

Natural Resources: Canada, North America and the World in ArcGIS 9.x

Introduction:

The natural resources of the world are spread unevenly across the landscape, and it is the nature of world trade that attempts to level the playing field. As needs become greater while supplies dwindle, the remaining natural resources will become even more important than they are currently. We can, in the following project, get an accurate idea of where the world's natural resources are located, and begin to see who the large trading partners will be, and where the major trading routes will occur.

Through this exercise you will learn about the location of water, forest, fossil fuel, metallic and non-metallic mineral resources. These are the building blocks of our modern world and ultimately determine the economic fate of all who continue to pursue the current technology and standard of living.

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Grade Level: Grade 7, Grade 10

Social Studies Learning Outcomes:

7-KL-028 Describe diverse approaches to land and natural resource use in a society of Europe or the Americas.

S2-KL-019 Identify major natural resources on a map of the world, a map of North America, and a map of Canada. *Include: water, forestry, fossil fuels, metallic and non-metallic minerals.*

S2-KG-035 Identify implications of more-developed countries extracting resources from less-developed countries. *Examples: social, political, economic...*

S2-KP-041 Identify ways in which competing interests and needs influence control and use of the land and natural resources in Canada. *Examples: mining, forestry, water...*

S2-VI-003 Be willing to consider diverse views regarding the use of natural resources.

S2-VP-009 Be willing to consider the implications of personal choices regarding natural resources.

Note: When creating projects in ArcGIS, it is best to create a new folder for each project to save to. You can give the folder a name that corresponds with the nature of your project. Whenever you add or create theme layers in your project, select the corresponding folder to save your changes. Also, note that the directory paths shown in the screen shots will differ from the paths in your system. Ask your instructor if you need help creating a folder or selecting an appropriate file directory.

Required files: ArcCanada 3.1 Disk 3:

World/cntry00.shp - *Statistics for each country of the world, eg. Life expectancy*

World/wwf_ecoreg.shp - *World Wildlife Fund Ecoregions*

World.shp/minerals.shp - *World minerals*

Continental/af/shp/lakes.shp - *Africa lakes, reservoirs and larger rivers*

Continental/af/shp/rivers.shp - *Africa major rivers*

Continental/as/shp/lakes.shp - *Asia lakes, reservoirs and larger rivers*

Continental/as/shp/rivers.shp - *Asia major rivers*

Continental/eu/shp/lakes.shp - *Europe lakes, reservoirs and larger rivers*

Continental/eu/shp/rivers.shp - *Europe major rivers*

Continental/na/shp/lakes.shp - *North America lakes, reservoirs and larger rivers*

Continental/na/shp/rivers.shp - *North America major rivers*

Continental/oc/shp/lakes.shp - *Oceania lakes, reservoirs and larger rivers*

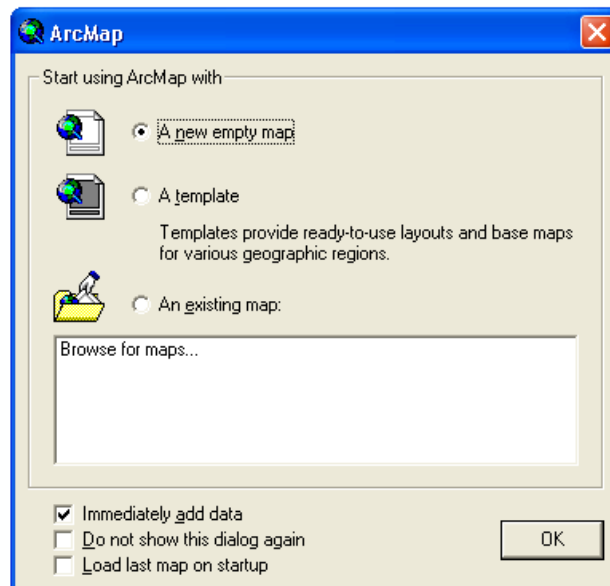
Continental/oc/shp/rivers.shp - *Oceania major rivers*


Continental/sa/shp/lakes.shp - *South America lakes, reservoirs and larger rivers*

