# CREATING DATA IN GIS

CIVE 201

## Ibrahim Alameddine

1   Getting Data from Google Earth

1) In Google Earth you can add points, lines, and polygons. These are saved in a format that is known as KML. KML stands for Keyhole Markup Language. KML files are an XML-based geographic dataset and have an extension of .kml. They may also be in a .kmz format, which is used for compressed KML files.

2) While Google Earth is a great tool, it lacks the capabilities of ArcGIS in terms of geoprocessing and spatial analysis. As such, you will often find yourself needing to bring the data from a KML file into ArcGIS.

3) ArcGIS can't natively read KML files directly, yet the people in ESRI have generated a code to convert between the two file formats. This conversion can be done either in both ArcCatalog and ArcMap.

4) Under Moodle, find the lake.kmz file. The file is under the folder called "Adding Data to ArcGIS". Download it and try to view it with Google Earth, if available on your PC. You should see what is shown below in the screenshot. The yellow pins are the locations, where we conduct water quality sampling in the Qaraoun lake.
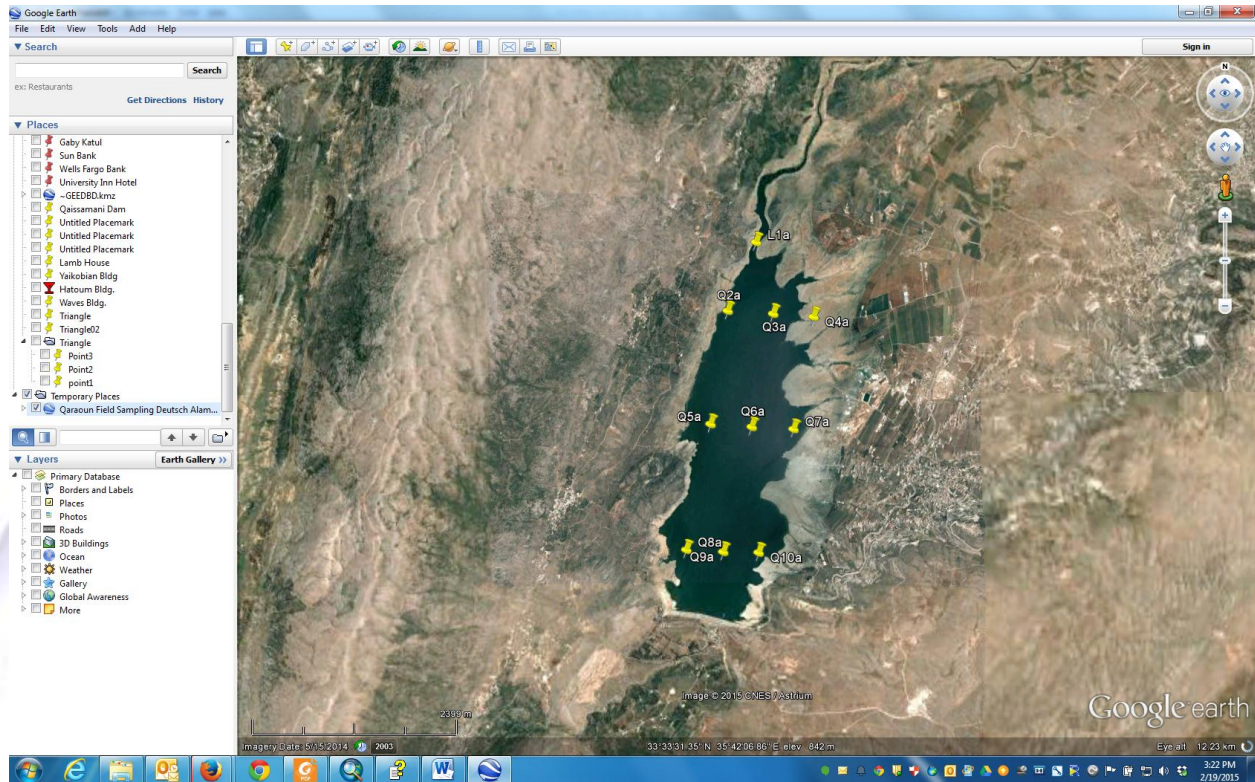
5) Open ArcMap and choose to start with a blank Map.

