Step by step guide in running sedimentation analysis in SedNet:
A guide for Pulot Watershed Sedimentation Analysis

I. Data Requirements

The input data identified were classified into base data, physical climatic data and flow data (**Error! Reference source not found.**).

1.1. DEM

The digital elevation model of Pulot Watershed thet was used in the study had a spatial resolution of 90 meters (3-arc second) from the Shuttle Radar Topographic Mission (The CGIAR-CSI Consortium of Spatial Information 2014). The watershed boundary used in the model was provided by the PCSDS office.

Table 1 List of input data

Base data	Physical and climatic data	Flow data
DEM	Rainfall Erosivity (R)	Streamflow data
Flood Plain	Soil Erodibility(K)	Gauge locations
Landcover 2010 and 2013	Slope Length-Steepness (LS)	
	Land Use (C)	
	Gully Density	
	Mean Annual Rainfall	
	Potential Evapotranspiration-Rainfall Ratio (PET)	
	Riparian Vegetation	

1.2. Land cover map

The land cover map for the study area was obtained from the classified 2010 SPOT5 imagery of the whole Pulot Watershed.

1.3. Rainfall erosivity (R)

Rainfall erosivity measures the erosive power of rainfall. It was calculated using rainfall isohyetal grid containing a 15 year average annual rainfall measurements from surrounding meteorological stations. The equation used was $R = 38.5 + 0.35P$, where P is the annual precipitation in the catchment (Hernandez et al. 2012; Blanco & Nadaoka 2006)

1.4. Soil erodibility (K)

Soil Erodibility Factor measures the resistance of soil to sheet and rill erosion. The K factor was estimated using data from soil physical and chemical properties. The K factors was then calculated using the equation provided by David (1988) and Wischmeier and Mannering (1969) for estimating K. A grid was developed from the estimated K factors for each soil unit on the soil map.

1.5. Hillslope length factor (L) and slope steepness factor (S)

The hill length factor represents the increasing runoff volume (and thus eroding power) down slope as the length of soil, subject to water erosion, increases. Meanwhile, the slope steepness factor (S) is the ratio of soil loss from the field slope length to that lost (Hernandez et al. 2012). A grid of slope in degrees was created from the DEM, which was then used to generate the slope factor and the length factor.

1.6. Cover Factor (C)

C represents a comparison of soil loss with that expected from freshly tilled or bare soil (C = 1). Land use grids for the catchment were derived from vegetation cover classified from SPOT5 imagery taken in 2010. The land use types were then assigned representative values for C to generate a grid of C values. The values of C for each land use were taken from the estimated crop cover coefficients, or C values for the common cover conditions of Philippine catchments (see **Error! Reference source not found.**) (Hernandez et al. 2012; David 1988).

1.7. Gully density

Gully density is the estimation of the influence of gully erosion on the total suspended sediment budget gully density must be estimated. In the absence of any measured data, Gully density at the Pulot Watershed has been estimated to be 5% of the drainage density.

1.8. Riparian vegetation

The riparian vegetation cover proportion was determined by assigning a value based on land use within a set distance from the stream link. A buffer of 100 meters from both sides of river/streams was chosen through overlaying of land cover with C factor.

1.9. Streamflow data

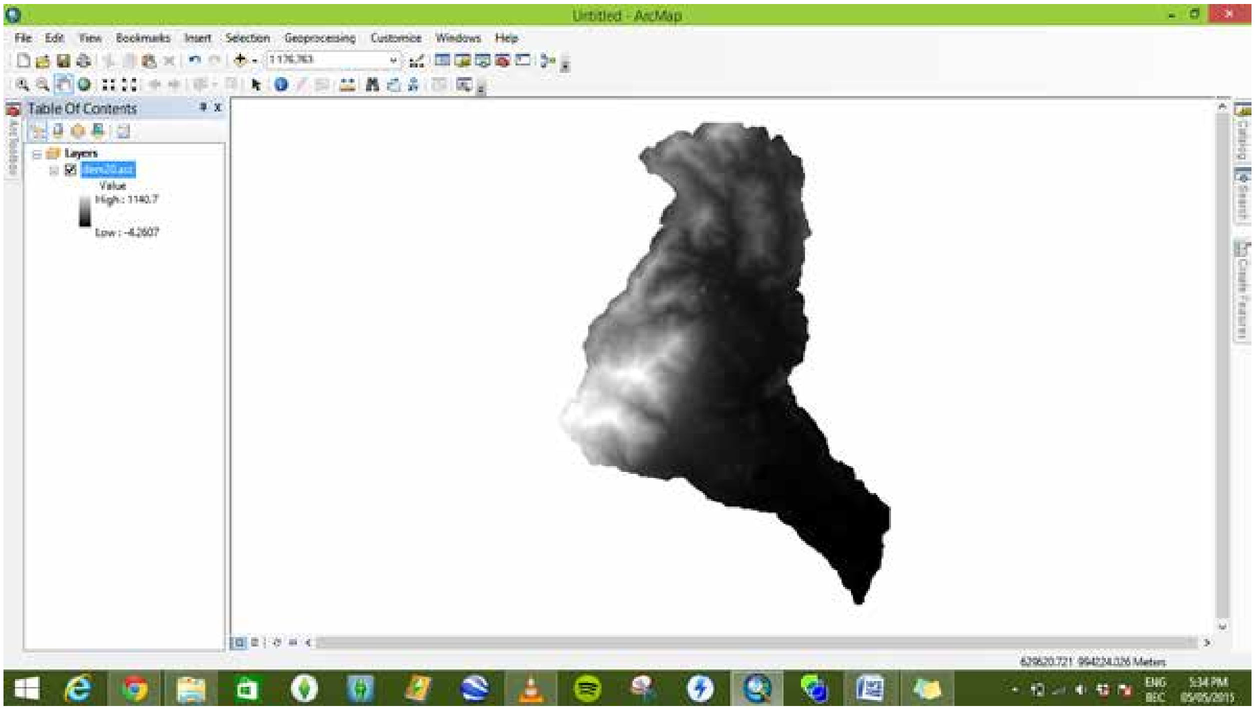
Time-series analysis of historical discharge data and characteristics of the catchment upstream of each stream gauge are required for flow regionalization by SedNet. The flow regionalization is essentially a regression procedure used to determine the relationship between mean annual flow (based on localized runoff coefficients and rainfall) and SigmaQ; median daily flow, bankfull flow and median overbank flow (Hernandez et al. 2012; Wilkinson et al. 2004). At the moment, the streamflow data in still on process.

II. Step by step guide

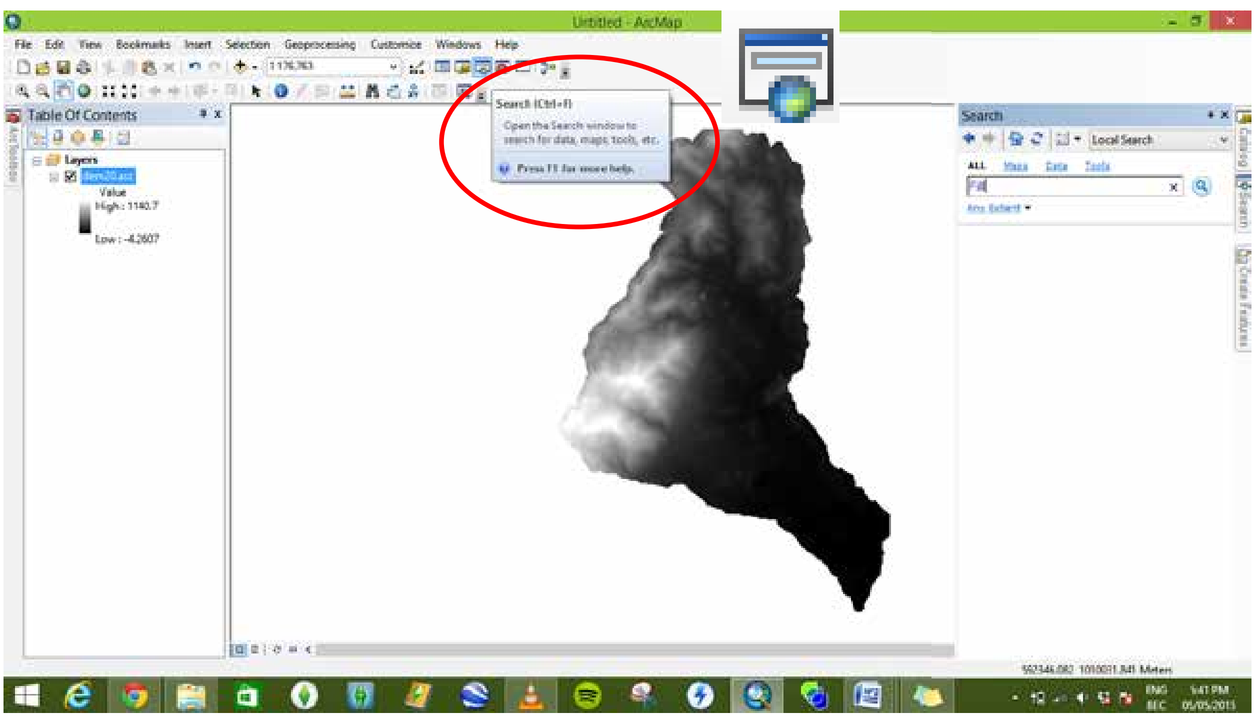
2.1. Processing of input data

2.1.1. Digital Elevation Model

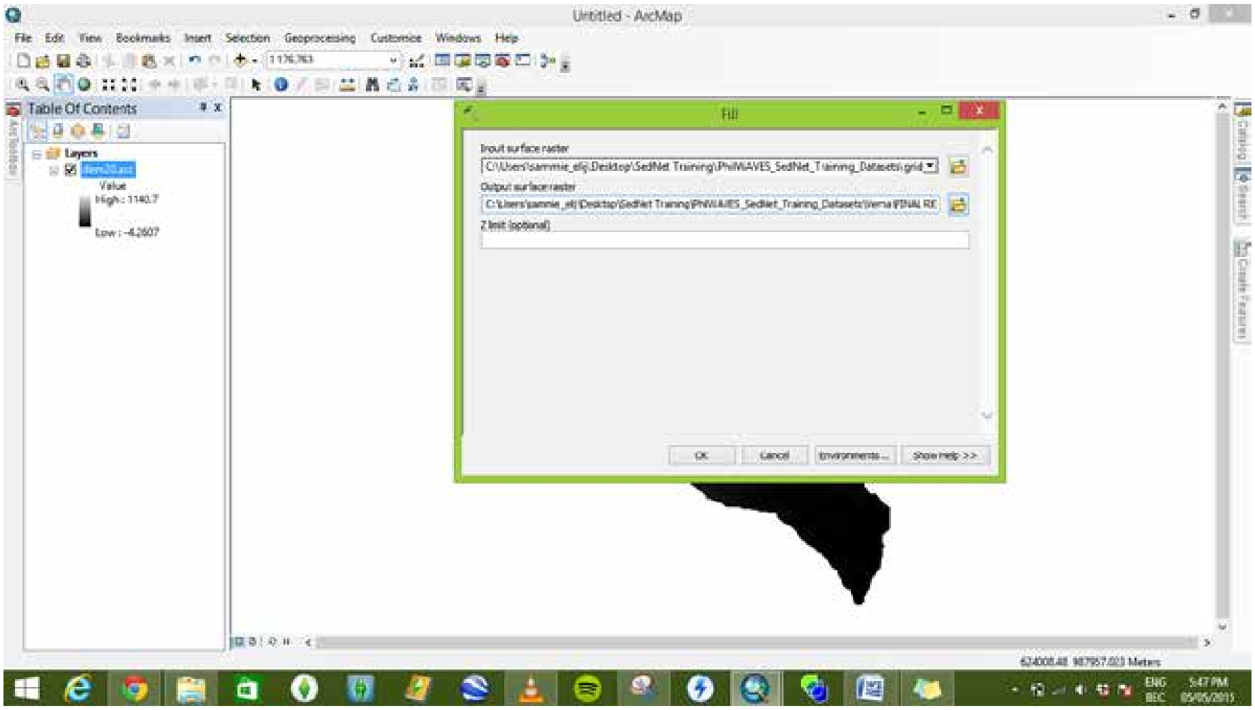
- In your ArcMap window, load the "DEM (SRTM 90 meters)" from the folder "Datasets" subfolder "grids".



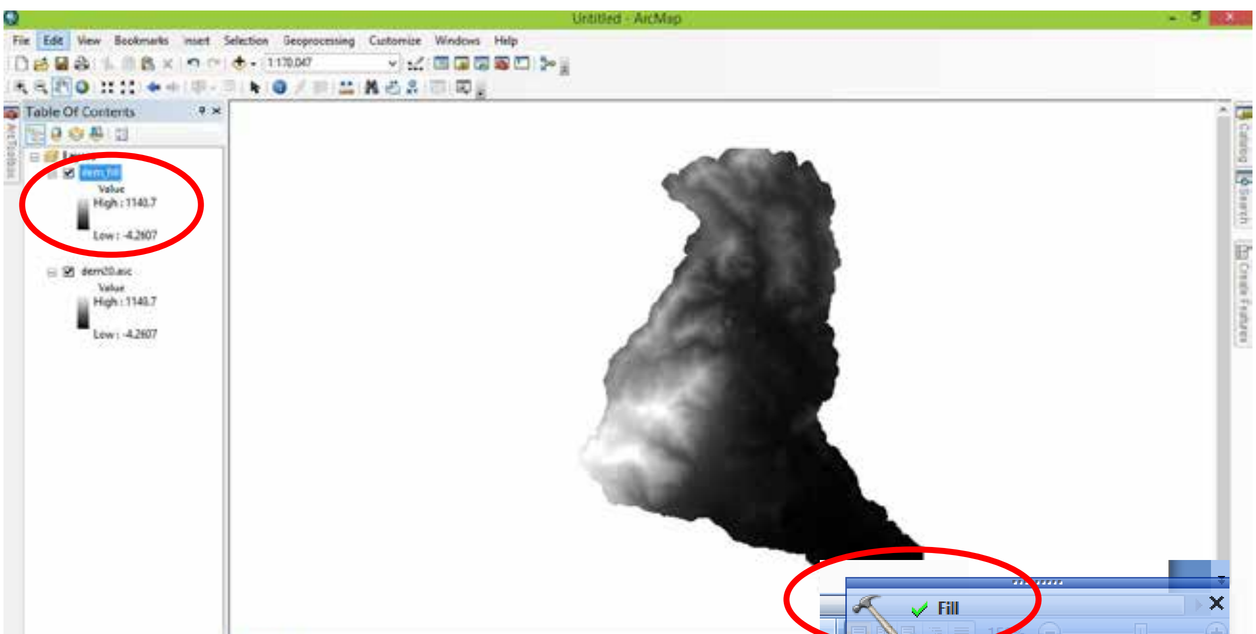
- Click “Search” and type in “Fill (Spatial Analyst)”. This will fill sinks in a surface raster to remove small imperfections in the data.



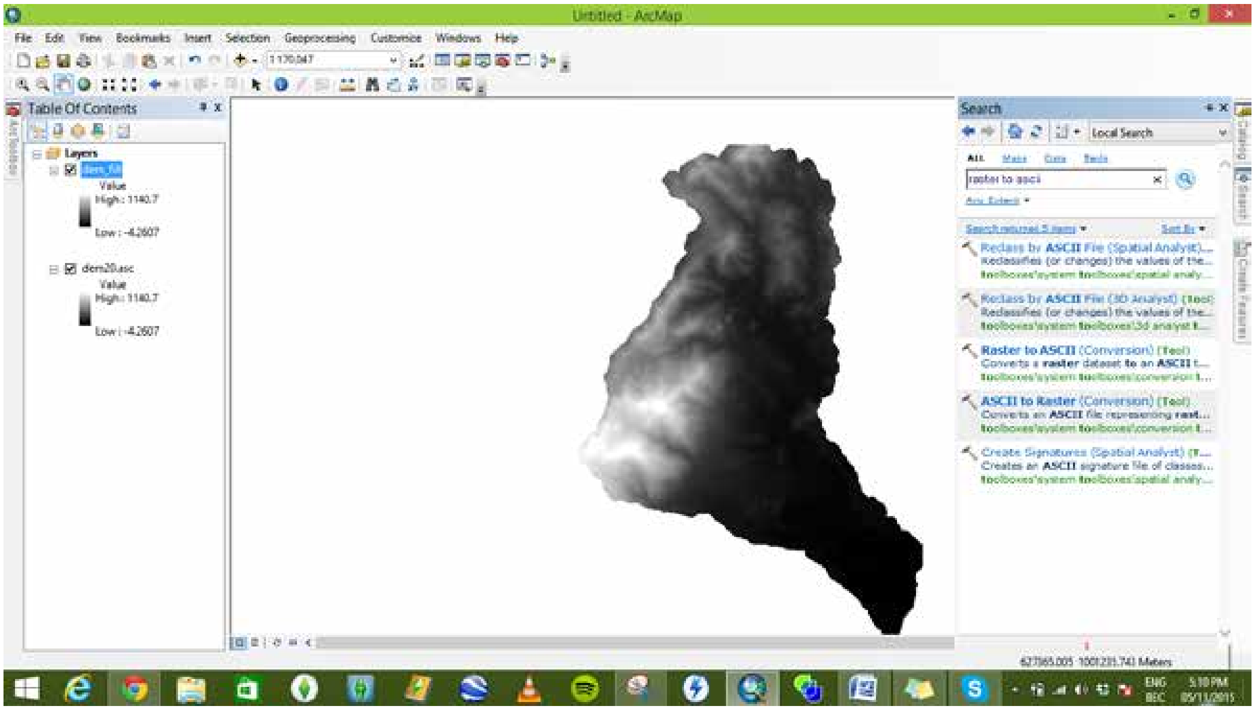
- Insert the input raster “dem20.asc” from the “grid folder” then assign the name of the output surface raster. The “Z limit” is left blank. Save the new raster to your designated work folder by pressing "OK". Make sure that all your output maps are located in one work folder for easy reference.



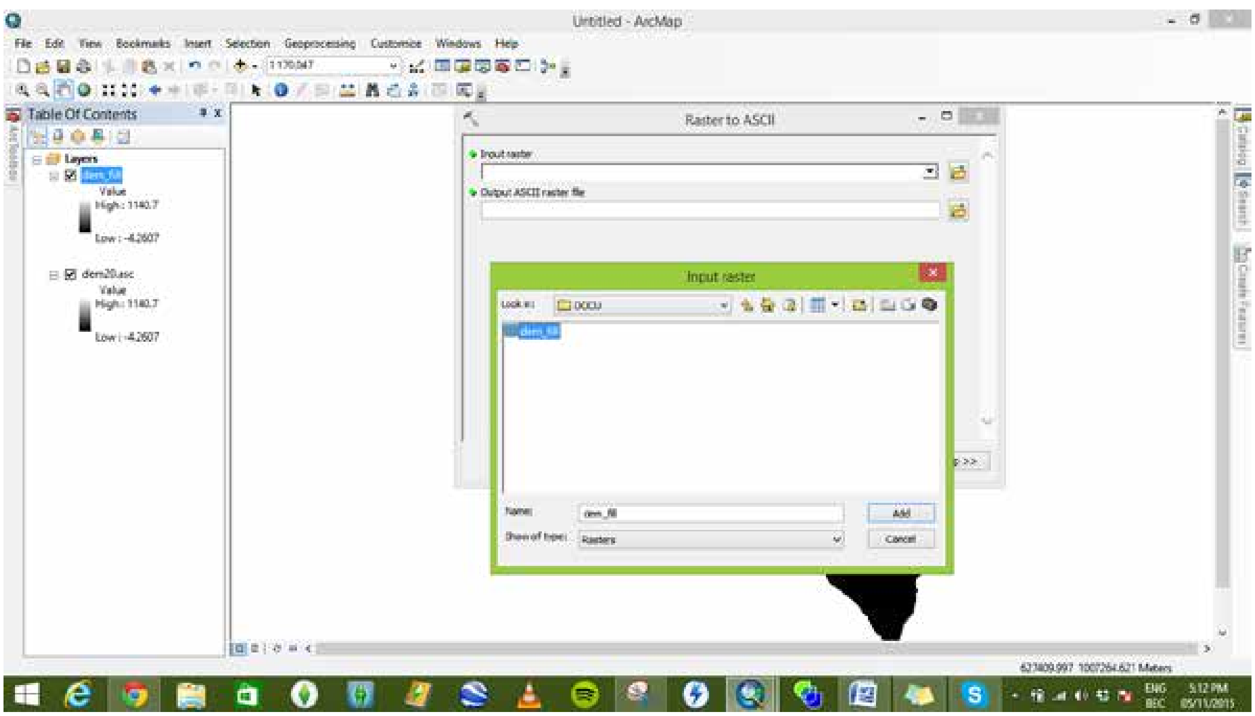
- When the "fill" operation is successful, the filled DEM will appear on your map window.