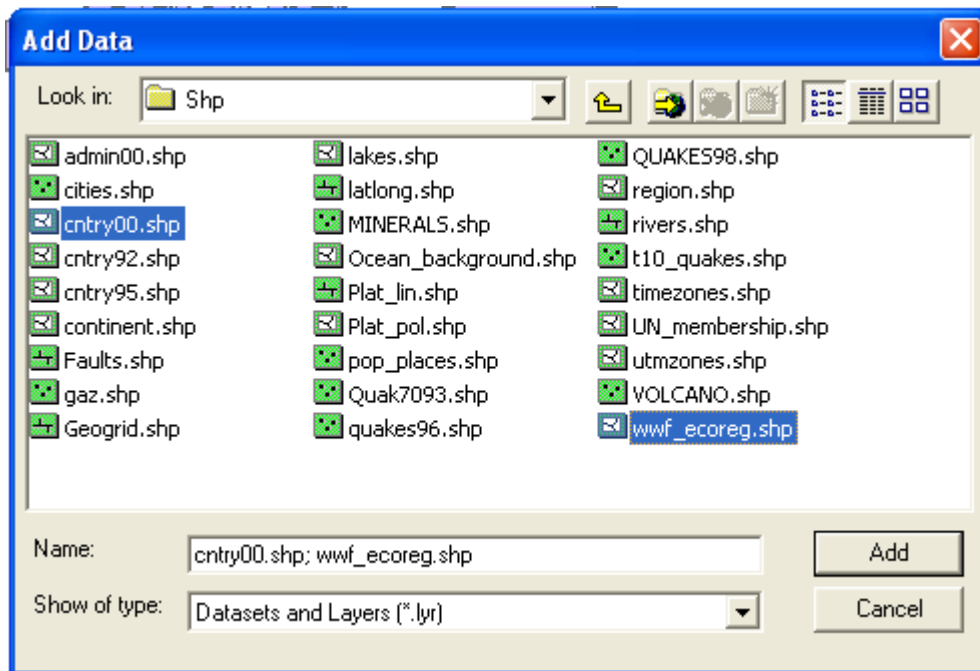
Continental/sa/shp/rivers.shp - *South America major rivers*

Instructions:

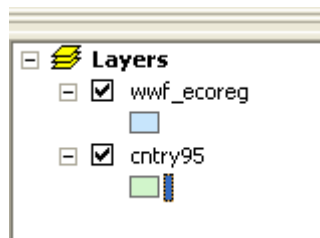
1. Launch ArcMap, when prompted choose **A new empty map**.



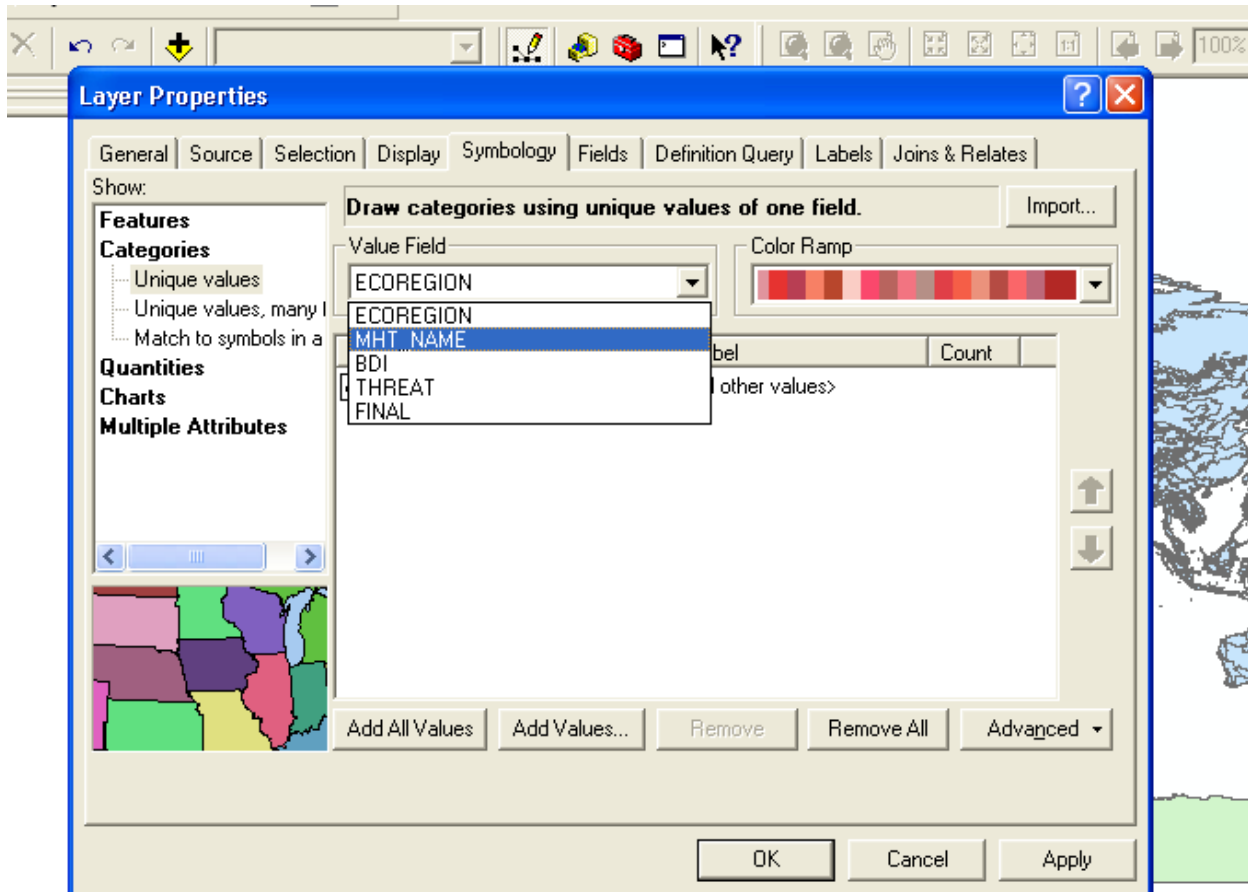
- Using the **Connect To Folder** button , navigate to **cntry00.shp** and **wwf_ecoreg.shp** files. If you do not know the location, ask your instructor for help.
- Select **cntry00.shp** and while holding down the **ctrl** button, select **wwf_ecoreg.shp**. Once they are both selected, add them to your data view by selecting the **Add** button.





