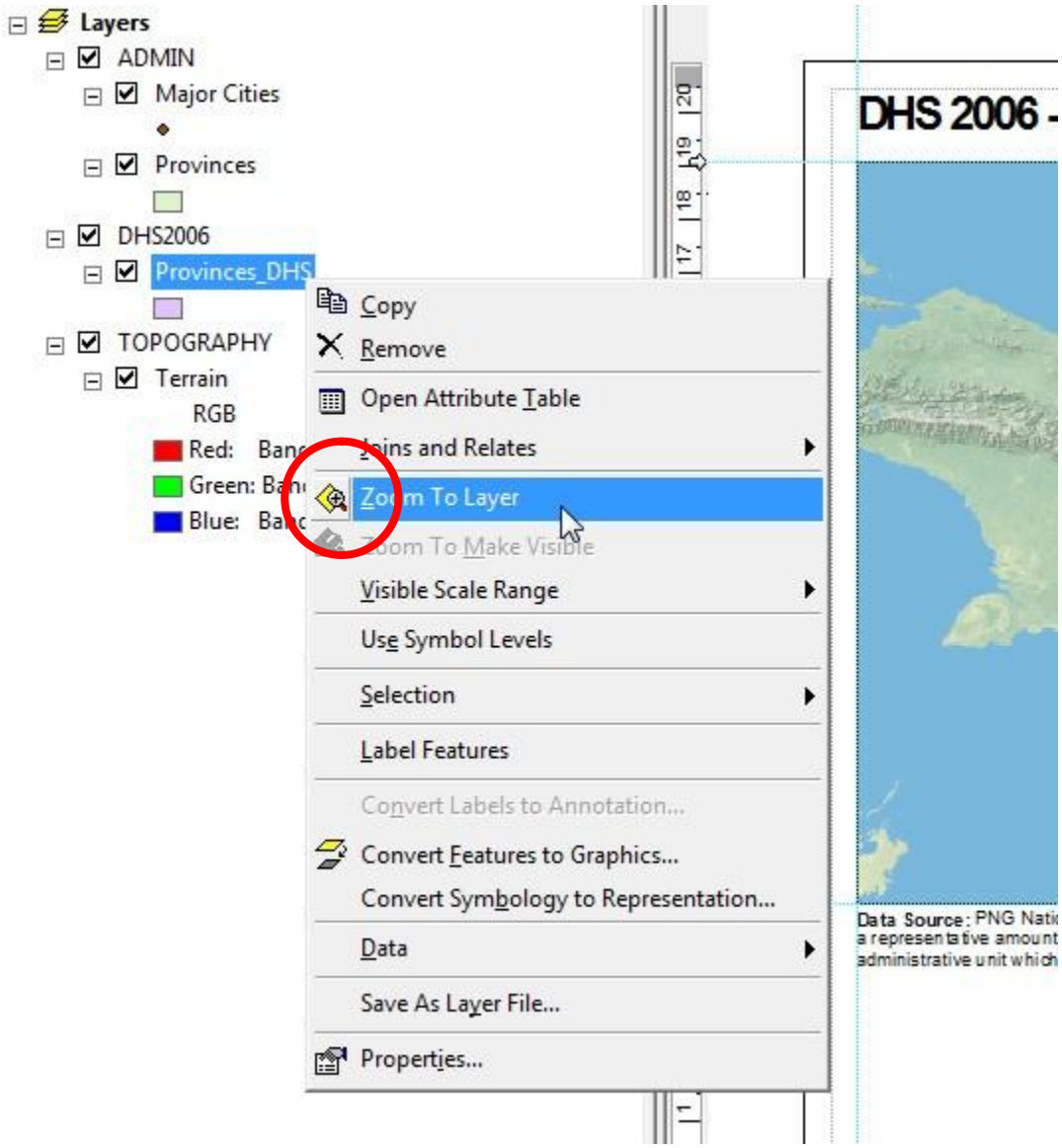
Normally, a map should also have a **scale bar**. In our case the information is in geographic projection (LAT / LONG). Since these coordinates are in decimal degree and not in a metric system, a scale bar is not an option for this map. Anyways, if you have metric (projected) information, you can find the scale bar just below the north arrow item in the insert menu.
Now we will zoom into our data to optimally fill in the map frame. There are several ways to do this:

Fixed zoom:  Clicking on the symbol zooms in and out in predefined steps.

Custom zoom by extend rectangle:  You draw a rectangle, your map window is set to that rectangles extend:



Zoom to layer: Choose a layer you want to have maximized within your map window, right mouse click and choose “Zoom to Layer” from the pull-down menu:

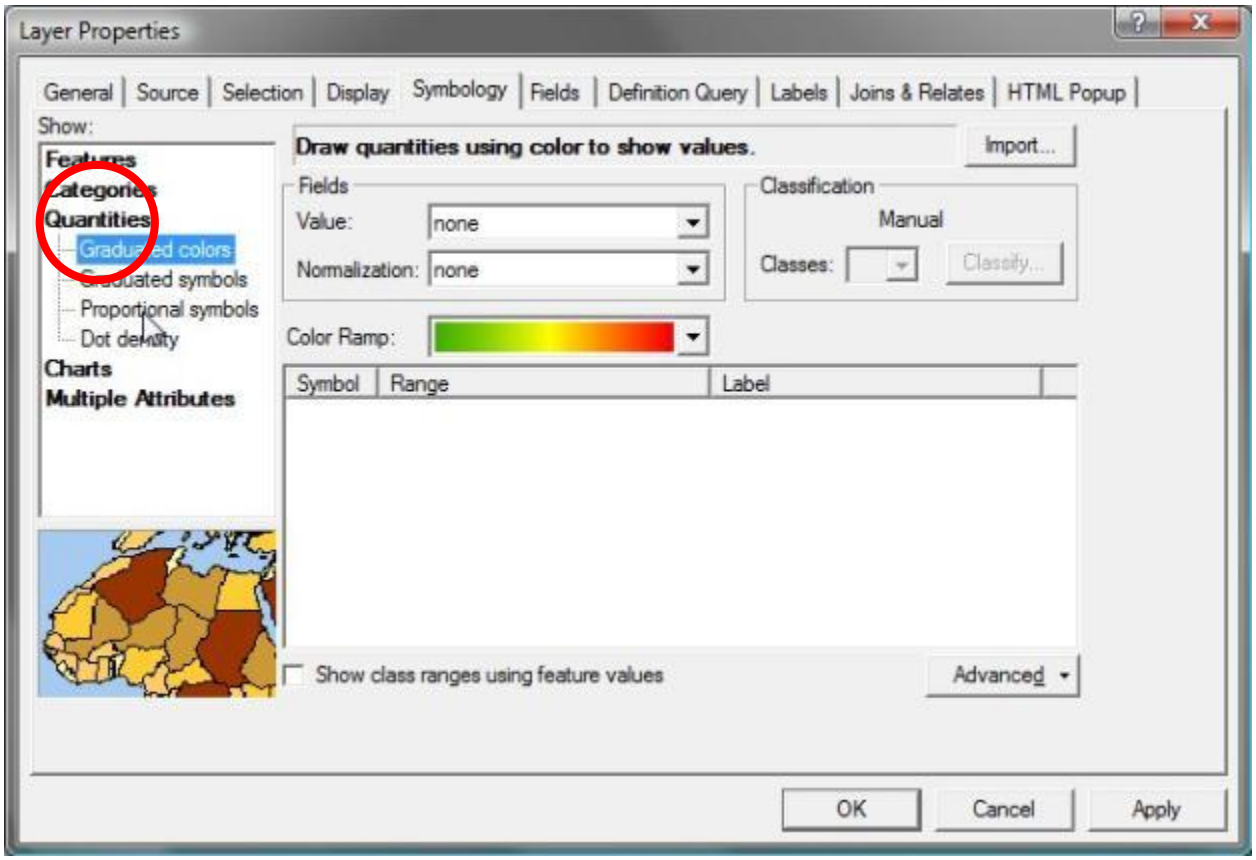


In our case, PNG has a lot of remote small islands. If you use “zoom to layer” they will all be in the map window, making the main provinces too small. Therefore use custom zoom and cut some of the small, remote islands out to maximize the zoom – and therefore better map readability – on the big province polygons.

Now we are ready for the final step: changing the symbology of our layers to make them represent our DHS data!

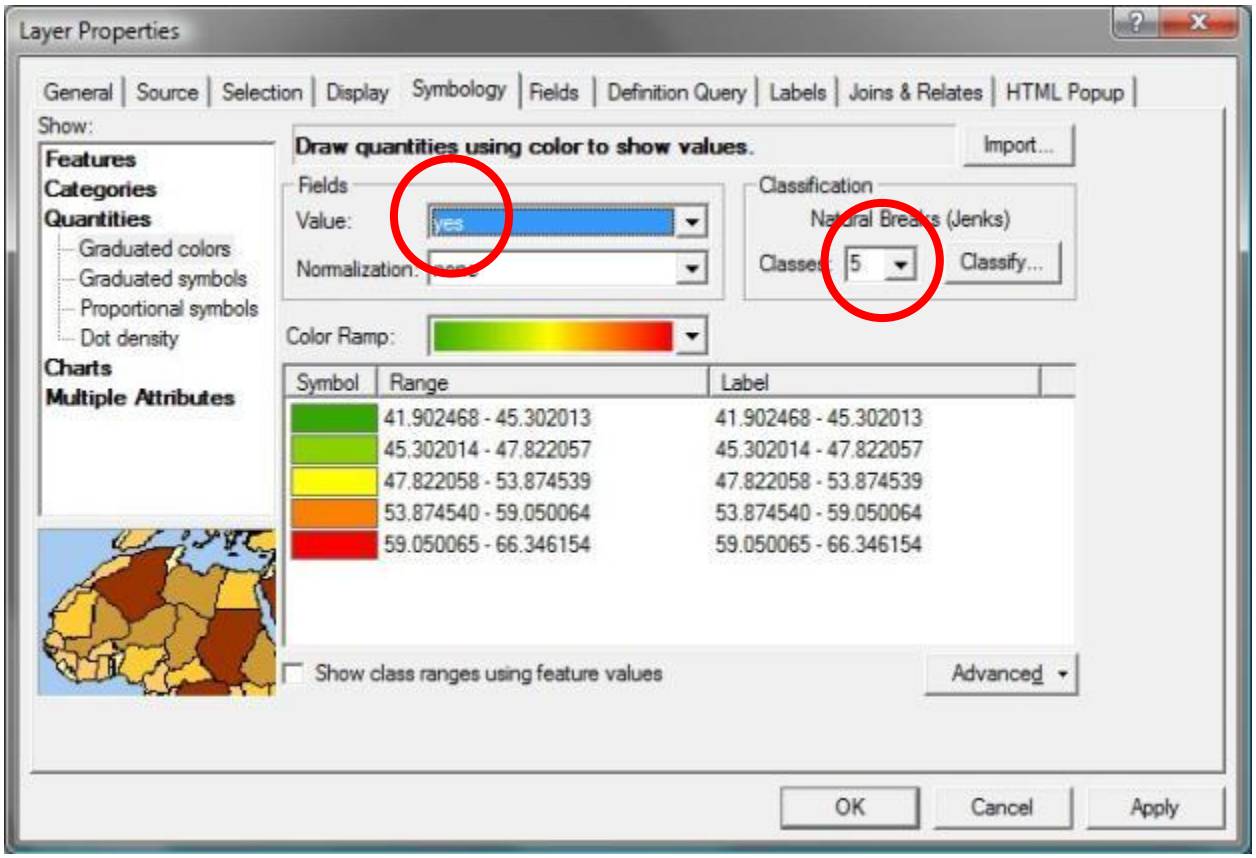
Double click on the layer that contains our B16 variable that we imported earlier – first, rename the layer to "B16 – Used Health Service in past 2 years (%)". See page 7 and 8 again if you forgot how to rename layers.

Then browse to the "Symbology" tab and the "Quantities" category on the left side.



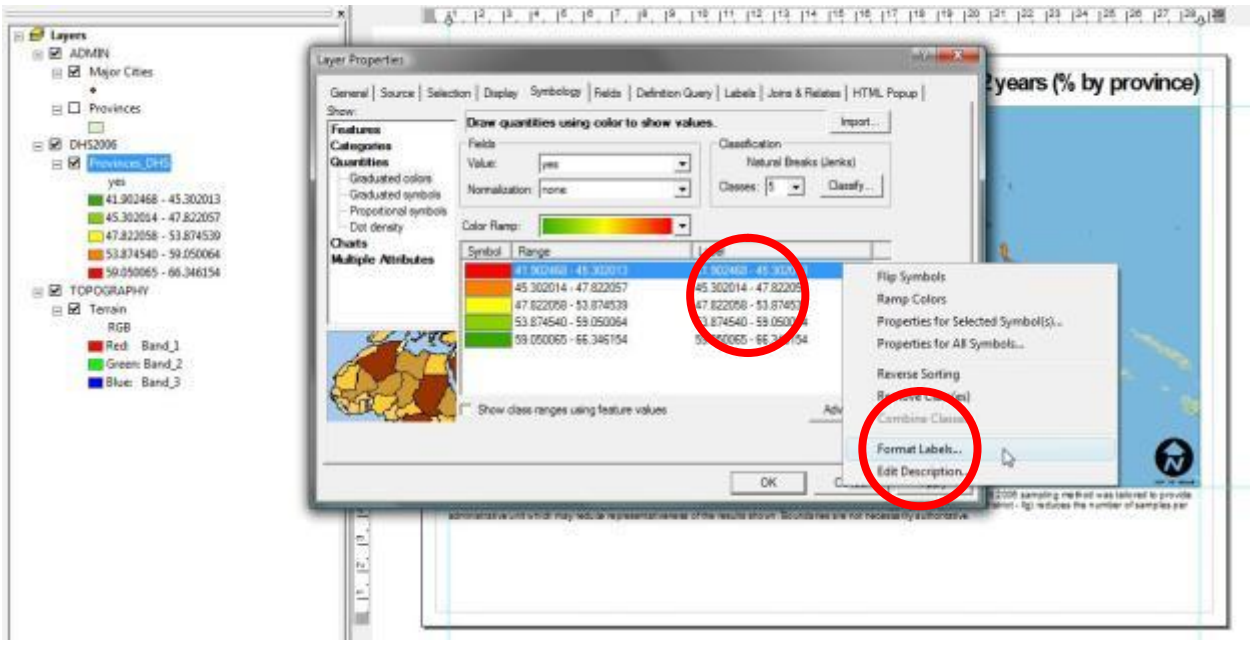
Choose "Quantities" – "Graduated colors". Under "Fields - Value", choose "Yes" – this is the percentage of people per province that have answered that they have used health services in the past 2 year. Set the "Classification – classes" to 5. See screenshot on the next page.

