FILE GEODATABASES

ArcGIS can directly use or import most GIS file formats in common use for geoprocessing and display. The recommended file format for use in ArcGIS is the file geodatabase that stores map layers, data tables, and other GIS file types in a system folder that has suffix extension .gdb in its name. In this chapter you will learn about working with file geodatabases.

Main learning objectives are following :

- Build a file geodatabase
- Use ArcCatalog Utilities
- Modify an attribute table
- Join tables
- Create centroid coordinates in a table
- Aggregate data

BUILD A FILE GEODATABASE

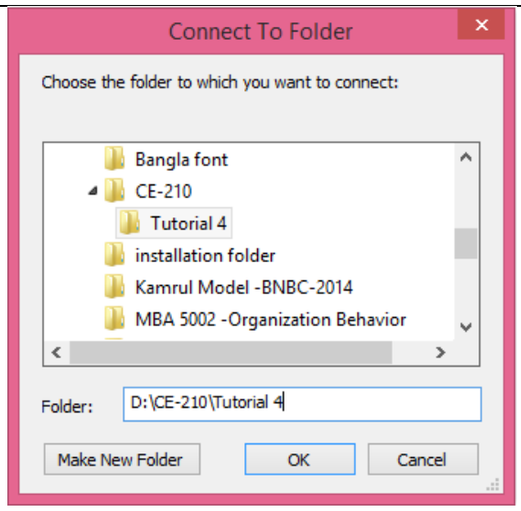
a. Open ArcCatalog
b. Create an empty file geodatabase
c. Import shapefiles
d. Import a data table

A file geodatabase is quite simple and flexible, being merely a collection of file s in a file folder. Nevertheless, you need a special utility program to build and maintain a file geodatabase. That program is ArcCatalog which you will use next. Some of the functionality of ArcCatalog window allows you to do some utility work while in ArcMap in its catalog window. The catalog window allows you to do some utility work while in ArcMap without opening the separate application program ArcCatalog.

a. Open ArcCatalog

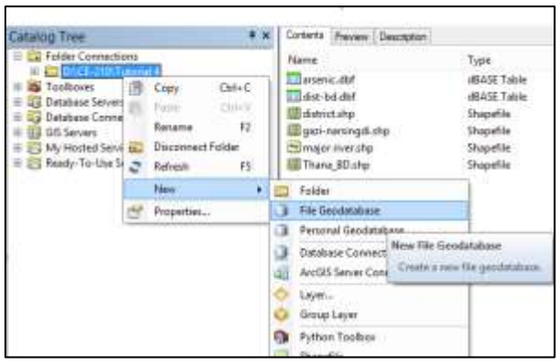
1. On the Windows taskbar, click Start,All Programs,ArcGIS,ArcCatalog 10.2.2
2. Click the Connect to Folder button , expand the folder and file tree for D:\CE210\Tutorial 4, to select it, and click OK.

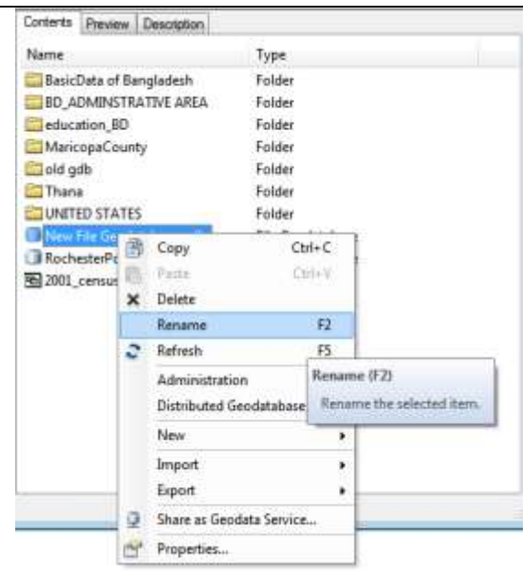


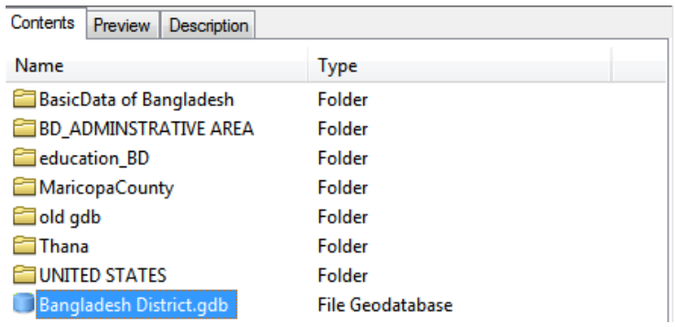


4.1.2 Create an empty file geodatabase

1. In the Catalog Tree panel, expand D:\CE210\Tutorial 4, create a new file named New File Geodatabse in the right panel of the window.
2. Right-Click on D:\CE210\Tutorial 4 in the left panel then New and then New File Geodatabse. Click New File Geodatabase. It will create a new geodatabase file having extension .gbd.
3. Change the name from New File Geodatabase.gdb to Bangladesh District.gdb.