- This is a good time to save your project. Go **File → Save As**, navigate to the folder you created for your project, create a title for your project, and select **Save**. Save your project frequently as you go along.
- In your **Table of Contents** make sure that the **wwf_ecoreg** theme is the top layer. If not, click on the layer and drag it to the top of the table of contents. This is important because the ecoregion layer is “transparent” while the country layer is a “solid” layer.

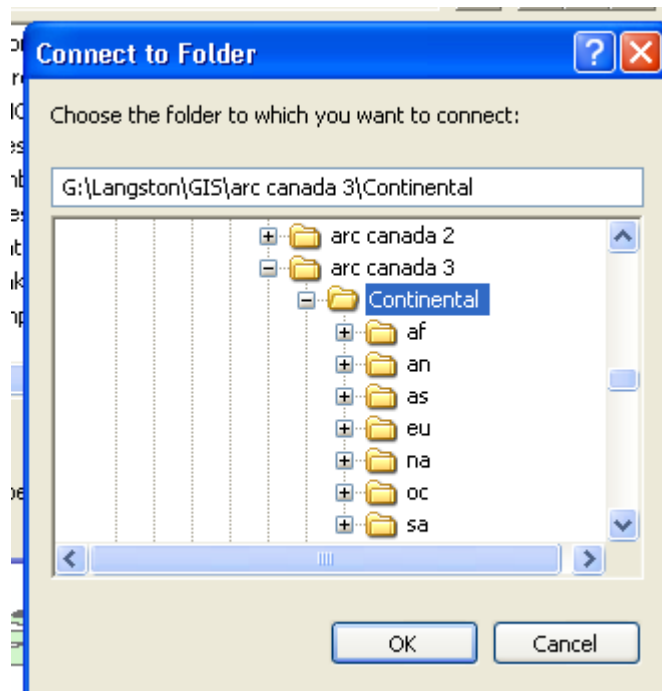


- In order to show the countries by different colours, it is necessary to change the **wwf_ecoreg** theme from **Single Symbol** to **Unique Value**. To do this, double click on **wwf_ecoreg** in the Table Of Contents and go **Symbology** → **Categories** → **Unique Value**. Make **Value Field = MHT_Name** and click on **Add All Values** → (if desired, you can uncheck **All Other Values**; this will create a cleaner legend when you make a layout of your map) **Apply** and **OK**.

