

GEO/EVS 423 / EVS 523

Exercise 8: Databases & Linkages of External Databases to Maps

The purpose of this exercise is to give you some experience with databases. Because one of the databases that you will be using throughout your career is the soils database from the US Department of Agriculture, we will concentrate on that database. If you want to download the database for yourself, you can go to the site, <http://soildatamart.nrcs.usda.gov>. You may be able to log in as a guest, but I believe that you will have to establish an account. In any case, you can go to the state you wish to consider, followed by the County. Choose spatial and tabular data sets. It's a fairly easy-to-use-site. When you submit your request, it typically takes about an hour or so before you get an e-mail that your file is ready. The file comes as a zip file that you can download onto your machine.

In this exercise, we will use the Cuyahoga County Ohio database. To begin, open Microsoft access. Click on the "file open" icon, and navigate to the CountyCuyahoga.mdb file on the T: drive. You may receive a security warning that certain content in the database has been disabled. At the same time, a window will very likely open informing you that an action has failed. Cancel out of this window by clicking the "Stop all Macros" button, and click on the security warning to enable the content of the database macro. Do *not* choose the recommended radio button. The soils report window should open.

Click on the "Systems Reports" button. This will give you access to the descriptions of the various tables in the database. You should probably take a brief look at the "How To Use This Database" report, but the SSURGO metadata reports are more interesting. You should look at them all. Pay special attention to the reports describing the relationship between the named soil series and the content of the various individual files. Probably the most interesting of these reports are the table column and table column description reports.

Those individual data files are shown in the window on the left-hand side of the Microsoft Access database window. Once you have determined that there is a particular database file which appears to be of interest, you can look at it by double-clicking on that file name in the left-hand window. Make sure you understand the relationship between what you see and the description that was made in the table column and table column description reports.

You will doubtless find that some of the tables are more interesting than others. Look through several of the tables, examining at least three or four tables whose names begin with each of the several different letters. In all cases, you will notice that there is a field labeled key (the name may actually be somewhat more complicated than simply "key," but the significance is pretty clear). These are the fields that are used to link tables. To get an idea of the linkage of tables that's possible in this database, click on the "Database Tools" tab and then click on Relationships. The resulting diagram is rather complex, and I don't really expect very many of you to understand it completely, but it will give you an idea of the way in which different tables can be joined to each other using these keys. You will note also that some of the tables have a relatively simple key, whereas most of the tables have a compound key. This reflects a need to join several tables together in order to extract information.

You need to consider a couple of things when thinking about joining information from different tables. First, what key do you actually use. Later in this exercise, you will be joining one or more tables to the soil map, and you will need to determine which field represents the proper key to use. If you use the incorrect field, even if it shows up as the suggested default key, you will end up with a database in which the value in each field is <null>. Second, you need to consider whether you are dealing with a one-to-one relationship or a one-to-many relationship. In the past, when you have dealt with joins, you have probably been dealing with one-to-one relationship. In this case, you will be dealing with a one-to-many relationship. For example, you may be dealing with a data table in which there is a single record for the Allis silt loam. There may, however, be many locations in which the Allis silt loam can be found. The one record in the data table will thus be mapped to many locations on the map. This is a relatively simple example. Just imagine what can happen when you have properties of interest data tables linked

together through multiple keys, each of which is mapped in a one-to-many relationship. The ultimate result can be quite complex.

Once you feel you understand at least some of the information which is in the very complex soils database, you should open ArcGIS and load the maps which are to be found in the CountyCuyahoga folder. Specifically, these are in the "spatial" folder in that directory. Examine the attribute tables for each of the shapefiles. Do they all contain content? For those that do not, remove them. What is represented by those that are left in the database? Which file actually represents the soil map for Cuyahoga County?

You can now load into your map composition those tables from the database which you think are most interesting. You'll note something rather interesting about this database. It is a Microsoft Access database. If you ask ArcGIS what kind of a file this is, it will tell you that it is a personal Geodatabase. That is because personal Geodatabases are nothing more than specialized Microsoft Access databases. However, the specialization that makes a Microsoft Access database into a personal Geodatabase for ArcGIS is not to be found in this particular database. You might, if you wanted to, create a personal Geodatabase into which you could load the tables from this particular Microsoft Access database, but you don't need to. Simply load the tables of primary interest into your map composition. Join your soil map to the table or tables of primary interest, and uses "properties" to map the particular properties of each soil that you find of interest. Select several properties of interest, and print the corresponding maps.

You should be prepared to turn in at least five maps showing the relationship between soils and factors of interest to the environmentally conscious use of the land comprising those soils.

Portfolio

- 8-1 All 5 of these maps will be maps of Cuyahoga County, showing issues which you feel are of
- 8-2 interest to environmental scientists and which can be shown using the Soil Survey. Which
- 8-3 issues you choose are entirely up to you, but you should choose five *different* issues.
- 8-4
- 8-5