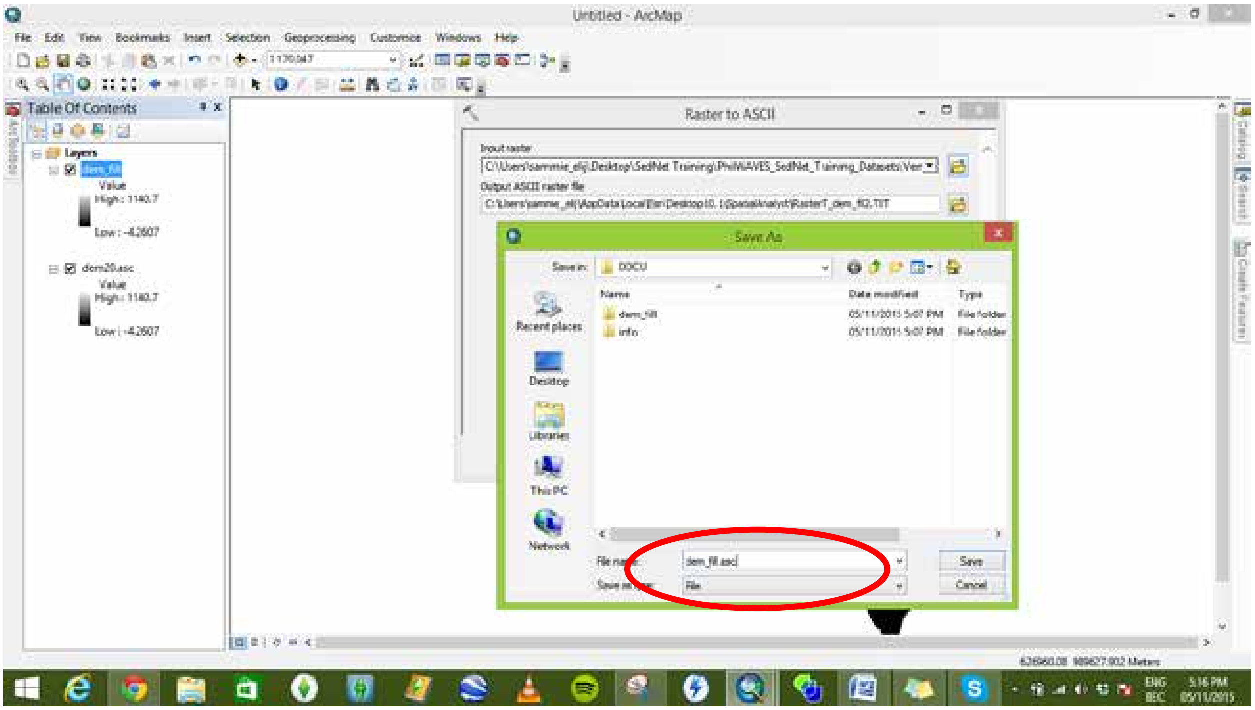
- Click "Search" and type in "Raster to ASCII (Conversion)". This will convert the raster file format to ASCII format which is format required in SedNet.



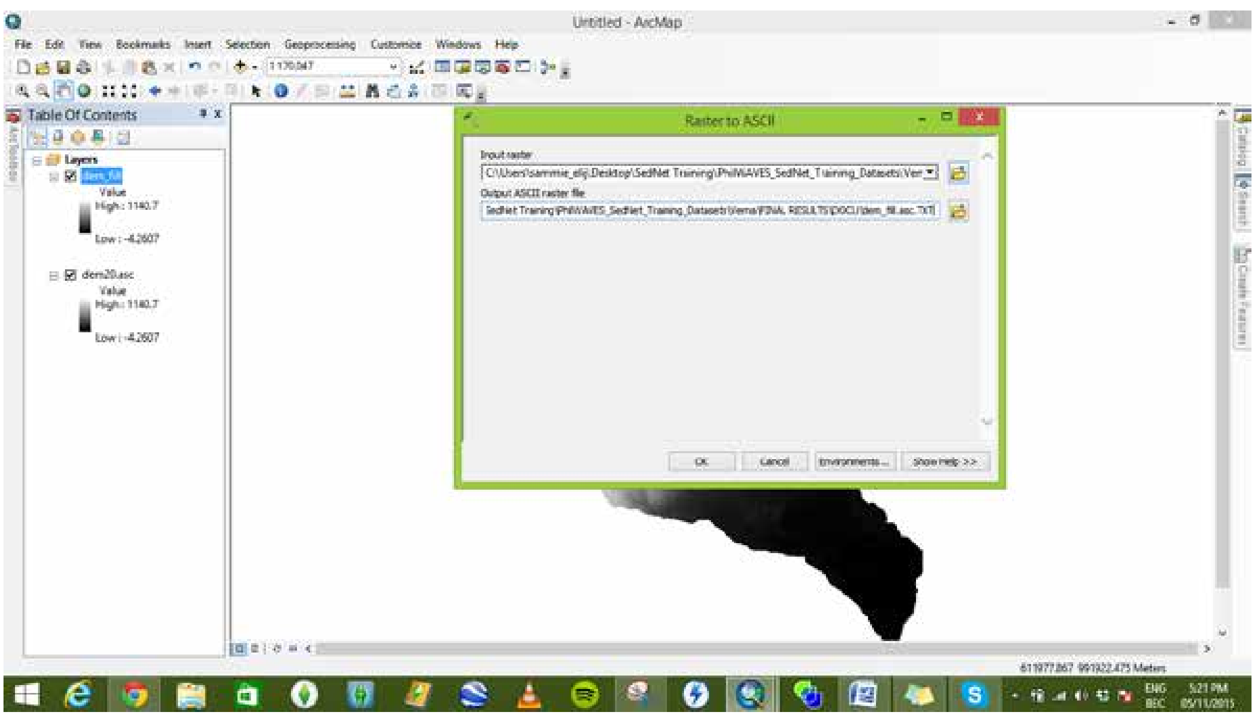
- On the “Raster to ASCII” pop-up window, choose your filled DEM.



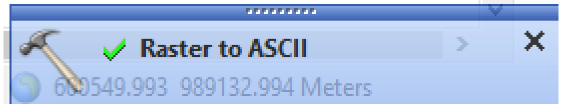
- In the “Output ASCII raster file”, type in the name of the output file e.g. dem_fill.asc. Make sure that you type the “.asc” as the file extension.

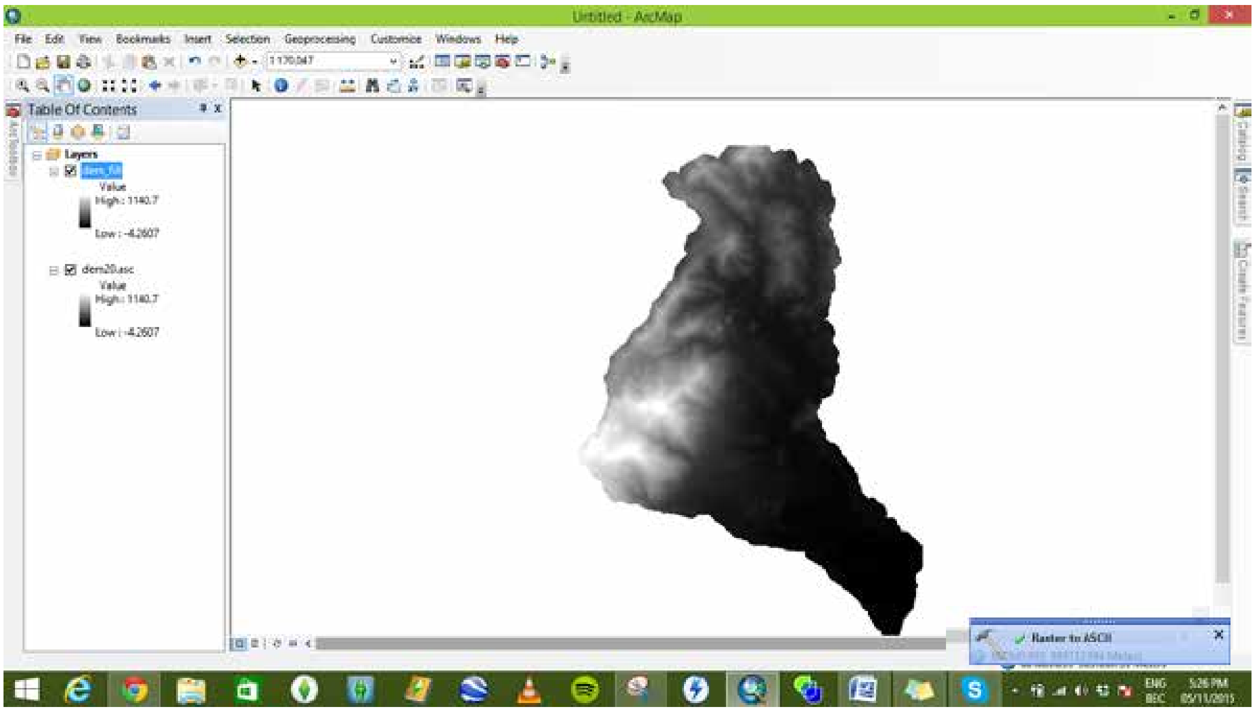


- Upon clicking “Save”, navigate to the “Output ASCII raster filename”. You will observe that the file extension has become “*.asc.TXT”. Erase the “.TXT” and maintain the “.asc” only, e.g. dem_fill.asc.
- Click “OK”



- When the “fill” operation is successful, this message will appear on the bottom left corner of the map window

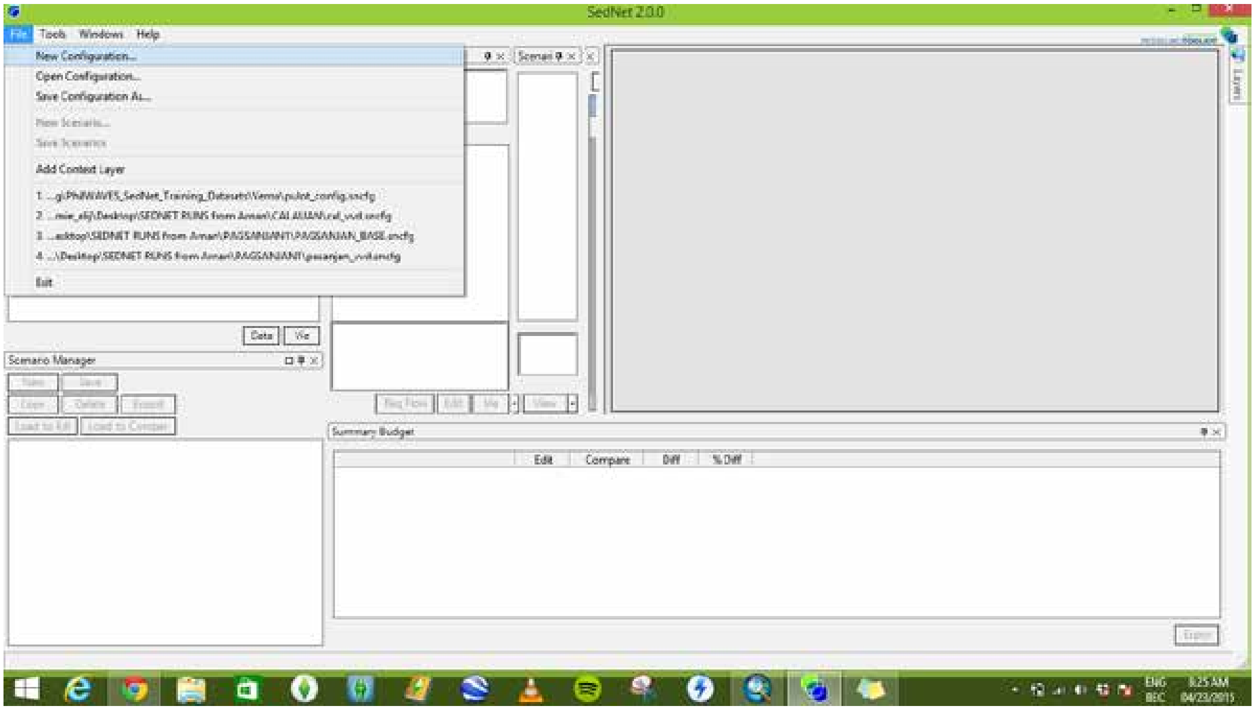




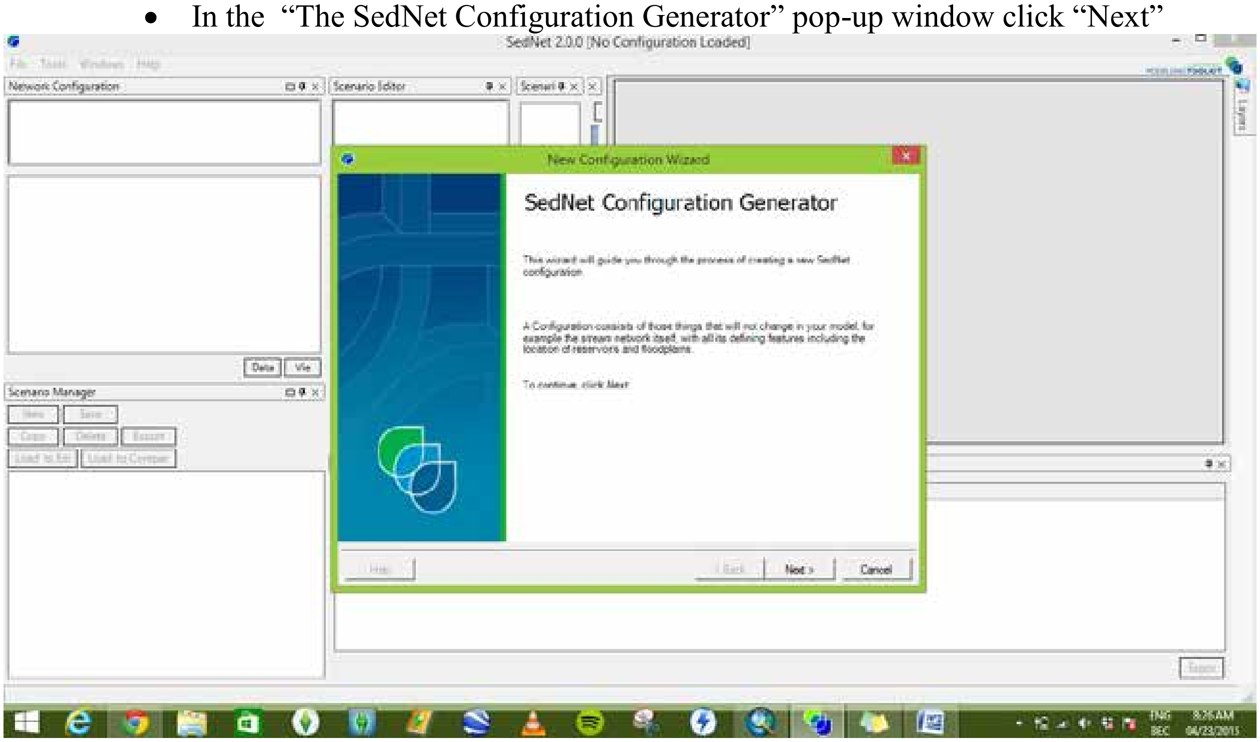
- The DEM is now ready to be run in SedNet.

2.1.2. *Loading DEM in SedNet (SedNet Interface)*

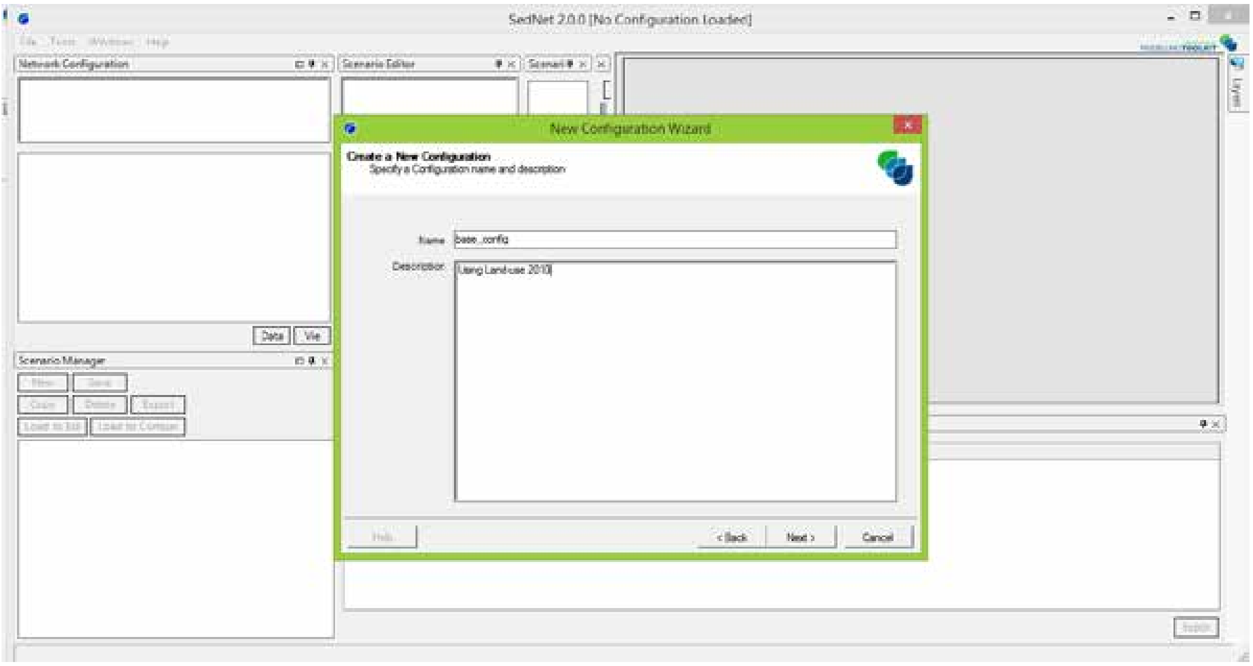
- Load SedNet program
- Under "File", click "New Configuration"



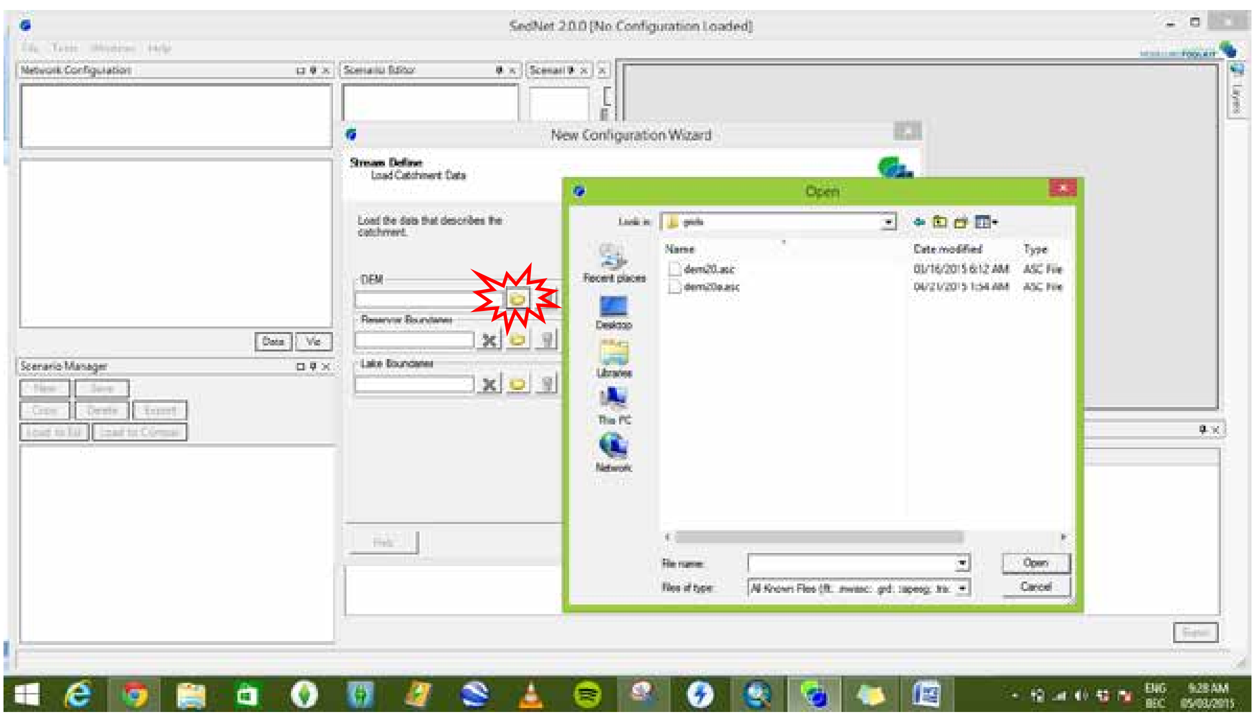
- In the "The SedNet Configuration Generator" pop-up window click "Next"