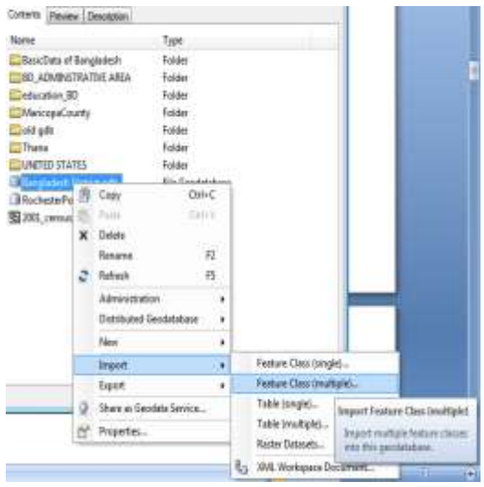


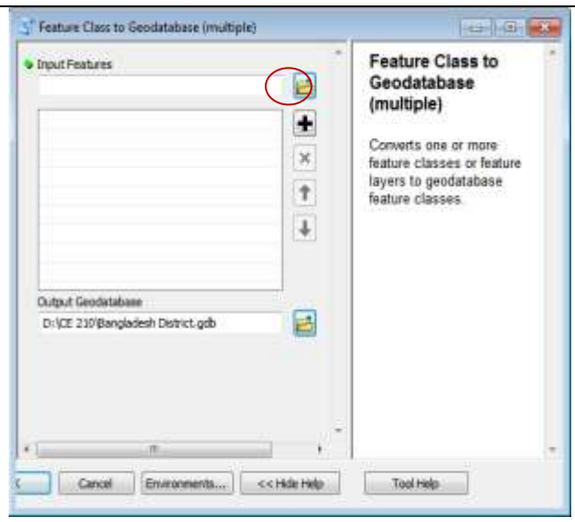




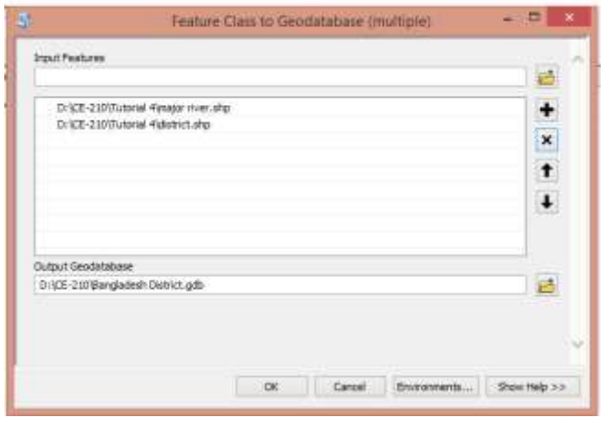
4.1.3 Import shapefiles

1. In the Catalog's right panel, right-click the Bangladesh District.gdb, click Import, Feature Class (multiple).
2. In the Feature Class to Geodatabase (multiple) dialog box, click the browse button to the right of the Input Feature Fields, browse to D:\CE210\Tutorial 4 click to open that folder, hold the shift-key down, and select both district.shp and major river.shp. Click add and click OK.



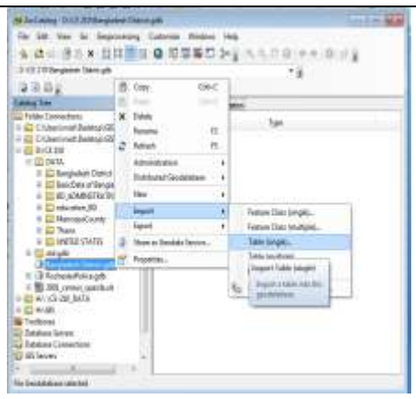


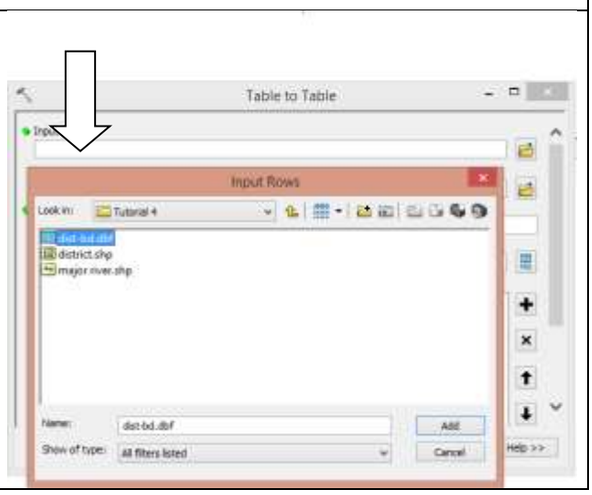


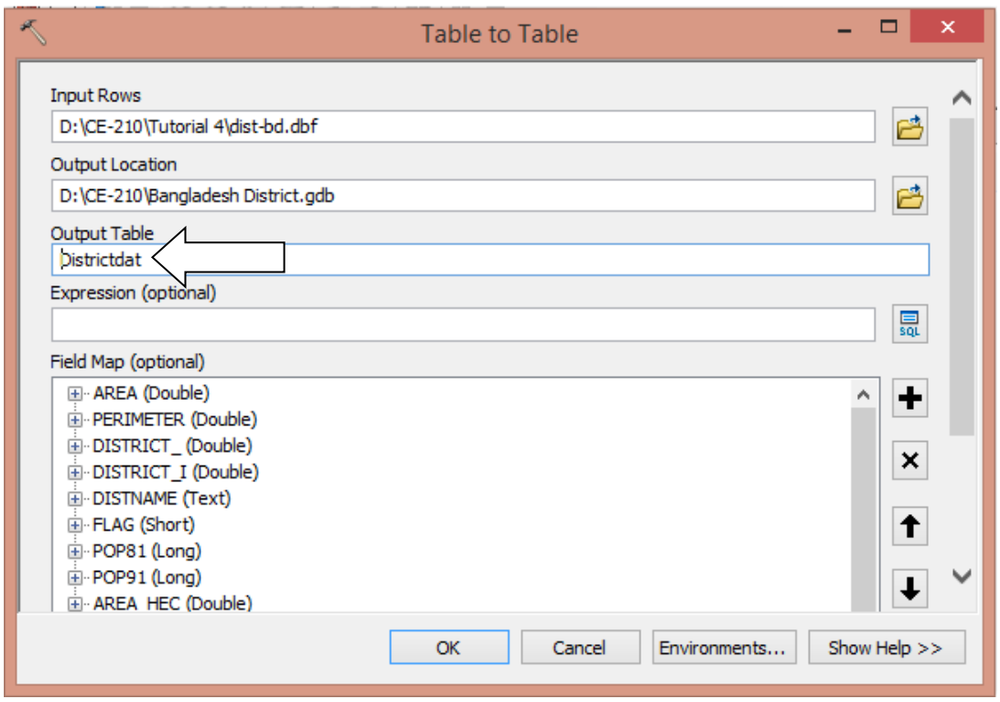


4.1.4 Import a data table

1. Right-click the Bangladesh District.gdb, click Import, Table (single).
2. In the Table to Table dialog box in the same manner add dist-bd.dbf. Location is D:\CE210\ Tutorial 4
3. Type Districtdat in the Output Table Field.
4. Click Ok.







TUTORIAL 4.2

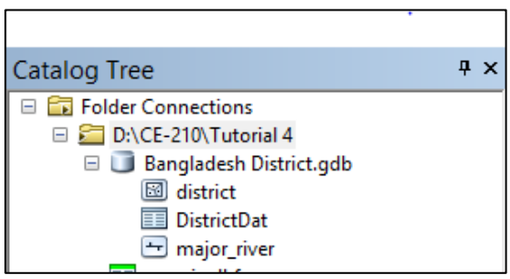
USE ARCCATALOG UTILITIES

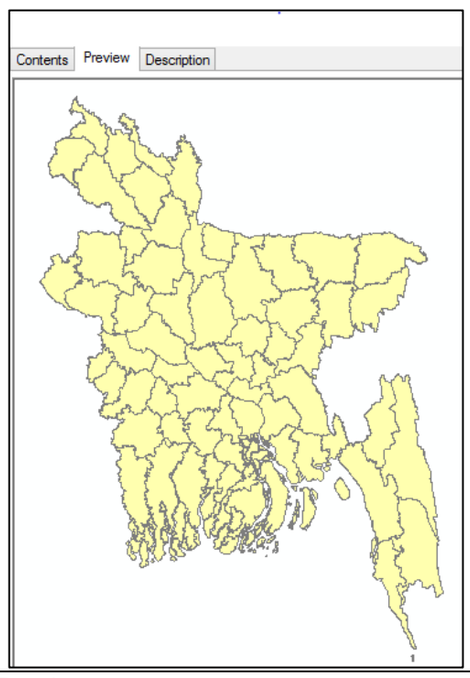
4.2.1	Preview layers
4.2.2	Rename feature layers
4.2.3	Copy and delete feature layers
4.2.4	Compress a file geodatabase

Now you've created a file geodatabase you can start using ArcCatalog's utilities. First are the preview utilities, which give you a good overview of a feature layer or table.