6) Before you start make sure that you change the properties of your file to save using "Relative Paths".

7) Click on File and then choose "Add Data" then "Add Basemap…". Choose "Imagery" and click Add. Basemaps are free maps and images that ESRI provides free of charge. These live on the cloud and **CANNOT** be saved on your machine. As such, if you have no internet then you cannot access them. The Imagery file is a set of areal images taken for the entire globe at different resolutions.
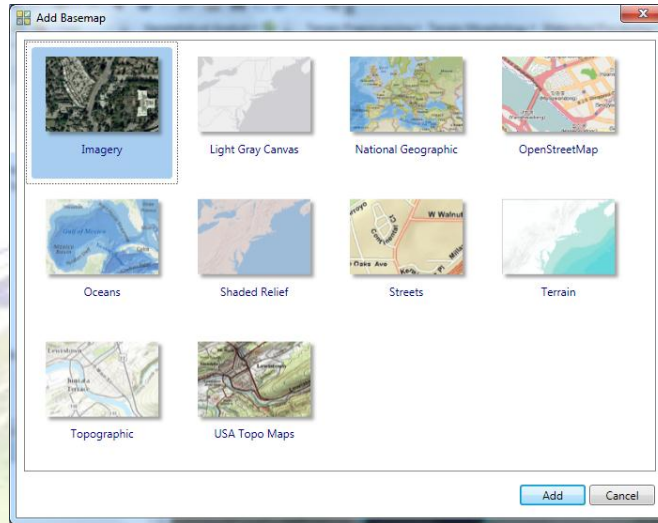