- Type in “Name” of the configuration e.g. base_config
- Provide the description of the configuration e.g. using Land-cover 2010
- Click “Next”

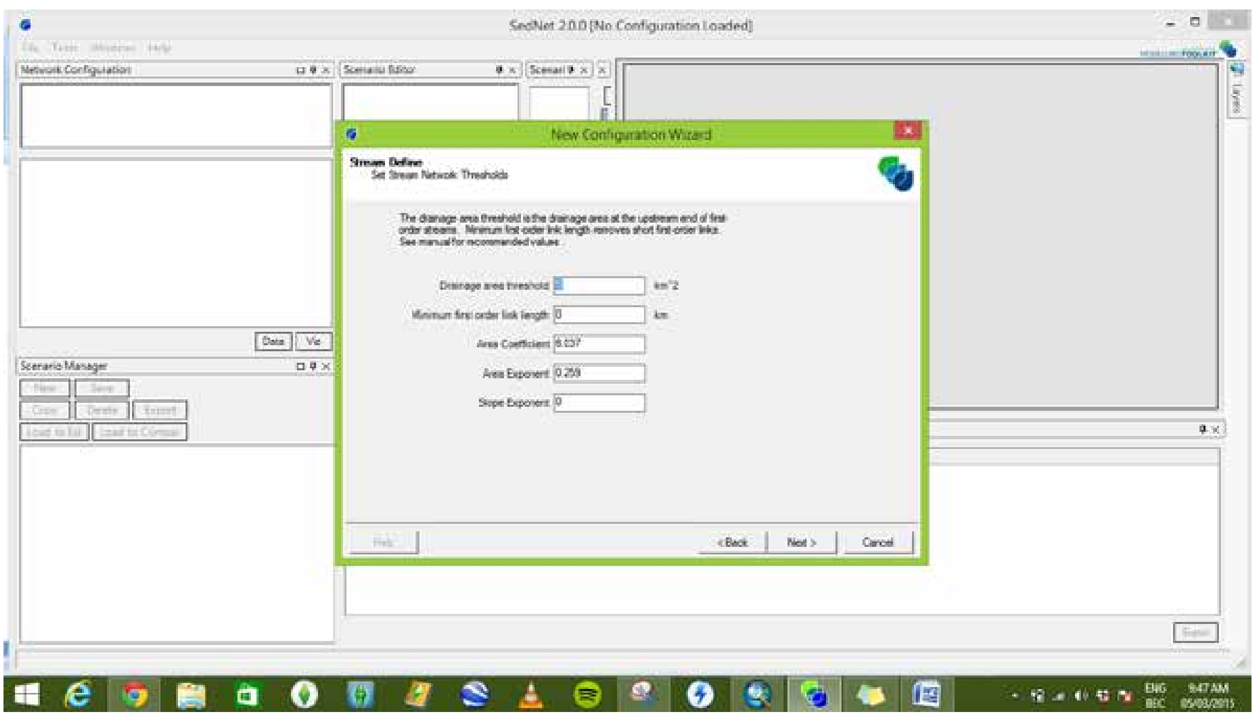


- In the “New Configuration Wizard” under the “Stream Define” pop-up window, click on the folder icon to load the processed and filled DEM
- Select the filled DEM (in your processed input data folder) then click “Open”

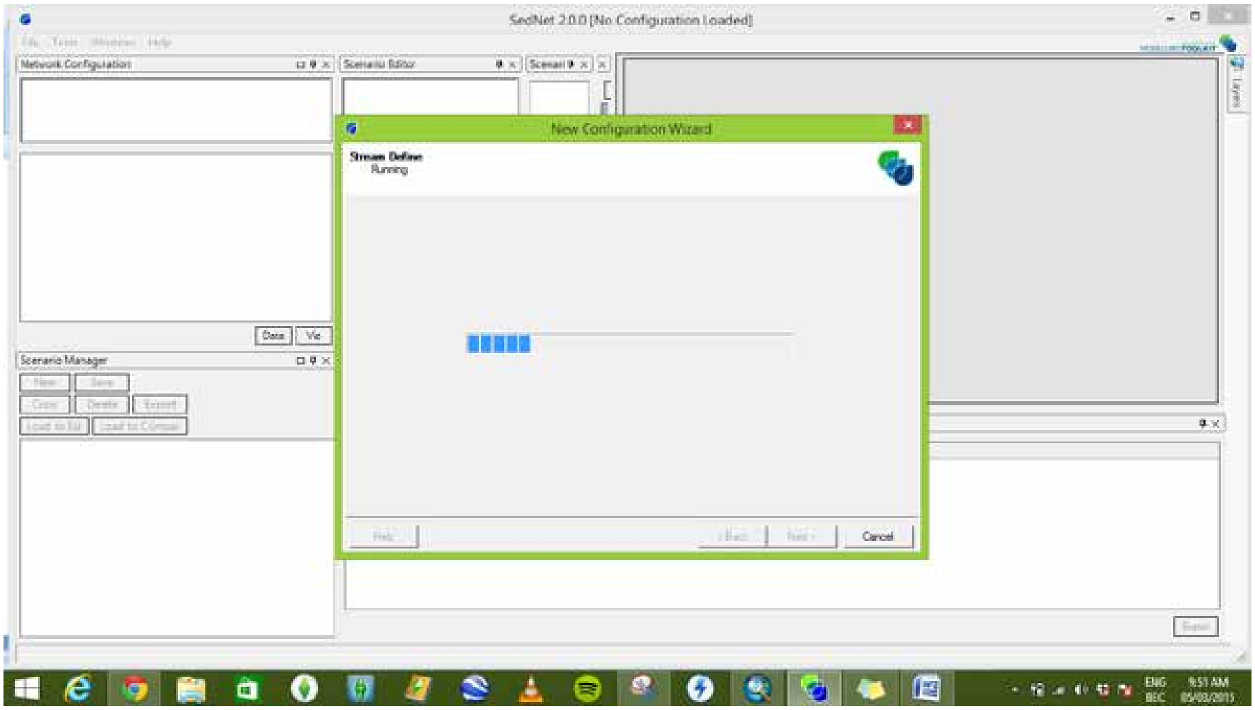


- Once the filled DEM has been loaded, click the “View” icon to check whether the DEM is readable by the program, if so click “Next”

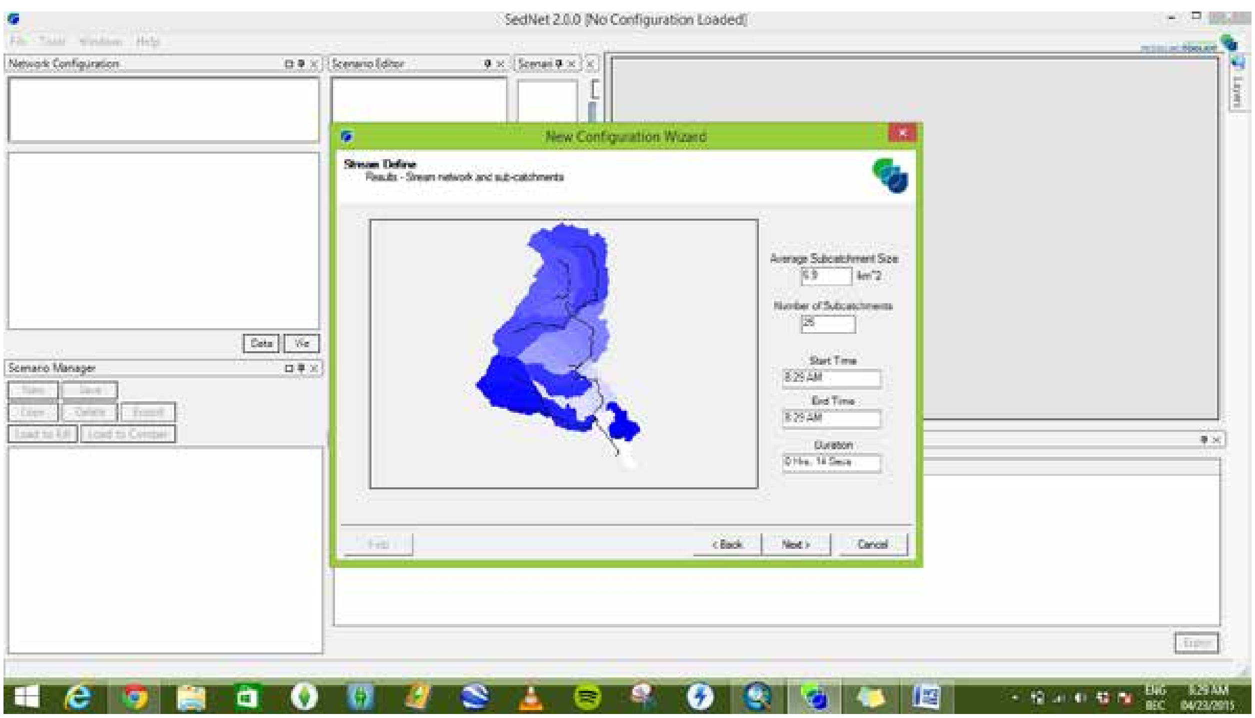
- In the “Stream Define” pop-up window, type-in the appropriate “Drainage area threshold”. In the case of Pulot Watershed, the drainage area threshold we define is **5** km^2.
- All other the parameters are held constant.



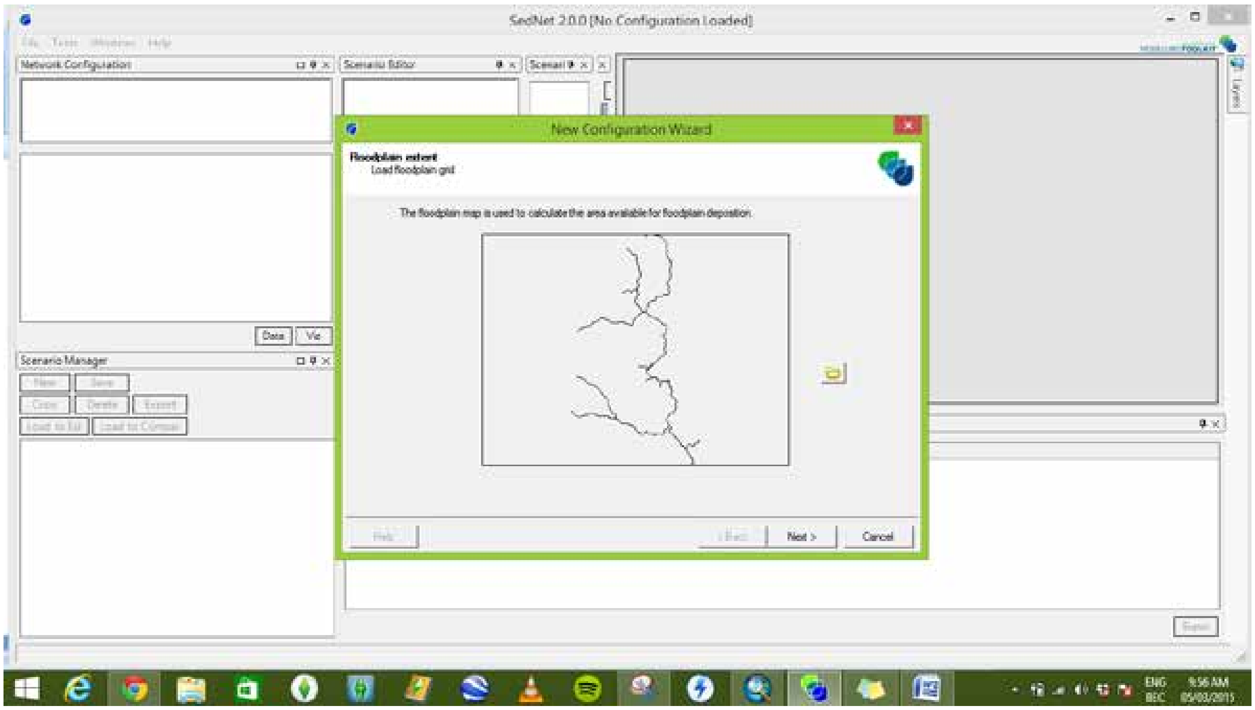
- SedNet will start defining the stream network



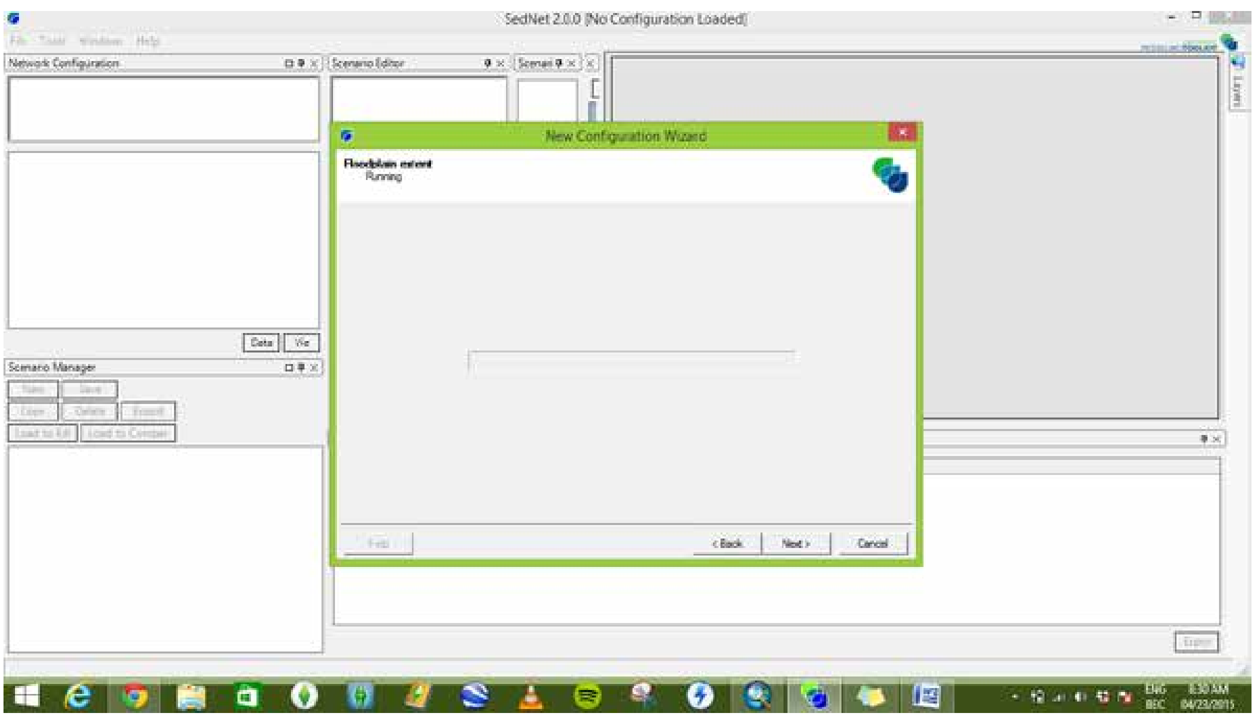
- When successfully run, the stream network and sub-catchments will be defined
- Click "Next"



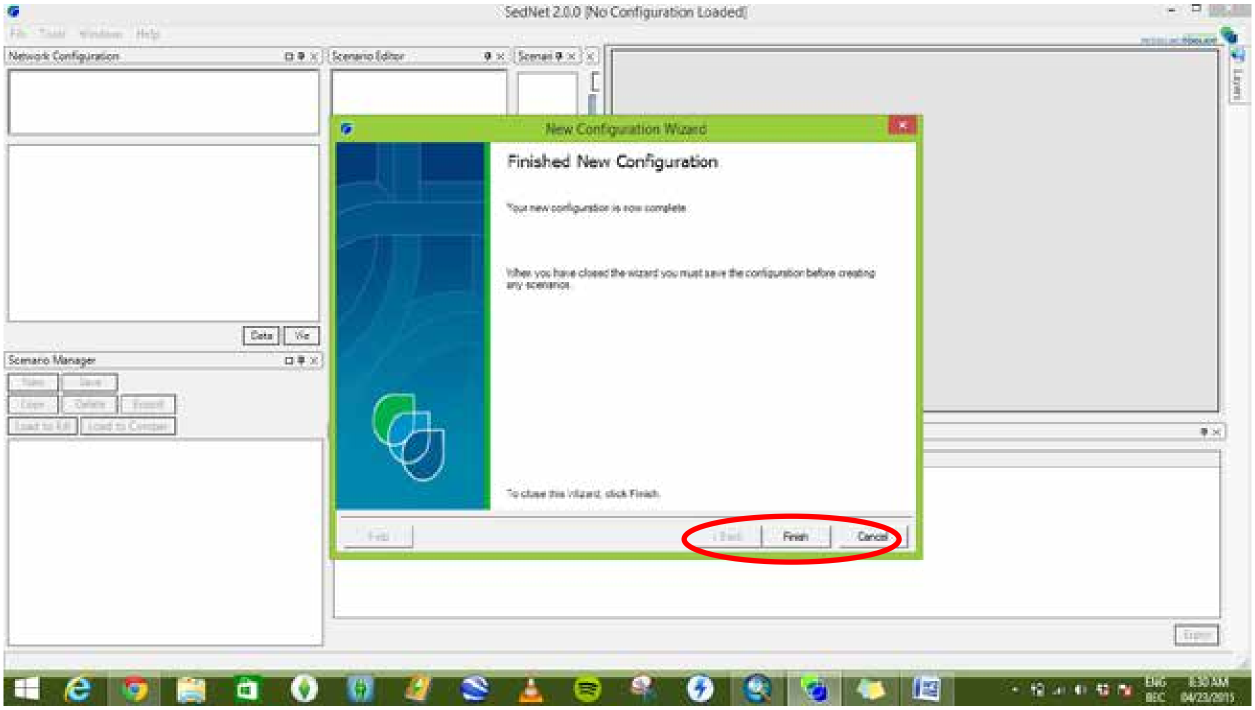
- The “Floodplain extent” pop-up window will appear. Load this file when available, otherwise click “Next”



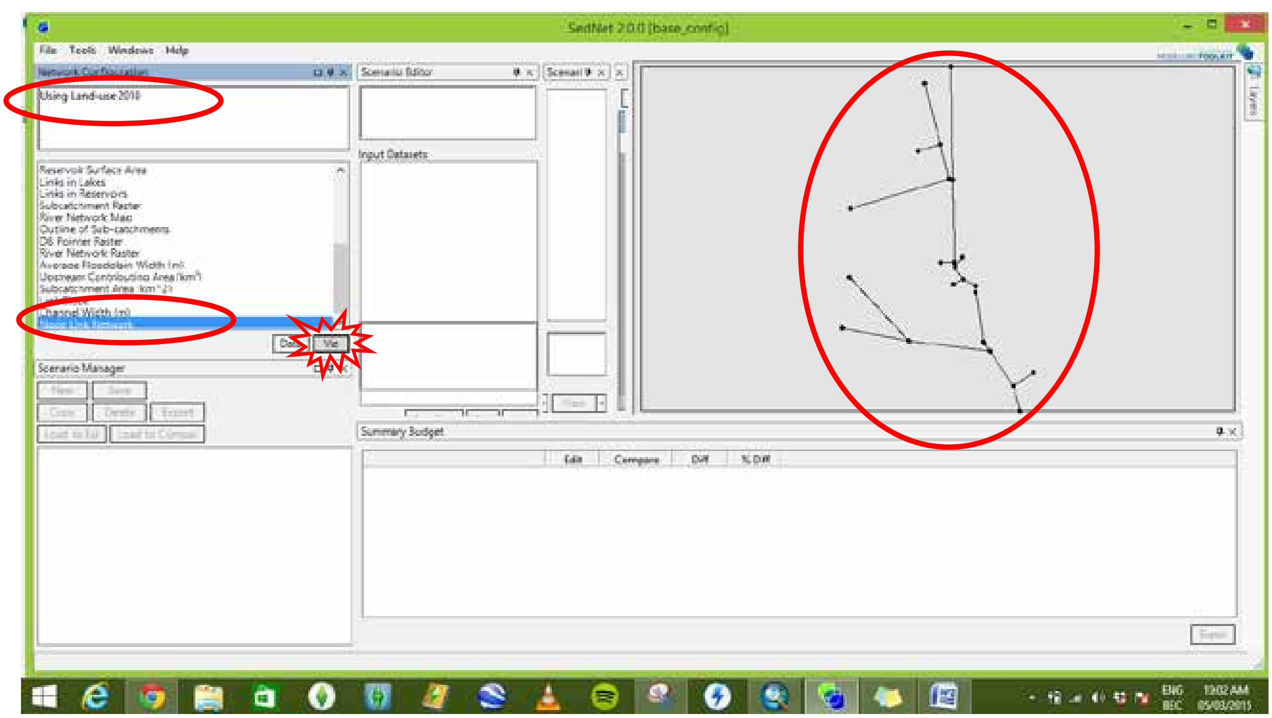
- Click “Next”