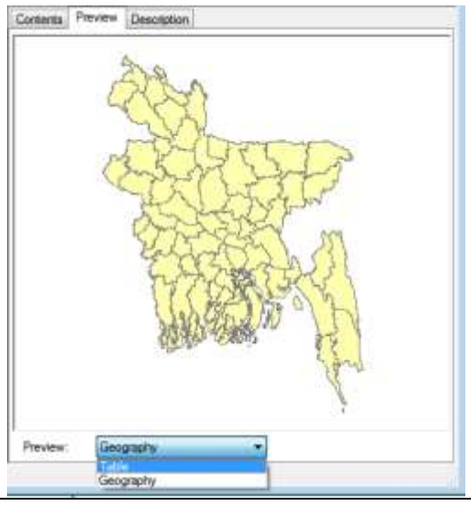
4.2.1 Preview layers

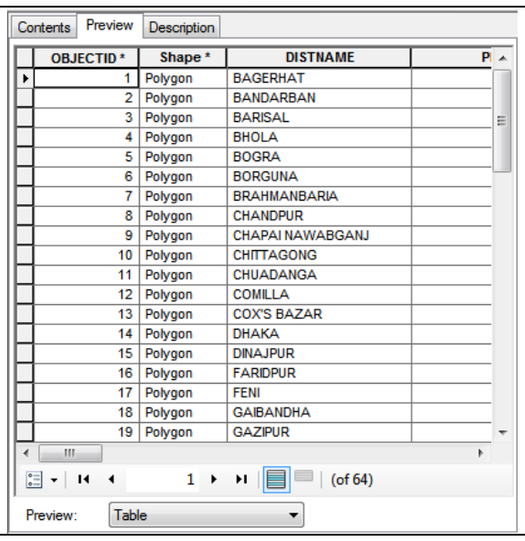
1. Click Bangladesh District.gdb to expose its contents in the right panel.
2. In the right panel, click district and click Preview tab.





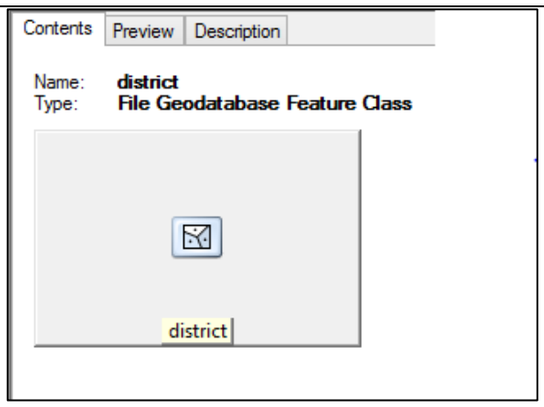
3. At the bottom of the Preview tab, select Table as Preview.





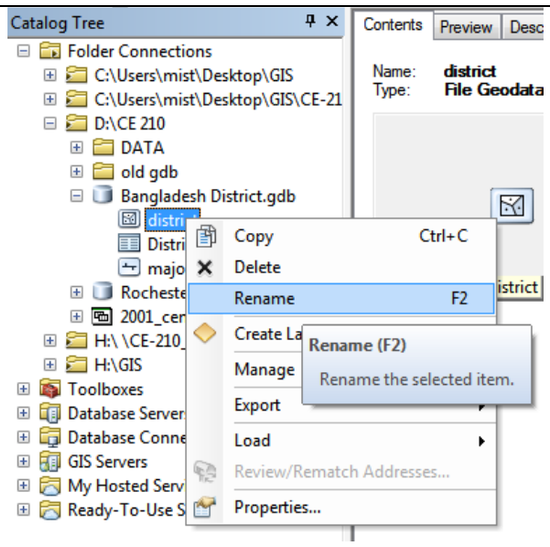
4. Click Description tab.
5. Click the Content tab.

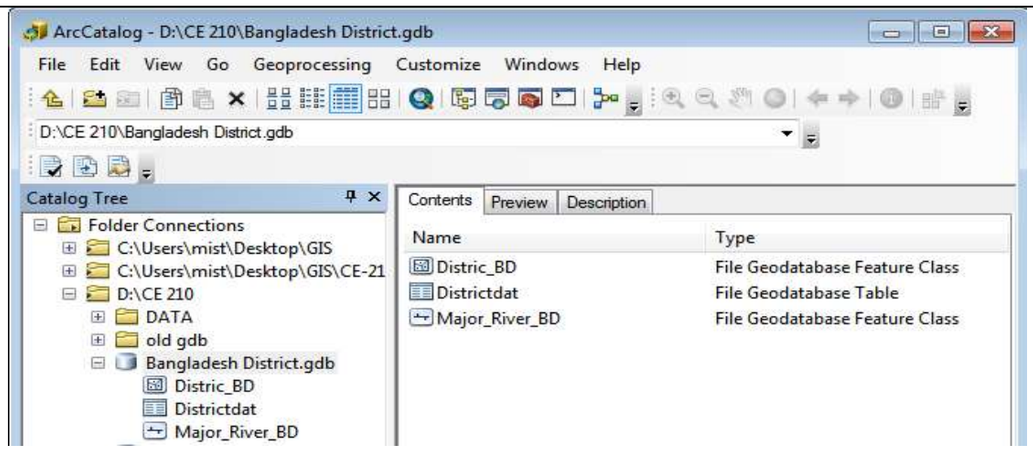




4.2.2 Rename feature layers

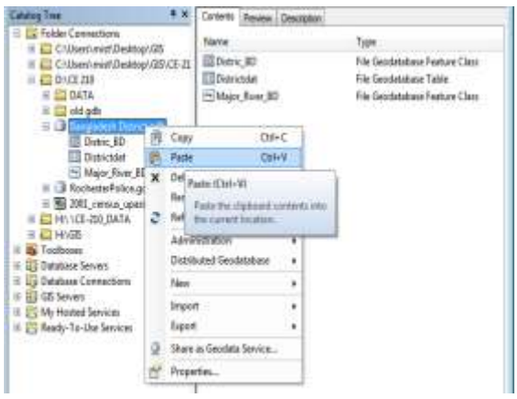
1. In the left panel under Bangladesh District.gdb, right click on District and Rename Districts_BD.
2. Repeat Step 1 and Rename major river as Major_River_BD.



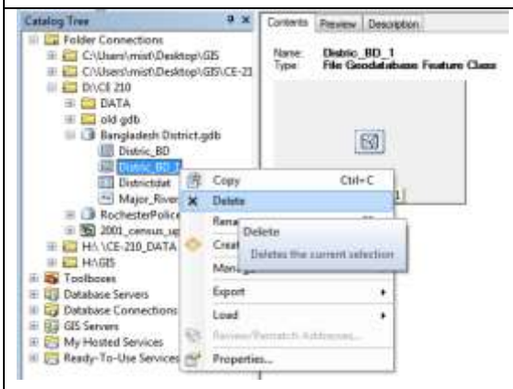


4.2.3 Copy and delete feature layers

1. In the left panel under Bangldesh District.gdb, right-click District_BD and click Copy. Right click Bangldesh District.gdb and click Paste and OK.
2. Right-click District_BD_1 and click Delete and OK.