The computer chooses a suitable way of setting ranges, but you can also set them manually under “Classification – Classify”.



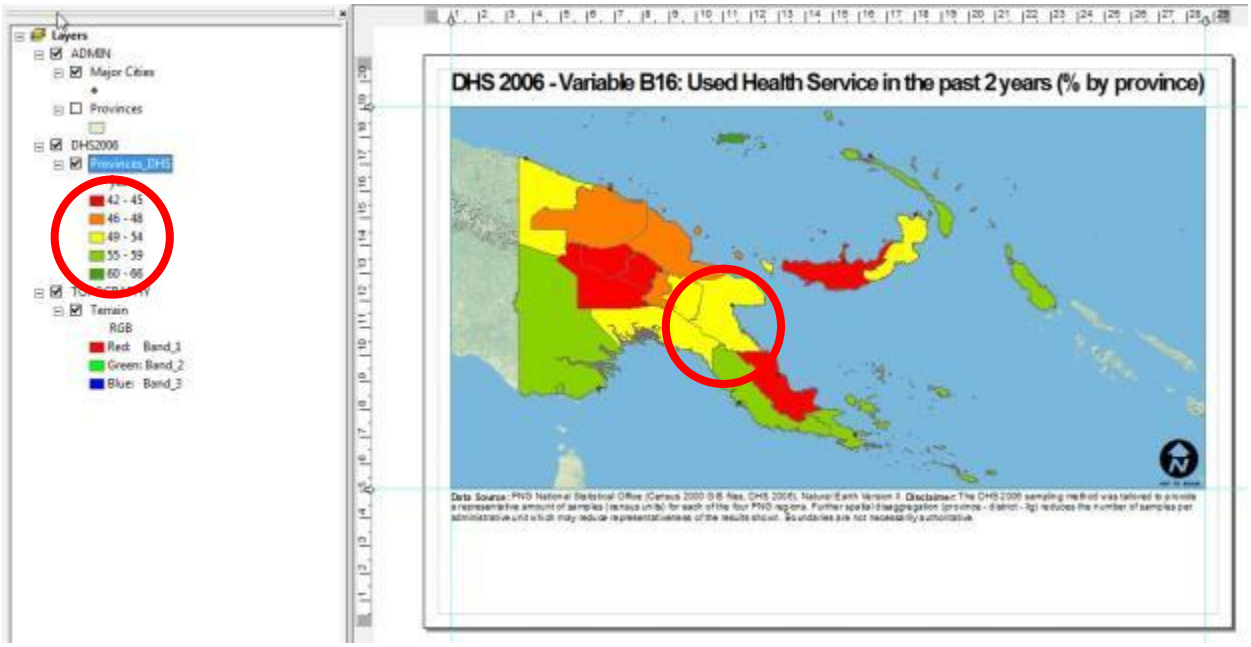
A color range of green to yellow to red is a good color scheme to highlight positive (green) and negative (red) areas.

In our case, the computer automatically assigns colors, and gives provinces where fewer people have used health services in the past 2 years (lower percentages) a green color and provinces where relatively more people have utilized health services red colors. It should be the other way around. You can change that simply by right mouse click on one of the color boxes and clicking “Flip colors”. You can also just chose “Reverse sorting” – that flips the values around – but values should be sorted increasing in this case, so the computers choice is correct. See screenshot on the next page



We should also get rid of the unnecessary decimals in the labels. You can do that by right mouse clicking on the labels – "Format Labels": here you can choose "Rounding – Number of significant decimals" and set it to 0.

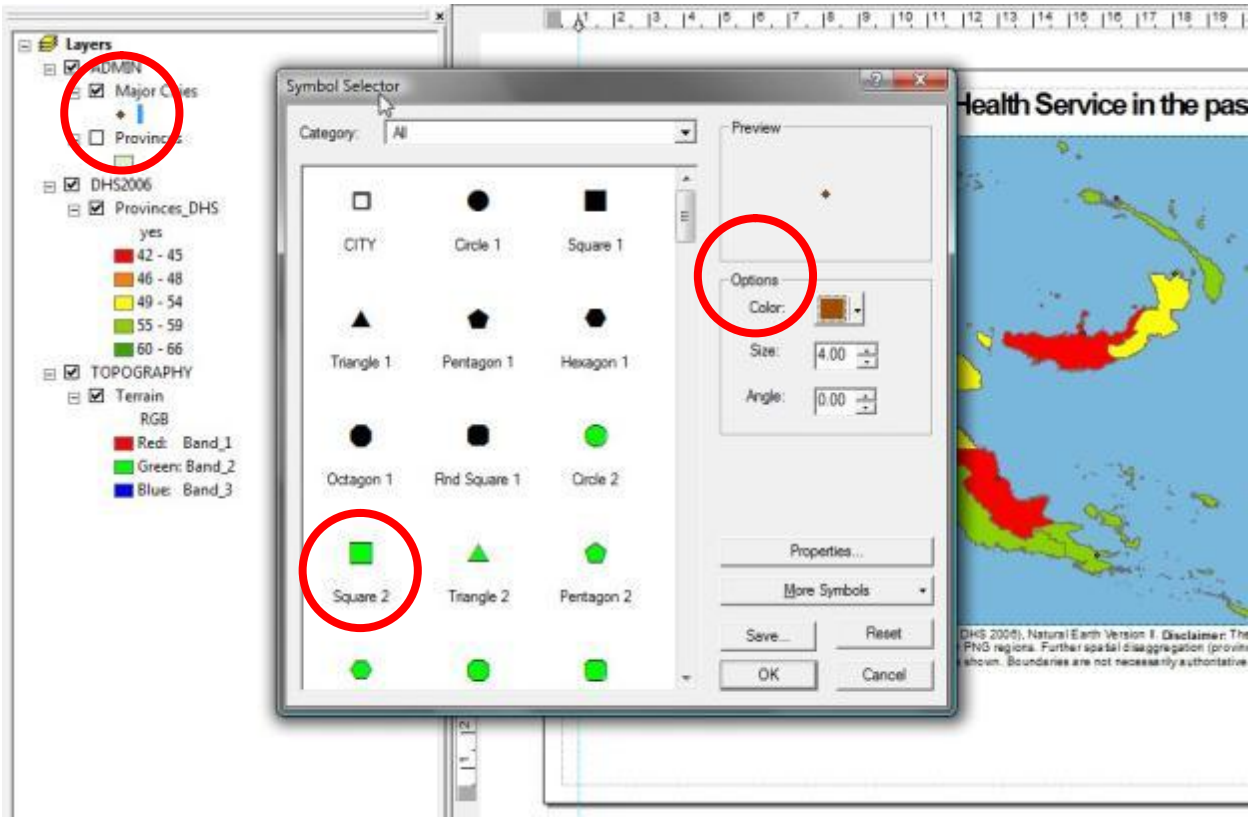
You map should look like this now:



NOTE: if you can't see your layer as in the previous screenshot, check if you have other layers switched on that cover this layer (i.e. are higher in the list) – in that case, switch them off.