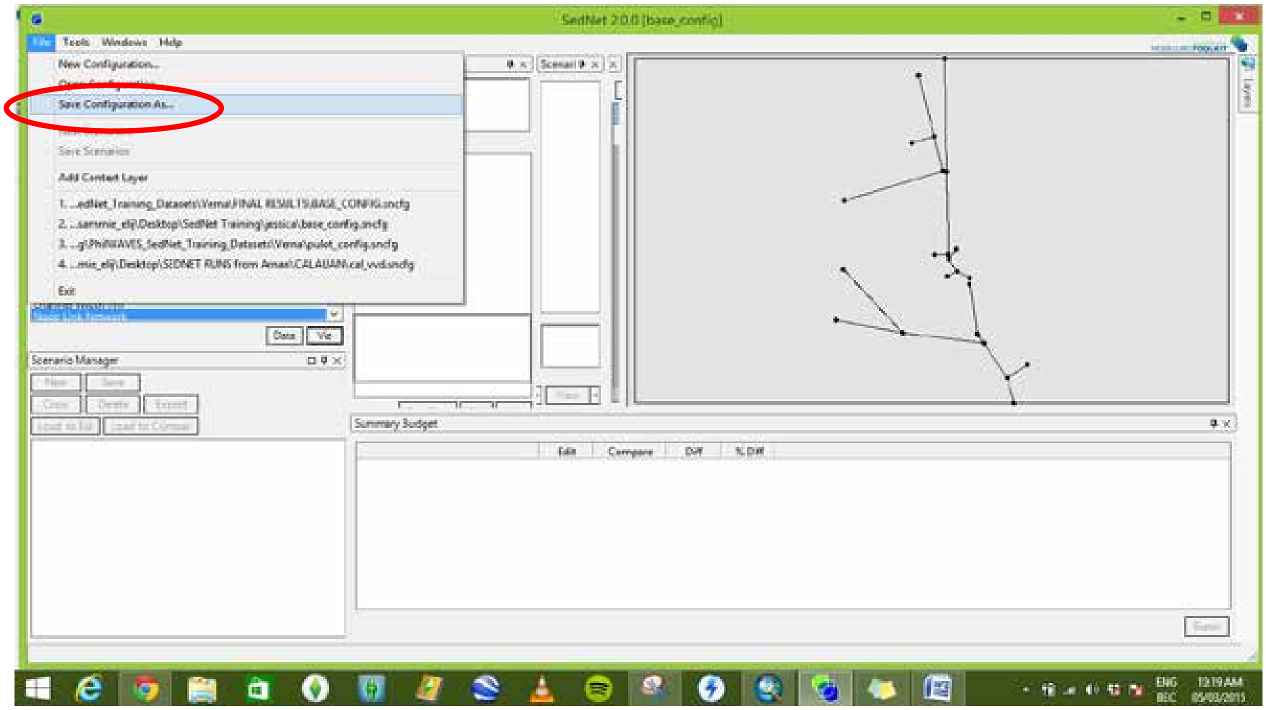
- Your new configuration is now finished running, click “Finish”.



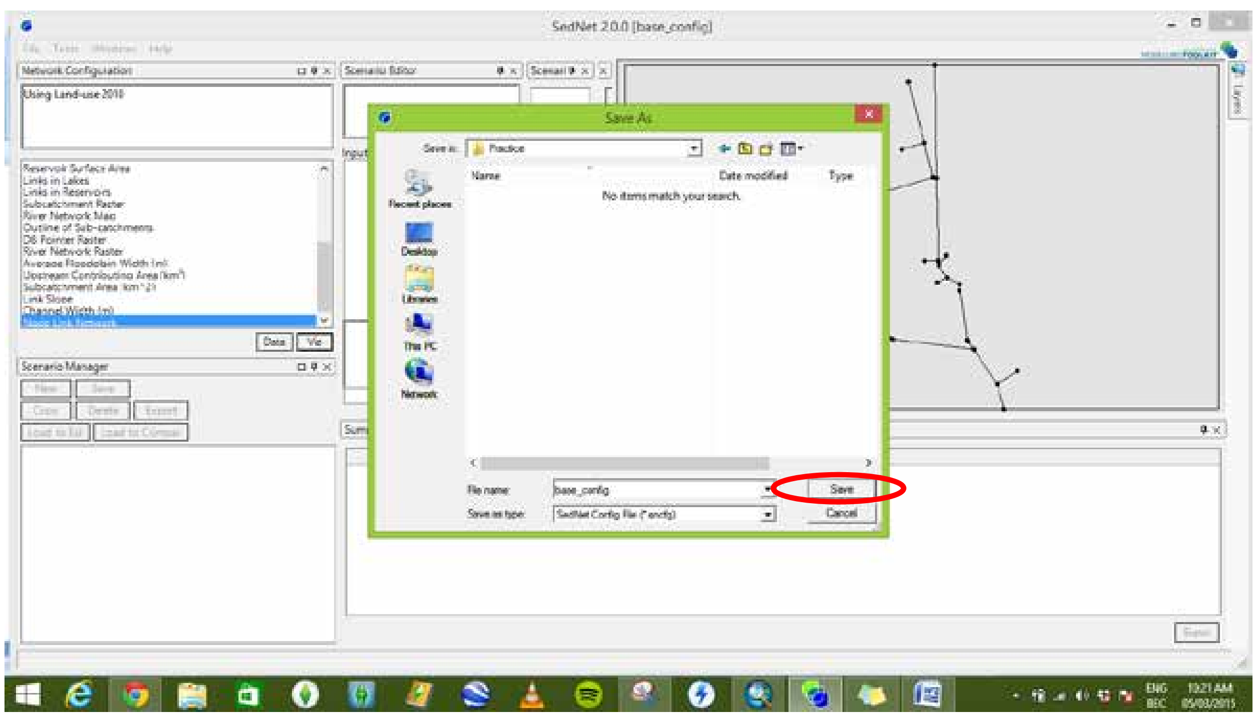
- The configuation window now shows the filename base_config, description: using land-use 2010.
- To check whether the river network is connected, click “Node Link Network” and click “View” icon.



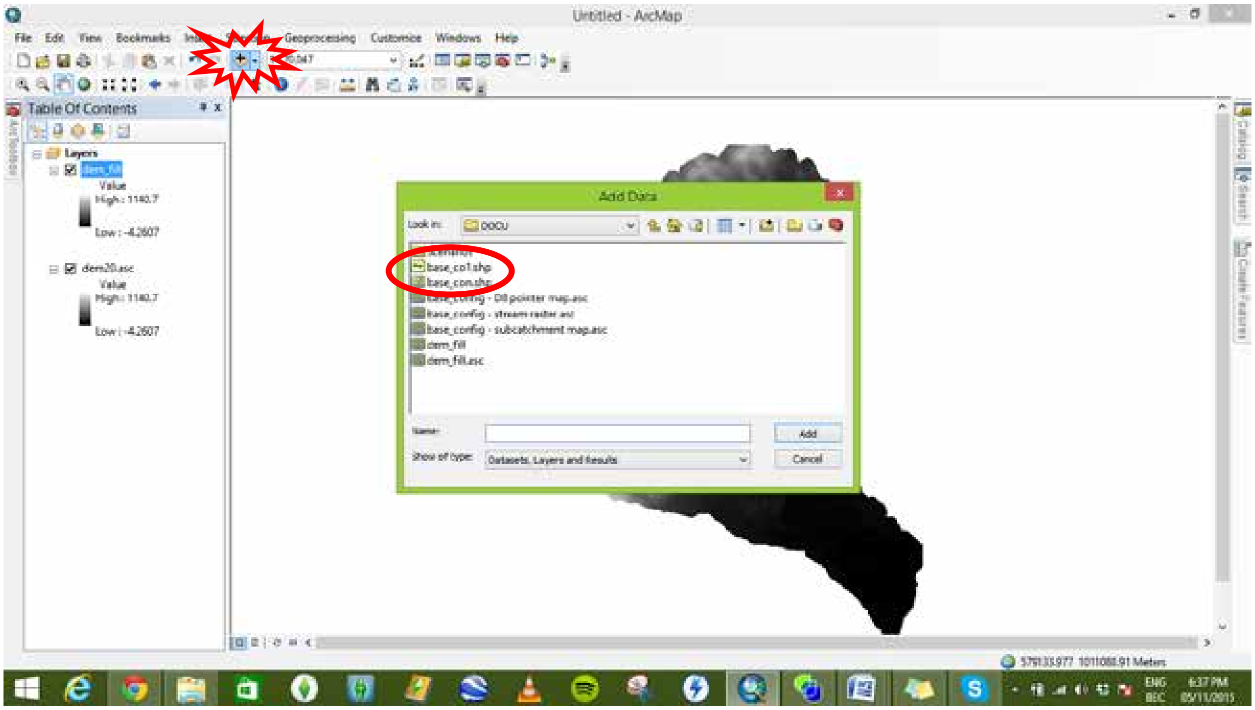
- Under “File”, click “Save Configuration As”



- Choose file destination, type in File name: e.g. base_config, then click “Save”.

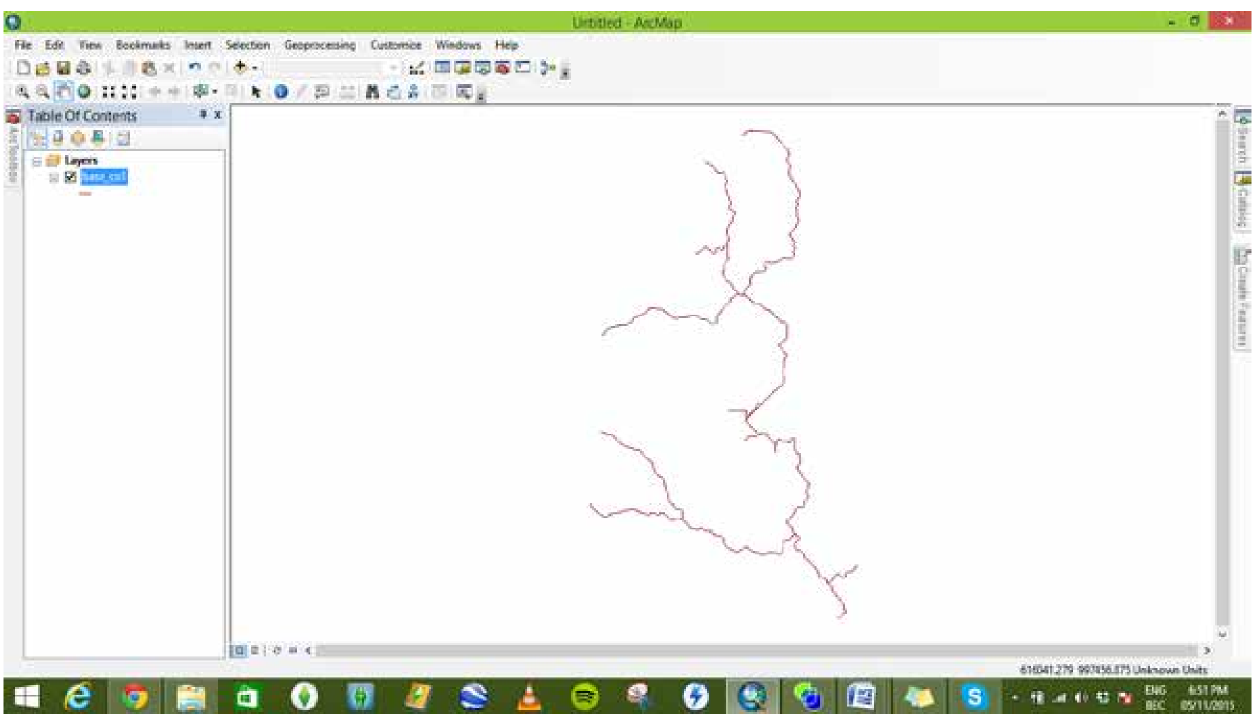


- Once saved, two output maps will be created in your working folder. One is the stream shapefile and the other is the subcatchment shapefile. You can check this by clicking “Add data” in your ArcMap.

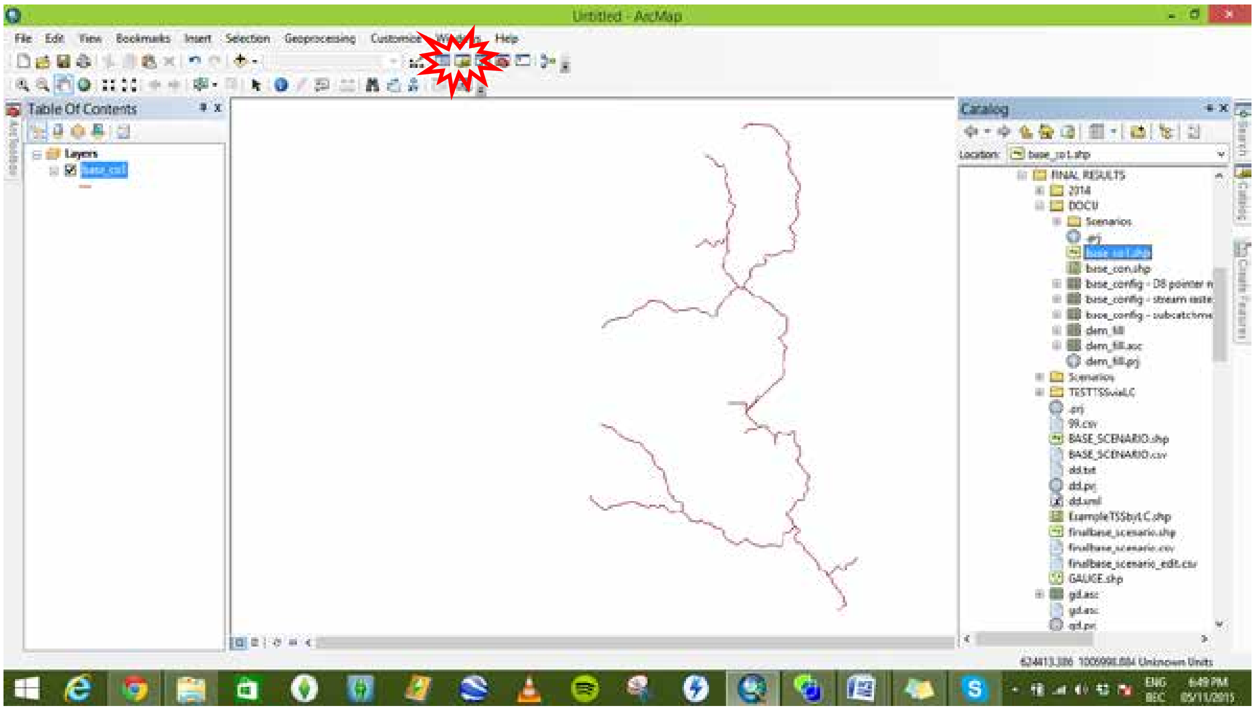


2.1.3. *Riparian Vegetation*

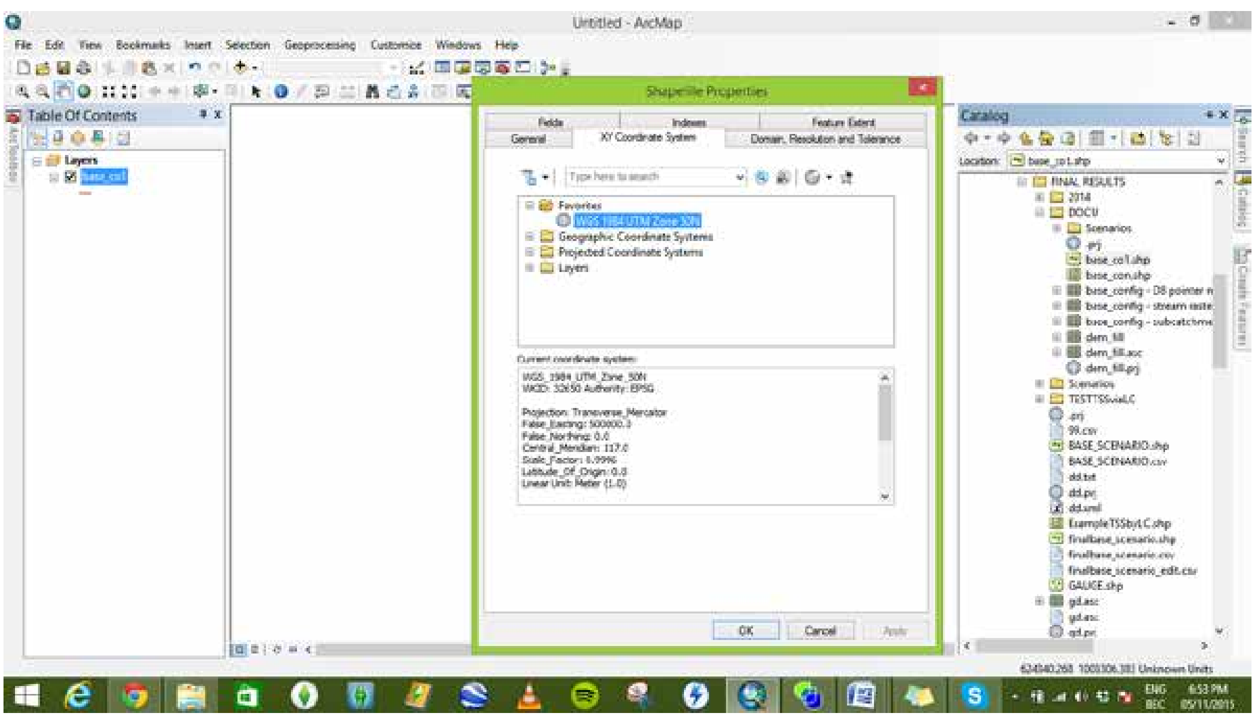
- Get the stream from your working folder



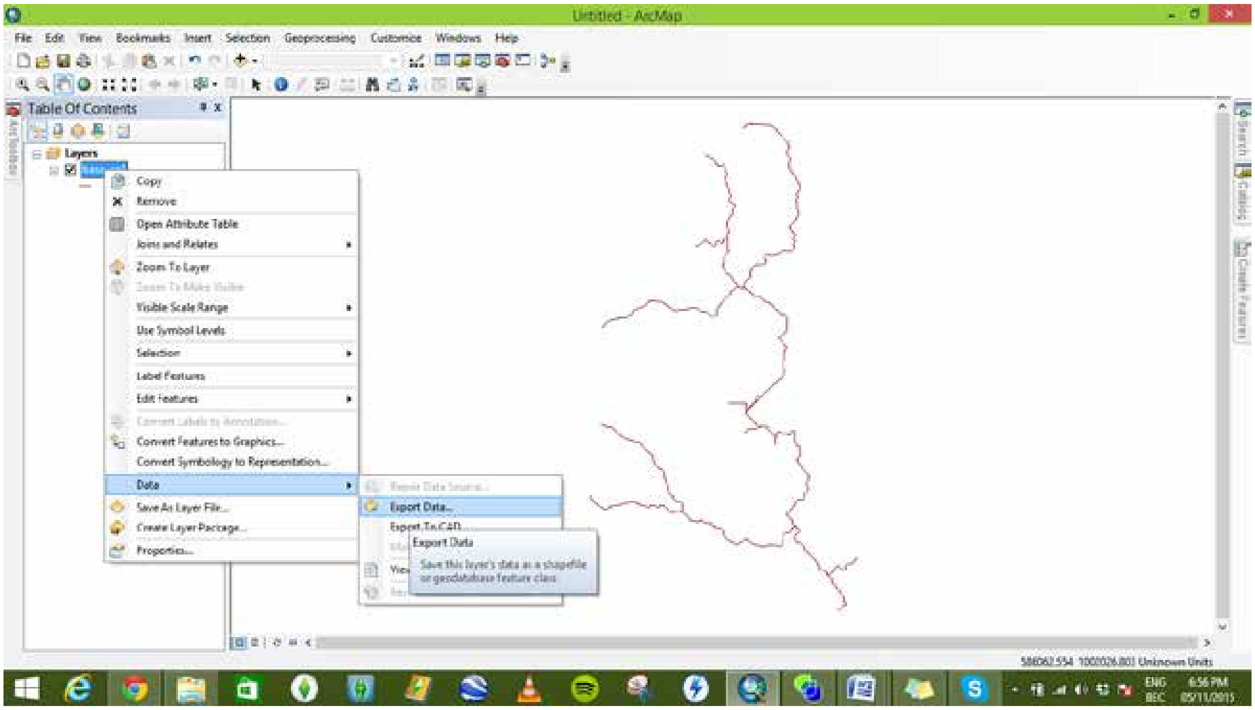
- Change the projection by going to “Catalog”, looking at your working folder search for the “stream” shapefile.