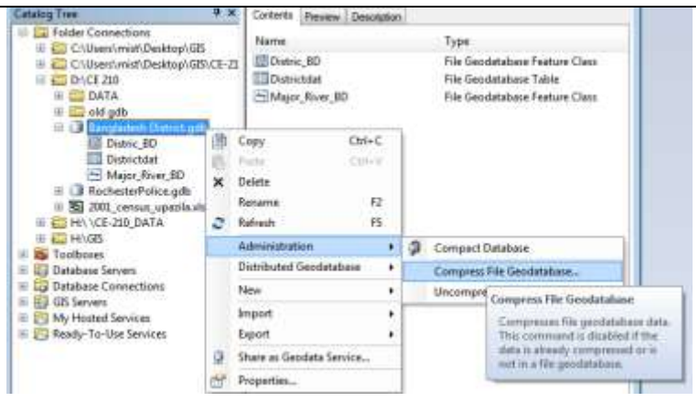






4.2.4 Compress a file geodatabase

1. In the left panel right-click on the Bangldesh District.gdb click on Administration and then Compress File Geodatase and click OK.
2. In the My Computer window check the size of the Bangldesh District.gdb folder.
3. In the left panel right click on the Bangldesh District.gdb and click on the Uncompress File Geodatase and click OK.
4. Close ArcCatalog.





TUTORIAL 4.3

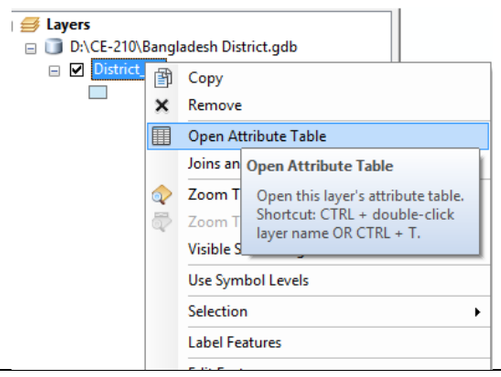
MODIFY AN ATTRIBUTE TABLE

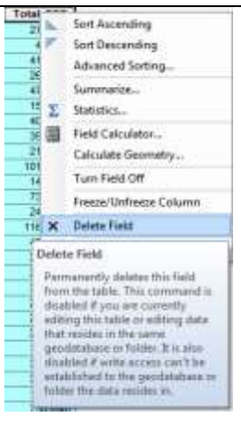
4.3.1	Delete unneeded columns
4.3.2	Calculate a new column
4.3.3	Modify a primary key

Most of gets processed or displayed in a GIS depends on attribute table values. There are many tasks therefore, that you need to know how to perform on these tables, including modifying columns and values.

4.3.1 Delete unneeded columns

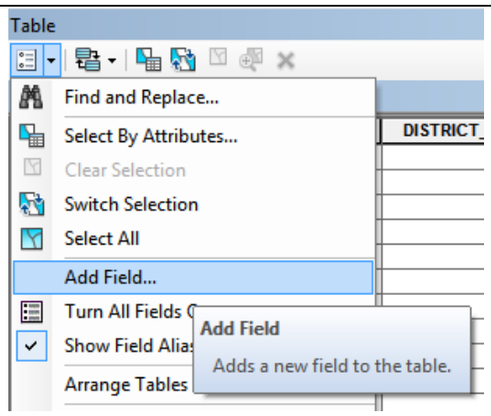
1. Open ArcMap.
2. Add District_BD.shp from the location D:\CE210\Tutorial 4\Bangladesh District.gdb.
3. In the TOC, right-click on the District_BD shape file and click on the Attribute table.
4. In the table, right-click the column heading Total_POP column, click Delete Field and click Yes.
5. Close District_BD attribute Table.

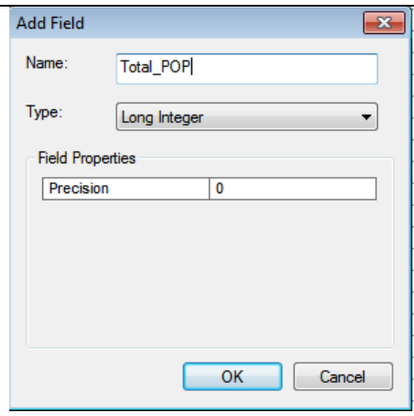


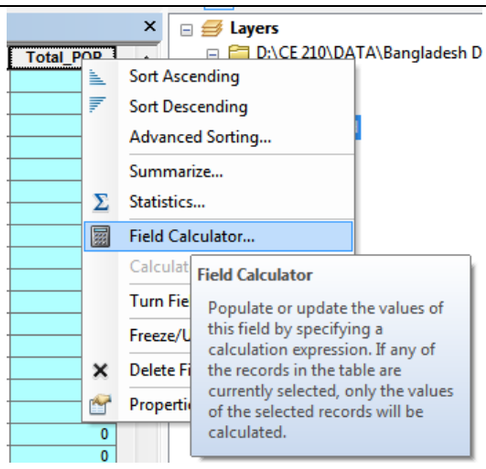


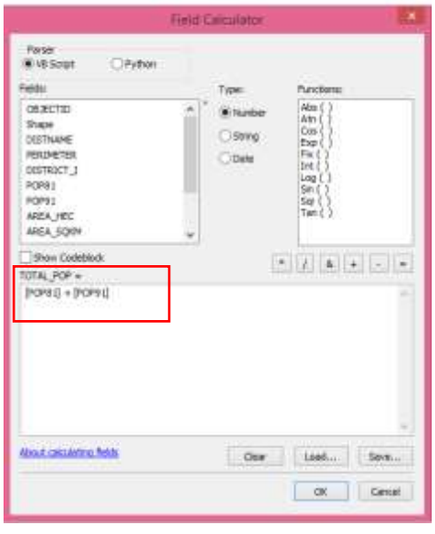
4.3.2 Calculate a new column

1. In the District_BD Data table, click drop-down arrow of the Table Option button and click Add Field.
2. In the Add Field window, type Total_POP in the Name field, change the Type to Long Integer and click OK.
3. Right-click on the Total_POP column heading and click Field Calculator.
4. In the Field Calculator window, double-click on the POP81 in the Fields panel, click the + button, double click on the POP91 in the Fields panel, then click OK.