8) You should now see a satellite view of the Earth. Zoom to Lebanon. Identify the Qaraoun lake (a bit south of Beirut). Make sure you do not mistaken it for the much LARGER Lake Tabaraya to the south of Lebanon. You can use the **"Go To XY"** tool in ArcGIS to find the lake. It has a Long of 35.692598 and Lat 33.565763 Decimal Degrees.
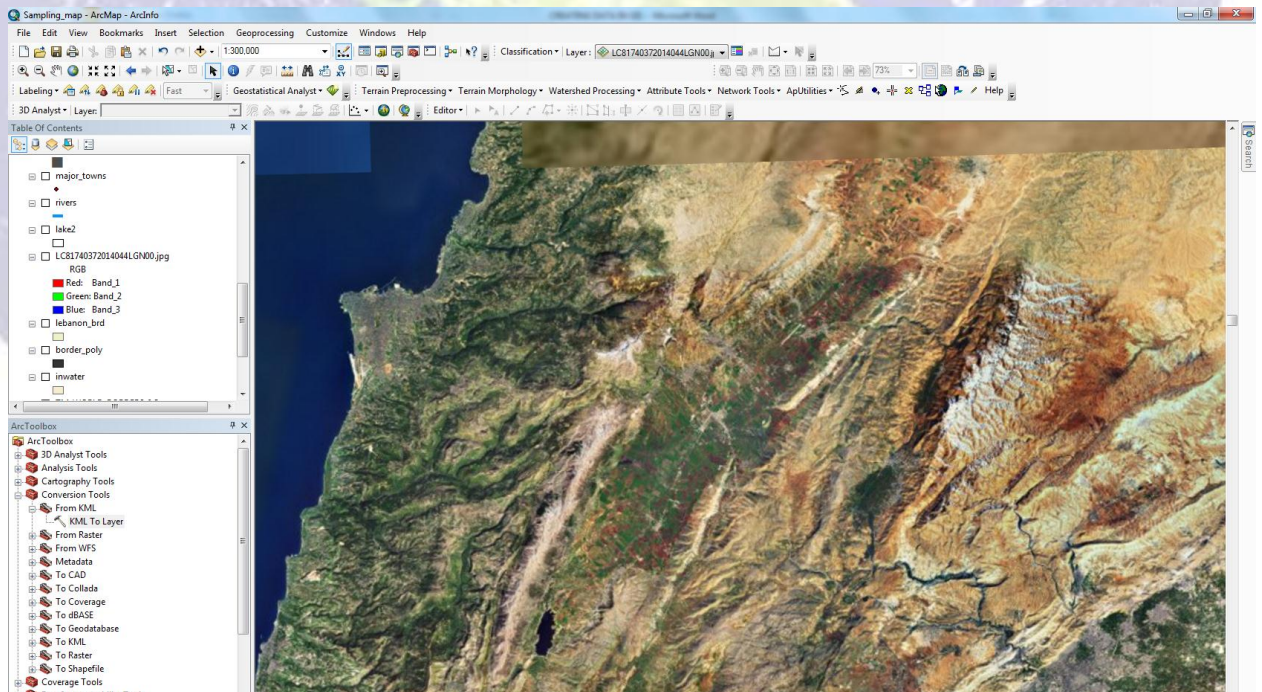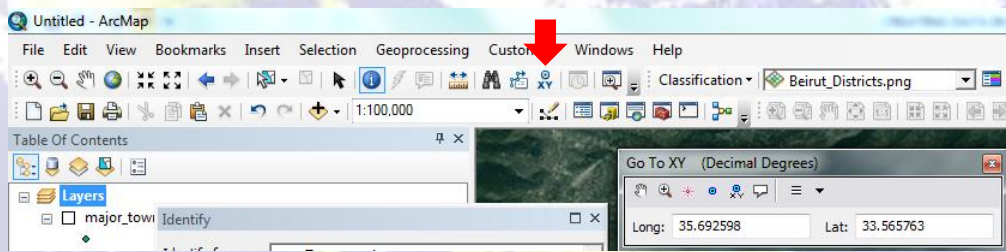
9) Click on the ArcToolBox icon (1) to open up the tools section. Then click on the Conversion toolbox (2) to open up the data conversion options. Select the "From KML" toolkit to access the 'KML to Layer' tool.
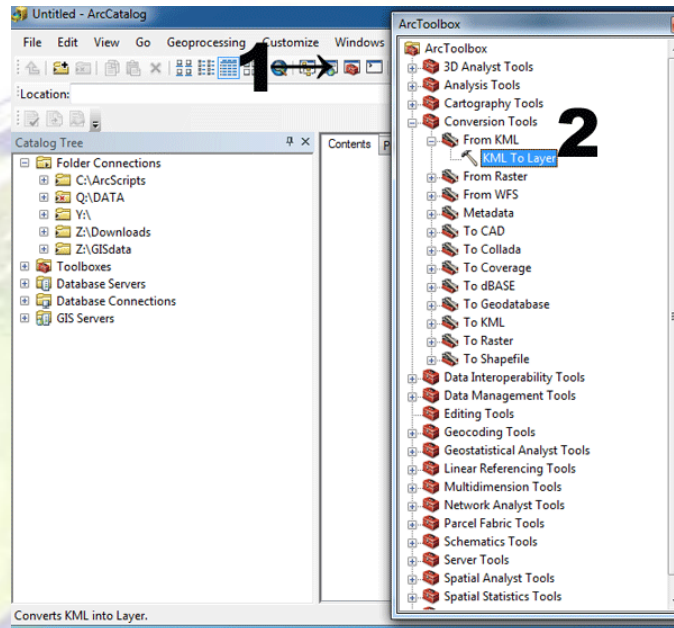