Similar to how we have approached changing the symbology of theis DHS province layer, change the symbology of the"Major Cities" layer to a symbol you like. Remember, you can access the symbology tab by right mouse click on the layer you want to change (in our case "Major Cities") – choose properties, and go to the symbology tab.

Alternatively, you can simply click on the current symbol of the layer directly – that makes the symbology selector dialogue appear:

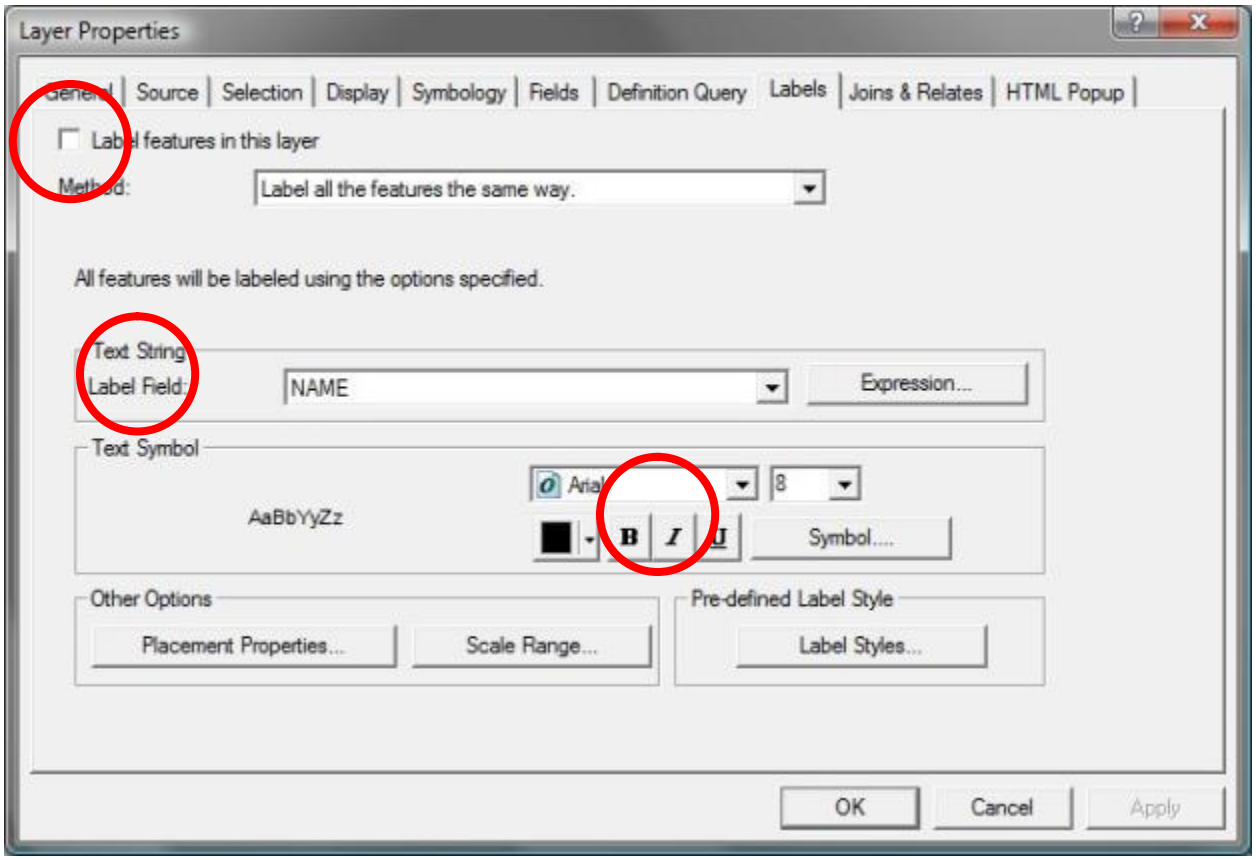


Choose Square 2 and change the color to white and the size to 14.

Now, we also want to attach labels to these points so we know the name of the cities.

Right mouse click on the “Major Cities” layer, choose properties from the pull down menu, and go to the “Labels” tab.

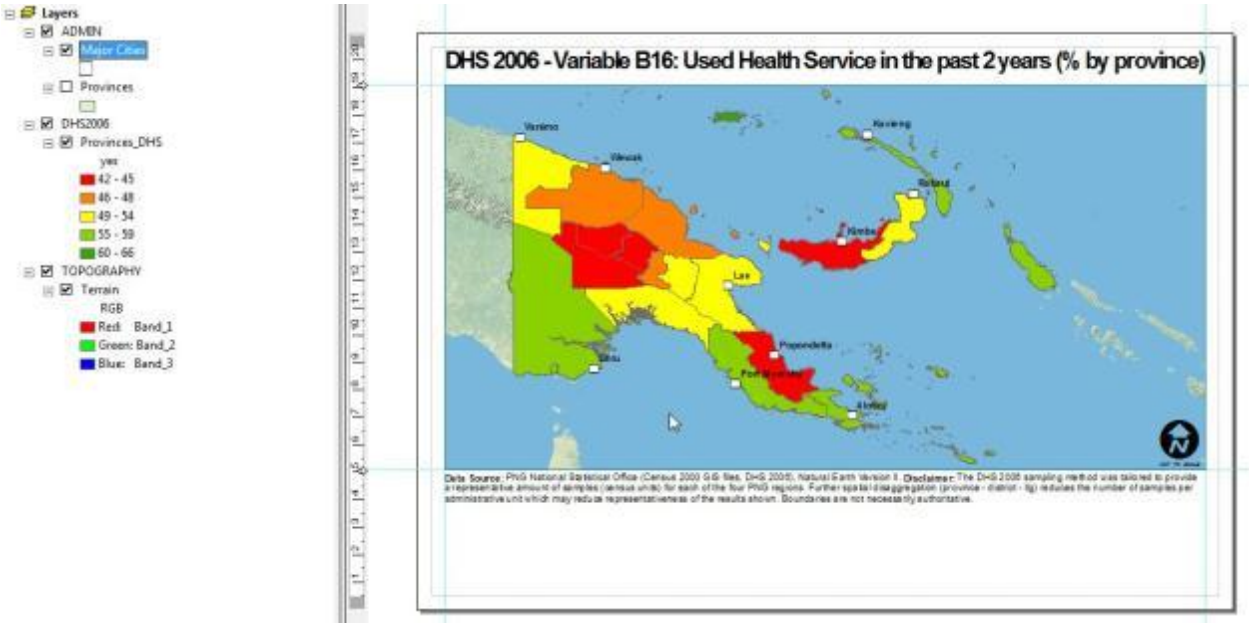
The following window appears:



Under “Text String” identify the column in the GIS layers attribute table (in our case the field NAME). You can change the appearance of the labels under “Text symbol, choose Arial size 10 Bold. Finally, switch the labels on by ticking “Label features in this layer”.