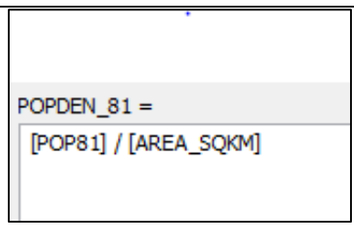






POP81	POP91	TOTAL_POP
130024	147619	2776439
171812	243849	415661
197865	220216	4180815
116785	148941	2657272
210773	268732	4795059
711904	792534	1504438
176686	225907	4025937
179657	213964	3936219
934103	120348	2137584
442691	572974	10156650
654152	828162	1482314

5. In the same manner calculate Population density (per sqkm area) of 1981. [Note: choose ‘double’ as the field type.]



POP81	AREA_SQKM	POPDEN_81
130024	2352.63	552.678944
171812	4315.77	39.810277
197865	22.19	89168.76757
116785	19.8	58982.67904
210773	2907.27	724.987698
711904	463.37	1536.361887
176686	1914.57	922.852677
179657	1695.25	1059.772305
934103	1729.25	540.178112
442691	3922.41	1128.61993
654152	1124.99	581.473618

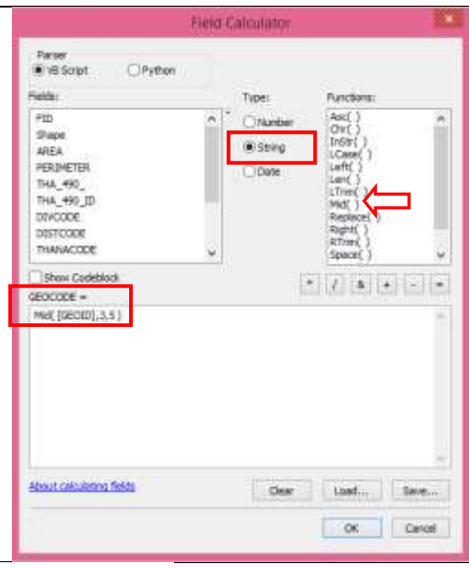
4.3.3 Modify a primary key

It is often necessary to join two tables to make a single table. For tables to join, they must share unique identifiers or keys.

For example, there are administrative records available for Gazipur and Narsingdi district in the gazi-narsingdi shape file. But you need to make a shape file basing on arsenic concentration of these district. The GEOCODE for arsenic data table and the GEOID column of the gazi-narsingdi are the corresponding unique identifiers for these tables. These attributes would match, except that GEOID has the extra characters “12” at the beginning of each value. Next, you will use a string function, Mid([GEOID],3,5), that extracts a 5-character string from GEOID starting from position 3 and creates a new column in Attributes of gazi-narsingdi data table to match GEOCODE of Attributes of arsenic table.

1. Right click arsenic in the TOC and click Open. (Note that GEOCODE in the table has values such as 33386)
2. Close the arsenic table, right-click on the gazi-narsingdi in TOC, and click Open Attribute Table.
3. In the gazi-narsingdi table, click drop-down arrow of the Table Option button  and click Add Field.
4. In the Add Field dialog box, type GEOCODE in the Name field, change the type to Text and Length to 5 and click OK.
5. Scroll to the right to the gazi-narsingdi table right click the GEOCODE column heading, and click Field Calculator.
6. In the Field Calculator dialog box, change the Type from Number to String; double-click the mid**()** function; and in the GEOCODE=box, edit the mid**()** function to the Mid([GEOID],3,5) and click OK.





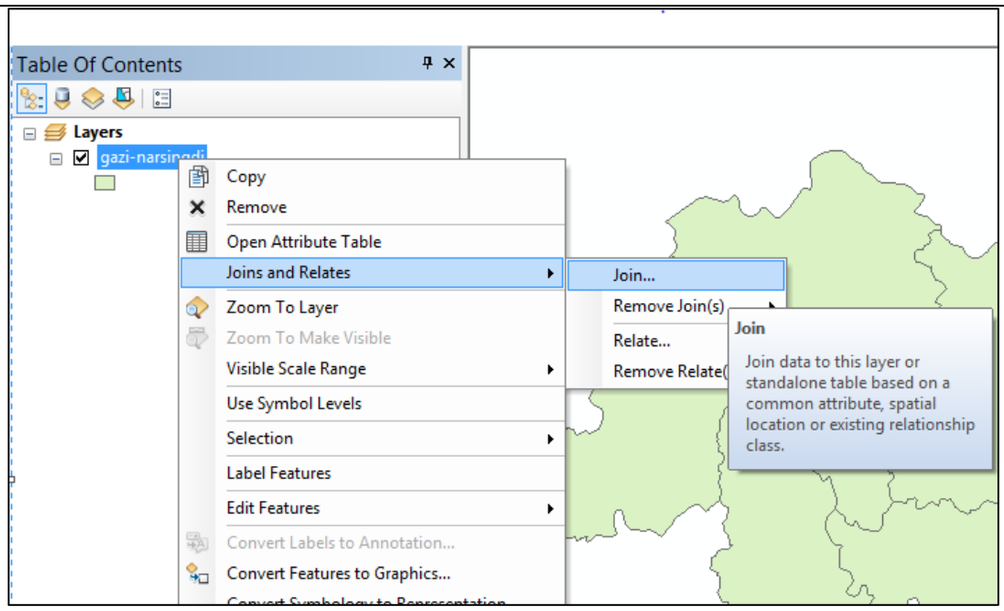
DISTNAME	THANA_NAME	GEOID	GEOCODE
GAZIPUR	SREEPUR	1233386	33386
GAZIPUR	KAPASIA	1233336	33336
NARSINGDI	MANOHARDI	1236852	36852
GAZIPUR	KALIAKAIR	1233332	33332
NARSINGDI	BELABO	1236807	36807
GAZIPUR	GAZIPUR SADAR	1233330	33330
NARSINGDI	SHIBPUR	1236876	36876
NARSINGDI	ROYPURA	1236864	36864
GAZIPUR	KALIGANJ	1233334	33334
NARSINGDI	PALASH	1236863	36863
NARSINGDI	NARSINGDI SADAR	1236860	36860

TUTORIAL 4.4

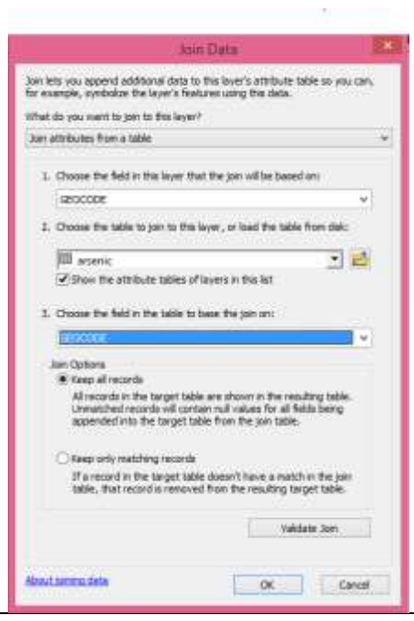
JOIN TABLES

Often you will need to display data on your map that is not directly stored with a map layer. For example, you might obtain data from other departments in your organization, purchase commercially available data, or download data from the Internet. If this data is stored in a table such as an Excel or comma-separated-value table and has geocode matching your gazi-narsingdi layer, you can import it into a file geodatabase and join it to your geographic features for display on your map. Next, you will join the arsenic table to the polygon gazi-narsingdi feature class. The same steps work if your map layer is a shapefile or map layer in another format supported by ArcMap.