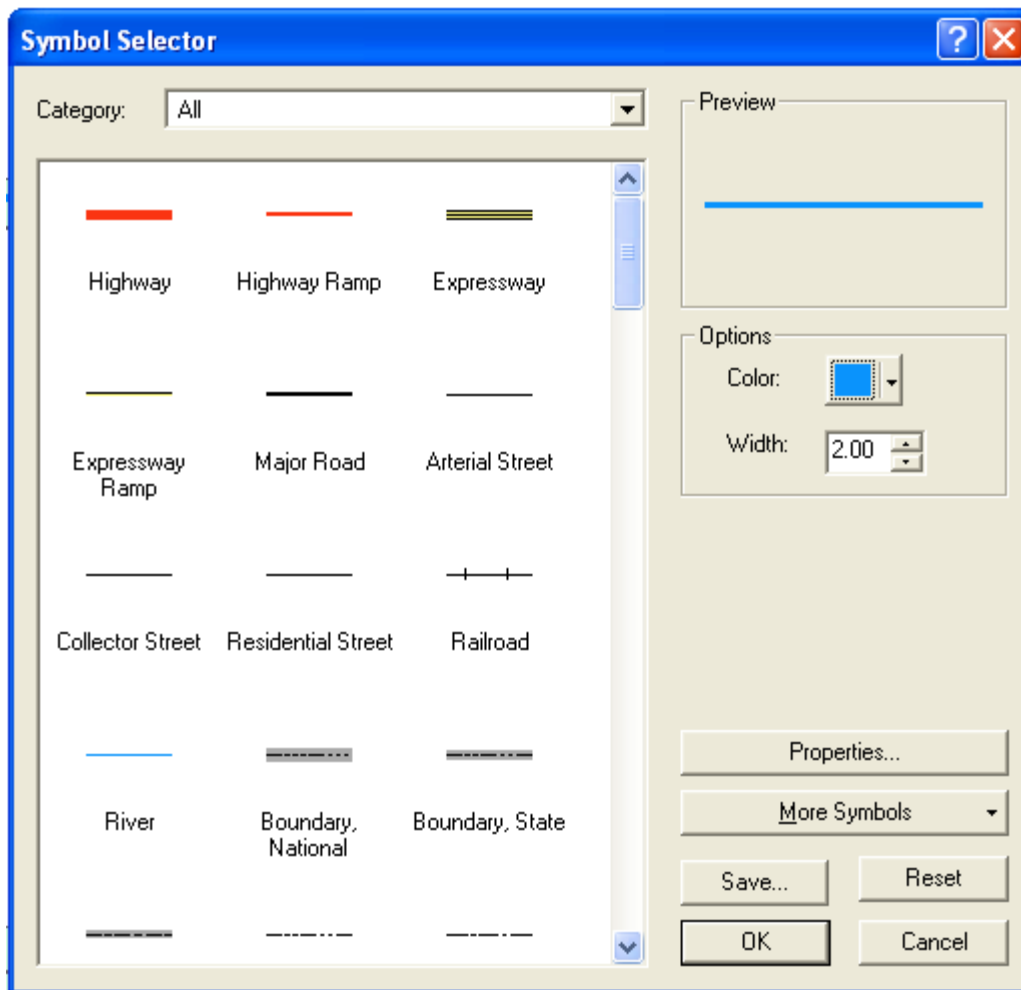


- Use the **Add Data** button  to add minerals, fuels and other resources to the map in the Data Frame.

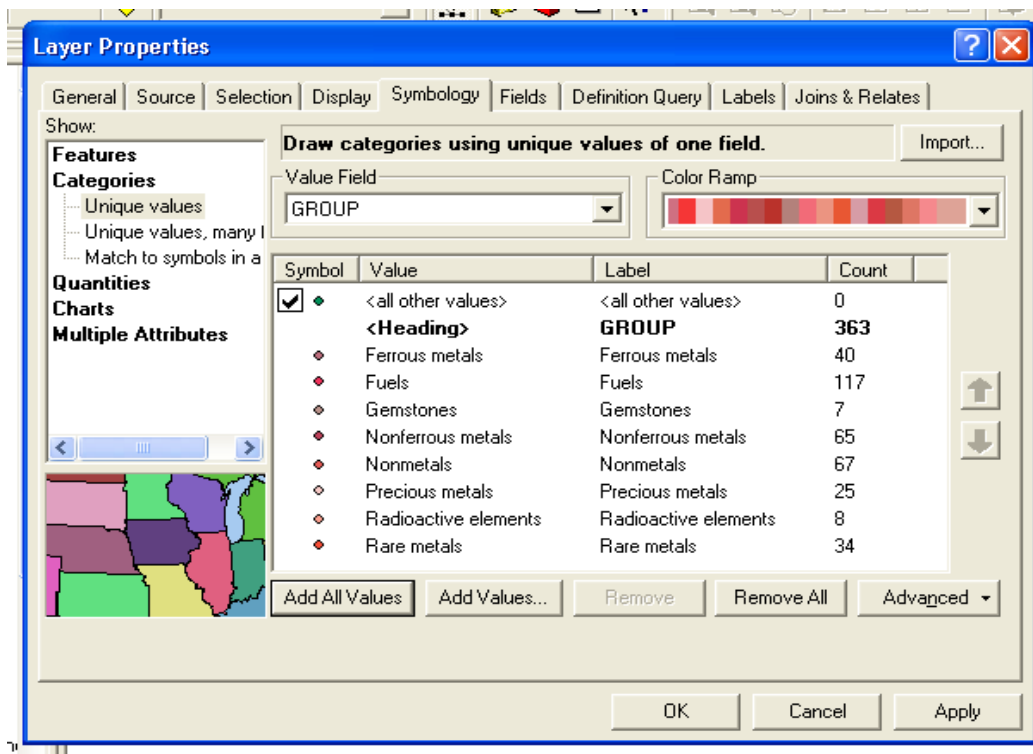
- Once you have clicked the **Add Data** button, use the **Connect To Folder**  button to navigate to the folder containing **Continental** data. This folder will contain, in alphabetical order, additional folders of geographical data for each continent (af = Africa, an = Antarctica, as = Asia, eu= Europe, na = North America, oc = Oceania, sa = South America).