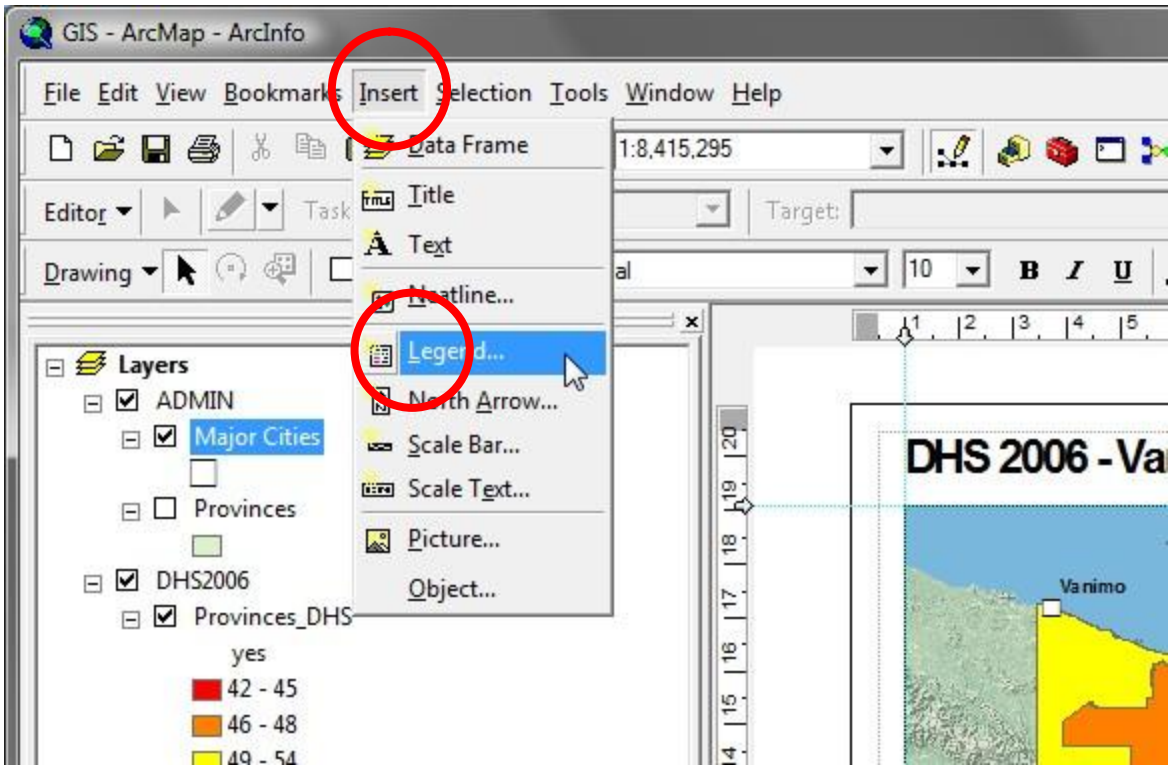
NOTE: If you don’t remember anymore how to browse the GIS layer attribute table, go back to page 12 and 13.

Your map should look like this now:

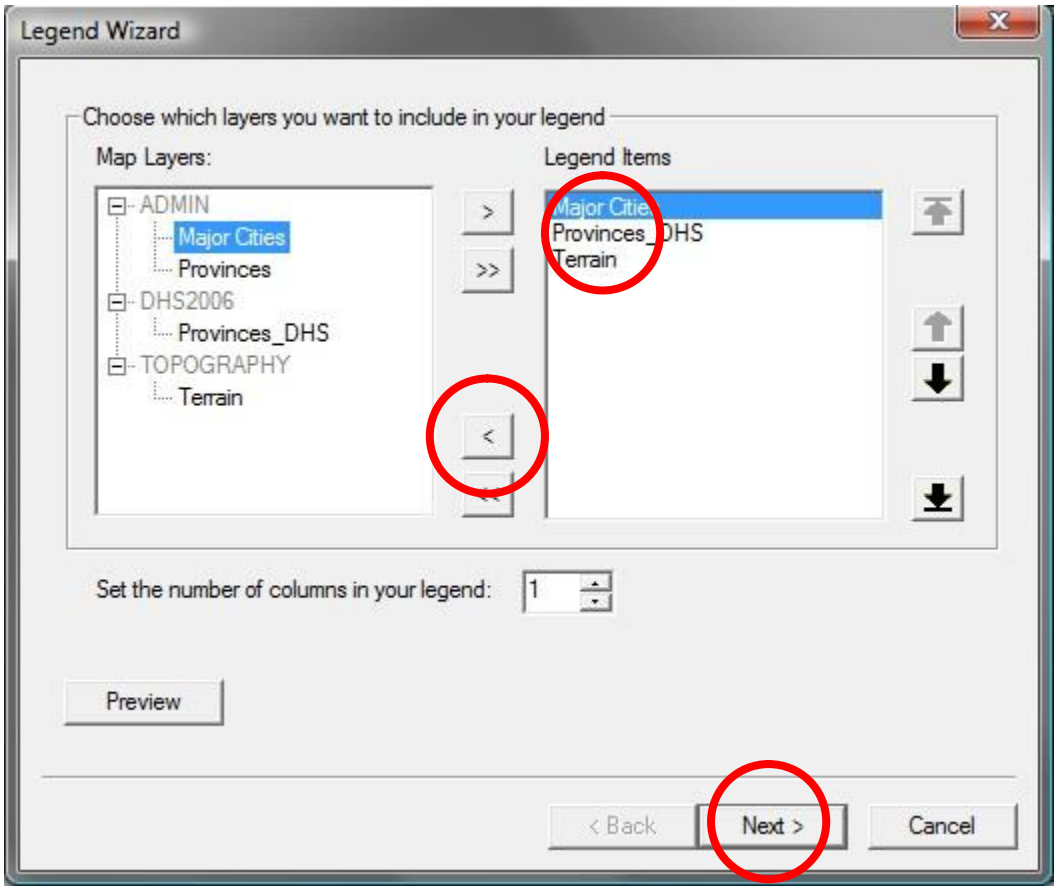


Finally, let's add the legend so that the map readers later understand the meaning of the different colors!