10) Within the dialogue box of the tool, browse to the kml file that you want to import to GIS. Use the folder icon next to the "Input KML File" box to find your file. In the "Output Location", select the folder where you want the shapefile to be stored. In the "Output Data Name" either type in the name that you want the shapefile to have or accept the default (which retains the name of the original KML file). Name your file "Lake_points". Save the file under a folder that you create under your X drive. Once done click OK and the tool will run and do the conversion for you.
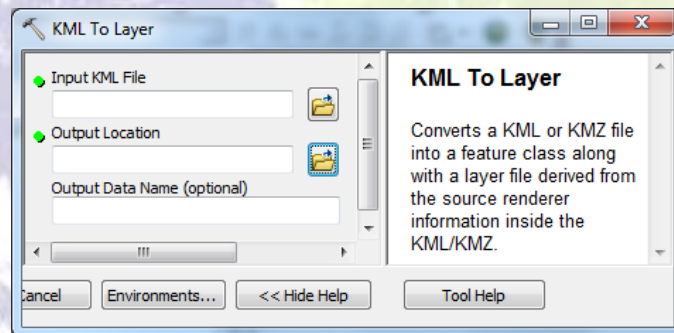
11) A scrolling text located in the lower right hand corner of ArcMap (1) will indicate the conversion is in process. Depending on the size of the KML file, this conversion process can take seconds or several minutes. This should go very fast given that we have only a few points that we are importing. You might also see the progress bar in an open window that informs you when the conversion is complete (3). Once the KML to ArcGIS layer has completed, a small window (2) in the lower right hand corner of your desktop will

pop up with a green check mark announcing the completion of the conversion. If the conversion fails, the window will have a red check mark. Let me know if that happens.
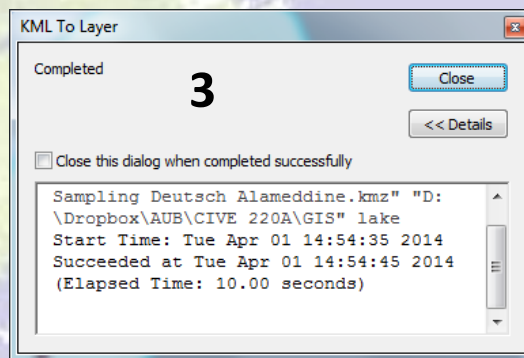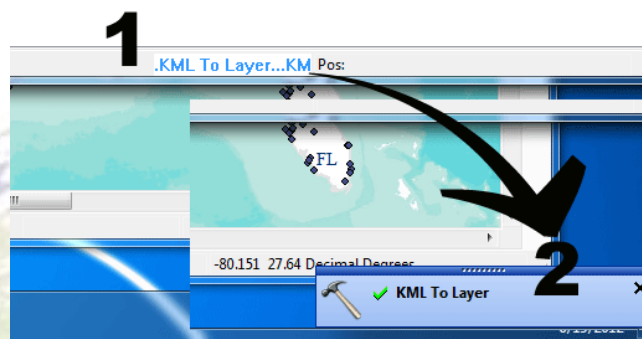

12) The converted file can now be loaded into an ArcMap session. Choose to add it to your Map. You have successfully imported a file from, Google Earth to Arc!

13) Make sure the points are within the lake boundaries. To zoom to the locations, use zoom to layer in the TOC.

14) Save your Map under your X drive. Use SAVE AS.

2 Reading In GPS locations to ArcGIS

1) Most GPS data will be in Degrees/Minutes/Seconds or DMS format such as:

2) I have provided you with a file that has the coordinate system of some villages near the lake.

3) Most GPS devices will default to WGS 1984 for the coordinate system, but it is important that you check prior to data collection and make note of it.

4) GPS data are often downloaded and saved in Excel files. Download the **GPS_coord_dd2.csv** file from Moodle and open it in Excel. The .csv file format is a very common file type that is used to read in data in many programs including Matlab, ArcGIS, REVIT, R, etc… The CSV stands for Comma Separated Value.

5) Now open ArcMap.

6) Click the "Add Data" button. Then choose the .csv file with your GPS data. This can also be done using Tools > Add XY Data.

7) The csv file will be added to your Table of content; but you will not be able to see the points.