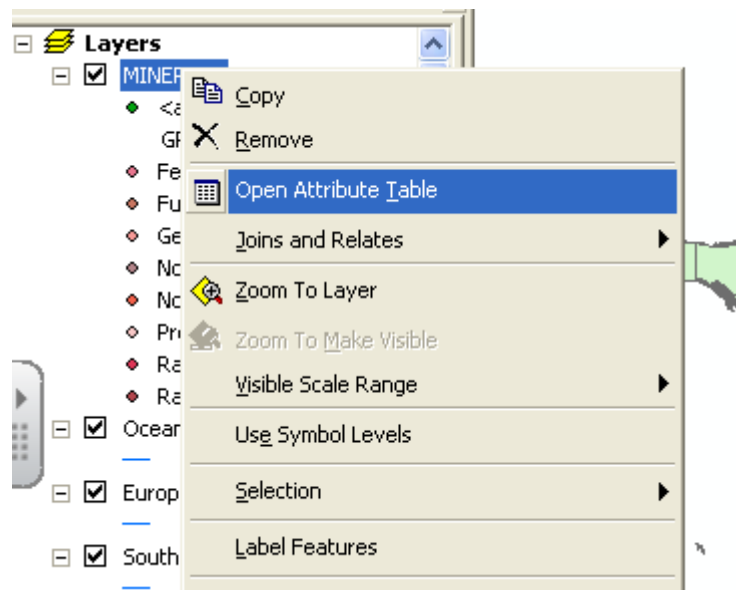
9. Double click on the **af** folder, click on **shp** and hit **OK**.
10. Now select **lakes** and while holding down the **ctrl** button, select **rivers**. Click on the **Add** button to add these layers to your Data View (map).
11. You can create new labels for your layers in the Table Of Contents. Click on the label name once to highlight it, and then click once on the highlighted line to make it editable (the cursor will appear).
12. You can also change the color for the data visible on the map. To change the color of the rivers to a blue, double click on the symbol for rivers and in the **Symbol Selector** dialog, choose an appropriate **Colour** and line **Width** and select **OK**.



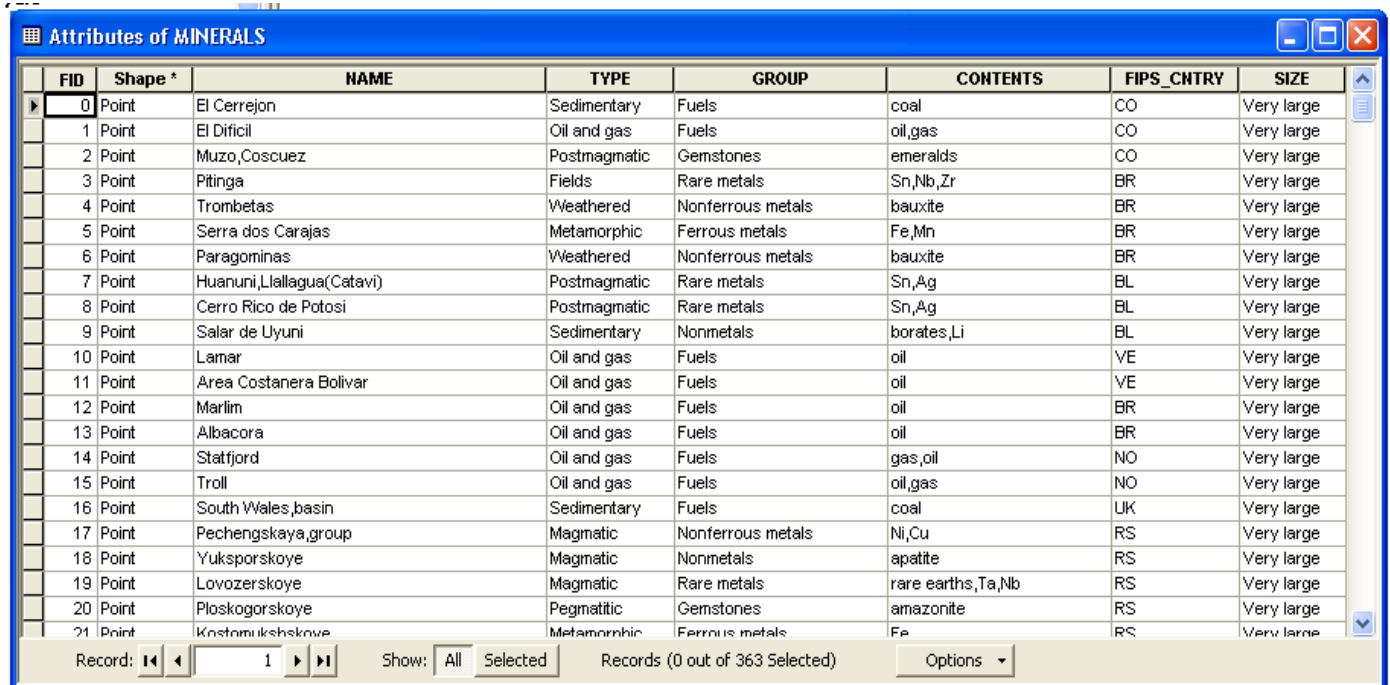
13. Repeat steps 11 and 12 for Lakes if necessary.
14. It is important to save your work frequently. Click on the **Save** button in the top toolbar to save your changes.
15. To complete your map, you will need to show water features for all continents (excluding Antarctica). To do this repeat steps 8 - 12 for the remaining continents.
16. Use the **Add Data** button and navigate to **minerals.shp** found in the World Data folder and add this shapefile to your Data Frame (map).
17. It is more beneficial to have the minerals classified into groups such as precious metals, ferrous metals, fuels, etc. To do this, double click on the **minerals** label in the Table Of Contents and go **Symbology** → **Categories** and **Unique Values**. Make **Value Field = Group**, select **Add All, Apply** and **OK**.