You can add a legend by going to the "Insert" menu and choosing "Legend":



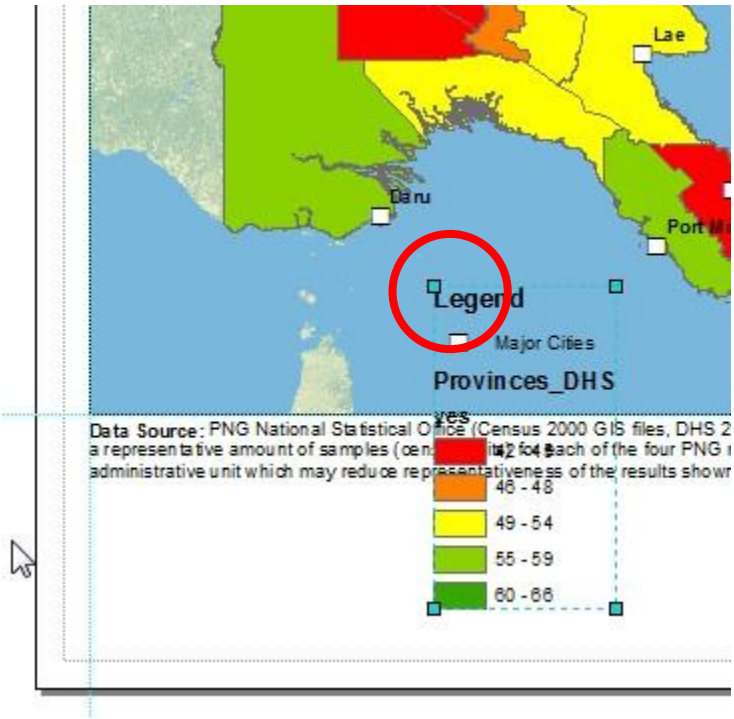
The following dialogue appears:



Choose the layers you want in the Legend. In our case, keep “Major Cities” and “Provinces_DHS” and remove “Terrain”.

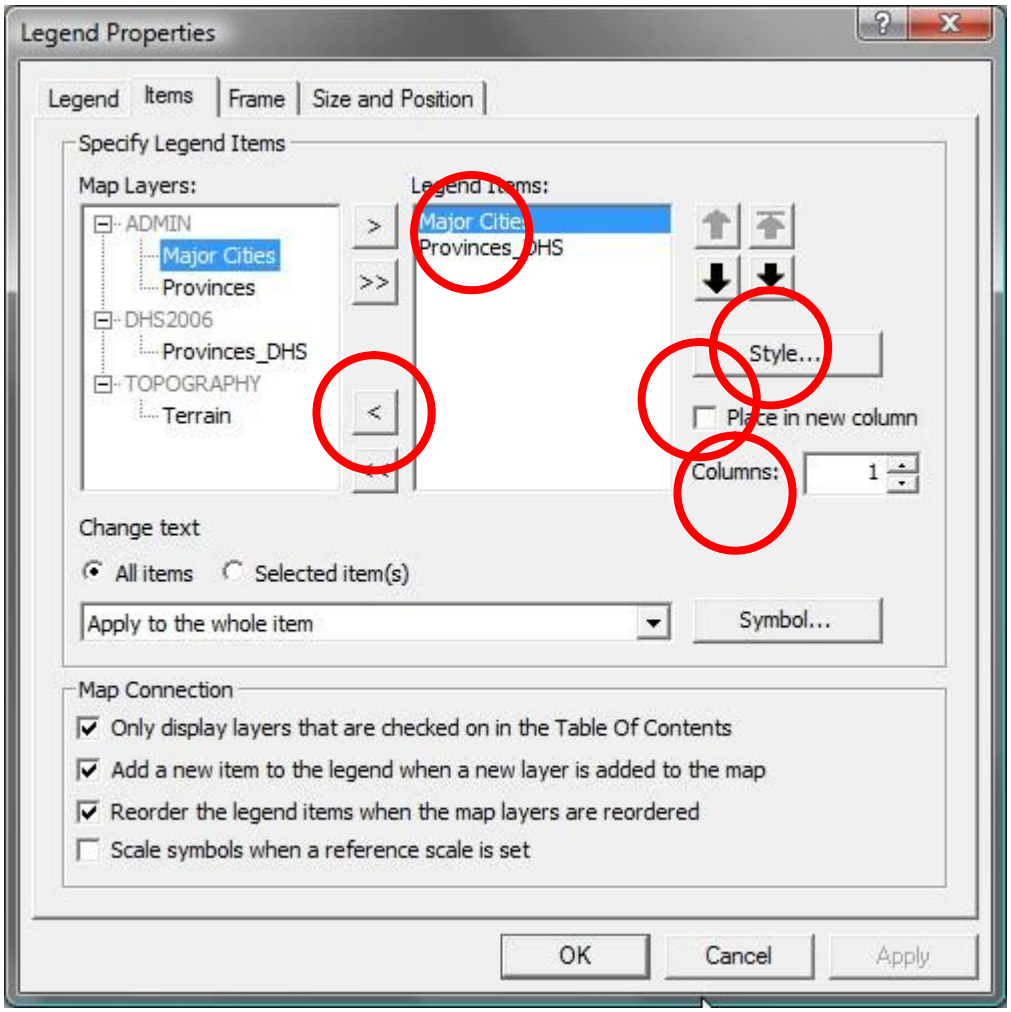
In the following steps you can chose layout options like size of symbols and spacing. Try it out or leave them as the computer chooses for you – you can always change them later.

The legend that appears should look like this – as you can see, it doesn't fit very well in the space we have under our map.



So let us edit the layout of the legend a bit to make it fit better!