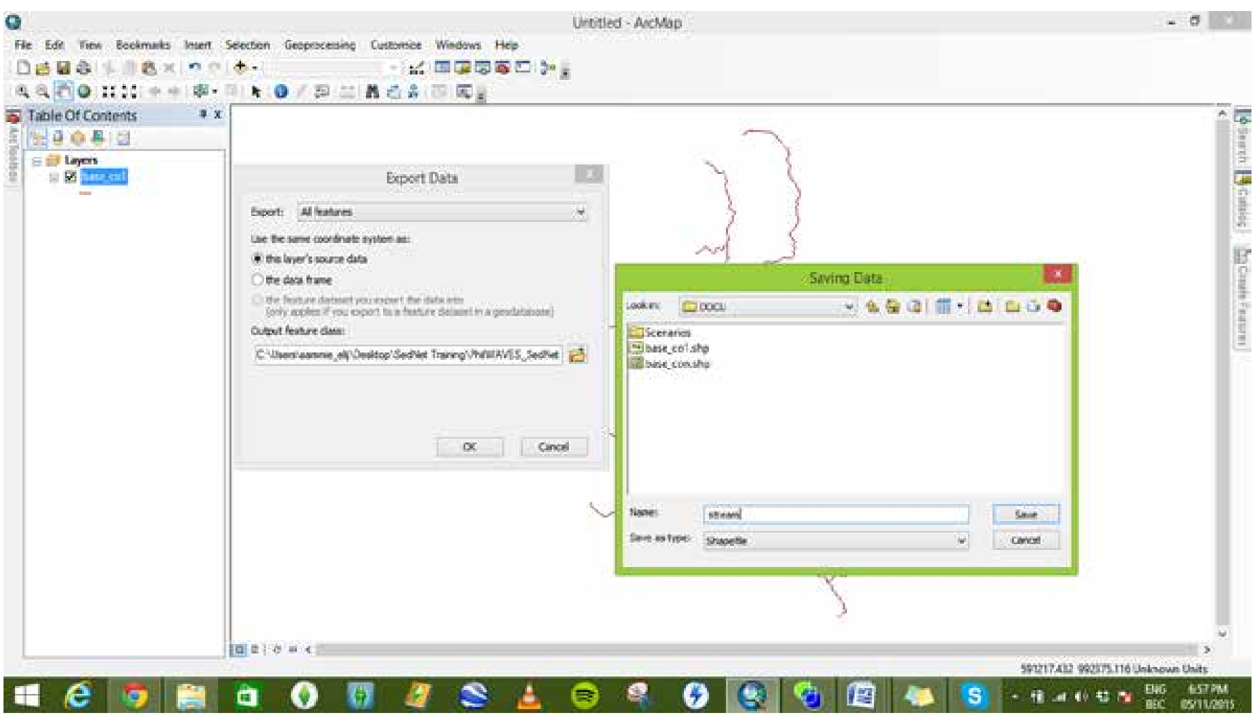
- Double click the “stream file”, the “Shapefile Properties” will be displayed. Change the projection to WGS 1984 UTM Zone 50N.



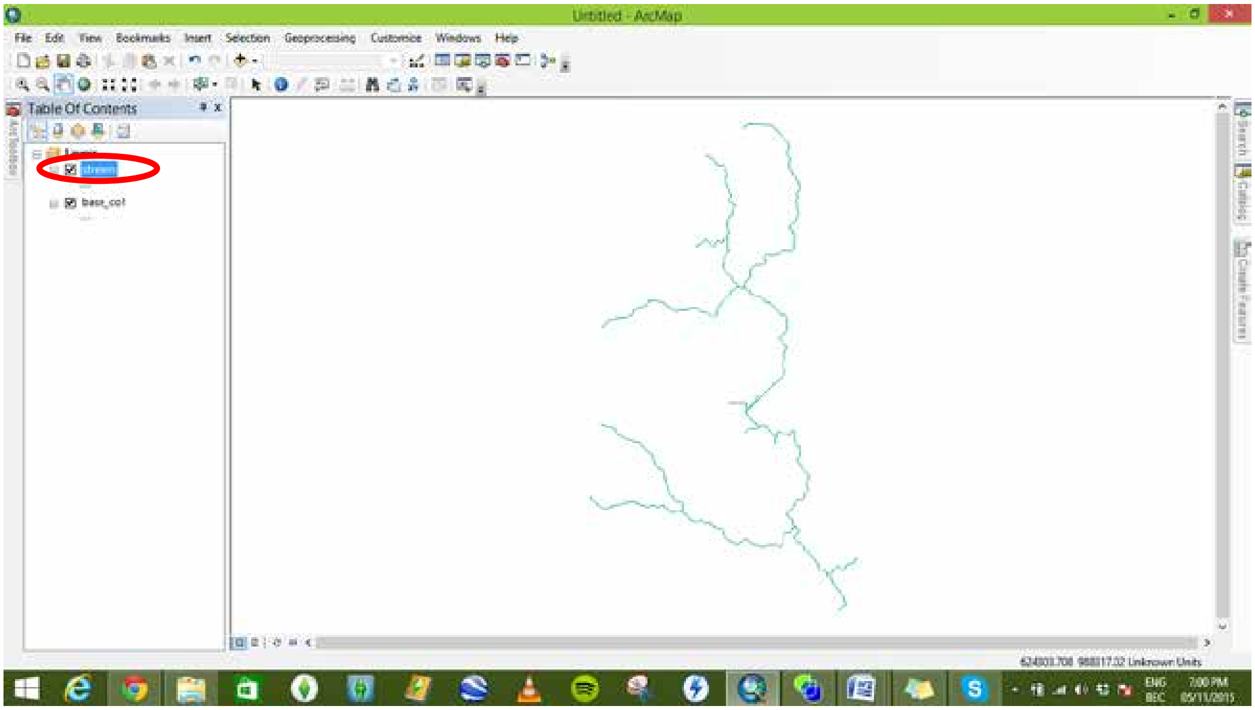
- Save the stream file by right clicking the file. Under “Data” click “Export Data”. This will prevent overwriting the original stream file.



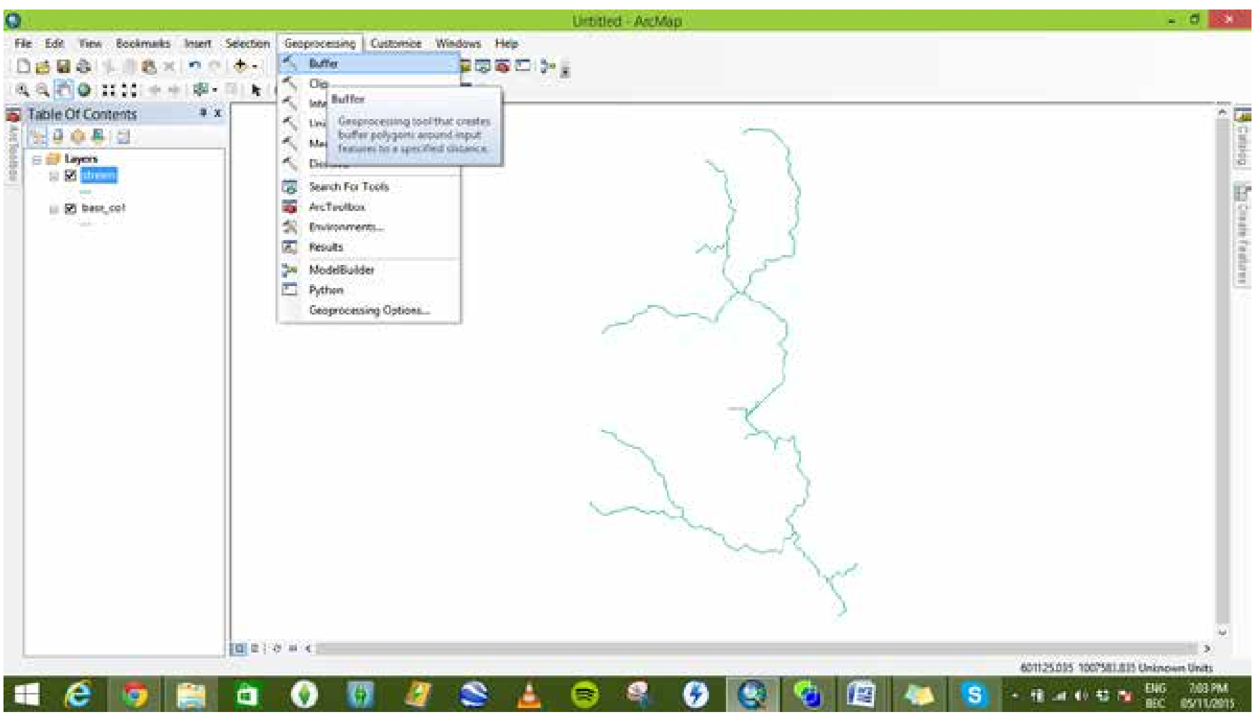
- Name the stream e.g. stream and save it to your working folder by clicking “Save” and “Ok”.



- Your new “stream” file will now be loaded in your ArcMap window.

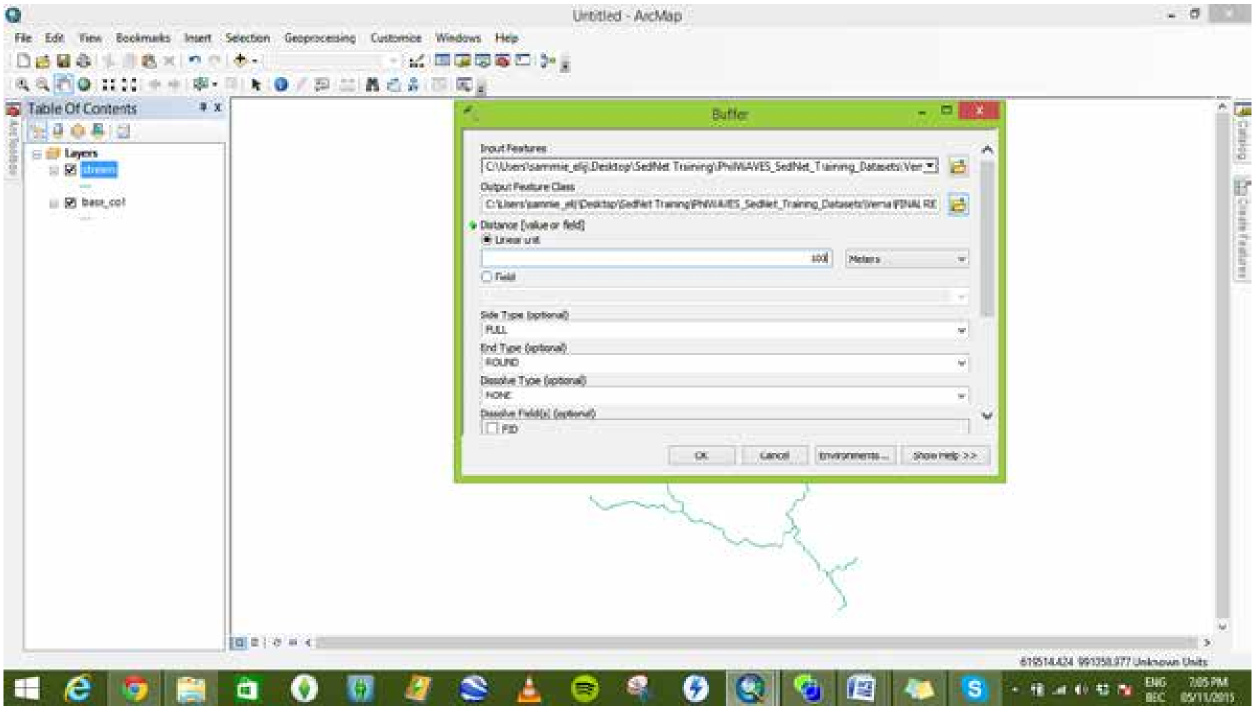


- Buffer stream by clicking “Buffer” under the “Geoprocessing” tool.

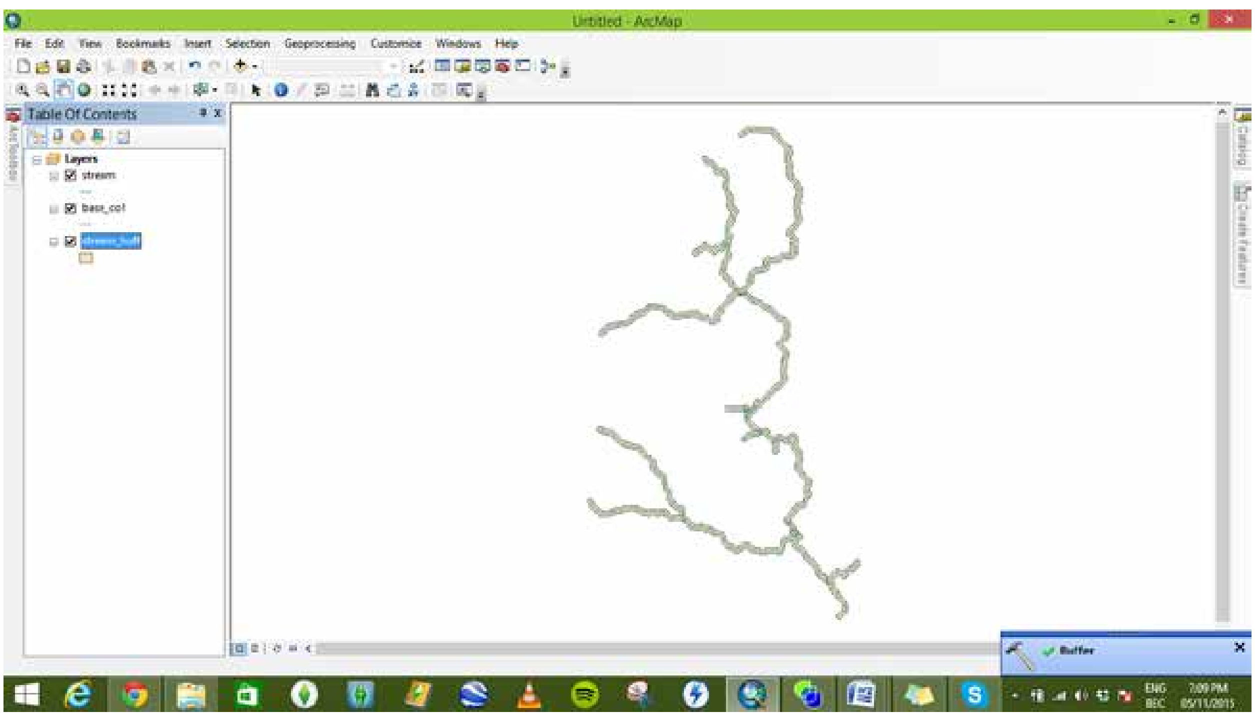


- Under the “Input Feature” in the Buffer pop-up, click the folder icon to choose your “stream” file.
- Assign the name of the “Output Feature Class” e.g. buff_stream.

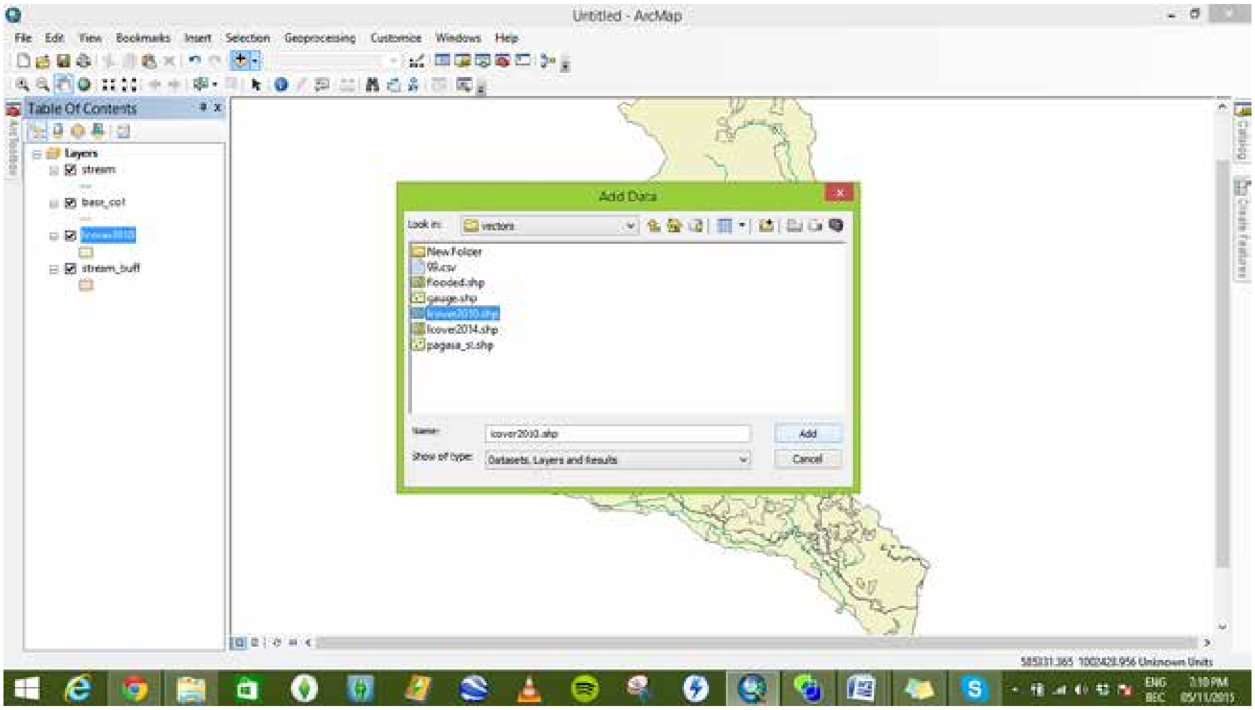
- Under the “linear unit” input 100, all the rest of the parameters stay constant, then click “OK”.