18. You may wish to investigate the kinds of information that is associated with each of the themes, e.g., minerals. In the **Table Of Contents**, right click on the layer you wish to investigate (e.g. minerals) and select **Open Attribute Table**.

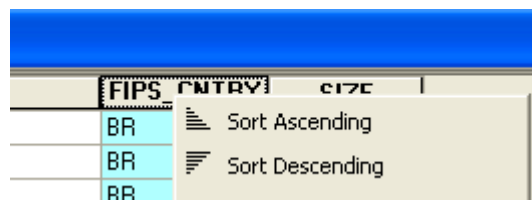



19. Examine the MINERALS attribute table. Notice that the table has seven fields of data including name of the deposit, type of deposit, group the mineral is from, contents of the mineral reserve, country where the mineral is found and the size of the deposit.

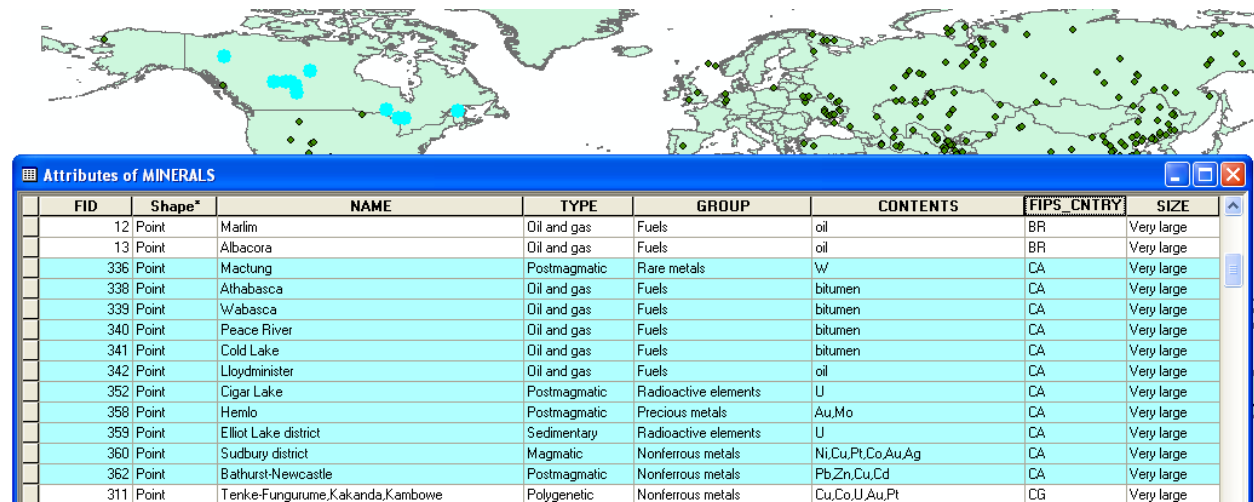




FID	Shape *	NAME	TYPE	GROUP	CONTENTS	FIPS_CNTRY	SIZE
0	Point	El Cerrejon	Sedimentary	Fuels	coal	CO	Very large
1	Point	El Dificil	Oil and gas	Fuels	oil,gas	CO	Very large
2	Point	Muzo,Coscuez	Postmagmatic	Gemstones	emeralds	CO	Very large
3	Point	Pitinga	Fields	Rare metals	Sn,Nb,Zr	BR	Very large
4	Point	Trombetas	Weathered	Nonferrous metals	bauxite	BR	Very large
5	Point	Serra dos Carajas	Metamorphic	Ferrous metals	Fe,Mn	BR	Very large
6	Point	Paragominas	Weathered	Nonferrous metals	bauxite	BR	Very large
7	Point	Huanuni,Llallagua(Catavi)	Postmagmatic	Rare metals	Sn,Ag	BL	Very large
8	Point	Cerro Rico de Potosi	Postmagmatic	Rare metals	Sn,Ag	BL	Very large
9	Point	Salar de Uyuni	Sedimentary	Nonmetals	borates,Li	BL	Very large
10	Point	Lamar	Oil and gas	Fuels	oil	VE	Very large
11	Point	Area Costanera Bolivar	Oil and gas	Fuels	oil	VE	Very large
12	Point	Marlim	Oil and gas	Fuels	oil	BR	Very large
13	Point	Albacora	Oil and gas	Fuels	oil	BR	Very large
14	Point	Statfjord	Oil and gas	Fuels	gas,oil	NO	Very large