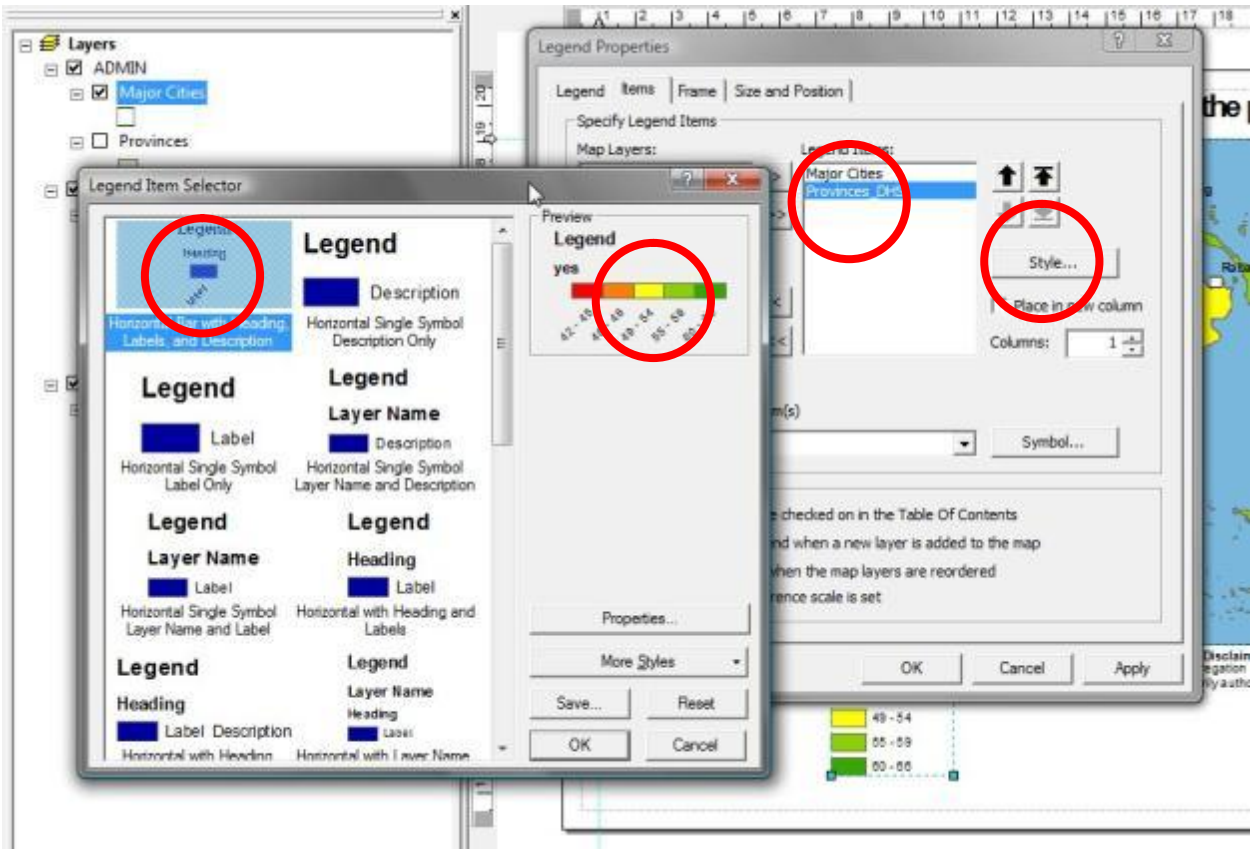
Go on the legend, right mouse click and choose “properties”. The following dialogue appears:



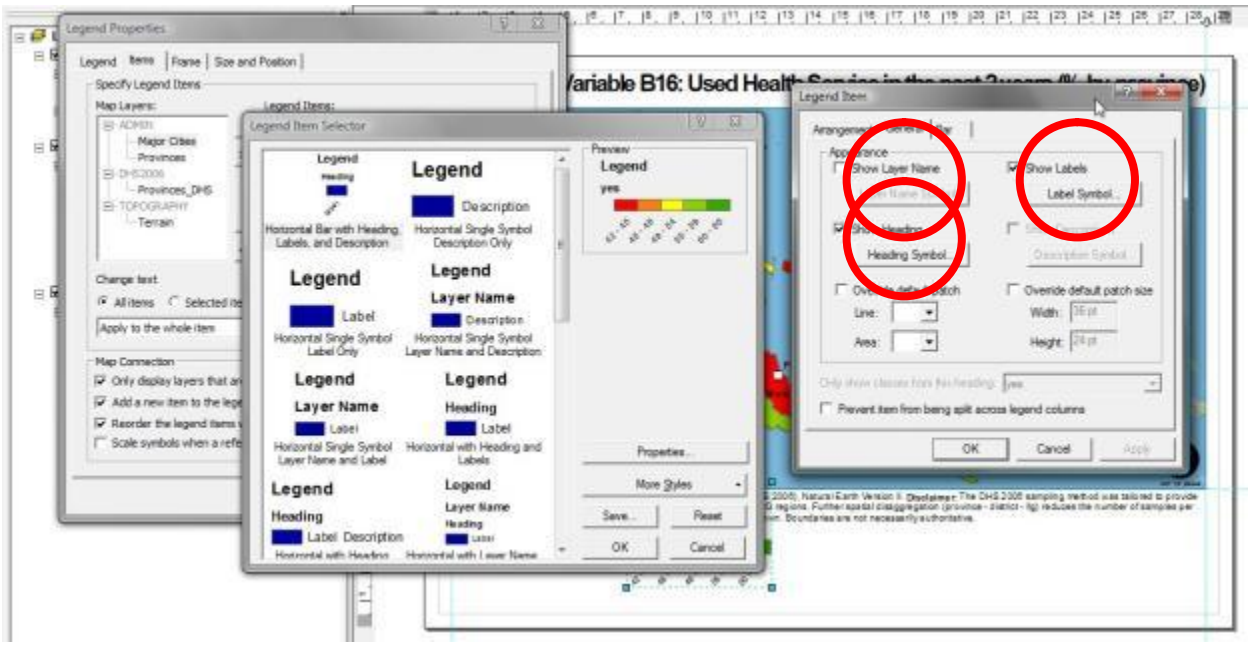
You can go on each individual legend item and change its style.

Choose “Major Cities” and move it out of the list. We don’t need it as the symbols with name should be self-explanatory. Since we have little space, we can live with this compromise, though normally you would try to have every map item represented in the legend.

Choose “Provinces_DHS” and click on “Style”. There, choose a horizontal arrangement like the one shown in the screenshot:



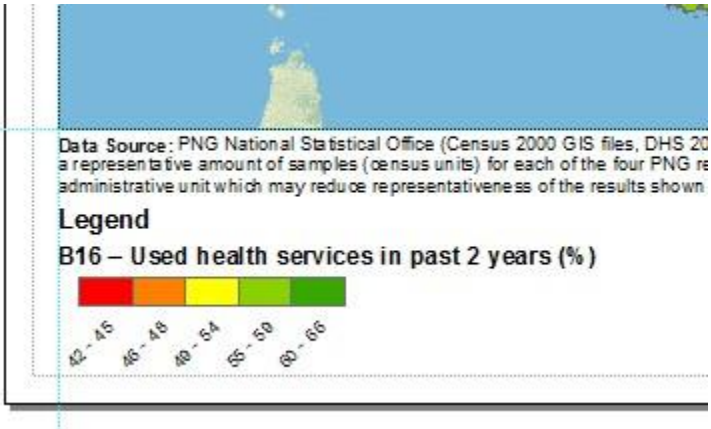
Under properties, you chose if you want to display the layer name, heading and labels. Chose layer name and labels and tick off “Layer Heading”:



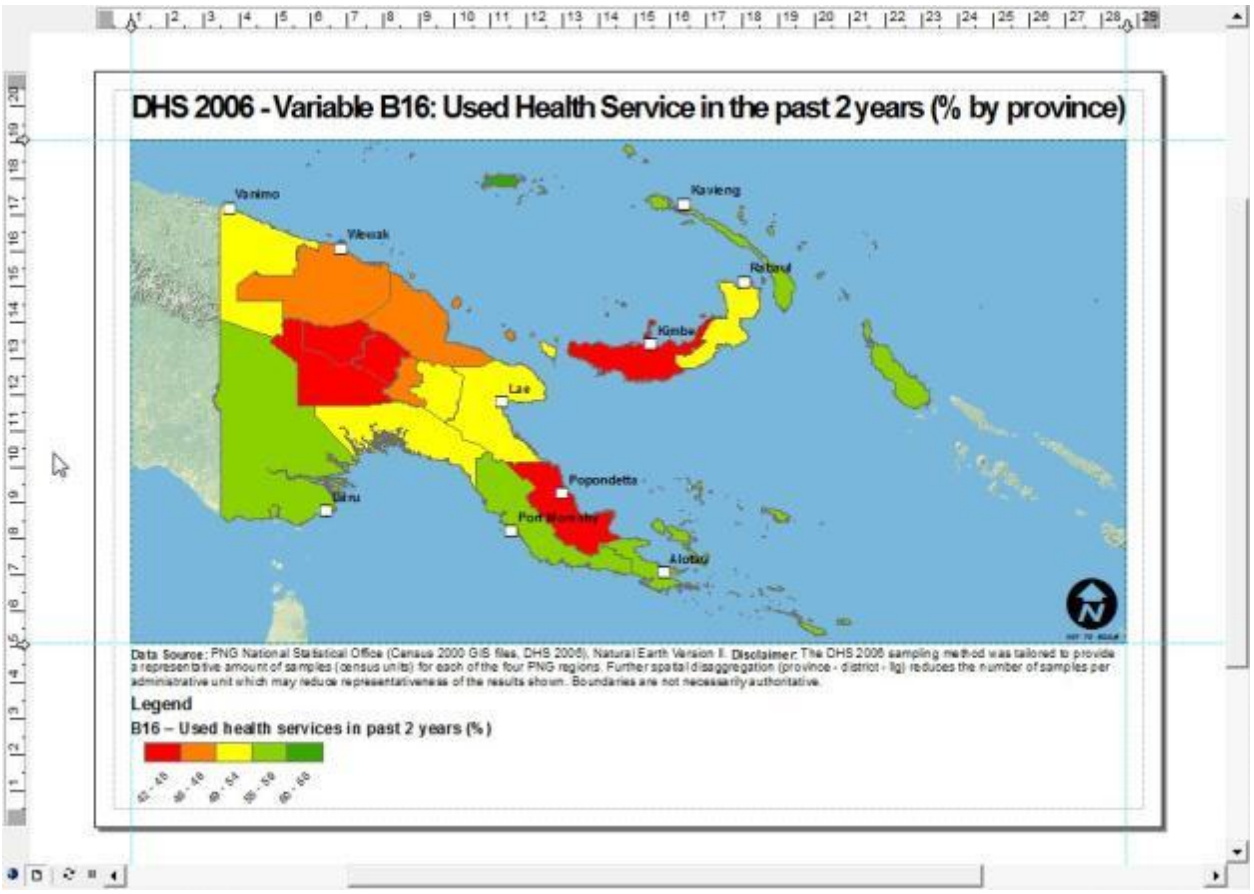
Now change our layer name from “provinces_DHS” to “B16 – Used health services in past 2 years (%)”.

NOTE: If you forgot how you can do that, refer to page 7 and 8.

Your legend should look like this now:



And your full map like this:

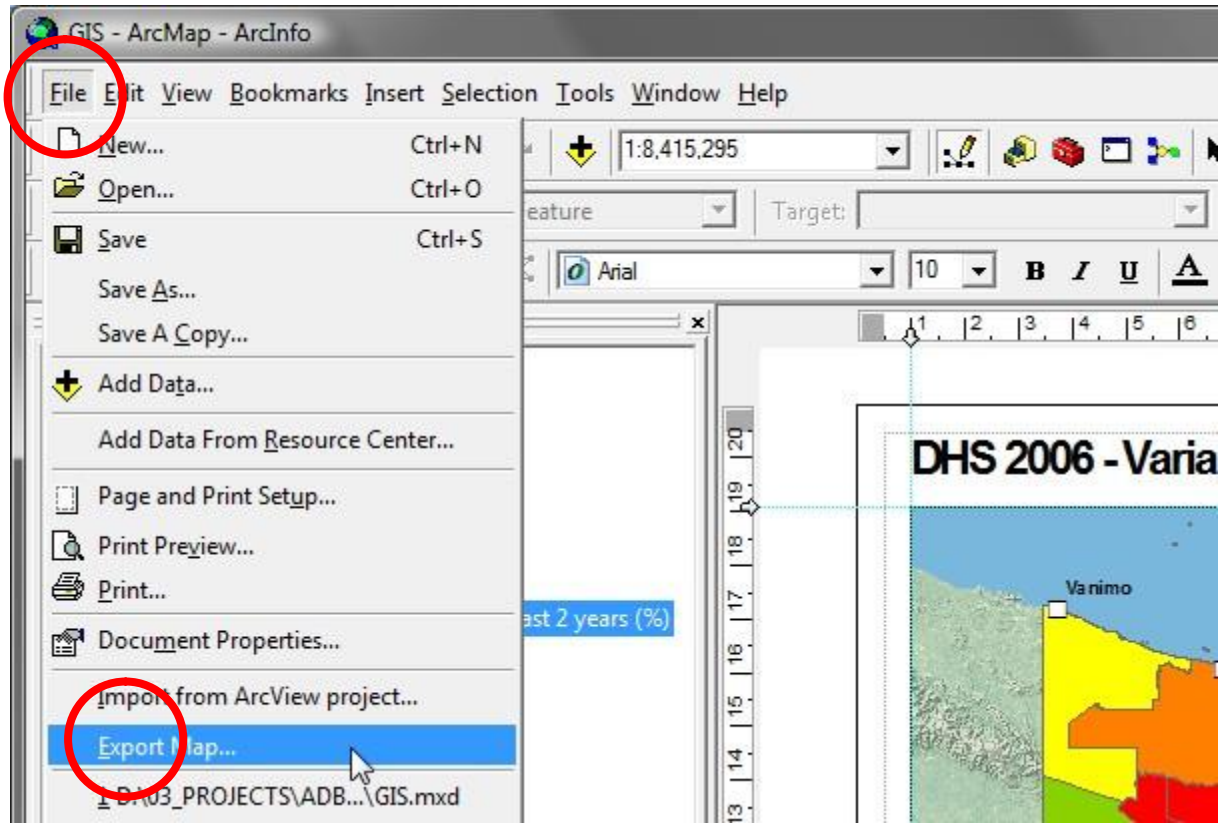


Our map is ready!

Of course, you can do a lot more with regard to layer processing and layout, but for producing a simple and informative map, these steps are sufficient.

Now we only have to export the map into a JPEG file so we can use is like an image in Word documents, Powerpoint presentations, or even on your Website!

Choose “File” – “Export Map”:



The dialogue that appears exports your ArcGIS map template into a JPEG file. If you drag this file onto a word document like this one, it will look just like that: