INTRODUCTION

This introductory manual will help to get familiarized with some of the basic features of ArcGIS. Some fundamentals of GIS will also be illustrated throughout this manual. You will work with map layers and underlying attribute tables for Administrative boundary of Bangladesh. Each geographic feature has a corresponding data record and you will work with both features and their data records.

Main learning objectives are following :

- Open and save a map document
- Work with map layers
- Navigate in a map document
- Measure distances
- Work with feature attributes
- Select features
- Work with attribute tables
- Label features

TUTORIAL 1.1

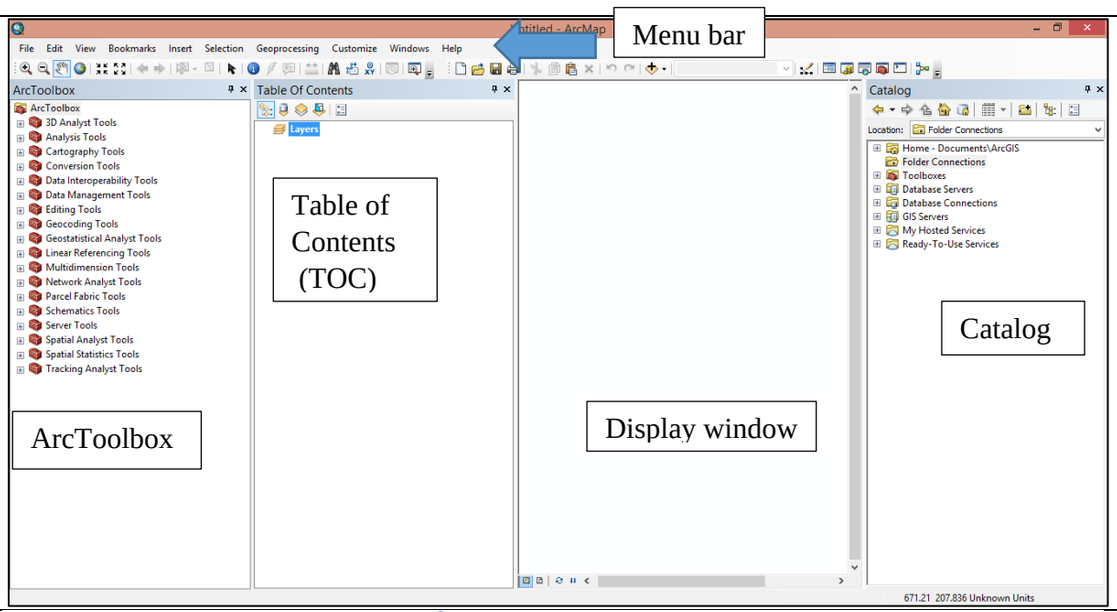
OPEN AND SAVE MAP DOCUMENTS

1.1.1	Launch ArcMap
1.1.2	Introduction to the Graphical User Interface(GUI) of ArcMap
1.1.3	Open an existing map document
1.1.4	Save a map document to a new location

1.1.1 Launch ArcMap

From the Windows taskbar, click start, All Programs, ArcGIS, ArcMap 10.2.2.

1.1.2 Introduction to the Graphical User Interface of ArcMap



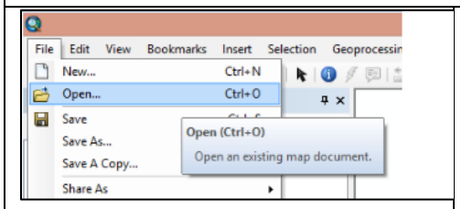


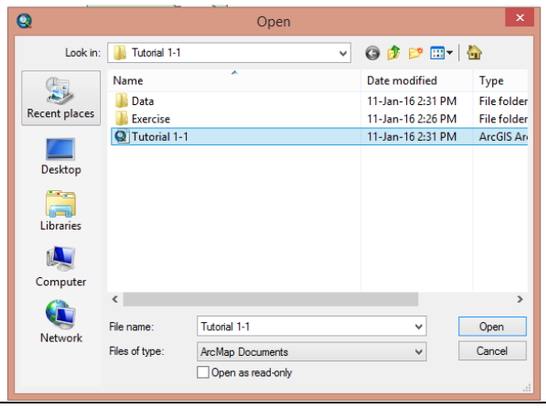


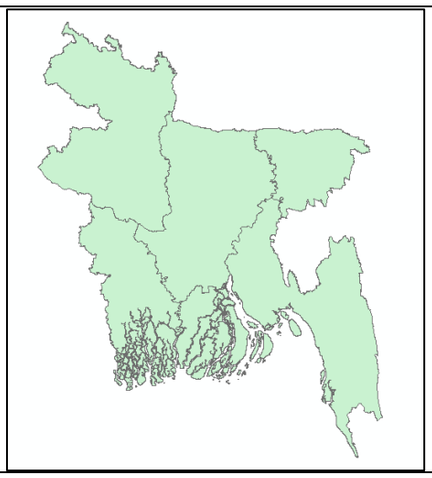
1.1.3 Open an existing map document:

The format used in ArcMap is .mxd

1. Browse to the drive D:\CE210\Tutorial 1-1
2. Click the Tutorial 1-1.mxd icon and click open.

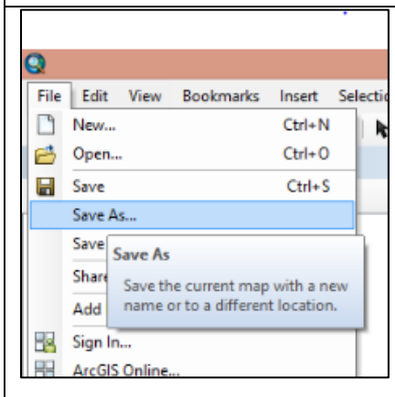


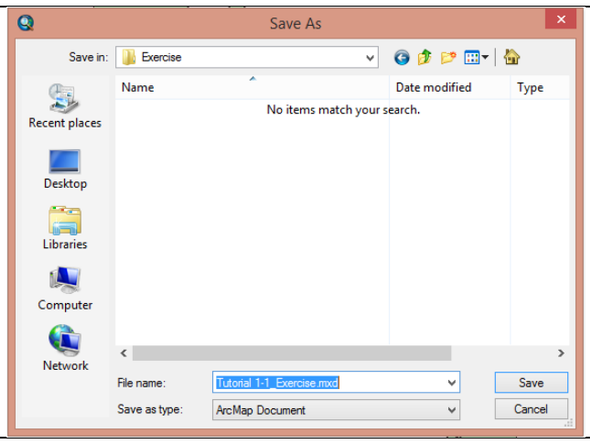




1.1.4 Save the map document to a new location:

1. Click File, Save As
2. Navigate to the D:\CE210\Exercise and save the map as Tutorial 1-1_Exercise.mxd
3. Click save.





TUTORIAL 1.2

WORKING WITH MAP LAYERS

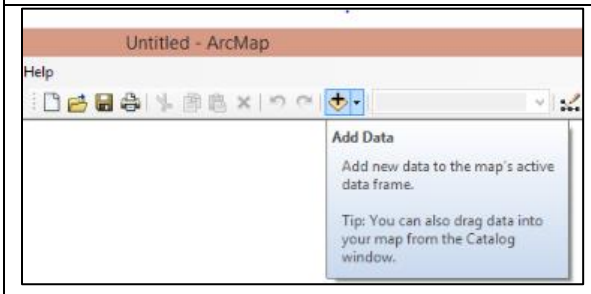
1.2.1	Add and remove map layers	
1.2.2	Drag and drop layer from the Catalog window	
1.2.3	Turn a layer on and off	
1.2.4	Change layer's display orders	
1.2.5	1.2.5.1.	Change a layer's color
	1.2.5.2	Change a layer's outline color and outline width
1.2.6	Using relative paths	

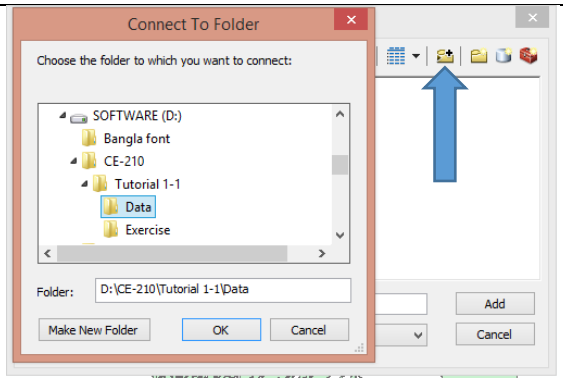
Map layers are references to data sources such as point, line and polygon shapefiles, geodatabase feature classes, raster images and so forth representing spatial features that can be displayed on a map. ArcMap displays map layers from a map document such as Bangladesh.mxd, but the map document does not contain copies of the map layers. The map layer files remain external to the map document wherever they exist on computer storage media. Next, you will use the map document's tables of contents for the map layers in the document

1.2.1 Add and remove map layers:

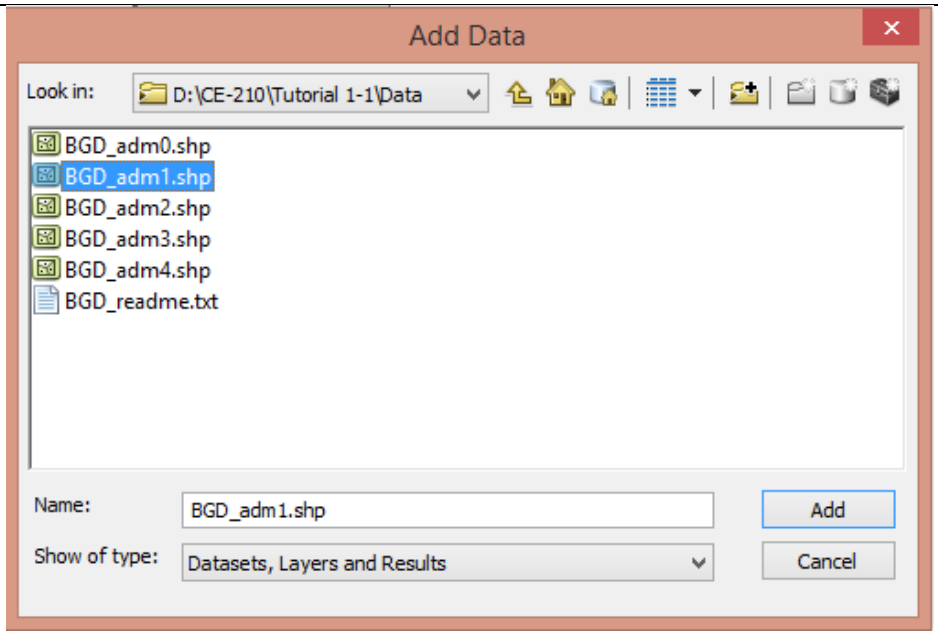
You can add map layers to the TOC form their storage locations.

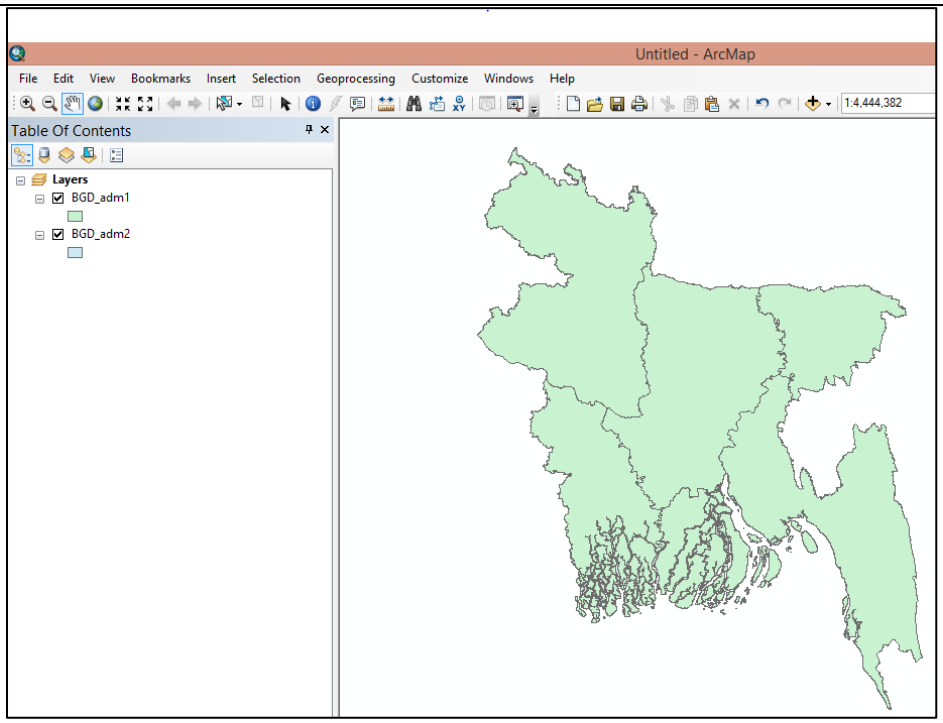
1. Click the Add Data button 
2. In the Add Data browser, click the Connect to Folder button 
3. Browse to the folder D:\CE-210\Tutorial 1-1\DATA and click OK.



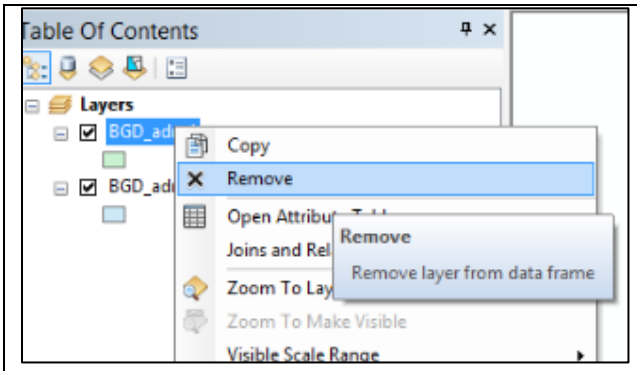


1. In the Add Data window, click BGD_adm1
2. Click Add
3. In the same way, add BGD_adm2





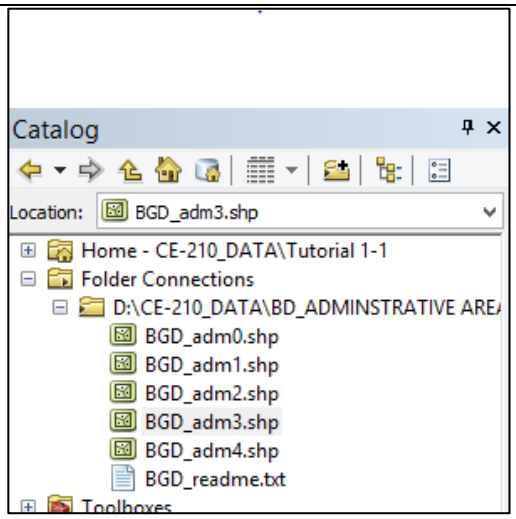
4. Right-click BGD_adm1 in the TOC and click remove.

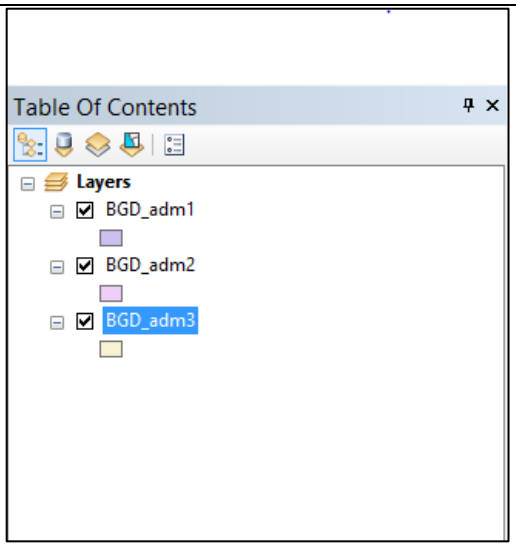


1.2.2 Drag and drop a layer from the Catalog window:

The Catalog window allows you to explore, maitain, and use GIS data with its many ArcCatalog utility functions.From Catalog, you will drag and drop a map layer into the TOC as an alternative method of adding data.

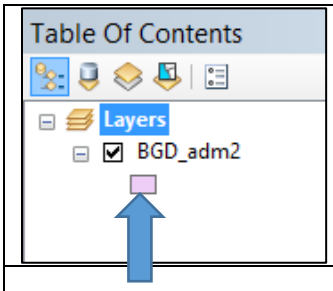
1. Click Windows, Catalog.
2. In the Catalog window, navigate to D:\CE-210_DATA\BD_ADMINSTRATIVE AREA under 'Folder Connections'.
3. Drag and drop BGD_adm1 into the top of the TOC window.
4. Similarly drag and drop BGD_adm3.





1.2.3 Turn a layer on and off :

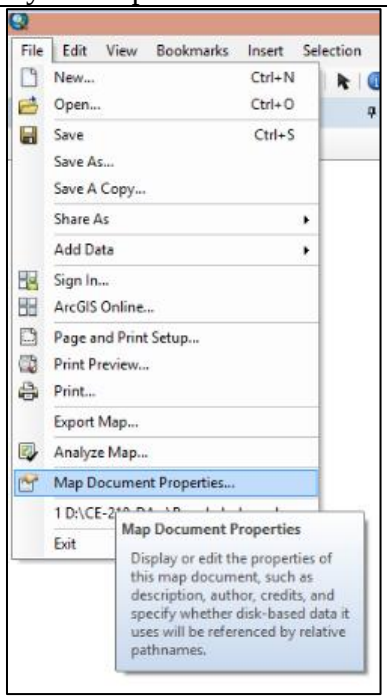
1. Click the small check box to the left of the BGD_adm2 layer in the TOC to turn that layer on.
2. Click the check box to the left of the BGD_adm2 layer in the TOC again to turn the layer off.

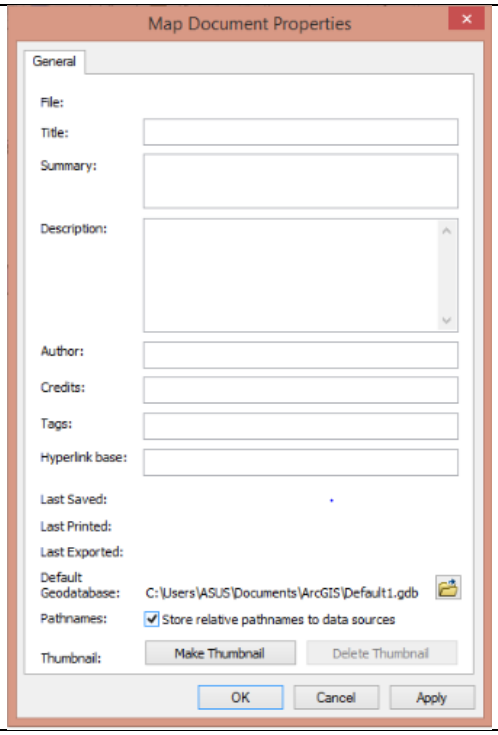


1.2.4 Using relative paths:

When you add a layer to a map, ArcMap stores the paths in the map document. When you open a map, ArcMap locates the layer data it needs using these stored paths. If ArcMap cannot find the data for a layer, the layer will still appear in the ArcMap TOC, but of course it will not appear on the map. Instead, ArcMap places a red exclamation mark (!) next to the layer name to indicate that its path needs repair. You can view information about the data source for a layer and repair it by clicking the Source tab in the Layer Properties window.
Relative paths in a map specify the location of the layers relative to the current location on disk of the map document (.mxd file).Because relative paths do not contain drive letter names, they enable the map and its associated data to point to the same directory structure regardless of the drive or the folder in which the map resides. If a project is moved to a new drive, ArcMap will still be able to find the maps and their data by traversing relative paths.

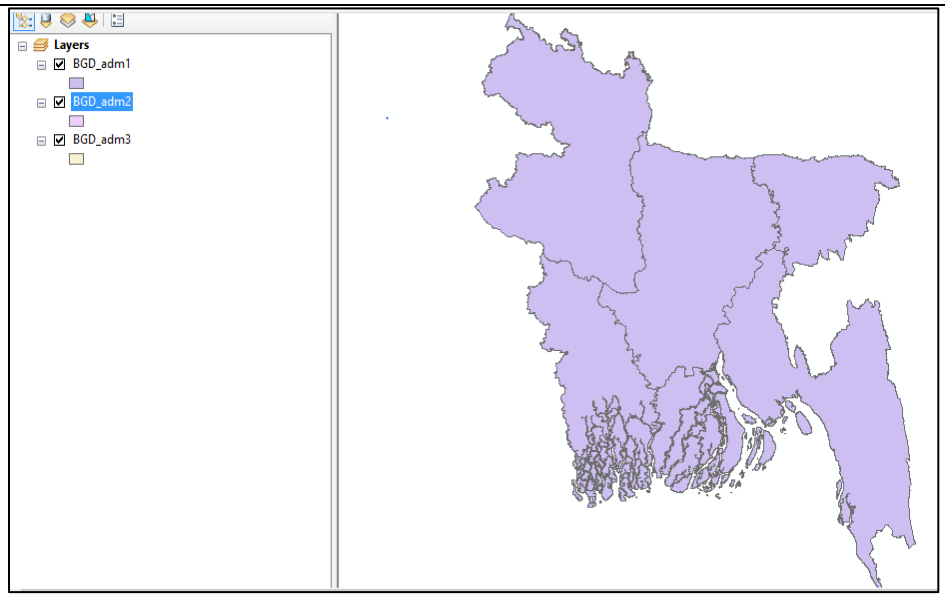
1. Click File, Map Document Properties.
2. Select the check box next to the Pathname
3. Click OK
4. Save your map document.



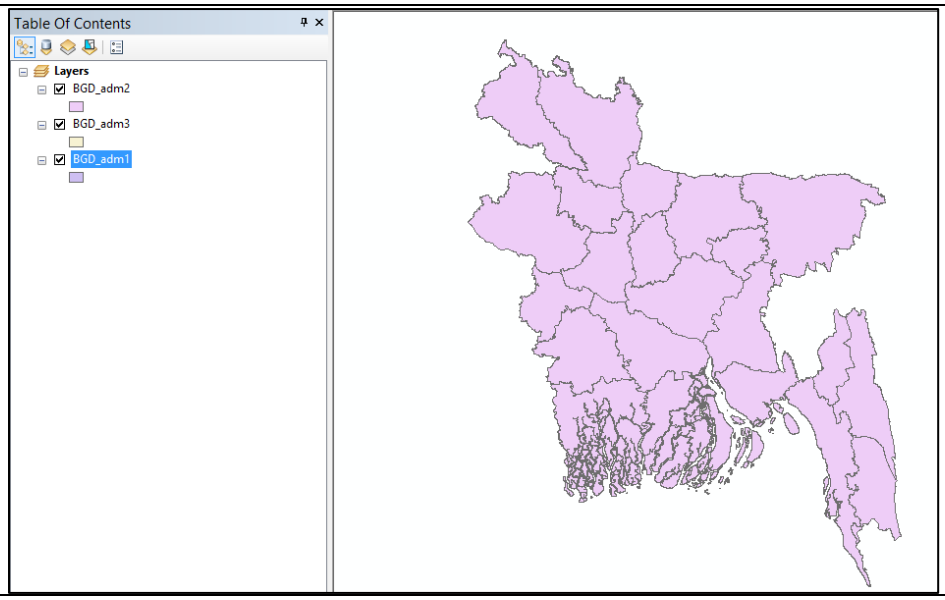


1.2.5.1 Change layer's display orders:

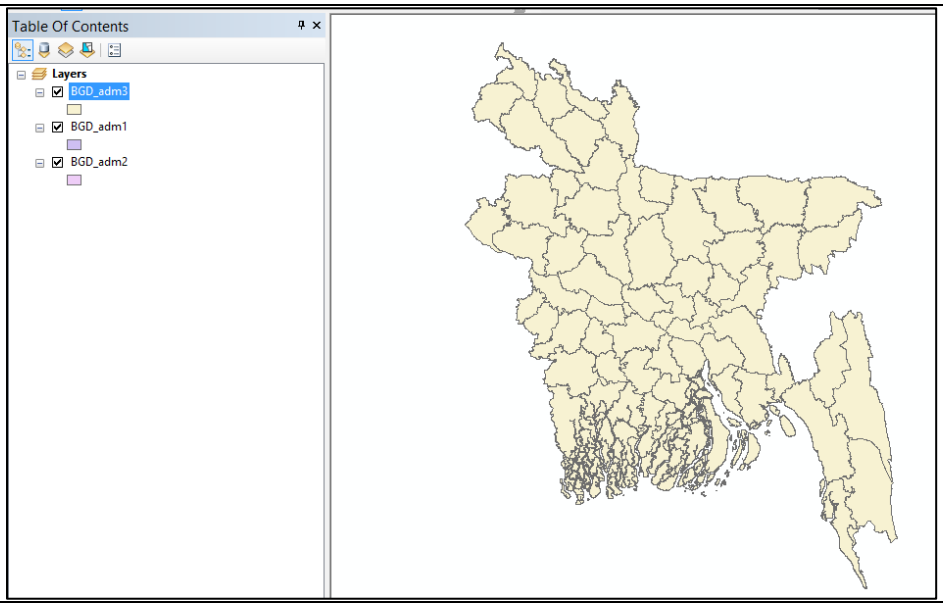
1. Make sure that the List by Drawing Order button is selected in the TOC and turn on the BGD_adm1 layer.



2. Drag the BGD_adm1 layer to the bottom of the TOC and drop it.

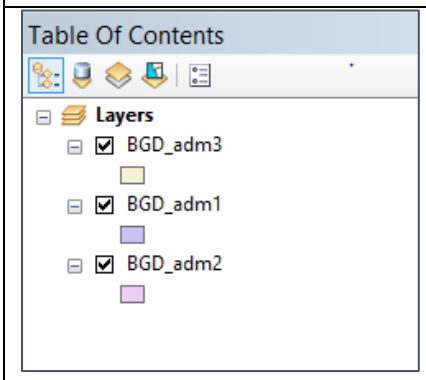


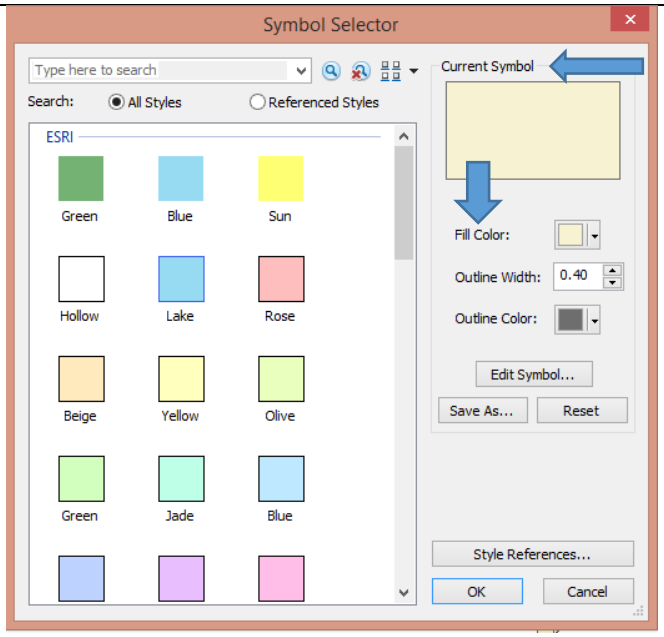
3. Drag the BGD_adm3 layer to the top of the TOC and drop it



1.2.5.2 Change a layer's color:

1. Click the BGD_adm3 layer's legend symbol in the TOC.
2. Click the Fill Color button in the Current Symbol selection of the Symbol Selector window.



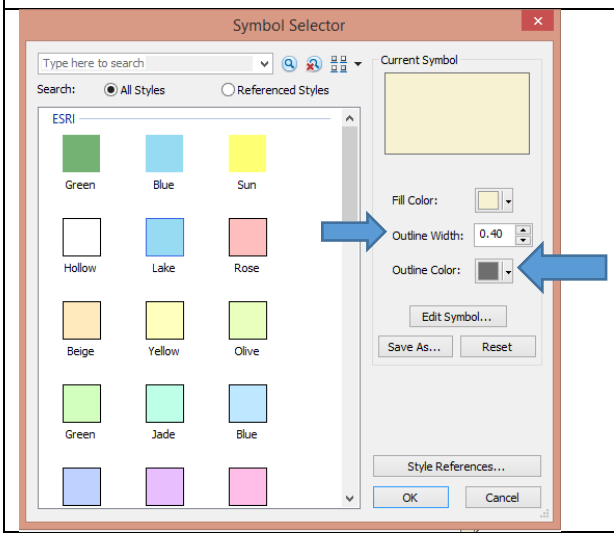


3. Click any color in the Color Palette.
4. Click OK.

1.2.6 Change a layer's outline color and outline width:

1. Click the BGD_adm3 layer's legend symbol.

2. Click the Outline Color button in the Current Symbol selection of the Symbol Selector window.
3. Click any color in the Color Palette.
4. Click the Outline Width button in the Current Symbol selection of the Symbol Selector window.
5. Change the width as per requirement.
6. Click OK.



TUTORIAL 1.3

NAVIGATE IN A MAP DOCUMENTS

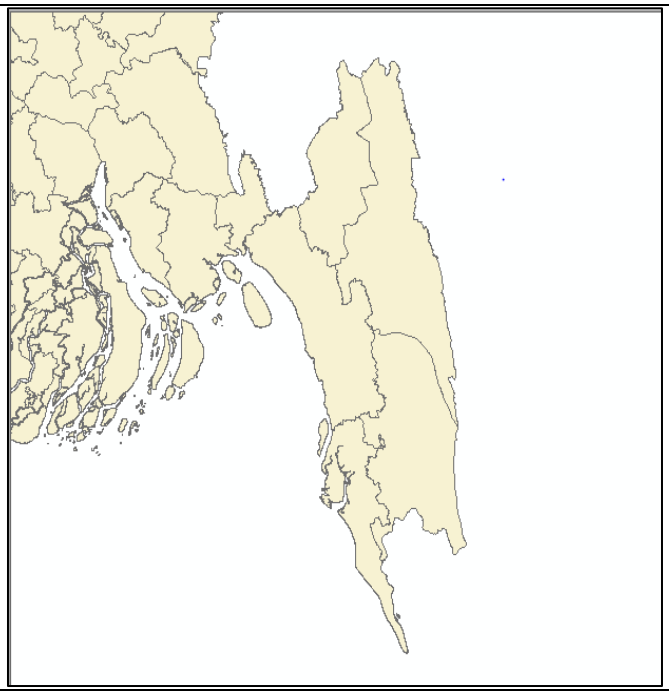
1.3.1	Zoom in
1.3.2	Fixed zoom in and out
1.3.3	Pan
1.3.4	Full, previous and next extent
1.3.5	Open the magnifier window
1.3.6	Magnifier properties
1.3.7	Use of overview window
1.3.8	Create spatial bookmark

When you open a map document, you see the entire map, a view called the full extent. You can zoom in to any area of the map resulting in that area filling the map window, giving you a close-up view. The current view of the map is its current extent. You can zoom out, pan, and use several additional means of moving about in your map document. These include the Magnifier window for close-up views without zooming in, the Overview window that shows where you are on the full map when zoomed in, and spatial bookmarks for saving a map extent for future use.

1.3.1 Zoom in:

1. Click the Zoom In button on the Tools toolbar.
2. Click and hold down the mouse button on a point above and to the South-Eastern side of the map.
3. Drag the mouse down to the bottom and to the right of the Chittagong division and release.

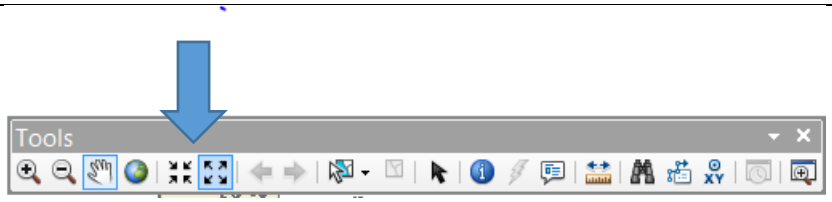




1.3.2 Fixed zoom in and out:

This is an alternative for zooming in by fixed amounts.

1. Click the Fixed Zoom In button (This zooms in a fixed distance on the center of the current display)
2. Click the map to zoom in centered on the point you pick.
3. Click the Fixed Zoom Out button (This zooms out a fixed distance from the center of the current zoomed display)



1.3.3 Pan:

Panning shifts the current display in any direction without changing the current scale.

1. Click the Pan button
2. Move the cursor anywhere onto the map display.
3. Hold down the left mouse button and drag the mouse in any direction.
4. Release the mouse button



1.3.4 Full, previous and next extent:

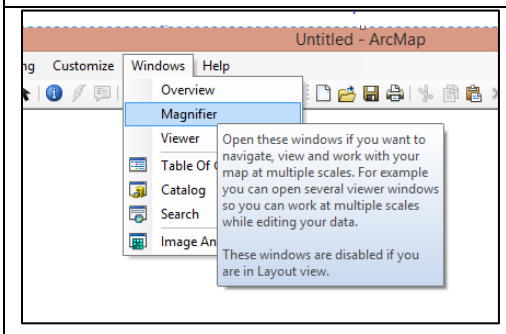
The following steps introduce tools that navigate through views which have already been created.

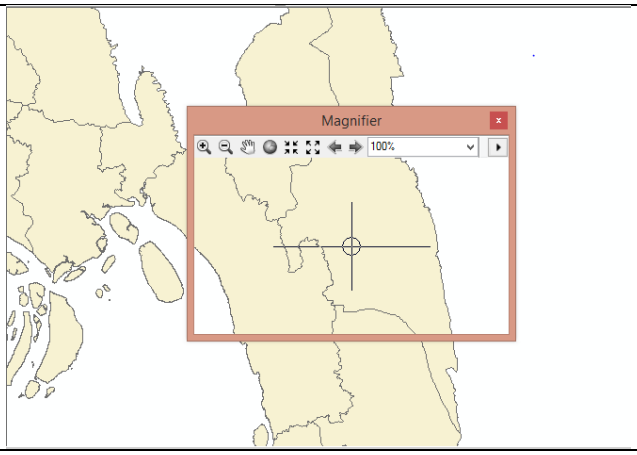
1. Click the Full Extent button . This zooms to a full display of all layers, regardless of whether they are turned on or turned off.
2. Click the Go Back to Previous Extent button . This returns the map display to its previous extent.
3. Continue to click this button to step back through all of the views.
4. Click the Go to Next Extent button . This moves forward through the sequence of zoomed extents you have viewed.
5. Continue to click this button until you reach full extent.

1.3.5 Open the Magnifier window:

The Magnifier window adjusts the map display to see more detail or get an overview of an area. This window works like a magnifying glass. As you pass the window over the map display, you see a magnified view of the location under the window. Moving the window does not affect the current map extent.

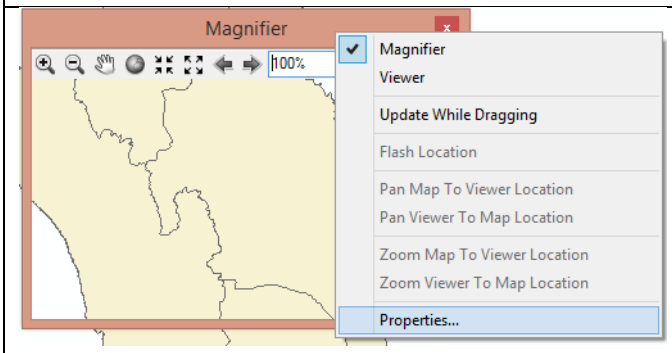
1. Click Windows, Magnifier.
2. Drag the Magnifier over an area of the map to see crosshairs for area selection, and then release to see the zoomed details.
3. Drag the Magnifier window to a new area to see another detail on the map.

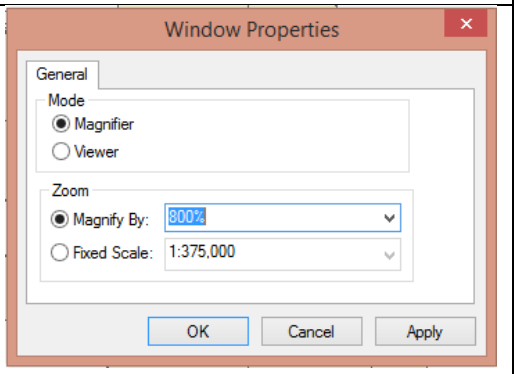


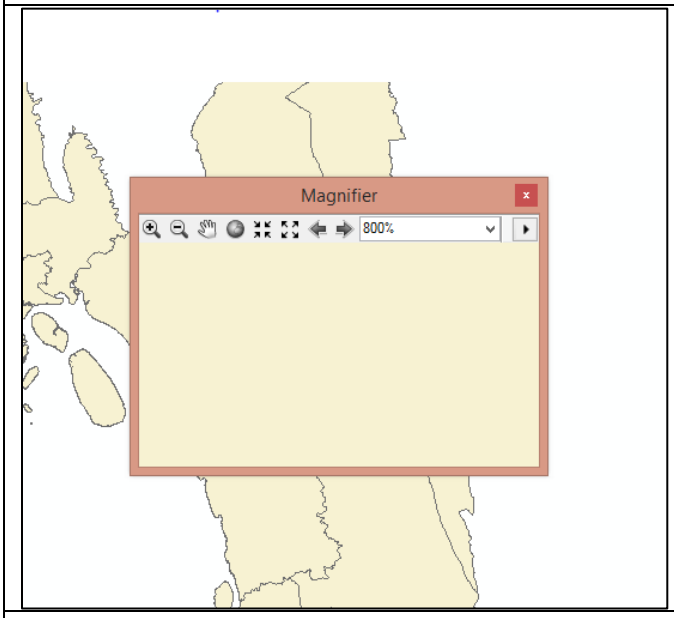


1.3.6 Magnifier properties

1. Right-click the title bar of the Magnifier window and click Properties.
2. Change the Magnifier by percentage to 800% if it is not already at the power, and then click OK.
3. Click Apply and see the resulting view.
4. Close the Magnifier window.





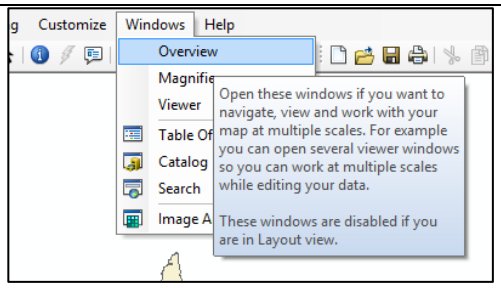


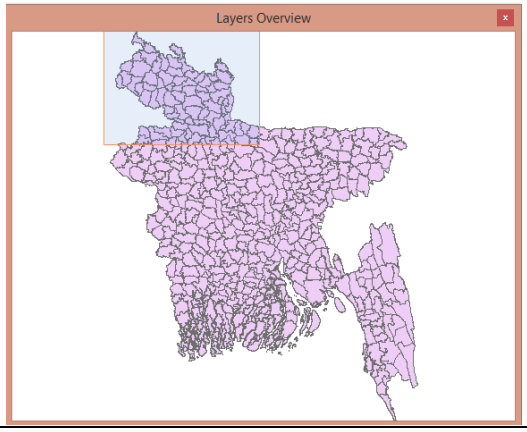
1.3.7 Use of Overview window :

The Overview window shows the full extent of the layers in a map. A box shows the currently zoomed area. You can move the box to the map display. You can also make the box smaller or larger to zoom the map display in or out.

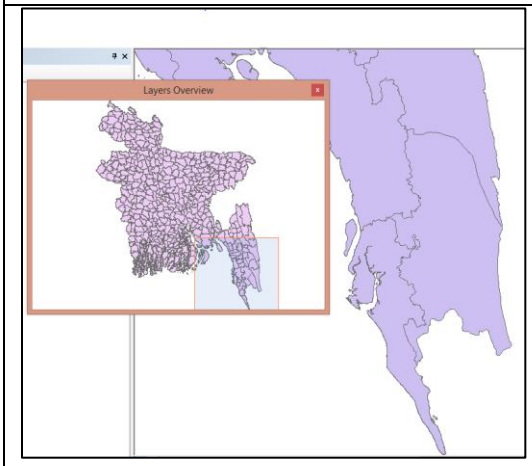
1. Click the Zoom to Full Extent button 
2. Zoom to a small area of the map in the northwestern corner of Bangladesh.

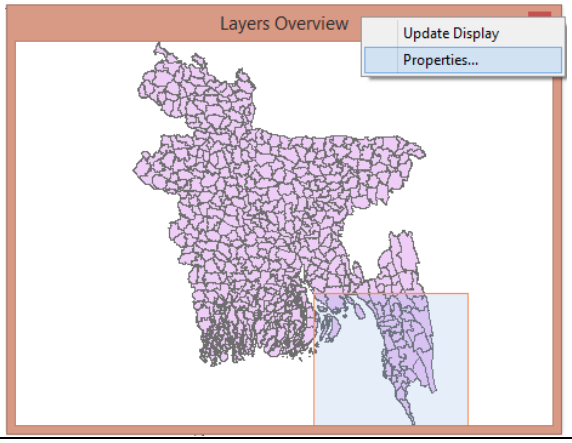
3. Click Windows, Overview. The Overview window shows the current extent of the map highlighted with a red triangle.





4. Move the cursor to the center of the red box, click and drag to move it to a new location, and release. (The extent of the map display updates to reflect the changes made in the Layers Overview window. Note that if you right-click the top of the Layers Overview window and click Properties, you can modify the display)





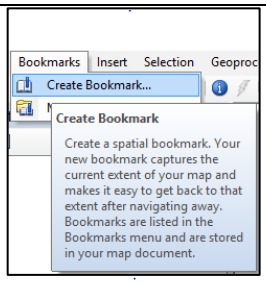
5. Close the Layers Overview window.

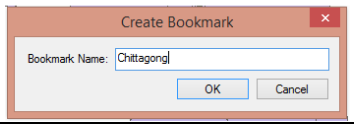
1.3.8 Create spatial bookmark :

Spatial bookmarks save the extent of a map display or geographic location so you can return to it later without having to use Pan and Zoom tools.

1. Click the Zoom to Full Extent button  .
2. Zoom to Southeastern corner of the map.
3. Click Bookmarks, Create, and type Chittagong in the Bookmark Name field.







4. Click OK.
5. Click the Zoom to Full Extent button.
6. Click Bookmarks, Chittagong.
7. Save your map document

TUTORIAL 1.4

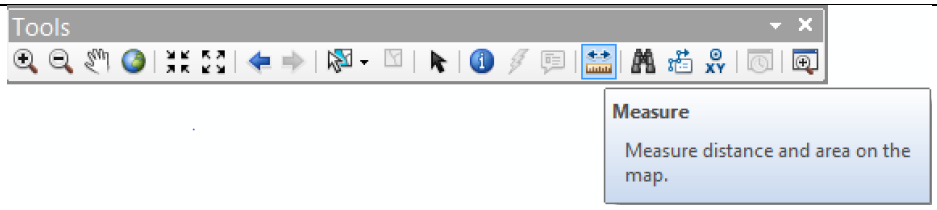
MEASURE DISTANCES

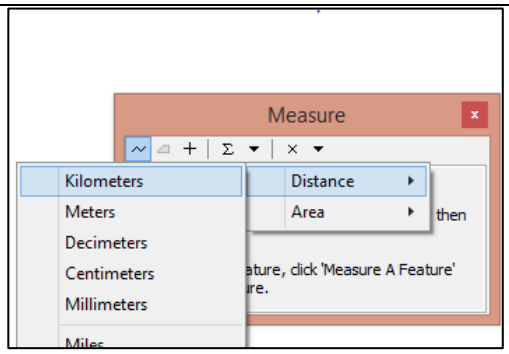
1.4.1	Change measurement units and measure the length

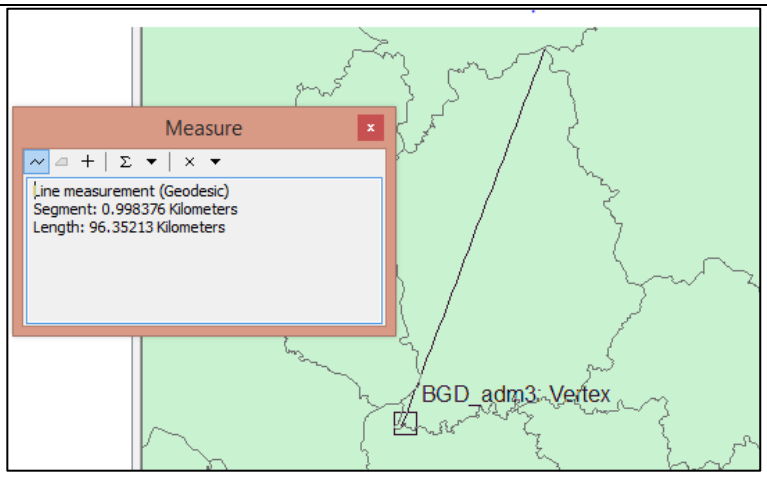
Maps have coordinates enabling you to measure distances along paths that you choose with your mouse and cursor.

1.4.1 Change measurement units:

1. On the Tools toolbar click the Measure button.
2. In the Measure window, click the Units drop-down button.
3. Click Distance and Kilometers and leave the Measure window open.
4. Now measure distance between any two locations by clicking those locations.







TUTORIAL 1.5

WORKING WITH FEATURE ATTRIBUTE

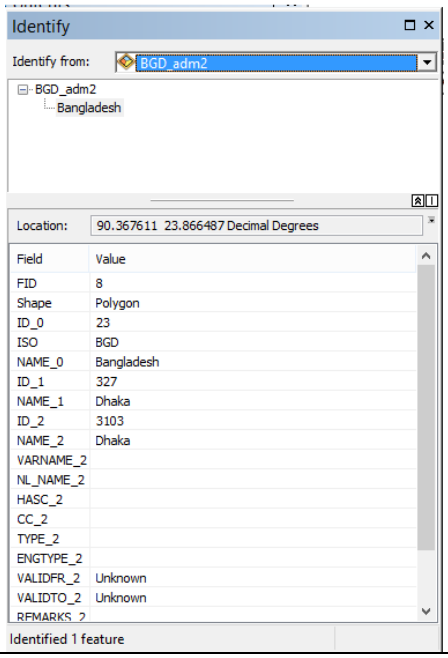
1.5.1	Use the identify tool
1.5.2	Find features

Graphic features of map layers and their data records are connected, so you can start with a feature and view its record. You can also find features on a map using feature attributes.

1.5.1 Use the identify tool:

1. Turn off the BGD_adm1, BGD_adm3 and BGD_adm4 layers.
2. Zoom to the full extent of the map.
3. On the Tools toolbar, click the Identify button .Click anywhere on the map.
4. From the Identify window, click the Identify from drop-down list and click BGD_adm2.



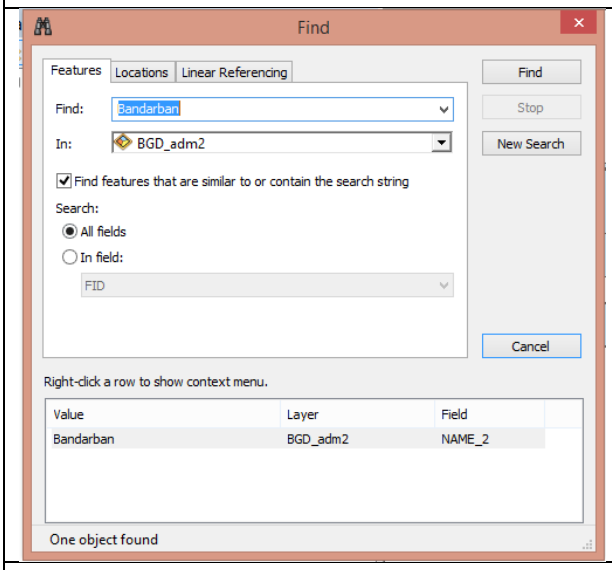


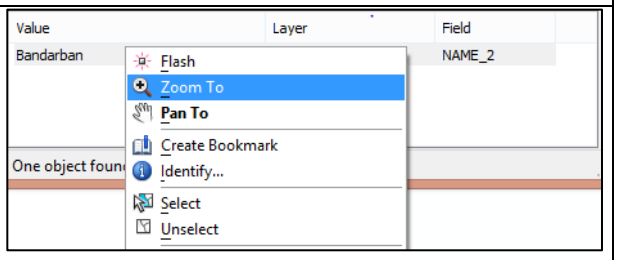
5. In the Identify window, click the ‘Identify from’ drop-down list and click another features to see the identify results.

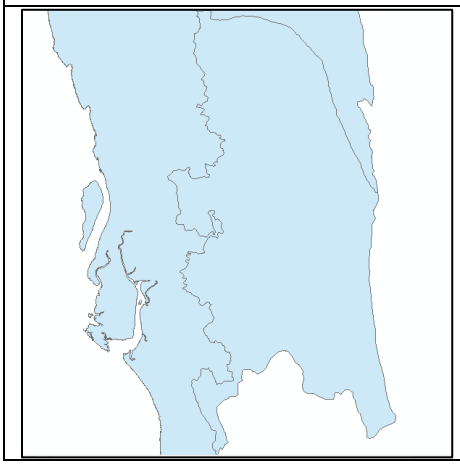
1.5.2 Find features:

1. From the Tools toolbar, click the Find button 
2. Click the Features tab.
3. Type Bandarban as the feature to find.
4. Click Find.









TUTORIAL 1.6

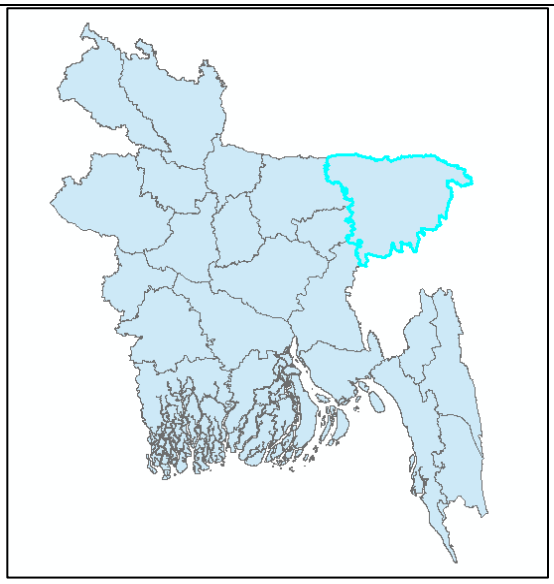
SELECT FEATURES

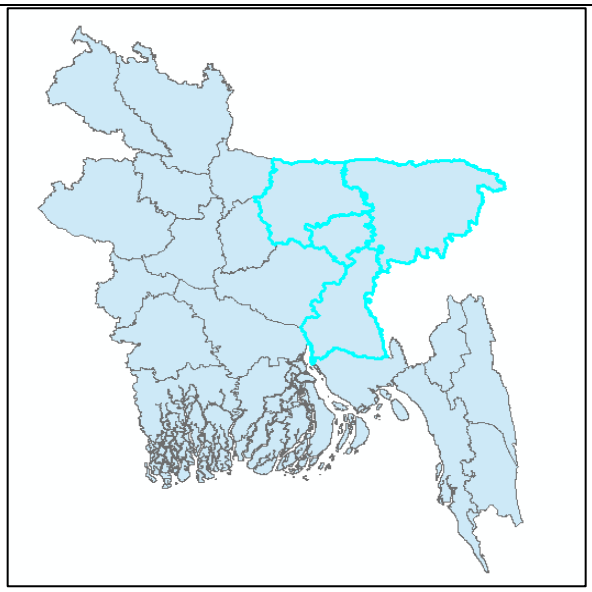
1.6.1	Use the select features tool
1.6.2	Clear selection
1.6.3	Set selectable layers
1.6.4	Select by graphics

You can work with a subset or more features in a map layer by selecting them. Selected features appear highlighted in the layer's attribute table and on the map.

1.6.1 Use the Select Features tool:

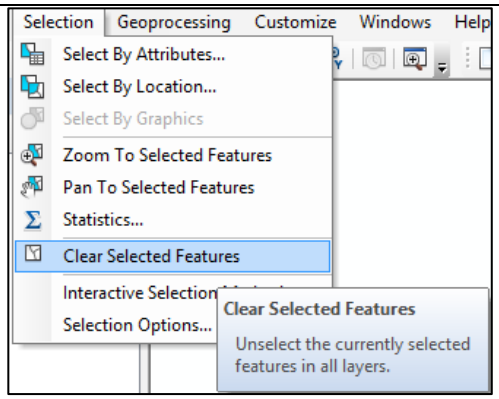
1. Zoom to the full extent of the map.
2. From the Tools toolbar, click the Select Features button .
3. Click inside Sylhet inside BGD_adm2 layer. This action selects Sylhet and highlights it with a blue outline.
4. Hold down the Shift key and click inside three different polygon adjacent to Sylhet.

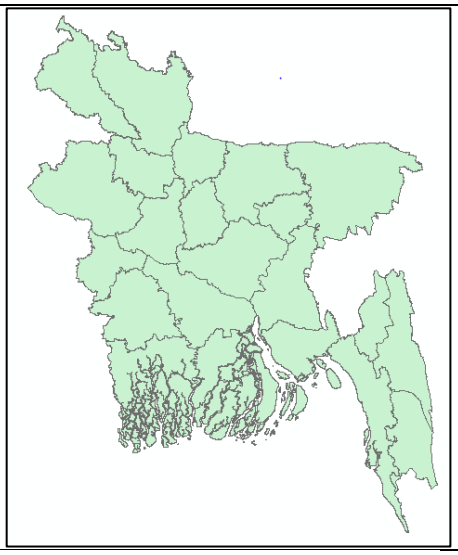


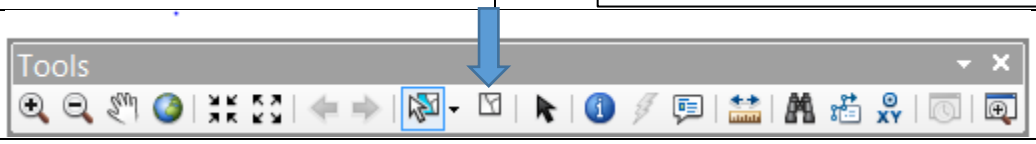


1.6.2 Clear a selection:

1. Click Selection, Clear Selected Features.
2. You can also clear the selection by clicking a tool in the Tools.



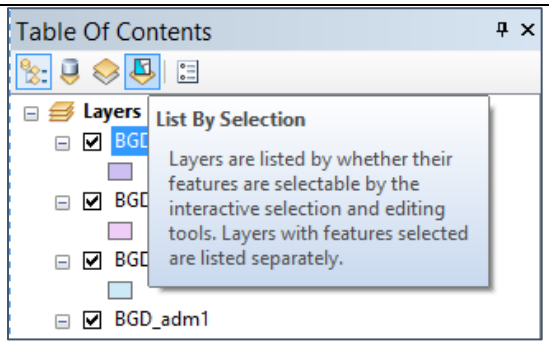


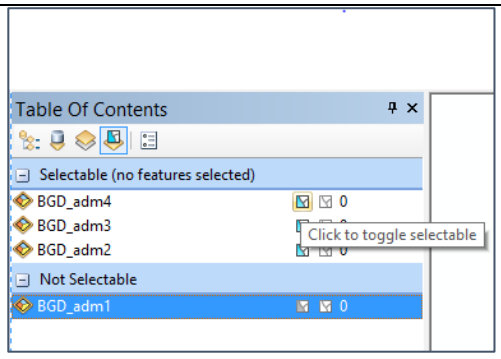


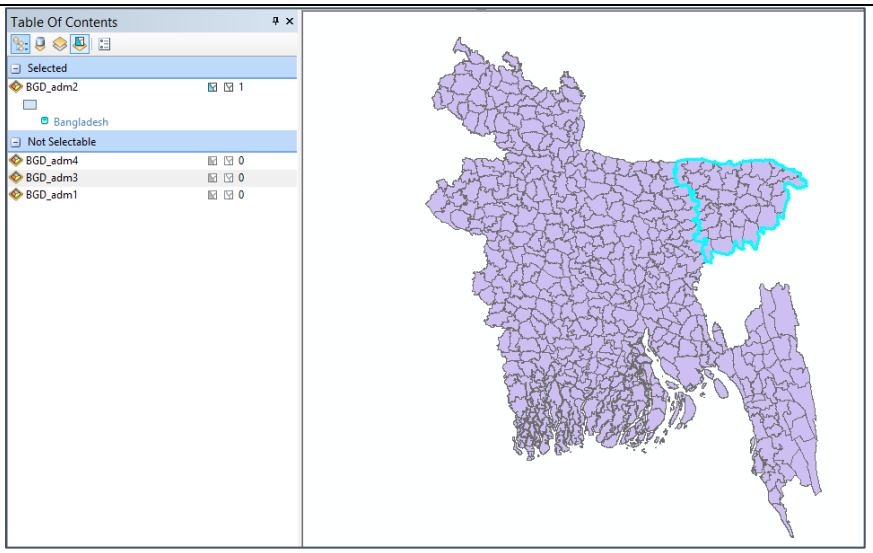
1.6.3 Set selectable layers:

When there are many map layers in a map document, you may want to restrict which ones are selectable. That simplifies the selection process.

1. Click the List by Selection button in the TOC.
2. Click off the selection boxes for BGD_adm1, BGD_adm3 and BGD_adm4 to make only BGD_adm2 selectable.
3. Click the Select Features button  and click a polygon.
4. Clear the selected features.



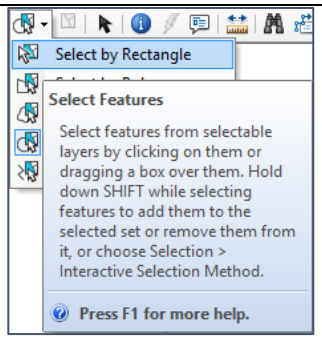


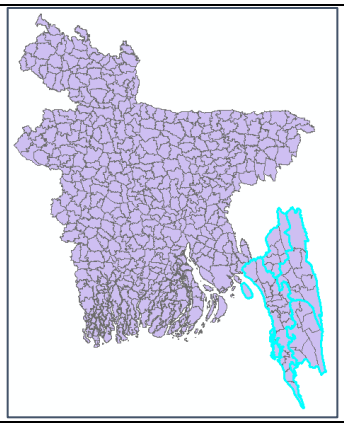


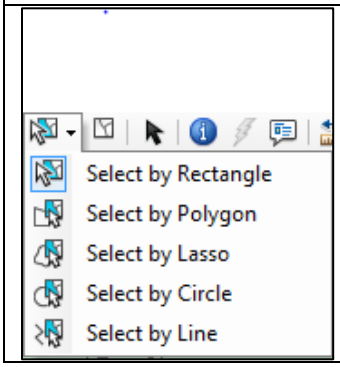
1.6.4 Select by graphics:

Selecting features by using graphics is simply a shortcut to select multiple features.

1. Click the drop-down list of the Select Features button and click Select by Rectangle.
2. Click to cover the entire Chittagong division.
3. Click the drop-down list of the Select Features button and try other option like.







TUTORIAL 1.7

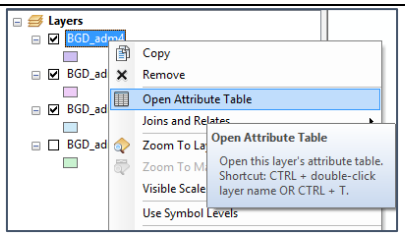
WORKING WITH ATTRIBUTE TABLE

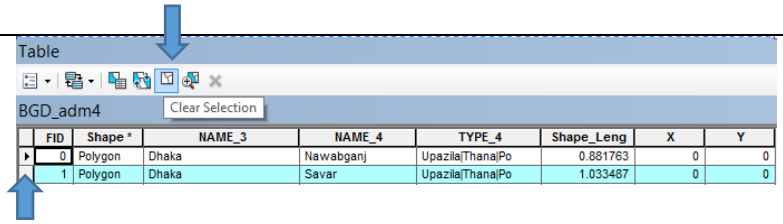
1.7.1	Open the attribute table and select a record
1.7.2	Select features on the map and see selected records
1.7.3	Switch selection
1.7.4	Move a field
1.7.5	Sort a field
1.7.6	Use advanced sorting

You can view and work with data associated with map features in the layer's attribute table.

1.7.1 Open the attribute table of a layer and select a record:

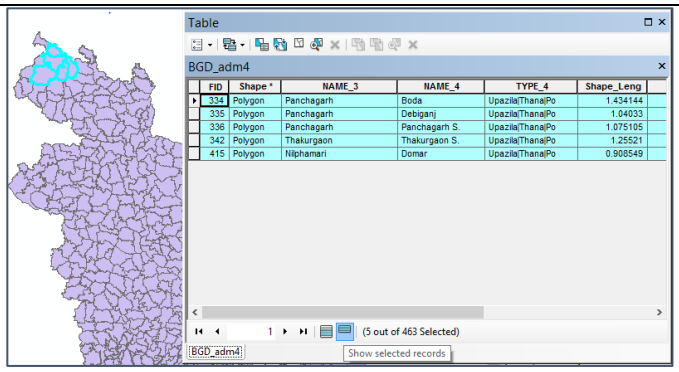
1. Right-click the BGD_adm4 layer in the TOC.
2. Click Open Attribute Table. The table opens, containing 462 records for Thana of Bangladesh.
3. Scroll down in the table to find Savar thana and click the record selector (gray cells on the left side of the table) for Chittagong to select that record.
4. In the table, click the Clear Selected Features button 



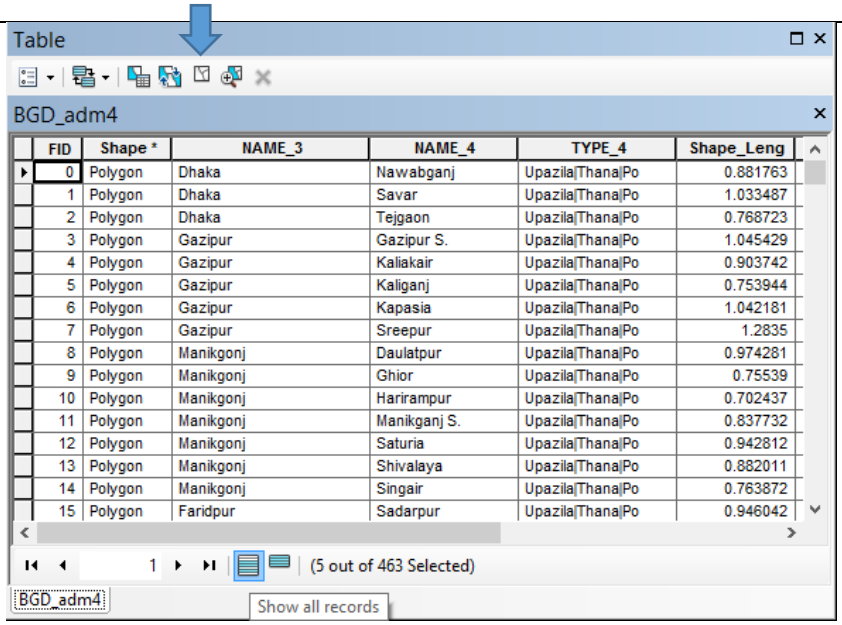


1.7.2 Select features on the map and see selected records:

1. Resize the BGD_adm4 table to see both the map and table on the screen.
2. Click the Select Features button  and hold down the Shift key, and select randomly number polygons on the map.
3. In the BGD_adm4 table, click the Show Selected Records button  .



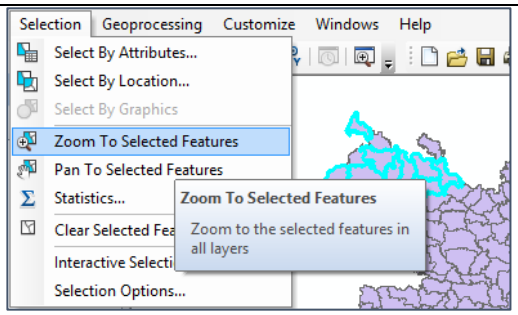
4. Click the Show All Records button  to show all records again
5. In the BGD_adm4 table, click the Clear Selected Features button.

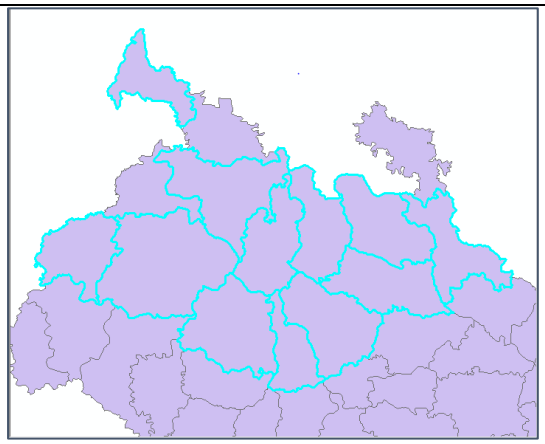


1.7.3 Switch selection:

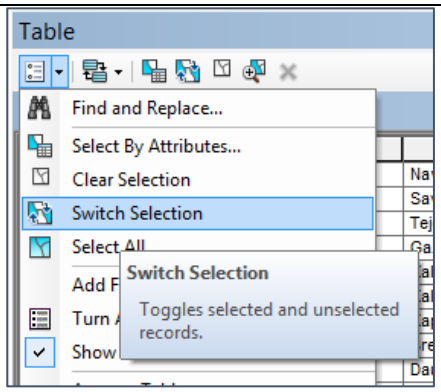
You can select most records in a layer by first selecting a few not to be selected and then reversing the selection.

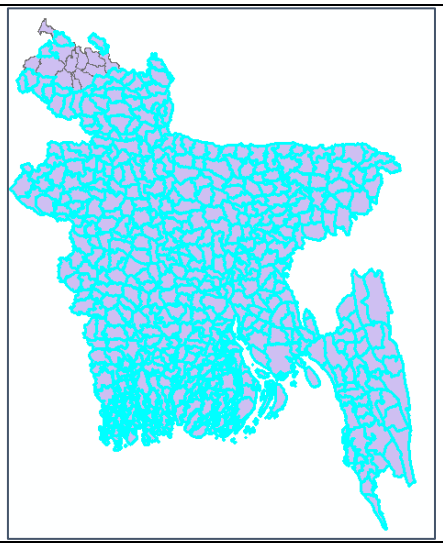
1. On the map, select a few polygon.
2. Click Selection, Zoom to Selected Features.



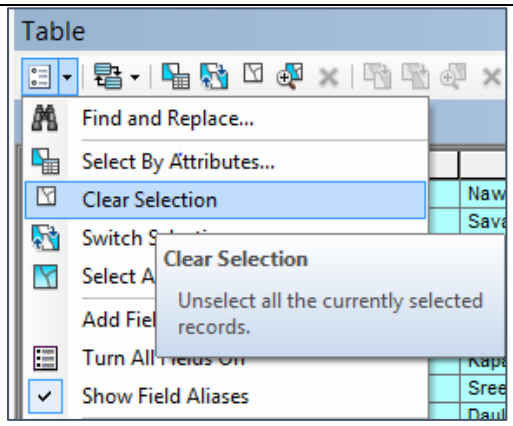


3. Click the drop-down option of the Table Option button.
4. Click Switch Selection.



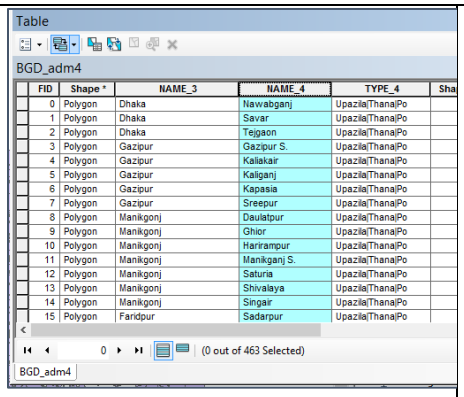


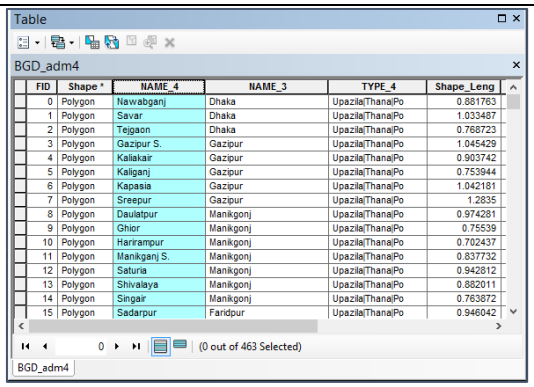
5. In the BGD_adm4 table, click the drop-down option of the Table Option button 
6. Click Clear Selection



1.7.4 Move a field:

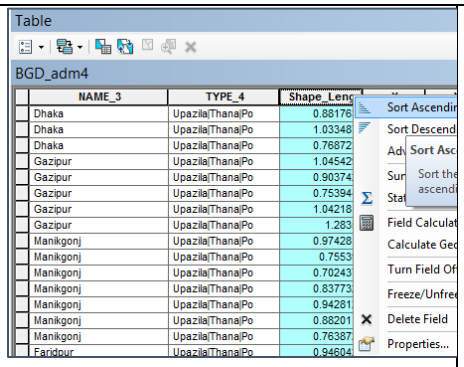
1. Click the gray title of the Name_3 field in the BGD_adm4 table.
2. Click, drag, and release the Name_3 field to the right of the Name_4 field.

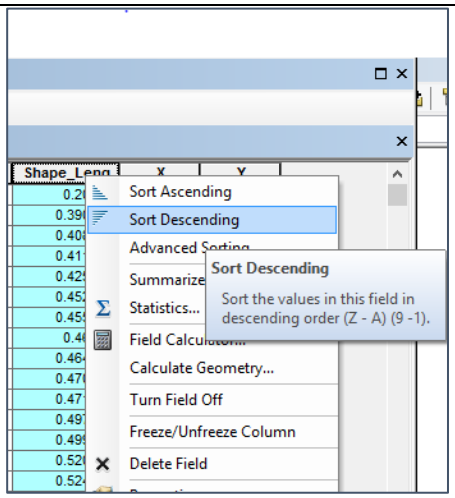




1.7.5 Sort a field:

1. In the BGD_adm4 table, right-click the Shape_Length field name.
2. Click Sort Ascending
3. Right-click the Shape_Length field name.
4. Click the Sort descending button

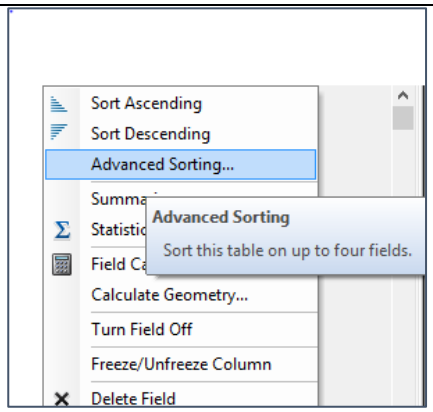


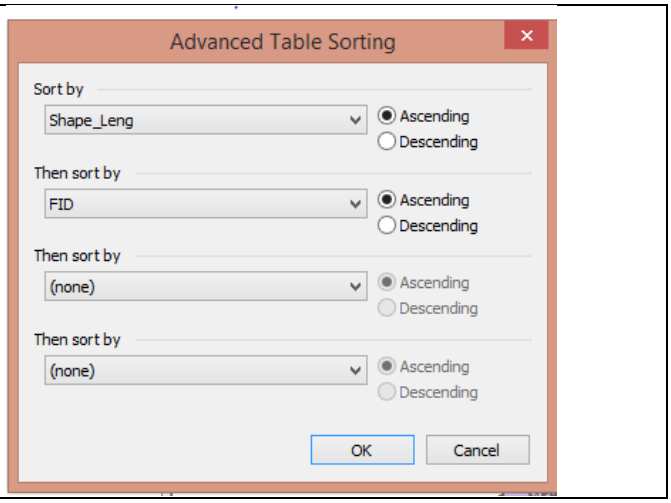


1.7.6 Use advanced sorting:

Selecting features by using graphics is simply a shortcut to select multiple features.

1. In the BGD_adm4 table, move the FID field to the right of the Shape_Length field.
2. Right-click the Shape_Length field and click Advanced Sorting.
3. Make selections as follow.
4. Click OK


Sort Ascending
Sort Descending
Advanced Sorting...
Summa
Statistic
Field Ca
Calculate Geometry...
Turn Field Off
Freeze/Unfreeze Column
Delete Field
Advanced Sorting
Sort this table on up to four fields.


Advanced Table Sorting
Sort by
Shape_Leng
Ascending
Descending
Then sort by
FID
Ascending
Descending
Then sort by
(none)
Ascending
Descending
Then sort by
(none)
Ascending
Descending
OK
Cancel

TUTORIAL 1.8

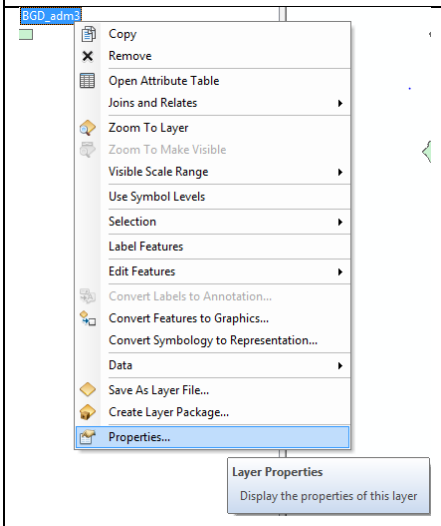
LABEL FEATURES

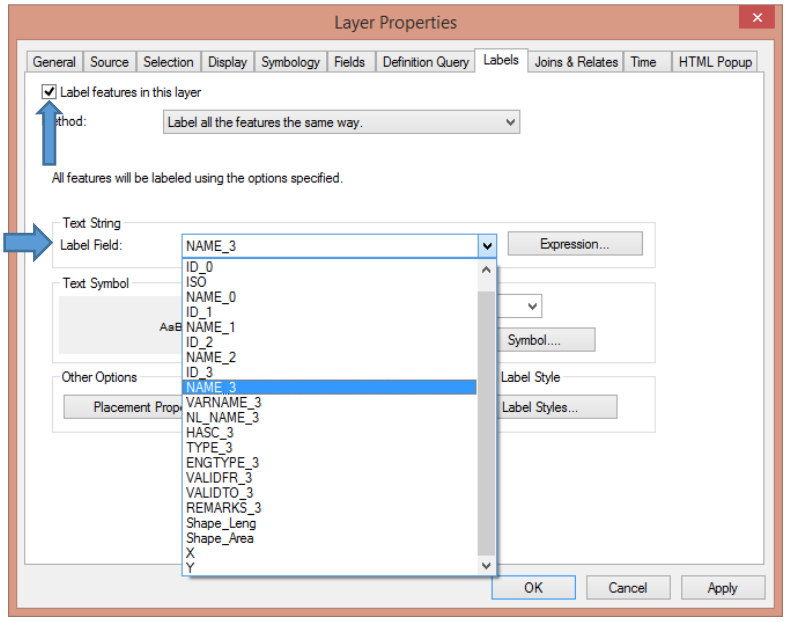
1.8.1	Set label properties
1.8.2	Label several fields in same row in the same map
1.8.3	Label several fields in different row in the same map

Labels are test items on the map derived from one or more feature attributes that ArcMAp places dynamically depending on map scale.

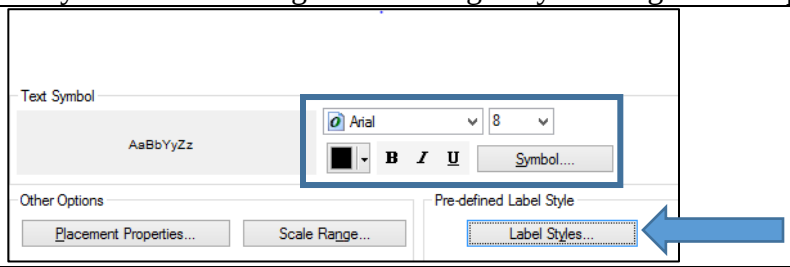
1.8.1 Set label Properties:

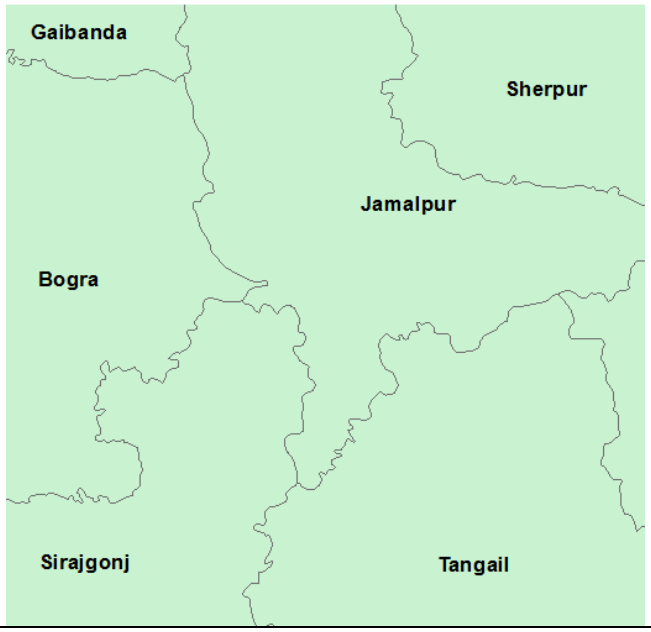
1. Right-click the BGD_adm3 layer in the TOC, Click Properties, Click the Labels tab.
2. Click the Label Field drop-down arrow and click NAME_3 if it is not already selected.
3. Make sure the "Label features in this layer" option is being checked.
4. Click OK.



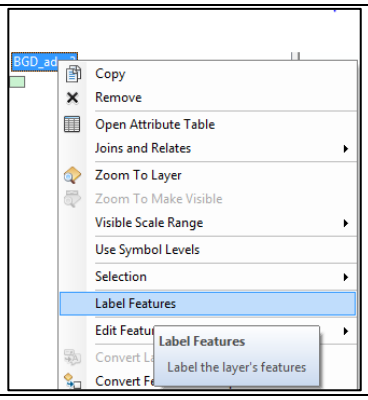


5. The text pattern and symbol for labelling can be changed by clicking several option.



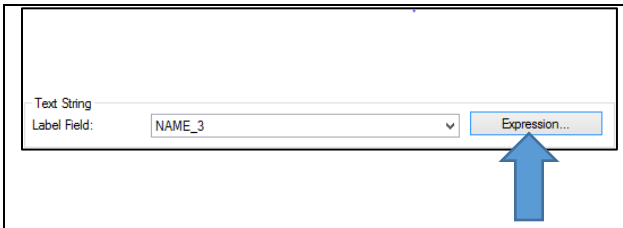


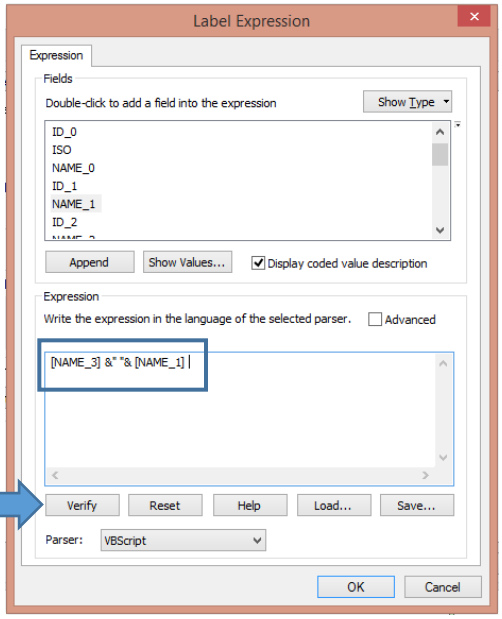
6. The other option for labelling feature is :Right click BGD_adm3 layer and click Label Features.

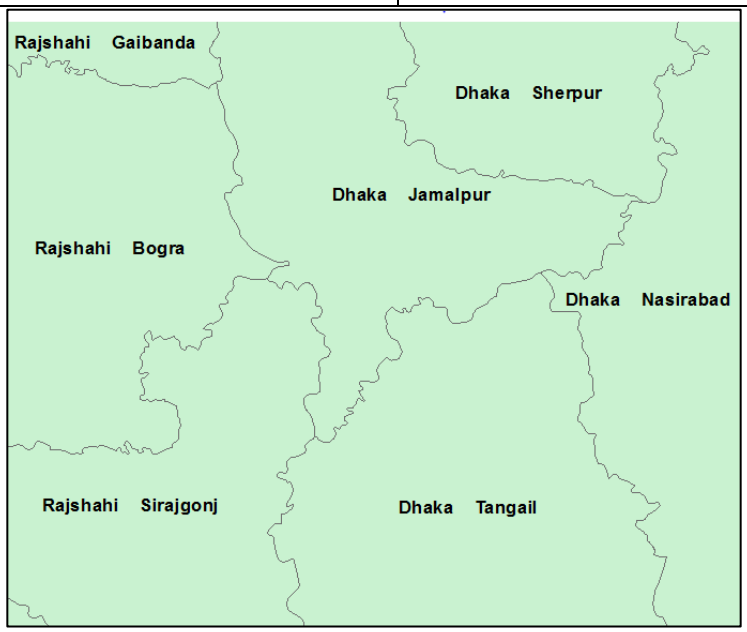


1.8.2 Label several fields in same row in the same map:

1. Right-click the BGD_adm3 layer in the TOC, Click Properties, Click the Labels tab.
2. In the Label Expression window write the expression [NAME_3] &" "& [NAME_1] (The space between two labels depends on the space between two '&'.
3. Click Verify to check whether the expression is correct or not.
4. Click OK two times.

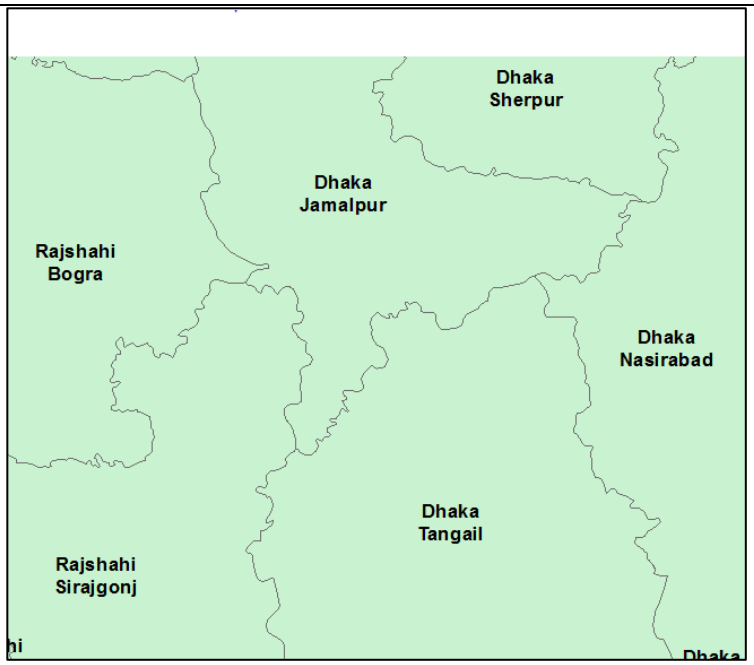






1.8.3 Label several fields in different row in the same map:

1. In the Label Expression window write the expression [NAME_1] & vbnewline & [NAME_3].
2. Click Verify to check whether the expression is correct or not.
3. Click OK two times.


Dhaka
Sherpur
Dhaka
Jamalpur
Rajshahi
Bogra
Dhaka
Nasirabad
Dhaka
Tangail
Rajshahi
Sirajgonj

TUTORIAL 1.9

SET THRESHOLD SCALE FOR DYNAMIC DISPLAY

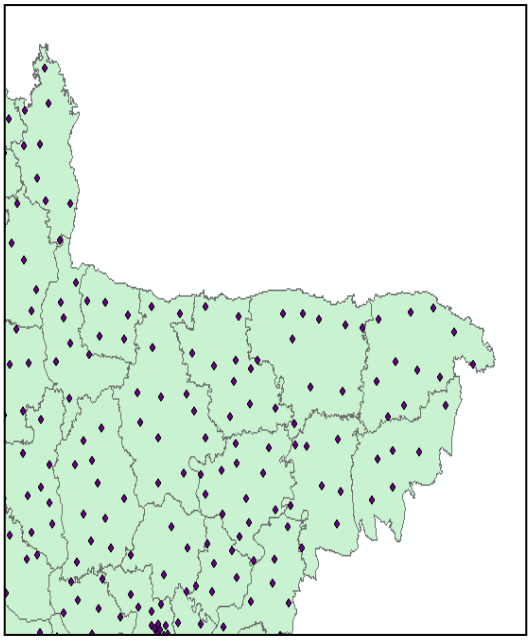
1.9.1	Set a visible scale based on the current scale
1.9.2	Set a maximum scale based on the current scale
1.9.3	Clear a layer's visible scale
1.9.4	Set a minimum visible scale for a specific layer
1.9.5	Type a specific scale

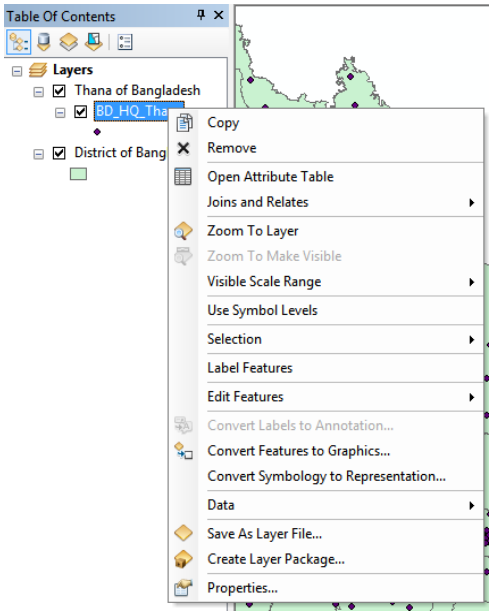
If a layer is turned on the TOC, ArcMap will draw it, regardless of the map scale. To automatically display layers at an appropriate map scale, you can set a layer's visible scale range to specify the range at which ArcMap draws the layer.

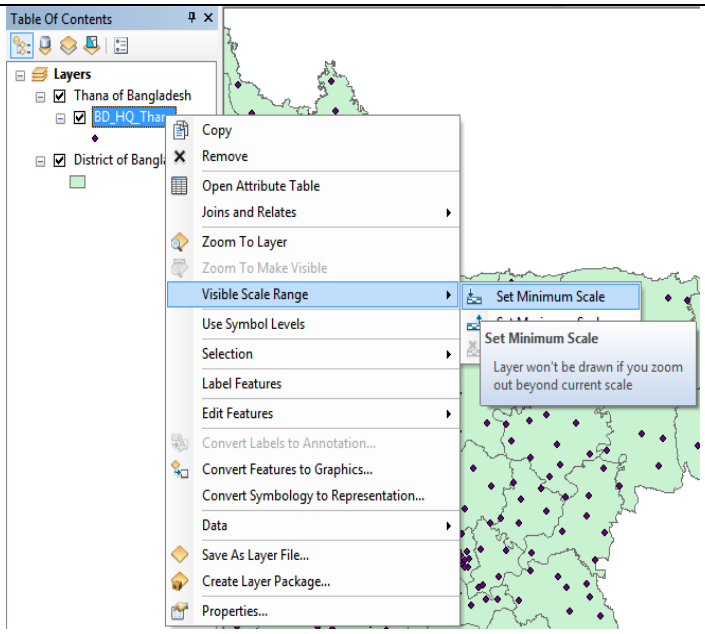
1.9.1 Set a visible scale based on the current scale:

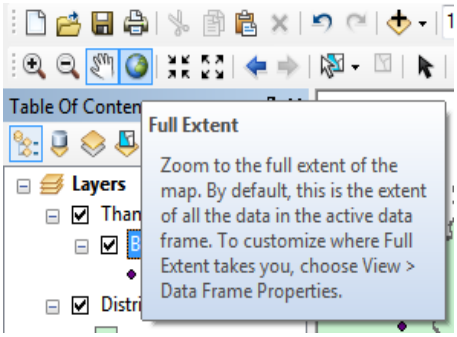
1. Zoom to district in the northeastern part of the country as shown in the following figure. Click the plus (+) sign to expand the Thana of Bangladesh group layer, then right-click the BD_HQ_Thana layer.

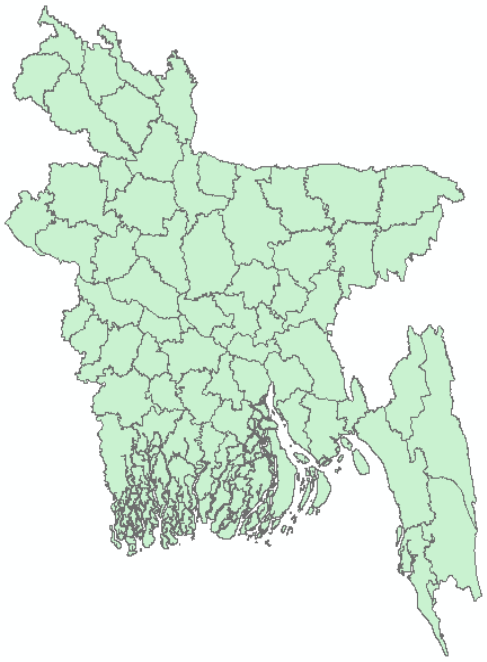
2. Click Visible Scale Range, Set Minimum Scale.
3. Click the full Extent button .





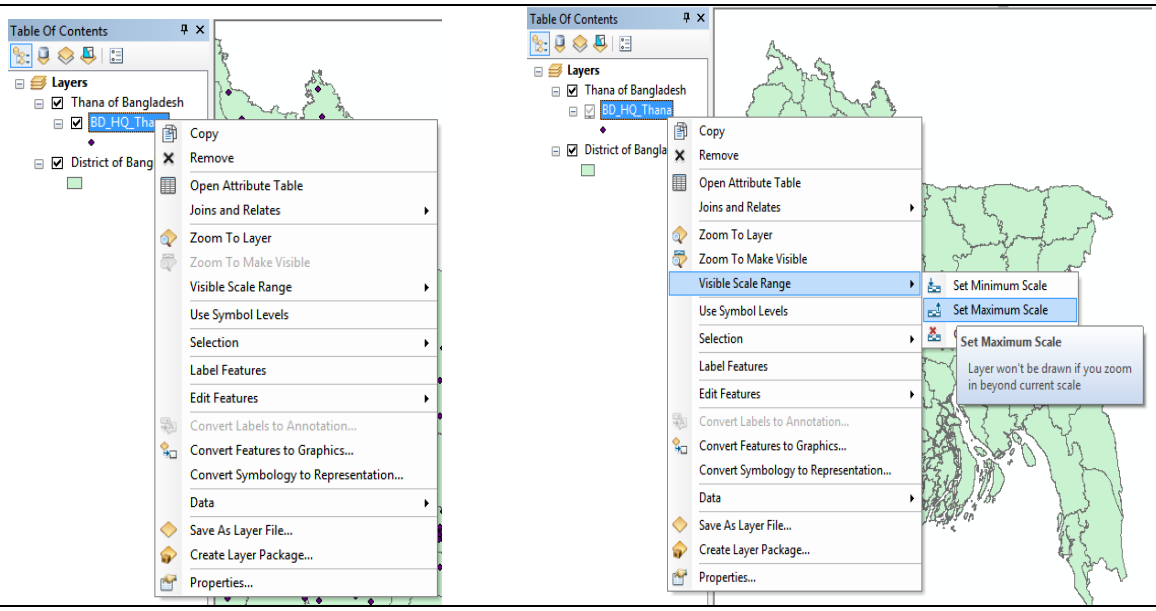






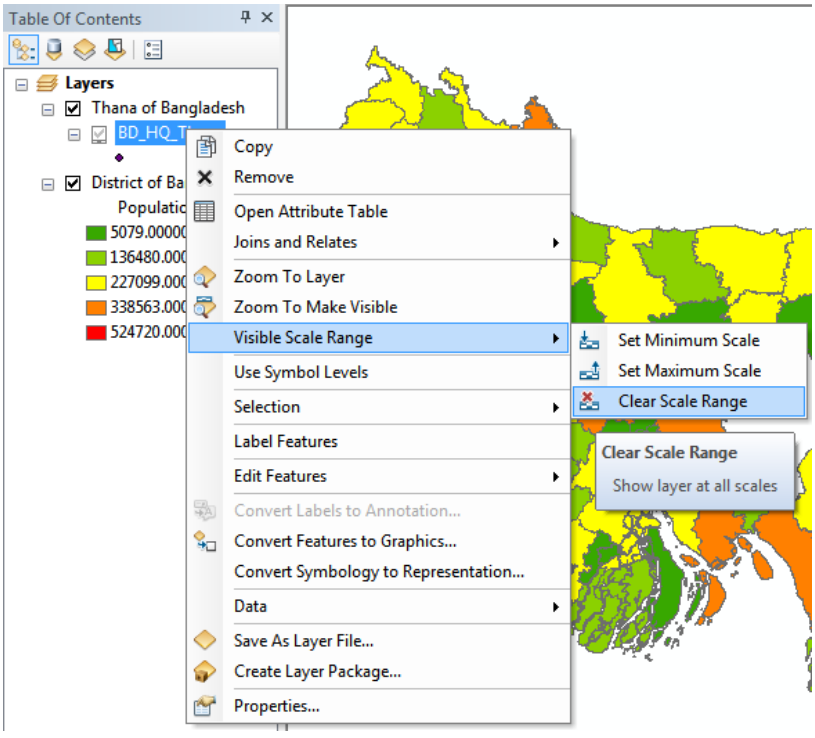
1.9.2 Set a maximum scale based on the current scale:

1. Right-click the BD_HQ_Thana layer.
2. Click Visible Scale Range, Set Maximum scale.
3. Zoom in a little closer.



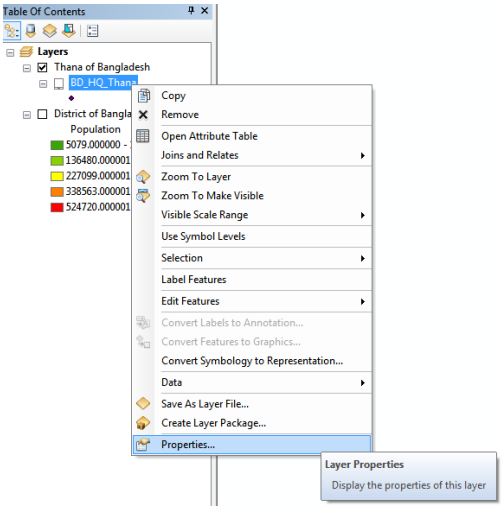
1.9.3 Clear a layer's visible scale:

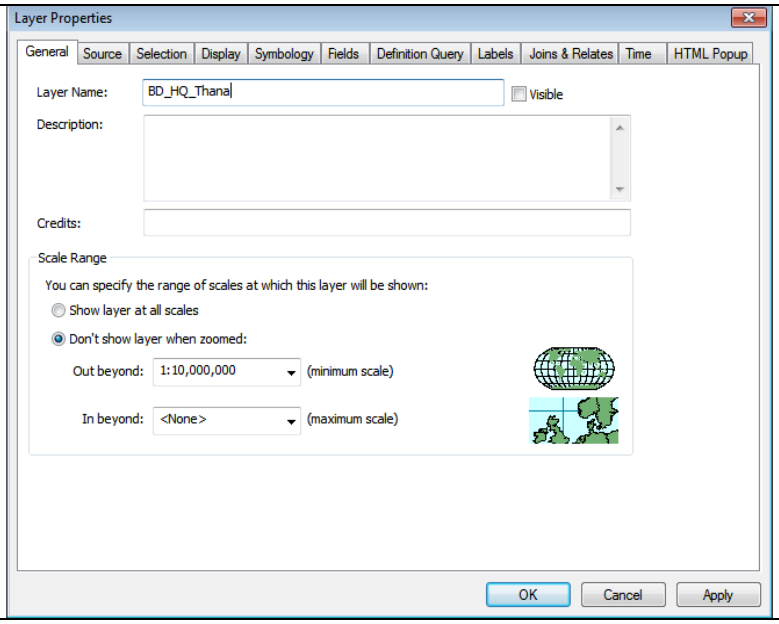
1. Right-click the BD_HQ_Thana layer in the Thana of Bangladesh group layer.
2. Click Visible Scale Range, Clear Scale Range.



1.9.4 Set a minimum visible scale for a specific layer:

1. Turn the BD_HQ_Thana layer group off.
2. Zoom to the full extent of the map .
3. In the TOC, right-click the Thana of Bangladesh layer and click Properties.
4. Click the General tab.
5. Click the Don't show layer when zoomed radio button.
6. Type **1:100,000** in the Out beyond field and OK.





1.9.5 Type a specific scale:

From the Standard Toolbar, click inside the scale box and type **1:7,900,000** as the scale and press Enter.