15	Point	Troll	Oil and gas	Fuels	oil,gas	NO	Very large
16	Point	South Wales,basin	Sedimentary	Fuels	coal	UK	Very large
17	Point	Pechengskaya,group	Magmatic	Nonferrous metals	Ni,Cu	RS	Very large
18	Point	Yuksporskoye	Magmatic	Nonmetals	apatite	RS	Very large
19	Point	Lovozerskoye	Magmatic	Rare metals	rare earths,Ta,Nb	RS	Very large
20	Point	Ploskogorskoye	Pegmatitic	Gemstones	amazonite	RS	Very large
21	Point	Krestomikshskoye	Metamorphic	Ferrous metals	Fe	RS	Very large

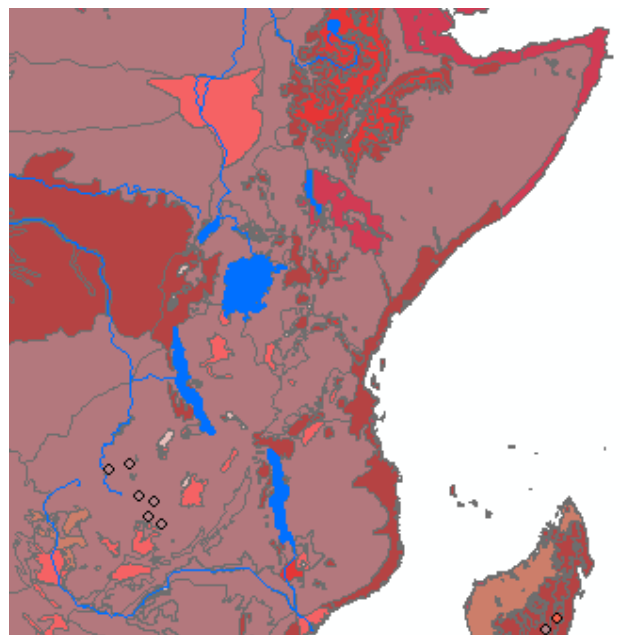
20. You can re-sort the data by country (e.g. Canada) to focus on the major minerals by country. Click once to highlight the **FIPS_CNTRY** column title, then right click and select **Sort Ascending**. Scroll down to Canada (identified as CA). What are the major types and groups of minerals found in Canada? What are the specific contents of these minerals? What size are the deposits? Where are they located?




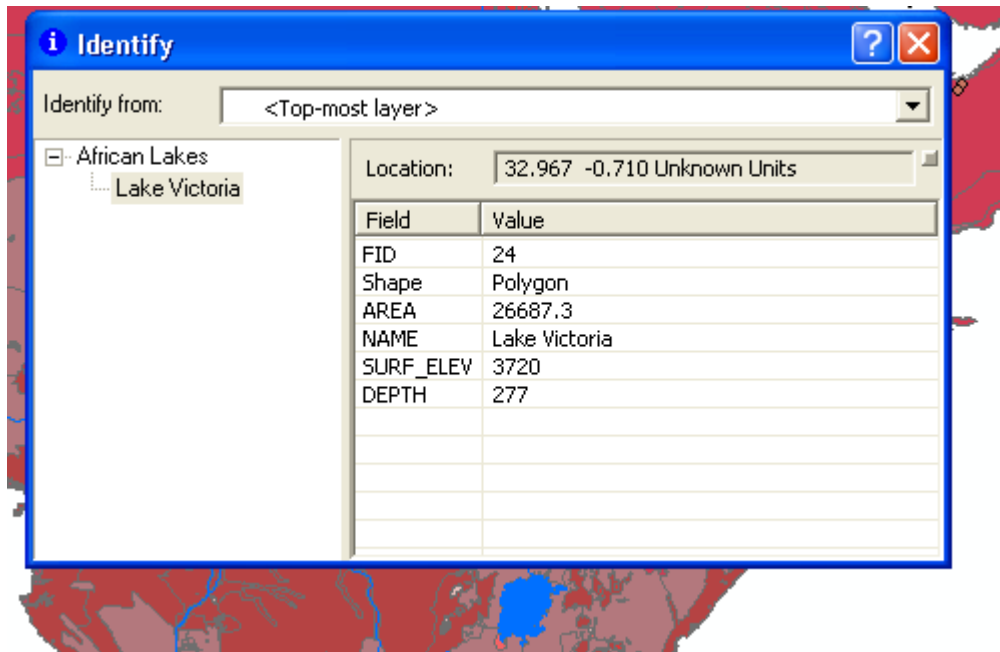
21. By highlighting selected data in the Attribute table, the features will show on the map (Data Frame). Now highlight the entries for Canada by placing your cursor in the extreme left side of the first row for Canada, then drag down to include all entries for Canada. Close the Attribute table and return to the Data Frame and you will notice that the mineral locations in Canada are also highlighted. Now use the **Identify** button  and click on the highlighted locations to determine the details associated with each. To clear the selected features, open the Attribute table and go **Options** → **Clear Selection**.



22. Repeat steps 18 and 19 and examine the attribute data associated with the **wwf_ecoreg.shp**. Make up some questions that you could ask about world and/or Canadian ecoregions.
23. To identify a country or geographical feature (e.g. lake or river), use the **Zoom In** button  and zoom to the desired area. Then activate the **Identify** button  and hold the cursor over the desired feature and click to display the **Identify Results** dialog. For example, you may wish to zoom in to enlarge the area of eastern Africa and identify a major lake in that region.

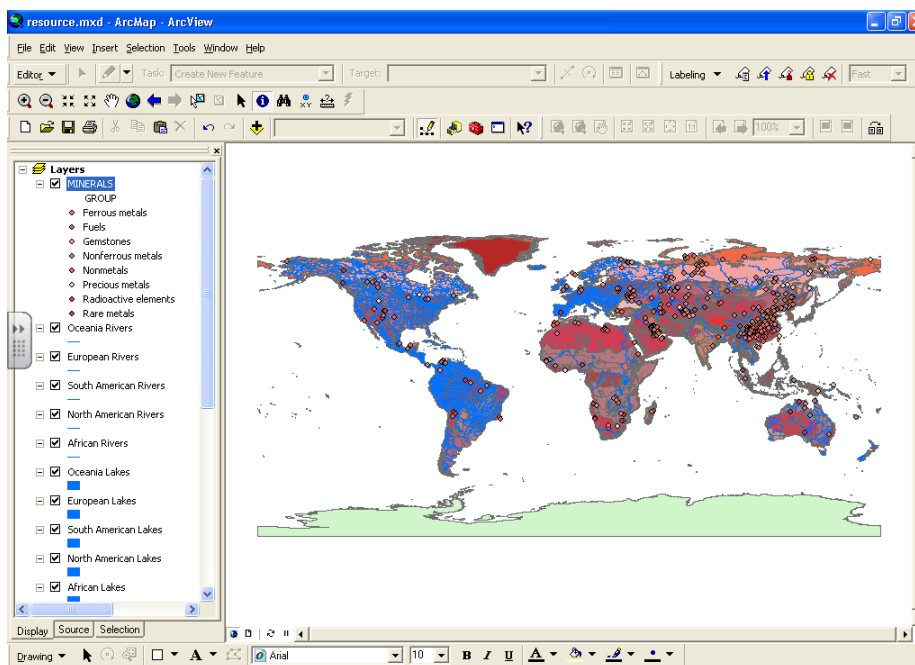


24. With the **identify tool** selected  , click on the large lake in eastern Africa. (It is important to be accurate when identifying a feature as the identify tool will identify the top most layer. If this is a problem you may have to rearrange the order of the layers in your table of contents). The **Identify** dialog will display and identify the lake as Lake Victoria, and will also provide the attribute data associated with this feature.



Summary

Working through this exercise is just the beginning of the acquisition of many GIS skills that you can learn to explore the planet and extract a vast amount of information about resources, populations, land features, and other topics. Geographers and others seek to organize their world and offer important solutions to real problems that we face. These skills give you the tools to become a valuable contributor to industry and business in your future, and to be part of the solution to the many problems that we face in our world.



Creating a Layout (Adding Map Basics)

25. If desired, you can create a **Layout** on which you can add the necessary map components (legend, scale, north arrow, name, title and border). You can access the map layout template by going to **View → Layout View** and then click on the **Change Layout** button found on the toolbar.



26. Click on the **General** tab, select **Letter Landscape** and click **Finish**. You should now see a map with all necessary map components. (Whatever is visible in the Data Frame will appear in the Layout view. If your map is too big or small, go **View → Layout View** and zoom in to the appropriate level.)

27. Using the cursor double click on the **Title** and add an appropriate title.

28. Double click where prompted and add your name and the date.

29. Use the cursor to move the North Arrow and Legend to a suitable location. If you want to make any changes to the legend or north arrow double click on the item and the **Properties** dialog displays allowing you to make the desired changes.
30. Double click on the **Scale** and go **Scale and Units → Divisional Units** and change the units to **Kilometers**.
31. The Layout is now ready to show to your teacher or to print.

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