1. In the ArcMap TOC, right-click the gazi-narsingdi layer, click Joins and Relates, then click Join.



2. Make the selections shown in the figure.
3. Click Ok, Yes
4. Right click the gazi-narsingdi layer in the TOC, click Open, Attribute Table, scroll to the right in the table, and verify the ArcMap join the arsenic table to the Attributes of the gazi-narsingdi table.
5. Leave the gazi-narsingdi table open.



GEOCODE	GEOCODE *	DISTNAME	AS_PPM
33386	33386	GAZIPUR	0.0003
33336	33336	GAZIPUR	0.0003
36852	36852	NARSINGDI	0.0011
33332	33332	GAZIPUR	0.0003
36807	36807	NARSINGDI	0.0027
33330	33330	GAZIPUR	0.0003
36876	36876	NARSINGDI	0.0422
36864	36864	NARSINGDI	0.004
33334	33334	GAZIPUR	0.0003
36863	36863	NARSINGDI	0.0212
36860	36860	NARSINGDI	0.192

TUTORIAL 4.5

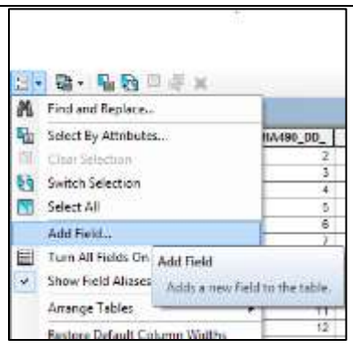
CREATE CENTROID COORDINATES IN A TABLE

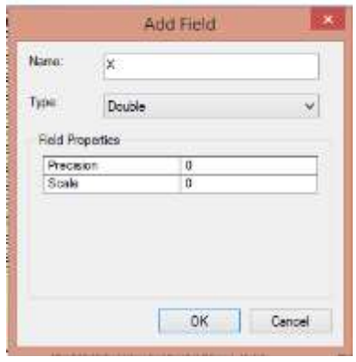
4.5.1	Add X,Y coordinates to a polygon attribute table
4.5.2	Export a table
4.5.3	Create feature class from an XY table
4.5.4	Symbolize a choloropleth and centroid map

Together, polygon and their centroids give you the ability to display two attributes of the same map layer, one as a choropleth map and other as a size-graduated point marker map. ArcMap has an algorithm that calculates and adds centroid coordinates to your attribute table, thereby allowing you to create a new point layer.

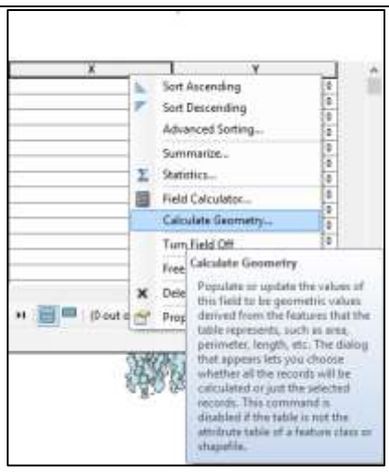
4.5.1 Add X,Y coordinates to a polygon attribute table

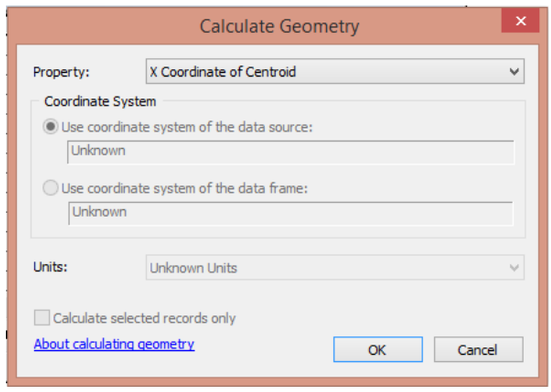
1. In the gazi-narsingdi table, click the drop-down arrow of the Table Option button and click Add Field.
2. Type X as the Name, type Double as the Type, and click OK.
3. Repeat step 3 and 4 except the new field Y.





4. Scroll to the right in the attribute table; right click the X column heading; click Calculate Geometry, Click Yes.
5. Select “X Coordinate of centroid” from the property dialogue box. Click OK twice.
6. Repeat step 4 except select “Y Coordinate of Centroid” from the property dialogue box.



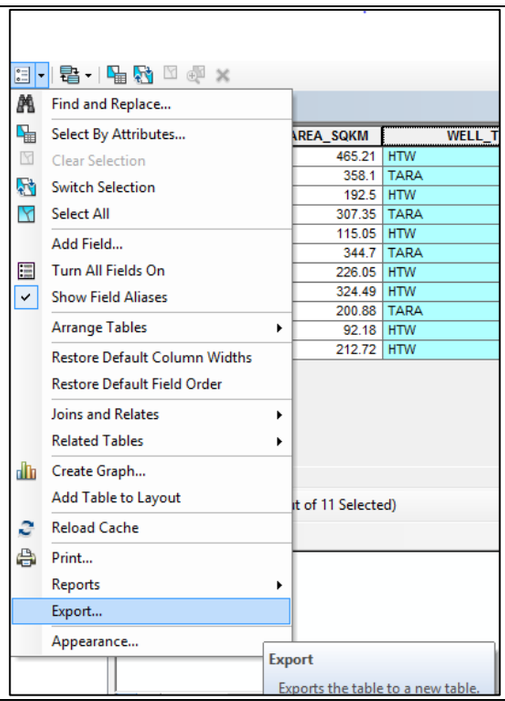


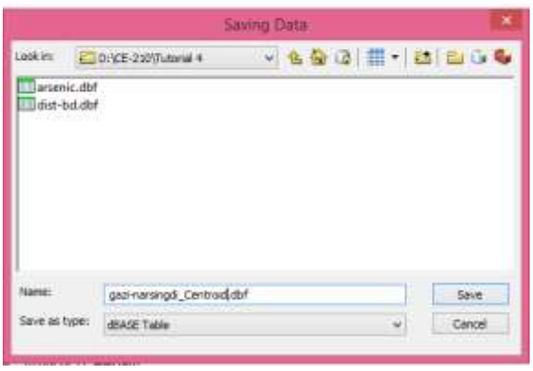
gazi-narsingdi.X	gazi-narsingdi.Y
544993.27515	676890.379179
561007.928551	670536.217522
574320.667251	672108.634994
527235.076497	665648.390644
586214.841431	665656.314796
541123.116766	656448.027012
576084.874054	657000.045019
589038.016852	649958.790829
556262.61501	652858.978098
566155.803378	649447.112225
572208.33911	639947.059796

4.5.2 Export a table

When you export joined table as a table, you get all the attributes of the joined tables stored as one table permanently. Then there are several possible uses for the resultant table, one of which is to use it to make a new point layer based on the centroid coordinates.

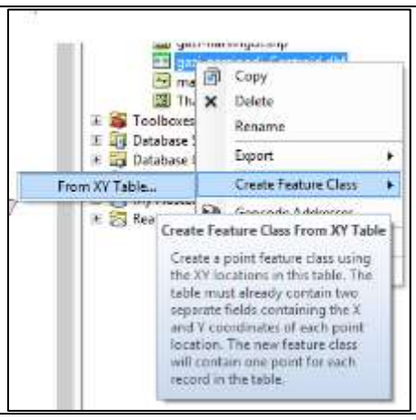
1. In the Attribute table, click the drop-down arrow of the Table Option button and click Export.
2. In the Output table field of the Export Data window, click browse button; browse to D:\CE-210\Tutorial 4; rename the file Export_Output change the name into gazi-narsingdi_Centroid, change the save as type as “dBASE Table”and click Save, Ok and yes.
3. Close the attribute table.



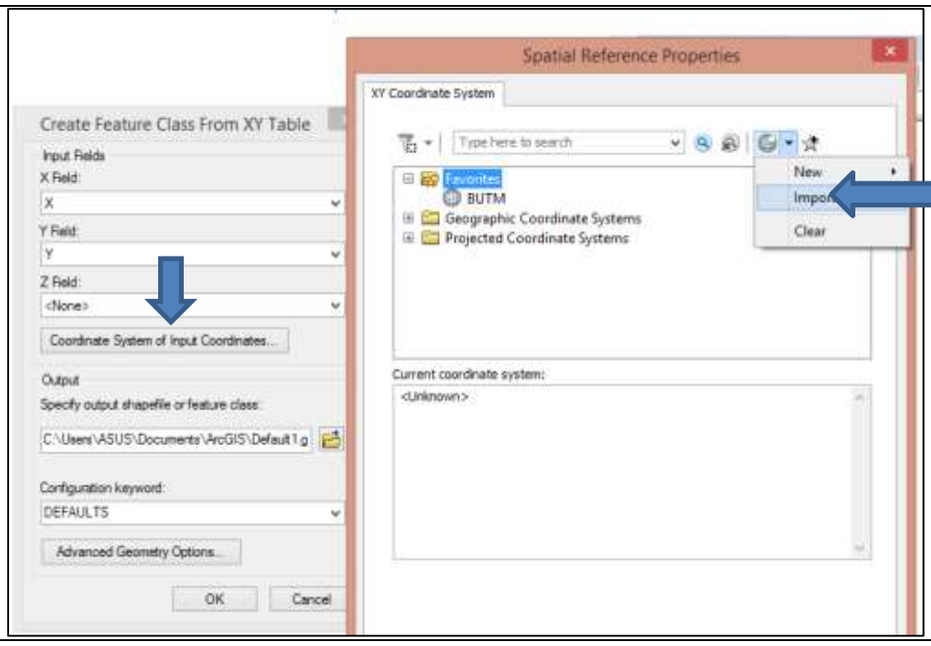


4.5.3 Create feature class from an XY table

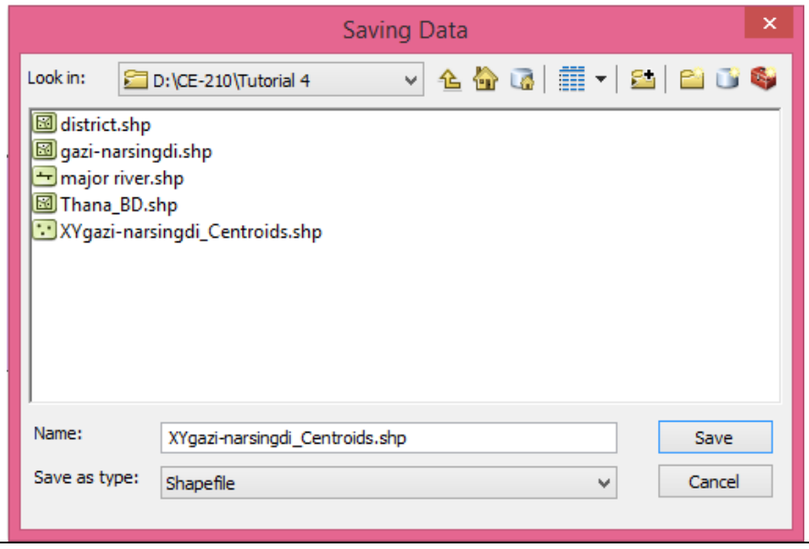
1. In Catalog Window expand D:\CE-210\Tutorial 4.
2. Right-click gazi-narsingdi_Centroid, click Create Feature Class, and click from XY table.



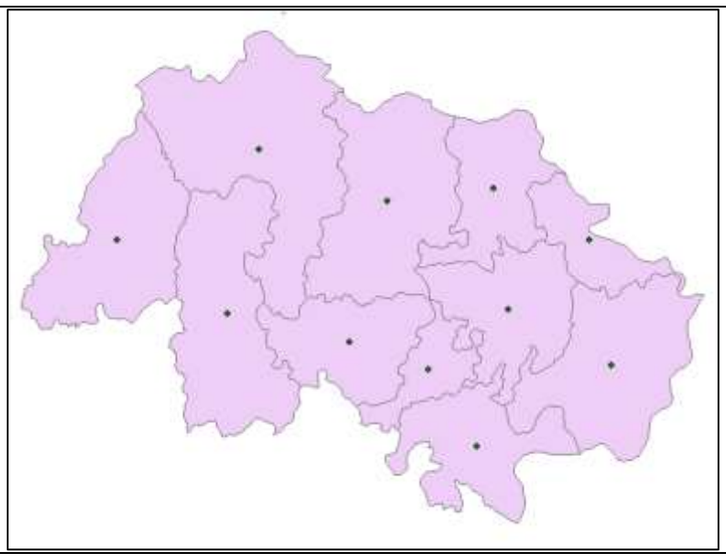
3. In the Create Feature Class from XY Table window, click the Coordinate System of Input Coordinates button, click Import, click gazi-narsingdi in Tutorial 4 folder and click ok.



4. Click the Browse button for Output, change the Save As type to shape file , browse to D:\CE-210\Tutorial 4 change the name to XYgazi-narsingdi_Centroids, click Save, and click OK.



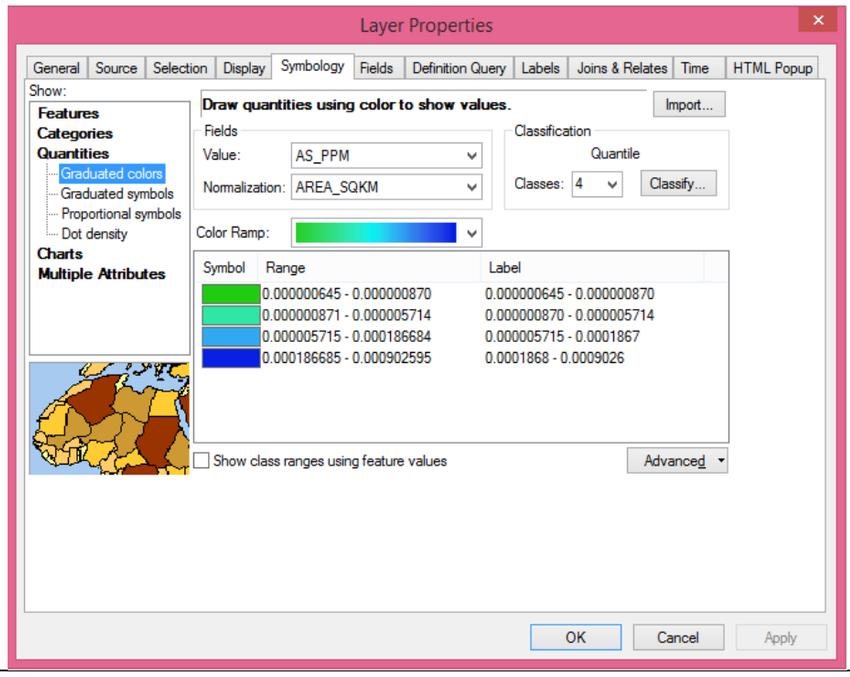
5. Click the Add Data button browse to D:\CE-210\ Tutorial 4, and click XYgazi-narsingdi_Centroids.
6. Zoom anywhere in the map. Now you can get a better look at the centroids point layer you just created.

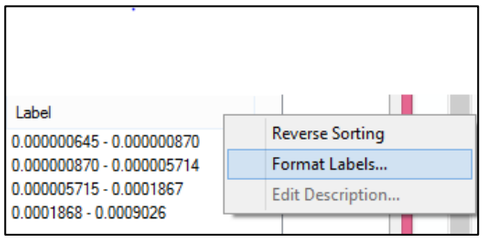


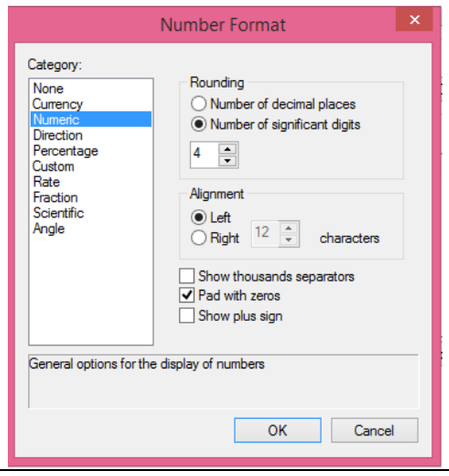
4.5.4 Symbolize a choropleth and centroid map

Here you will symbolize a map using both gazi-narsingdi polygon and Centroids. Let's see how depth of the water level compares with the percentage of Arsenic concentration per sqkm area.

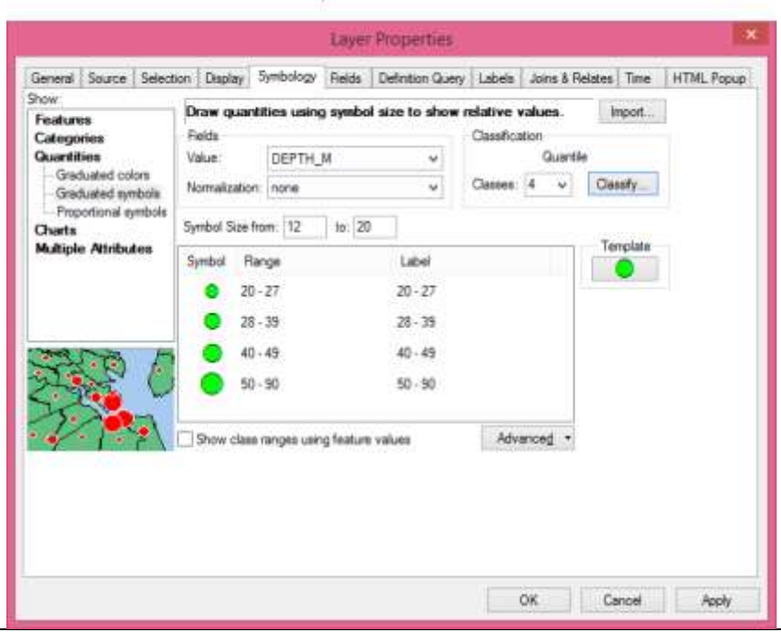
1. Right-click the gazi-narsingdi layer in the TOC and Properties, and click the Symbology tab.
2. In the Show panel, click Quantities and Graduated Colors, under Fields, select AS_PPM for the Value field, change the Normalization to AREA_SQKM, click Classify, change Method to Quantites, and click OK.
3. In the Symbology tab, click the Label column heading to the right of the Symbol and Range Headings, click Format Labels, You can change the format of labelling from here.



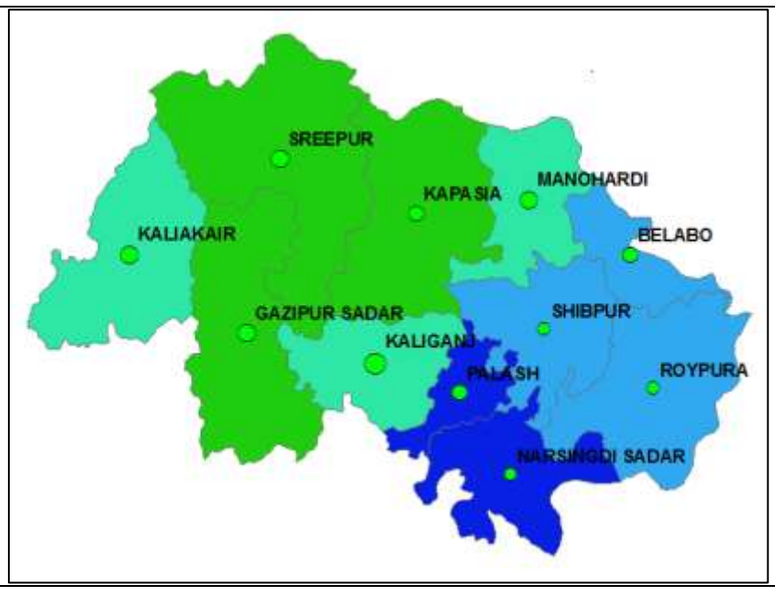




4. Right-Click XYgazi-narsingdi_Centroids in the TOC, click Properties, and click the Symbology tab.
5. In the Show panel, click Quantities and Graduated Symbols. Under Fields, change Value to DEPTH_M.
6. Change and Symbolize Size range to 12 to 20.
7. Click the Template button, choose Circle 2, and click Ok.
8. In the Classification panel, change the number of classes to 4, click Classify, change Method to Quantile, and click Ok twice.



Now you can compare the arsenic concentration with water depth of the corresponding area.


SREEPUR
KAPASIA
MANOHARDI
KALIAKAIR
BELABO
GAZIPUR SADAR
SHIBPUR
KALIGANJ
PALASH
ROYPURA
NARSINGDI SADAR