8) Right click the added file and choose "Display XY Data".
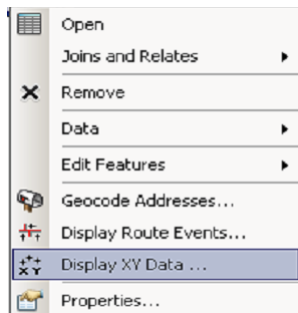
9) The Add XY Data dialog will open. Set the "X" field to the Longitude and the "Y" field to the Latitude.
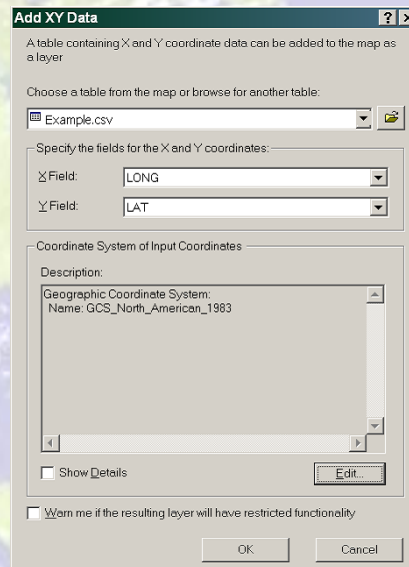
10) Click on "Edit" to specify a coordinate system. This should be the coordinate system used at the time of data collection. Since it is from a GPS, it is using the WGS84 geographic coordinate system. The coordinate system can be changed afterward in the GIS program by using a "Projection and Transformation" tool.

11) Now click OK. You will receive a warning that the resulting table does not have an Object-ID field – click OK to close the message – GIS will create an Object ID field for you. This is important for Indexing.

12) The data now can be seen on your map; yet it is a temporary layer and will disappear when you close ArcMap. You want to keep it for later use.

13) To save it, we will export it to a new shapefile. Now right click on the Layer that you have just created and select "Export Data". Choose the coordinate system "this layer's source data". This means that your file will have the same coordinate system as the original GPS data.

14) Browse to where the file is to be saved, name you file and then click OK.
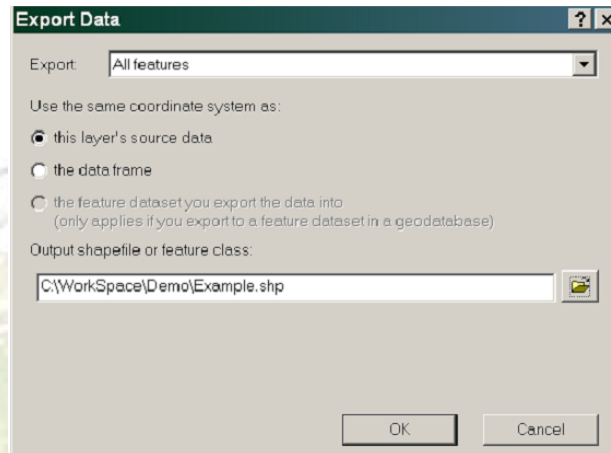
15) A dialog box will pop up asking if you would like to add the exported data as a layer to the map. Click YES.

16) The new layer will now be visible and you can remove the temporary event layer of the spreadsheet by right clicking and choosing remove.

17) To view the attribute table (similar to a spreadsheet) for the shapefile or newly created layer, simply right click on the name and choose "view attribute table" from the menu.

18) Change the symbology so that is red dots of size 10.

19) Note that the in ArcGIS desktop 10 and more recent versions, you can also use the "Make XY Event layer" tool under "Data Management>Layers and Table Views". Try it to see if it works.
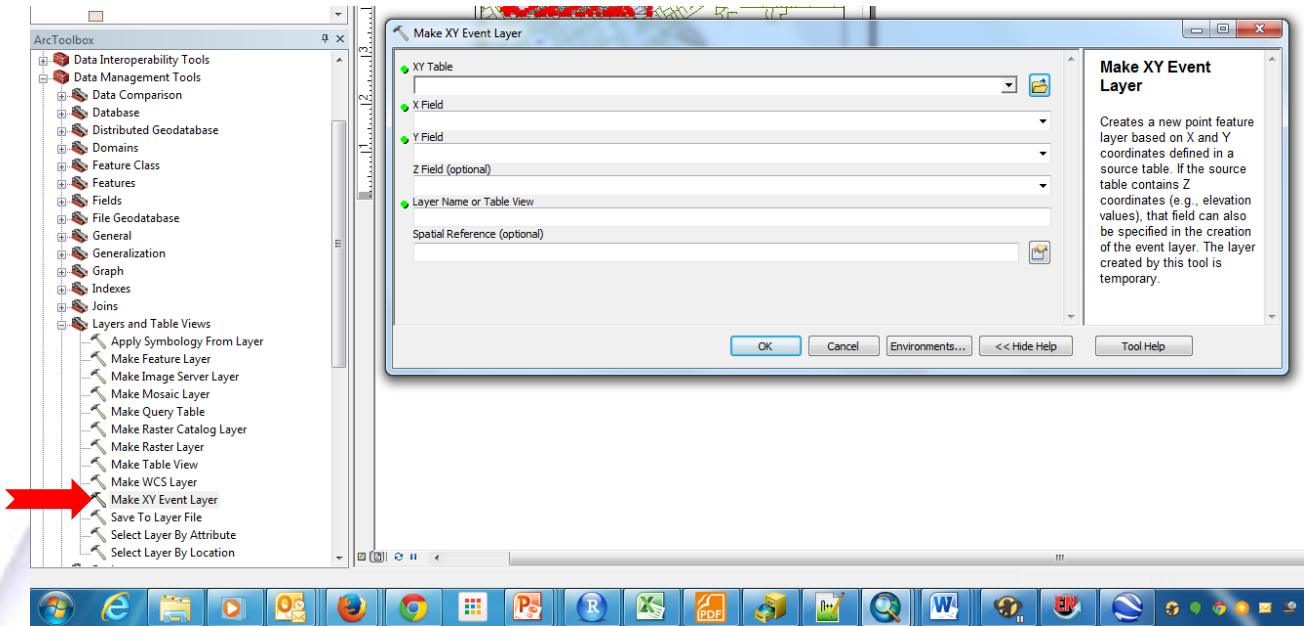
3 Digitizing Data

1) We are now going to begin digitizing features.

2) Digitizing is the process of making features we can see on the image editable and making them features to which additional spatial and non-spatial attributes can be assigned. This means we will convert the image (an image i.e. a raster) or part of it to a series of digital objects that will have an attribute table associated with them.

3) We can digitize points, lines, or polygons. By digitizing these features, you make them available for future mapping efforts.

4) We will experiment with digitizing the Qaraoun Reservoir in the Bekaa.

5) The digitizing process is started by creating new layers in ArcCatalog, and then adding features to them in ArcMap.

6) So open ArcCatalog. We are going to create a new shapefile that we can edit in ArcMap—this will be a polygon feature shapefile (a lake is a closed object) to which we will trace the reservoir's boundaries.

7) In ArcCatalog, browse to your folder on X, where you are saving your GIS data. This is the folder in which you will create your new shapefile, so select that folder and right-click on it. Go to New ➜ Shapefile…

8) That should open the Create New Shapefile window. Give the polygon shapefile an appropriate name such as Qaraoun_lake. Click on Edit… to see the Coordinate System of the file. In the Spatial Reference Properties window click Select… Choose Projected ➜

UTM ➔ WGS 1984 ➔ Northern Hemisphere ➔ WGS 1984 UTM Zone 36N.prj. Click OK and OK again to create the shapefile. You have just set the projection system of your new file.

9) Return to ArcMap, start a new map and add your new shapefile to your Data Frame (TOC). It is empty and as such you will not be able to see anything on your map. Add the Imagery from ESRI.

10) You will need the Editor toolbar. Click on View➔ Toolbars ➔ Editor. On the toolbar, click on the Editor menu and choose "Start Editing". You will be prompted to choose the folder that your shapefiles are in, select the appropriate one and then click OK. Before you get started creating polygons, turn off all layers except for the created lake shapefile and the image we added from ESRI. Change the scale of your map to 1:45,000.

11) Make sure the editor toolbox is active If not right click on any location on the toolbox and choose the editor toolbox.
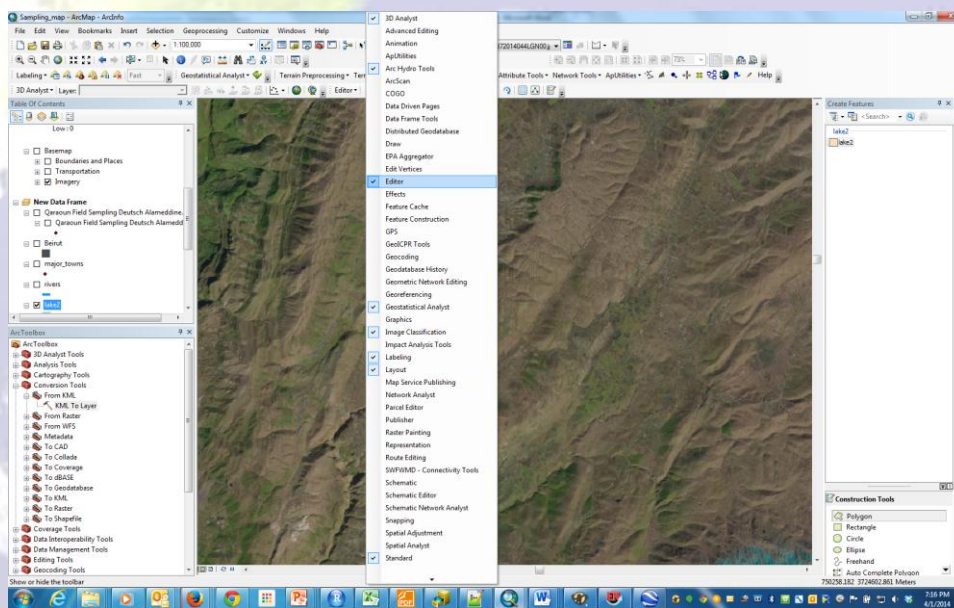
12) In the Editor toolbar, click on "Start Editing". Choose the Lake shapefile (or whatever you named it) layer as the layer you want to edit. The Create feature window will appear and dock on your right side.

13) The top panel of the Create Features window shows the templates in the map, while the bottom panel of the window lists the tools available to create features of that type. The availability of the feature creation tools, or construction tools, depends on the type of template you have selected at the top of the window. Since we have selected the Lake shapefile (a polygon) you should only see the following "Construction Tools":
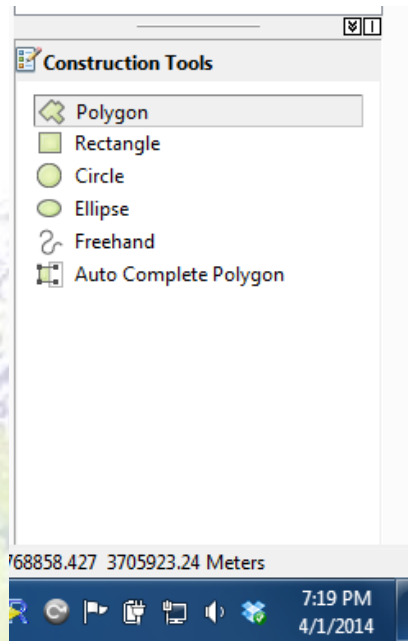
14) Before you digitize, change the symbology of your lake shapefile to be "Hollow". This is only to help you see beneath it once you start drawing.

15) Select the Polygon tool and then move to the Image. You should see that your cursor now changed to a cross "+". Use it to trace the lake. By left clicking you establish a point on the perimeter of the lake. Click multiple times to trace the lake border. Double clicking when you get back to where you started. This will finish your Sketch and close the polygon. This should make your polygon become an actual, filled polygon.

16) If you make a mistake you can select the polygon and choose delete sketch. If you want to move vertices around, Click on the "Edit Vertices" button within the "Editor Toolbox". You should see the vertices are points that can be moved, added, and/or deleted. Once you have completed your changes click on "Finish Sketch".
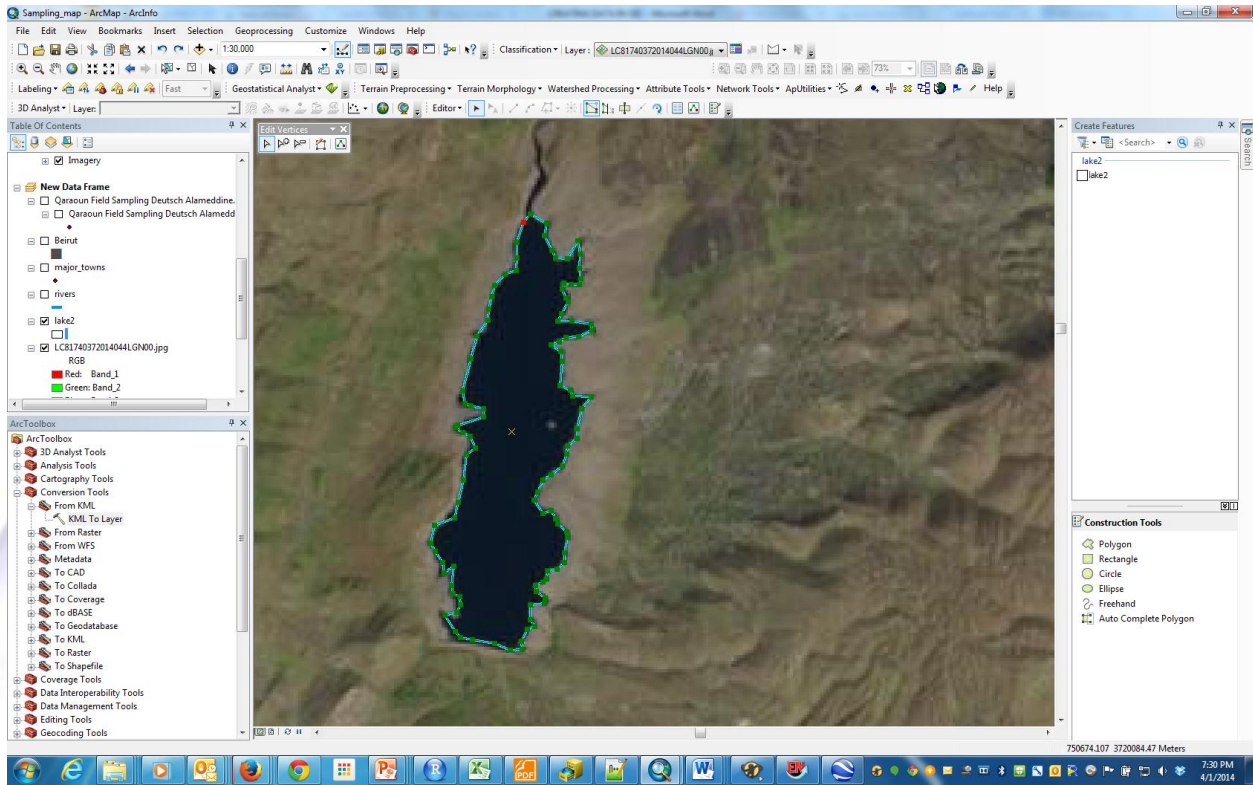
17) Now that you are happy with how your lake looks click on "Stop Editing" and then click on "Save Edits". Congrats you have just created a shapefile!!

18) Now try to trace the boundary of the lake before the draught on the same file. This will create a new polygon for you in the same shapefile. You should now have two polygons in your file. You can check on that in your attribute table.