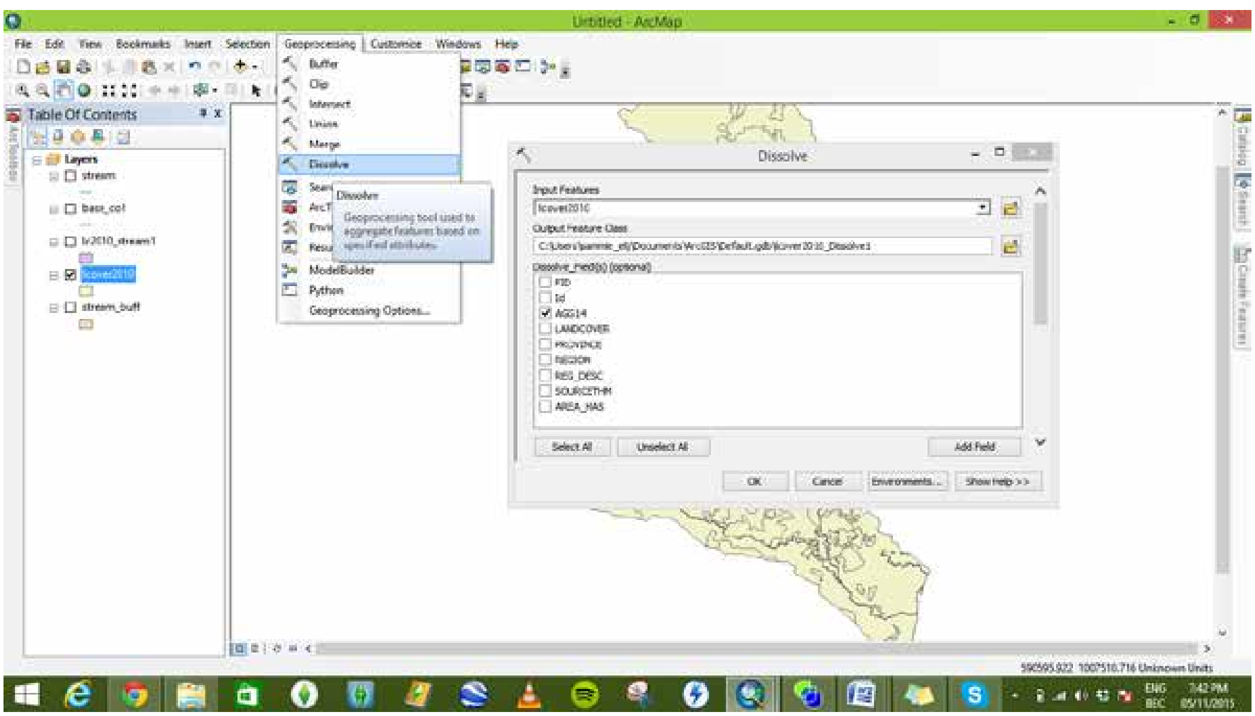
- This will be the result of the Buffer Operation



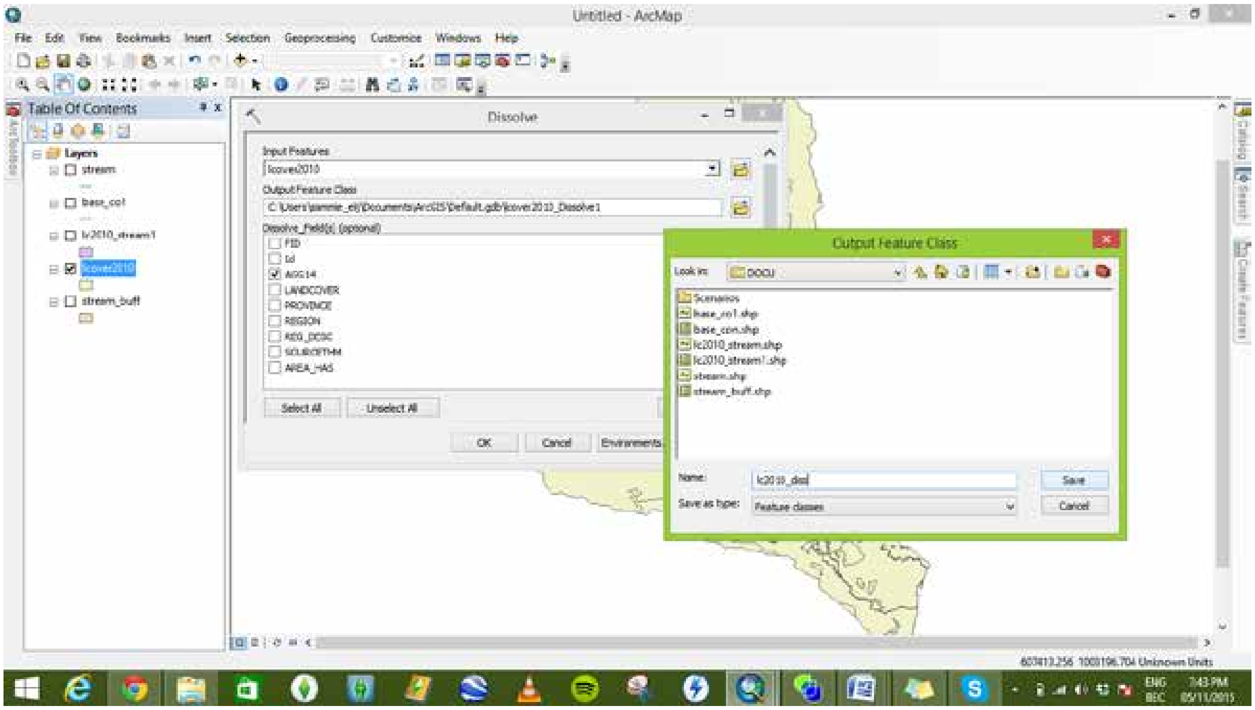
- Add data of the Land cover 2010 (lccover2010) located in the vector folder.



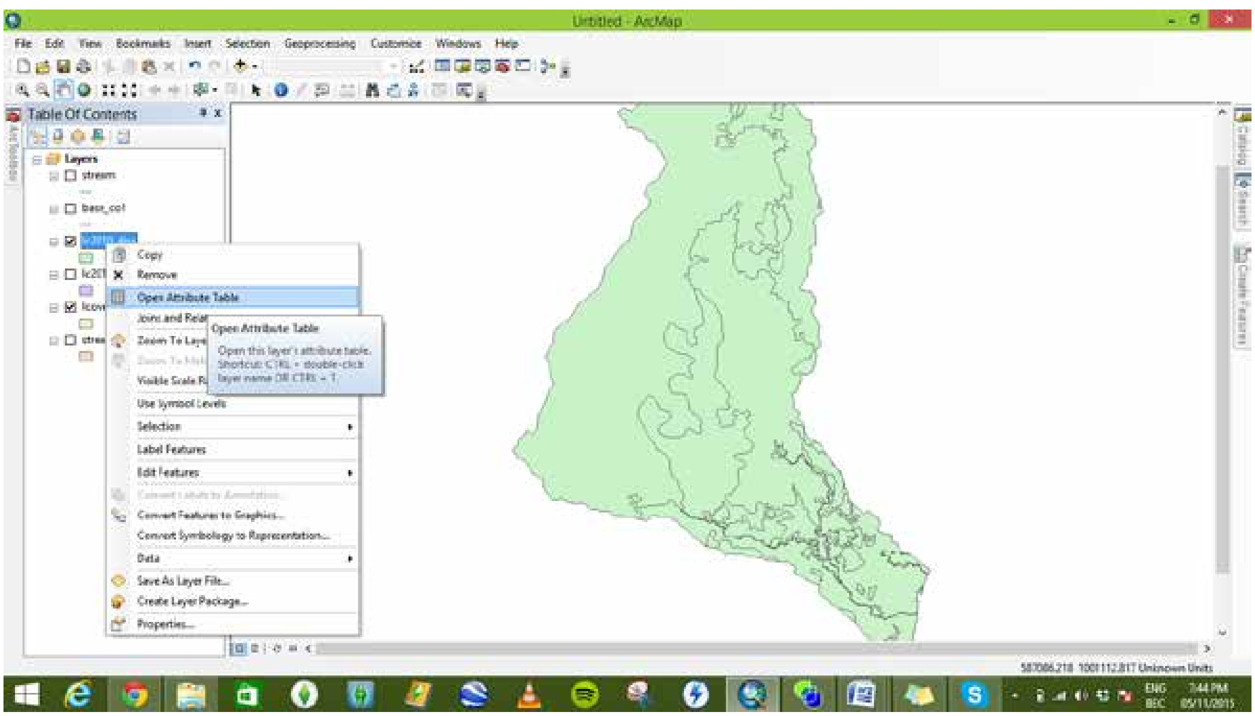
- Using “Dissolve” under the Geoprocessing tool, limit the information of the “lcover2010” to only ACG14 representing the different classes of land cover.



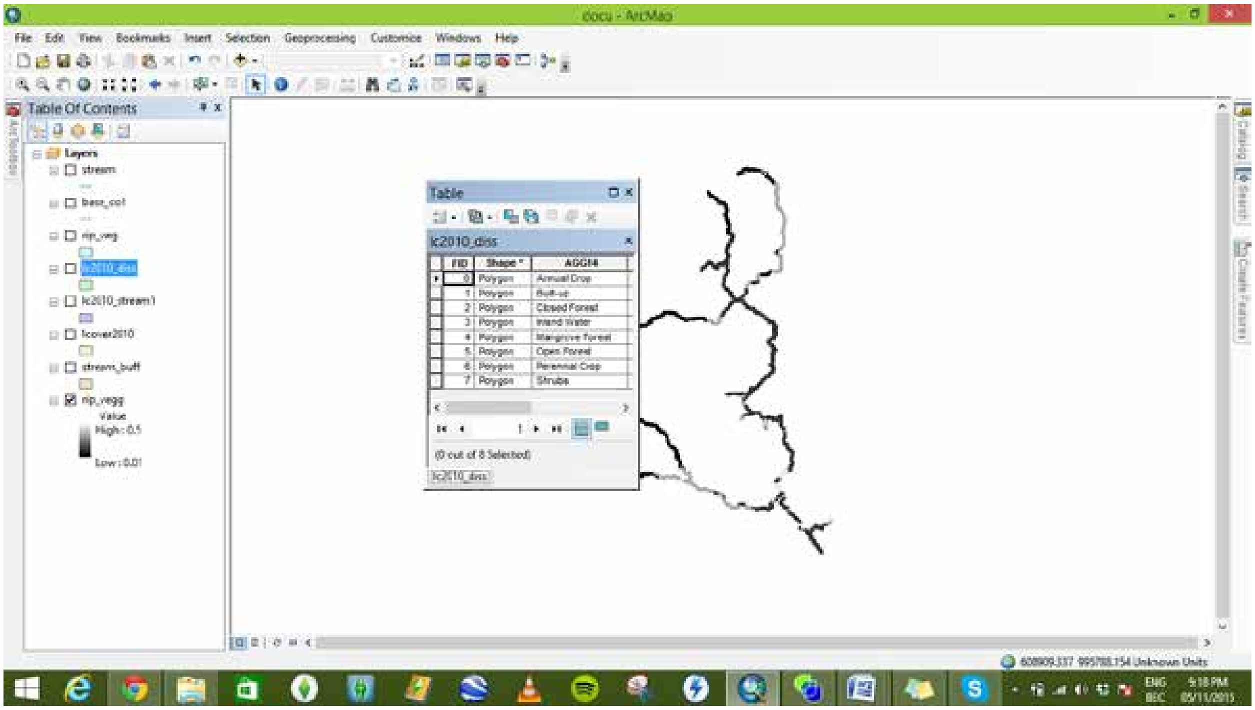
- Save the file as lc2010_diss.



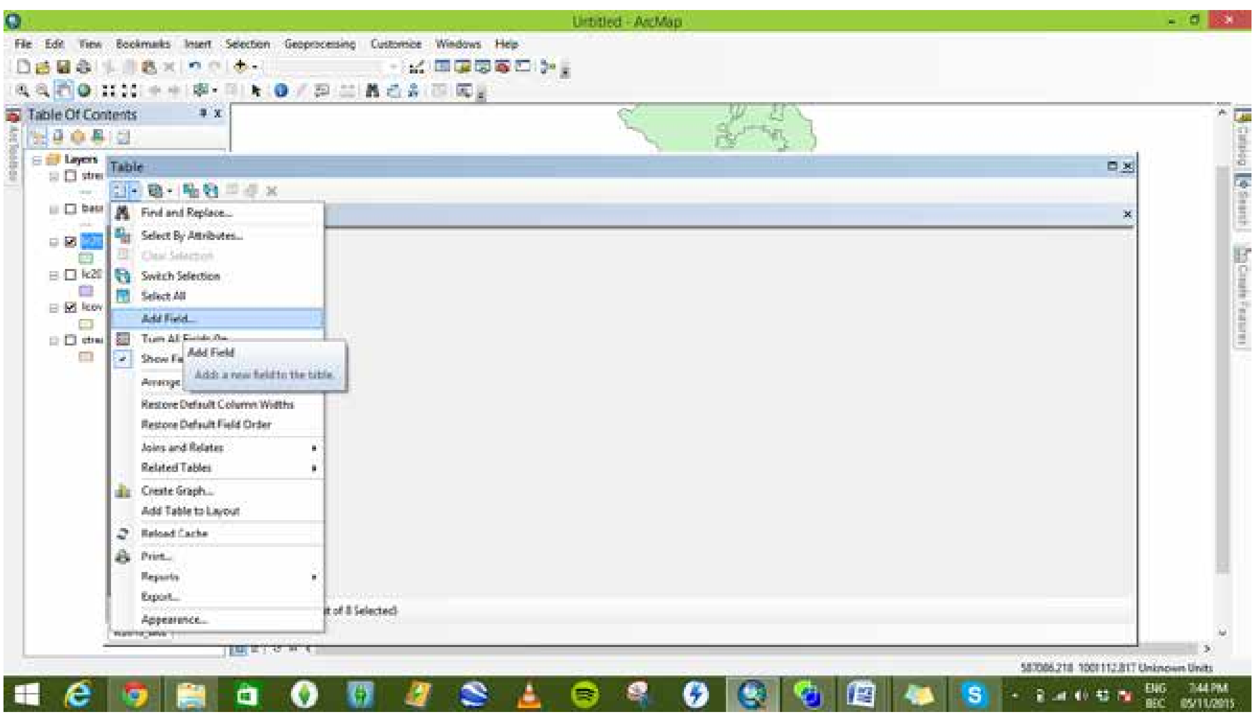
- Right click the newly saved file and "Open Attribute Table".



- Examine the attribute table.

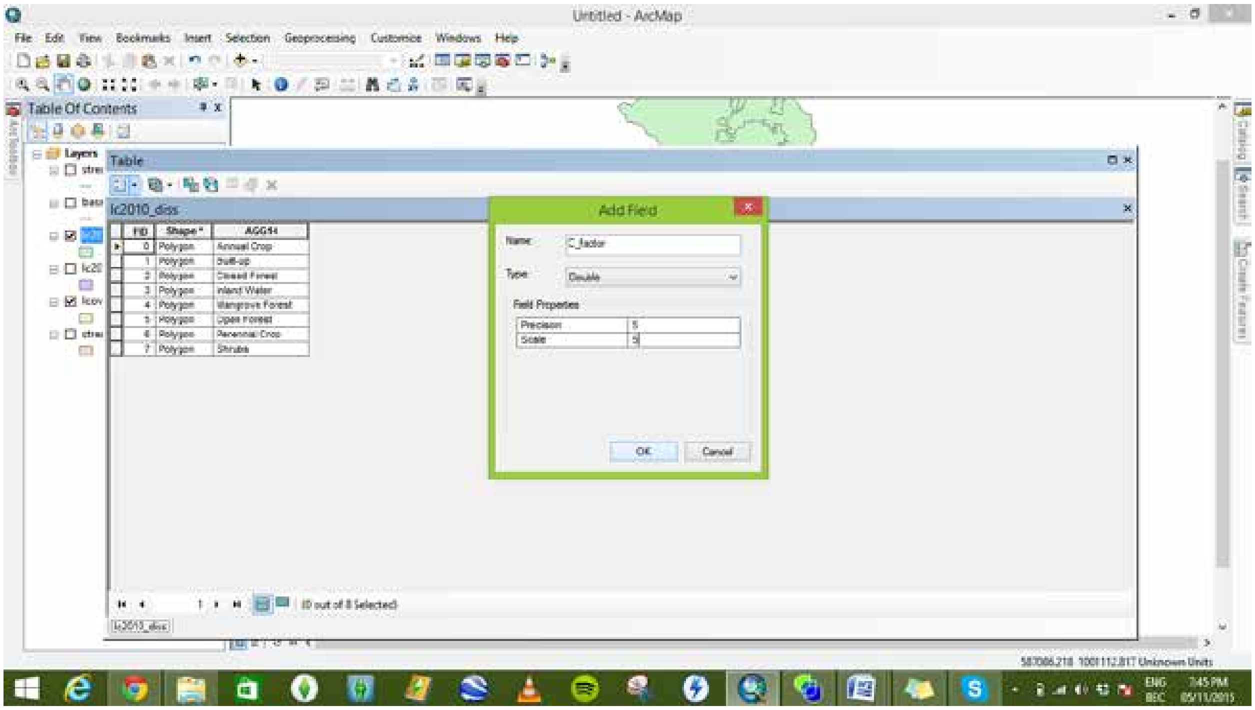


- Right click the “lc2010_diss” and “Add Field”.



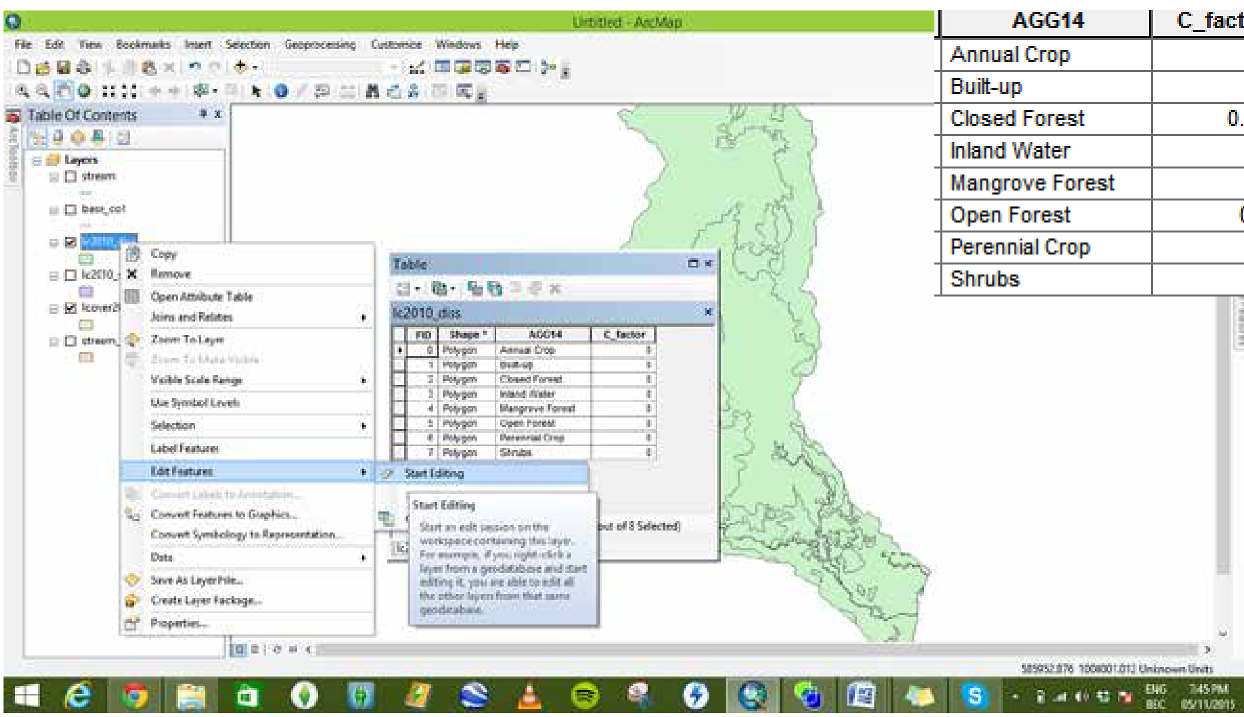
- Right click the “lc2010_diss” and “Add Field”.

- In the pop-up window, name the field “C_factor”. Select “Double” in the Type and input 5 for both “Precision” and Scale”.

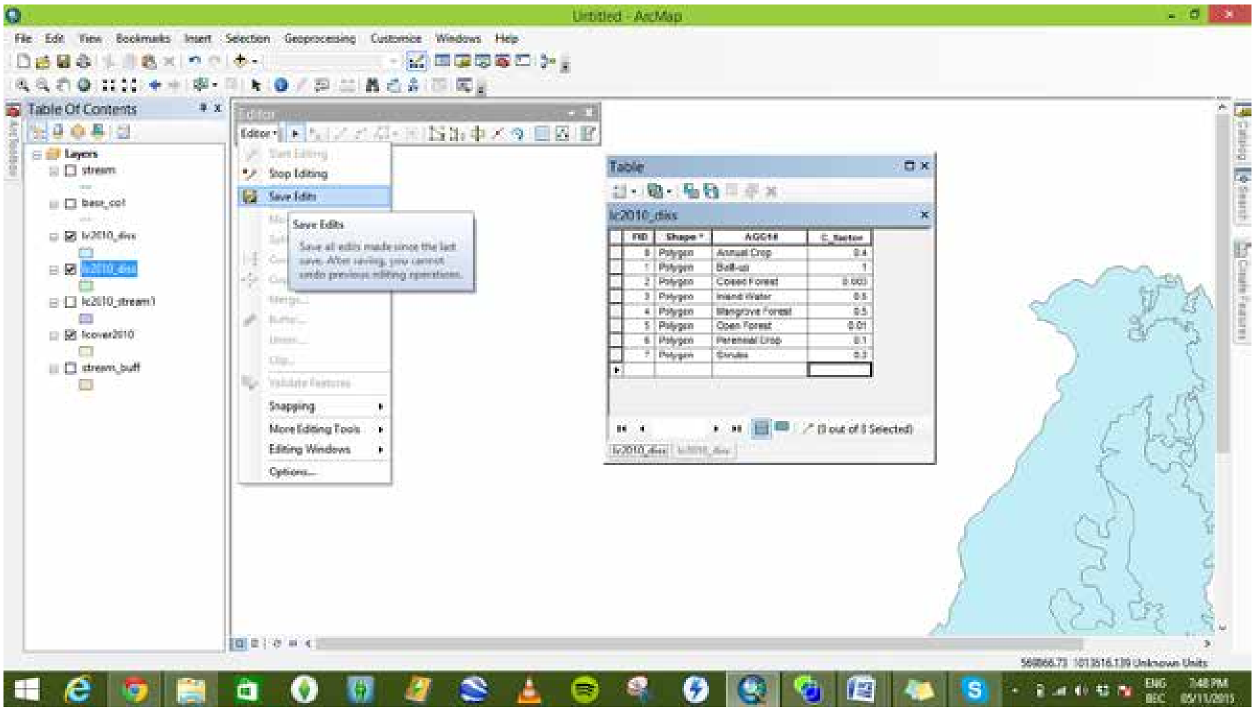


- Right click the file again then press “Edit Feature” then “Start Editing”. Start inputting the equivalent C_factor for each land cover.

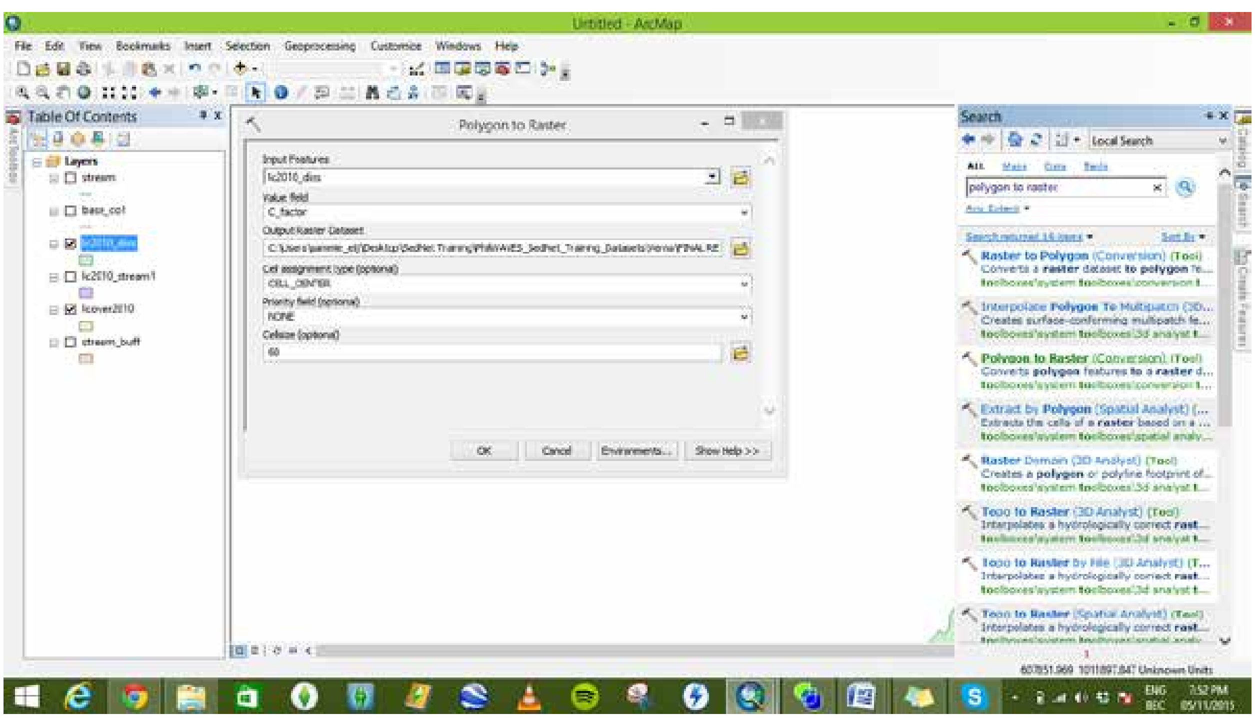
AGG14	C_factor
Annual Crop	0.4
Built-up	1
Closed Forest	0.003
Inland Water	0.5
Mangrove Forest	0.5
Open Forest	0.01
Perennial Crop	0.1
Shrubs	0.3



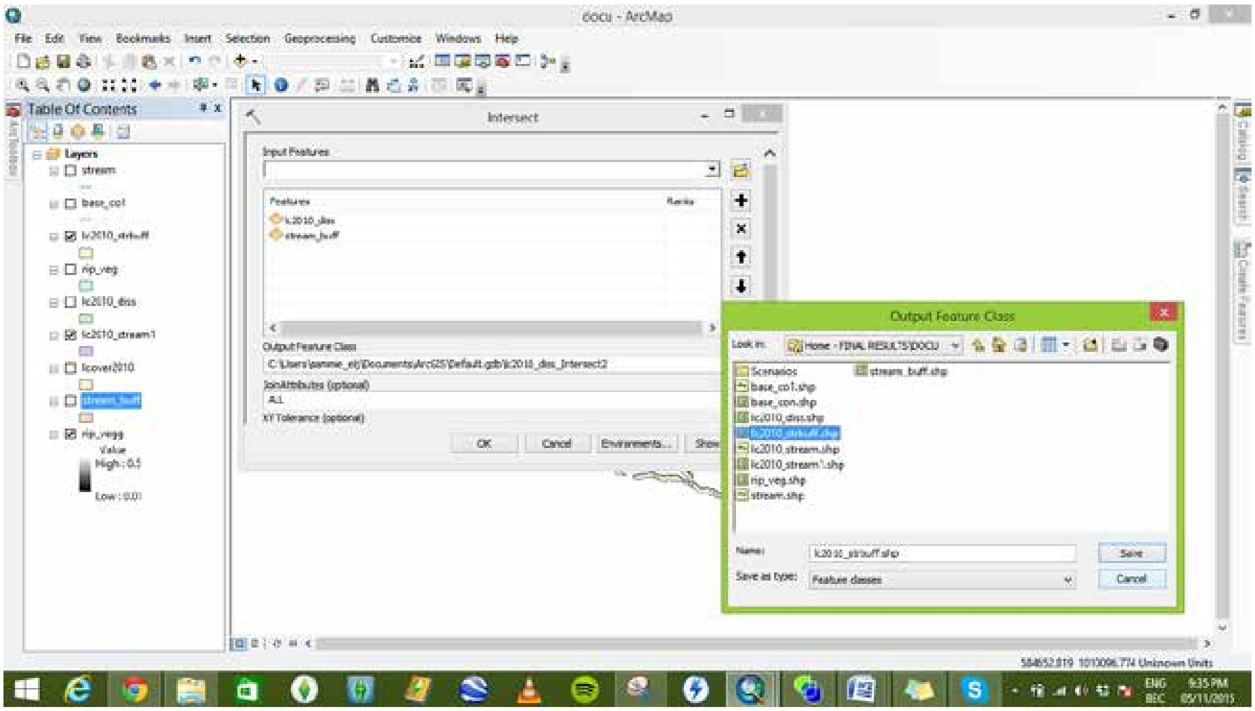
- In the “Editor” tools, “Save Edits” then “Stop Editing”.



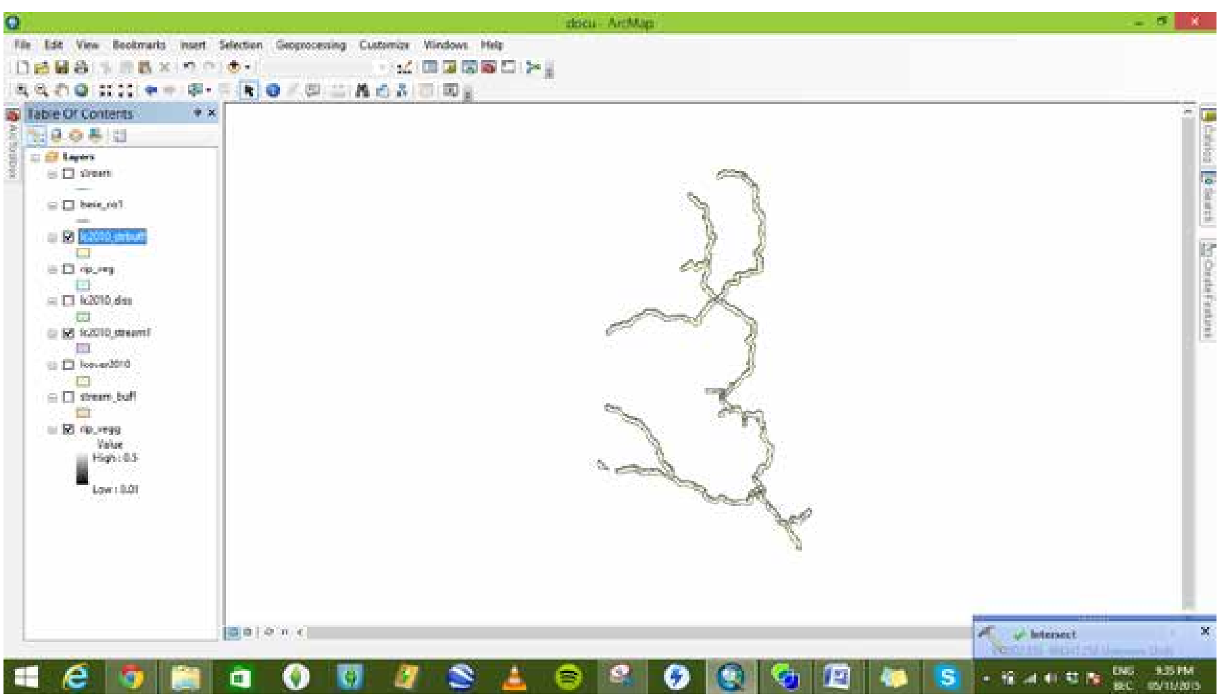
- Convert the shapefile to raster by using “Polygon to raster” using C factor as the “Value Field”.
- Save file as “lc2010_cfact” under your woking folder. Change the cellsize to 60 for uniformity and click “OK”.



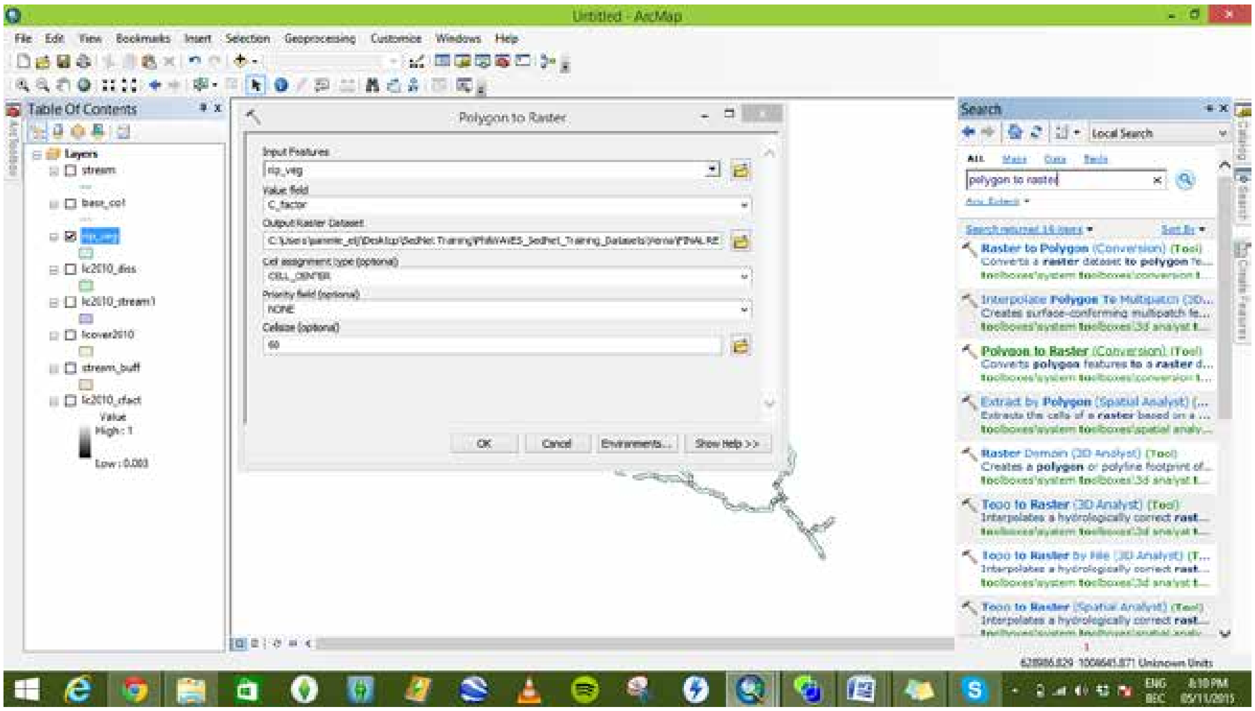
- Using “Intersect” in the Geoprocessing tool, intersect the “lc2010_diss” with the buffered stream “stream_buff”. Save the file as “lc2010_strbuff”, then press “OK”.



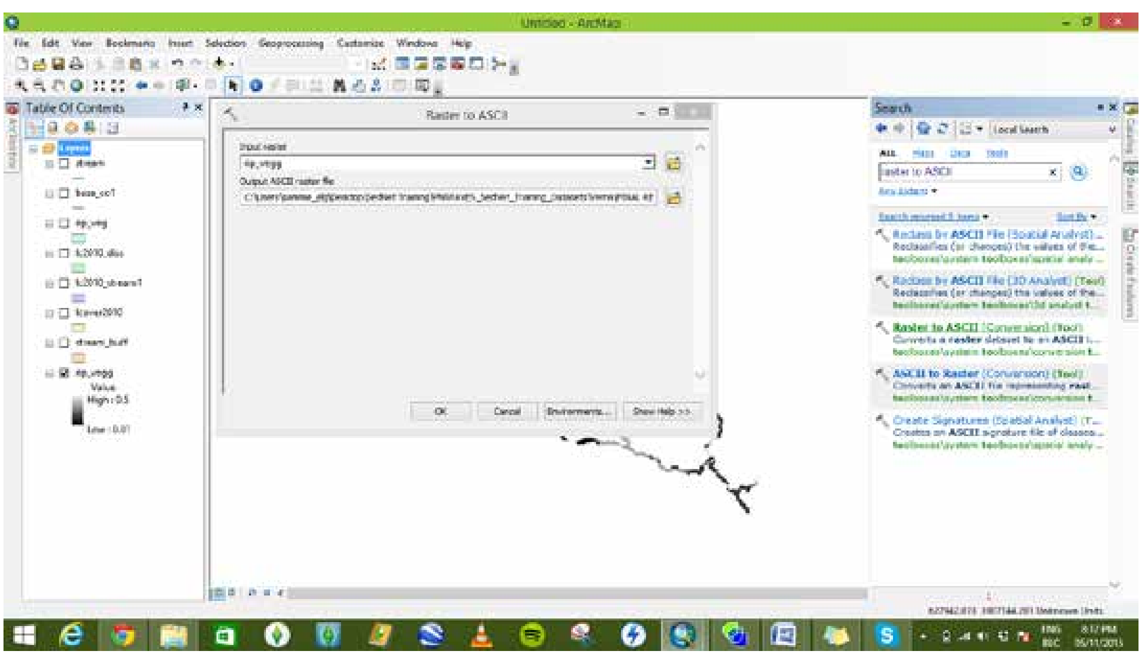
- The result of “lc2010_strbuff”.



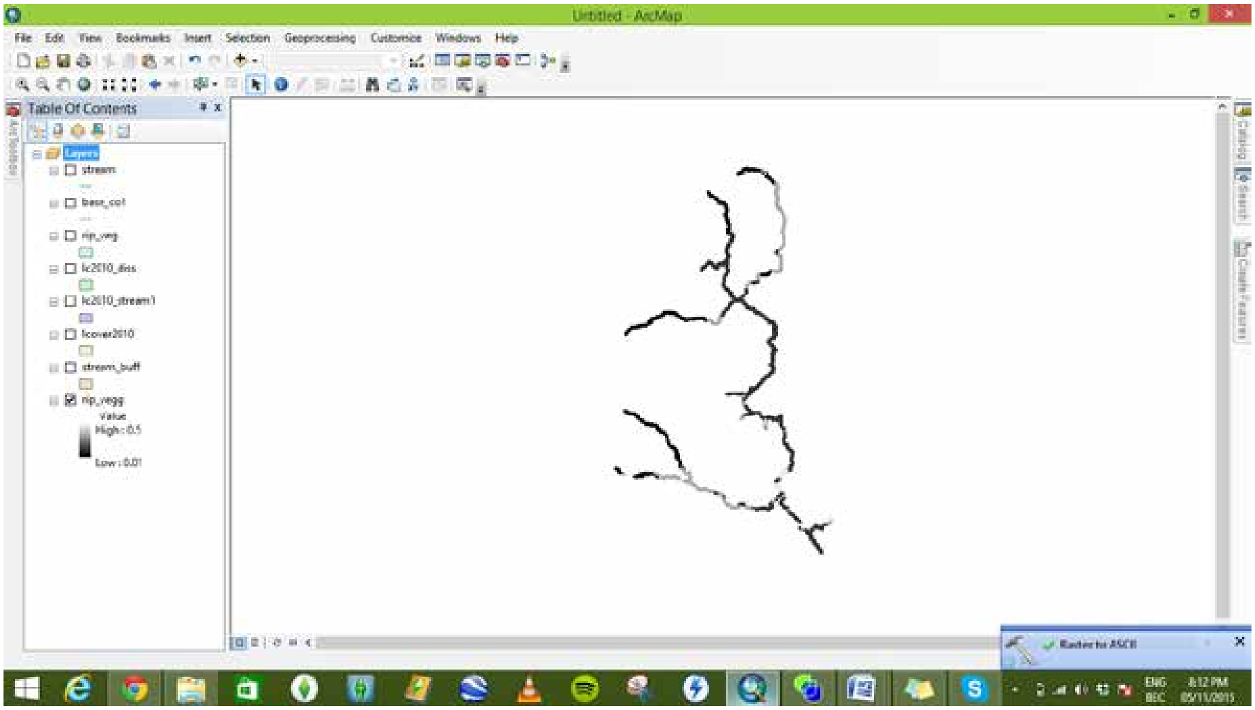
- Convert the file “lc2010_strbuff” from “Polygon to Raster Conversion)” using “Search”.
- Type in rip_vegg in the “Input Feature”. Choose “C_factor” as “Value Field”.
- Save the file as rip_vegg and change the cellsize to 60 for uniformity.
- Click “OK”.



- Convert the rip_vegg from “Raster to ASCII (Conversion)” using “Search”. Make sure to remove the “*.TXT”. The file should only contain the “*.asc” e.g. “rip_vegg.asc.”

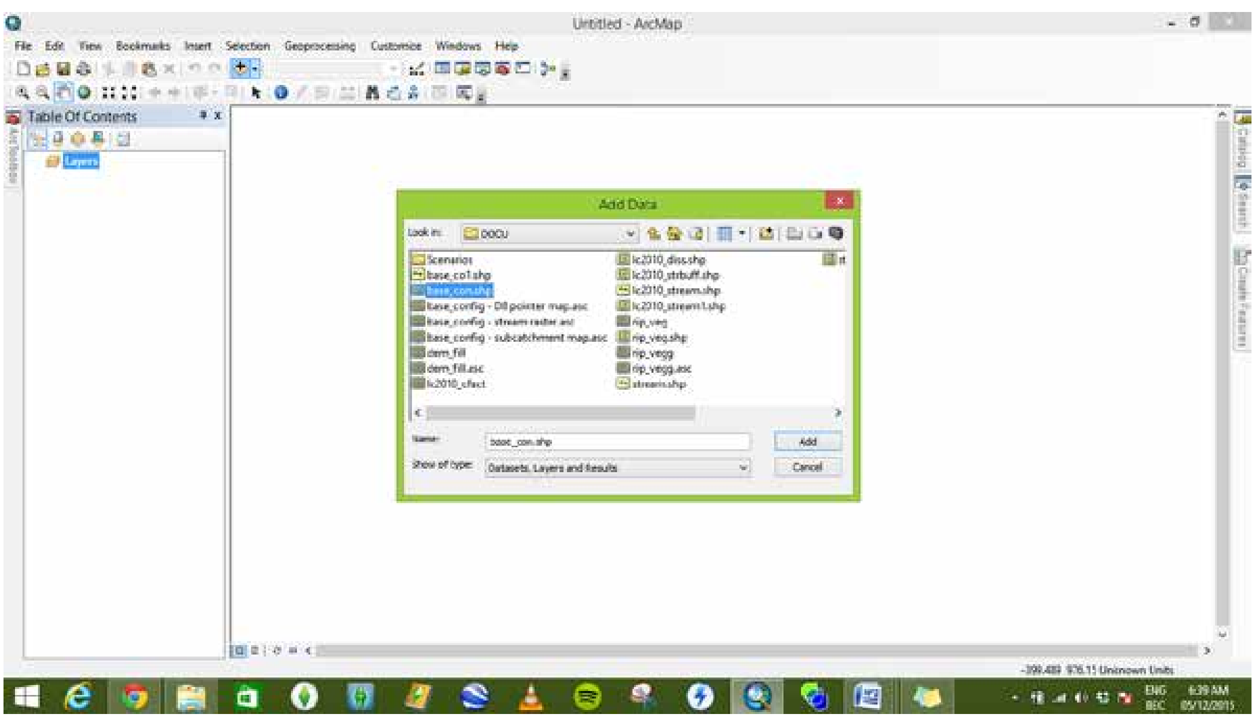


- The final riparian vegetation file “rip_vegg.asc” ready for input to SedNet

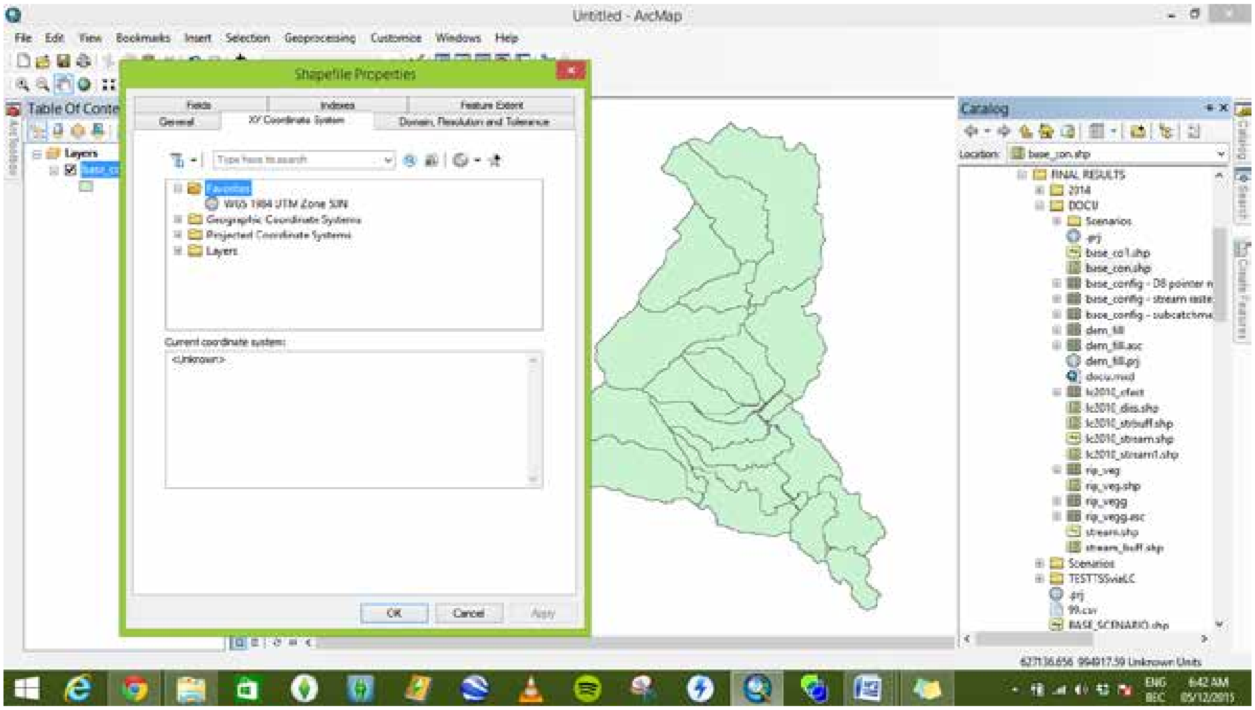


2.1.4. Gully Density

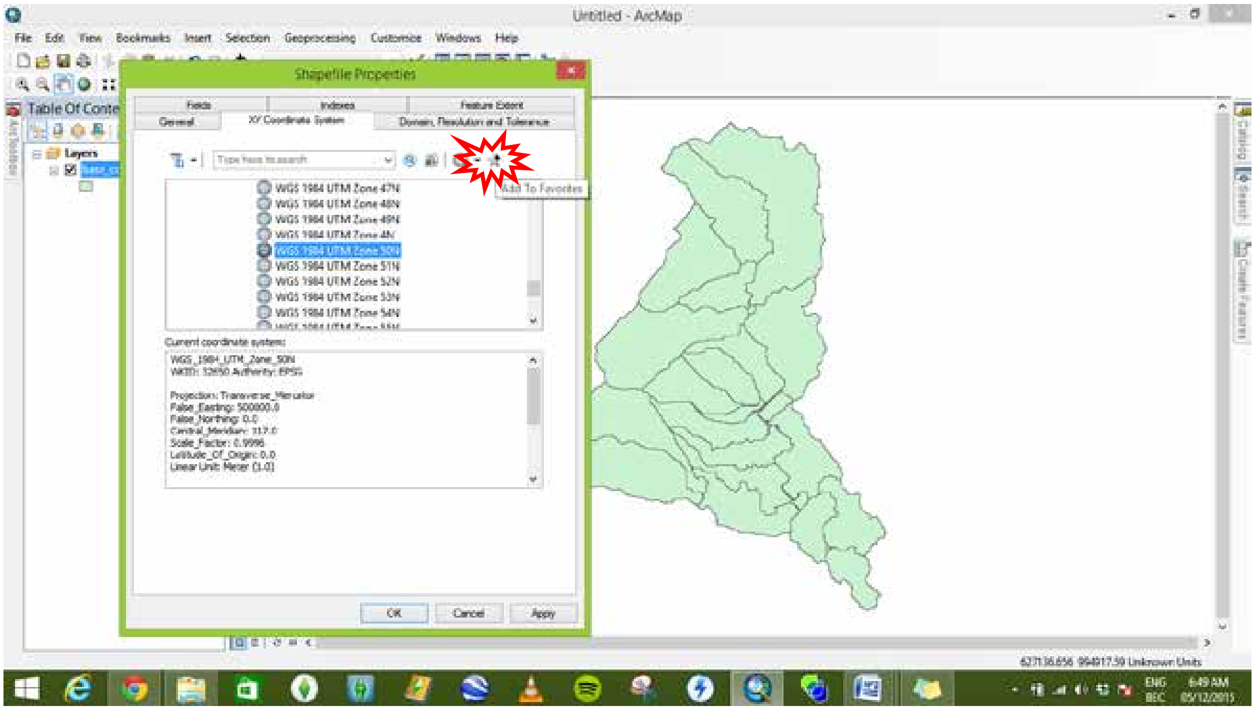
- Get the subcatchment shapefile from your working folder, e.g. “base_con.shp”. This is the file that was generated when you first saved your first base configuration in SedNet.



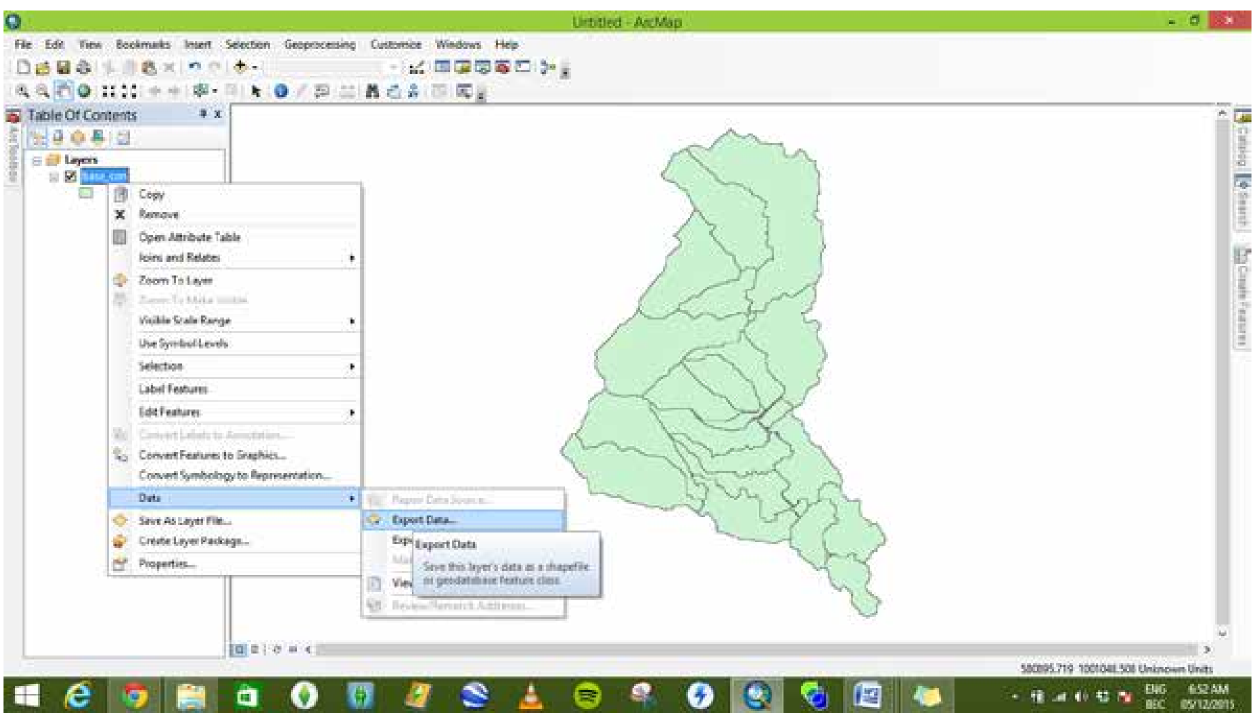
- Change the projection by going to “Catalog”, looking at your working folder search for the “base_con.shp” shapefile. Double click the file and the “Shapefile Properties” will pop-up.



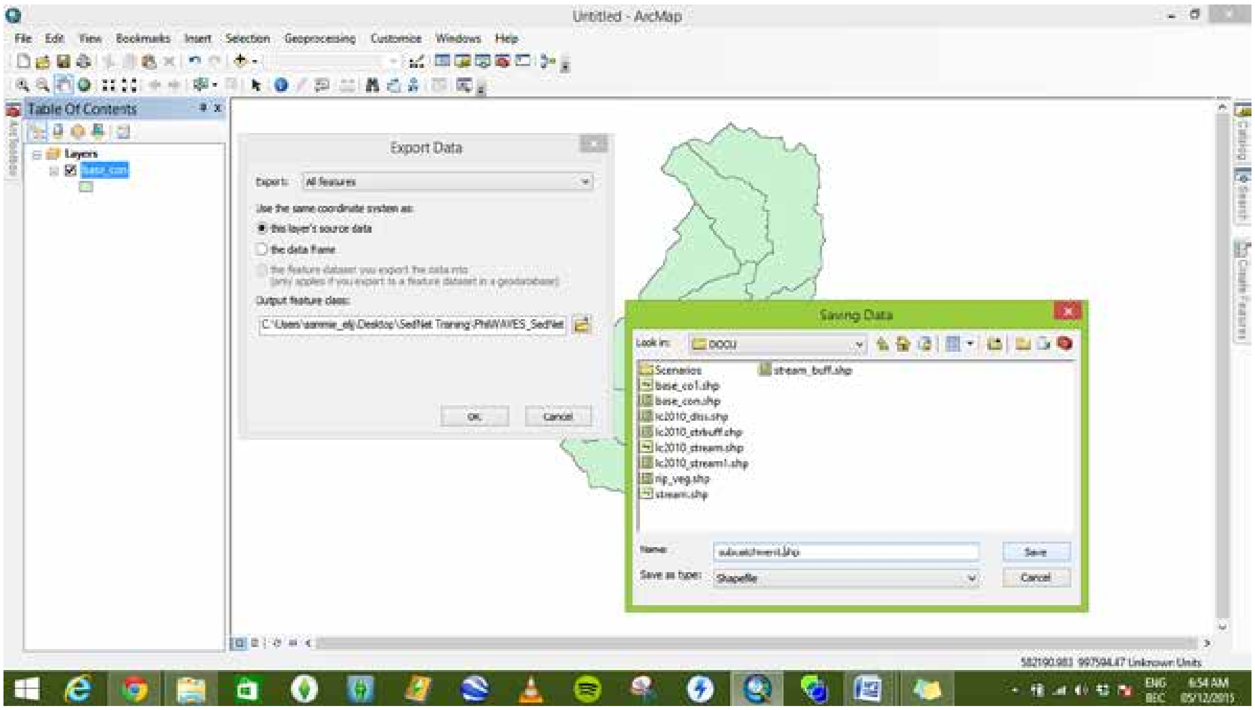
- Change the projection to WGS 1984 UTM Zone 50N. This can be found under the “Projected Coordinate System”, Folder: “UTM”, Folder: “WGS”, Folder: “Northern Hemisphere” and search for WGS 1984 UTM Zone 50N.
- By clicking the “Star” button, you can add this projection as a favorite and will easily appear as a choice of projection.
- Click “Ok”.



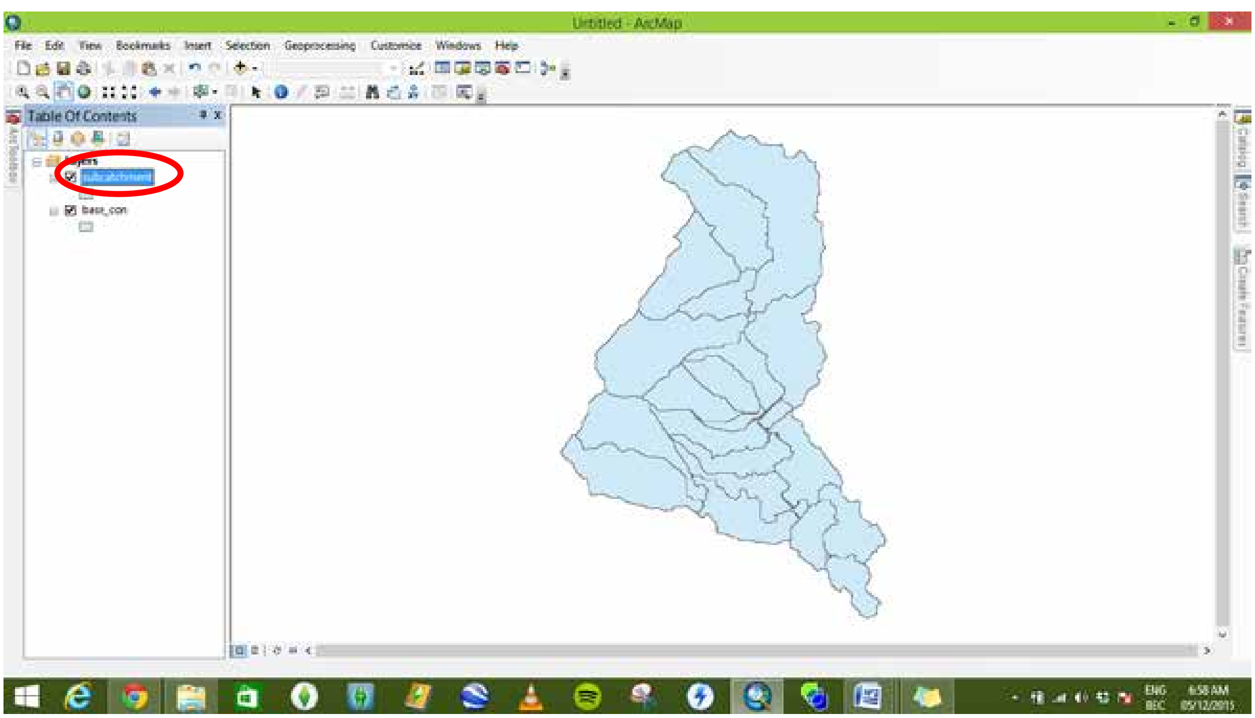
- Save a copy of this map by right clicking the file. Under "Data" press "Export Data".
- This will create another copy of the subcatchment to prevent alteration to the original subcatchment file.



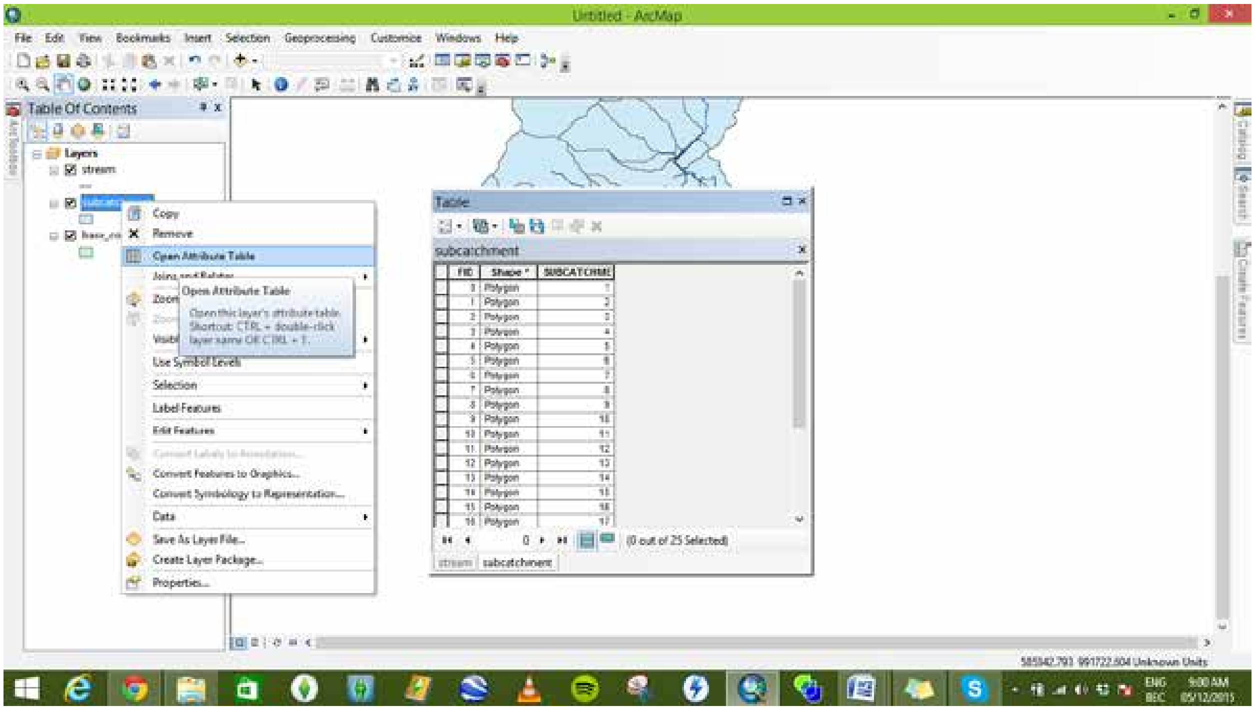
- Rename the file “subcatchment.shp” in the “Output feature class” and choose your working folder to save it to.
- Click “Save” and click “OK” and “Yes”.



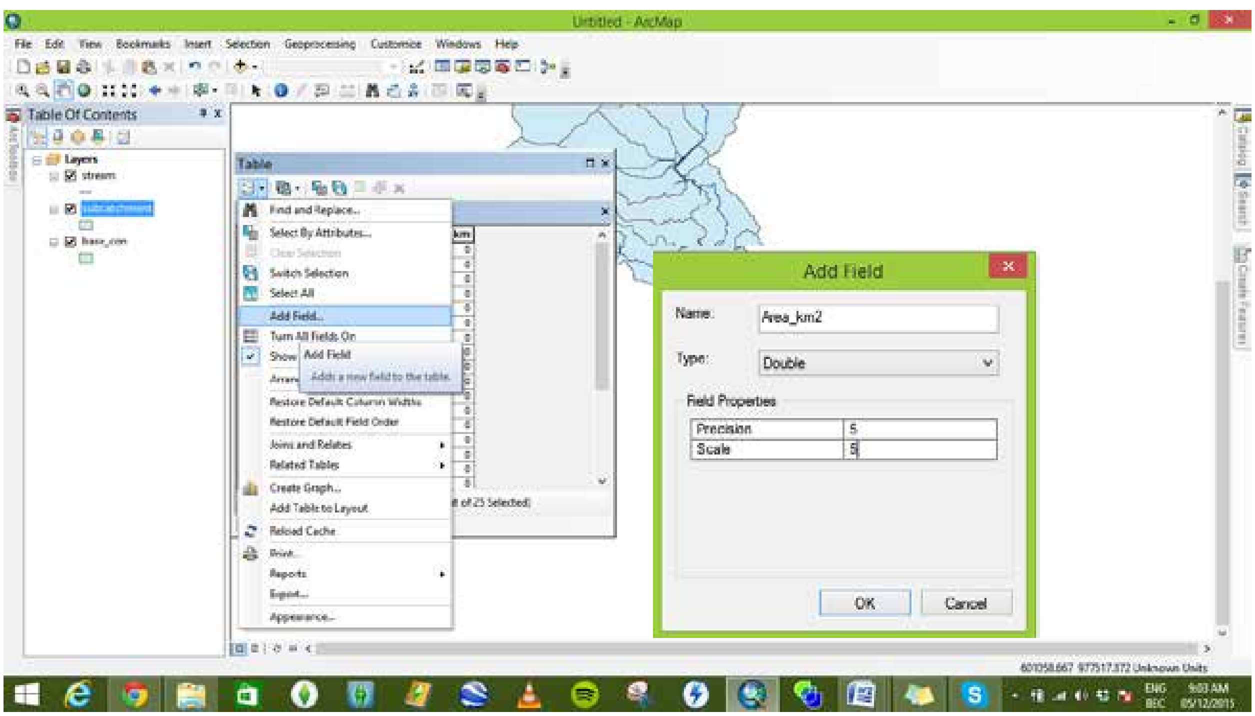
- Your new subcatchment file is ready in the ArcMap window



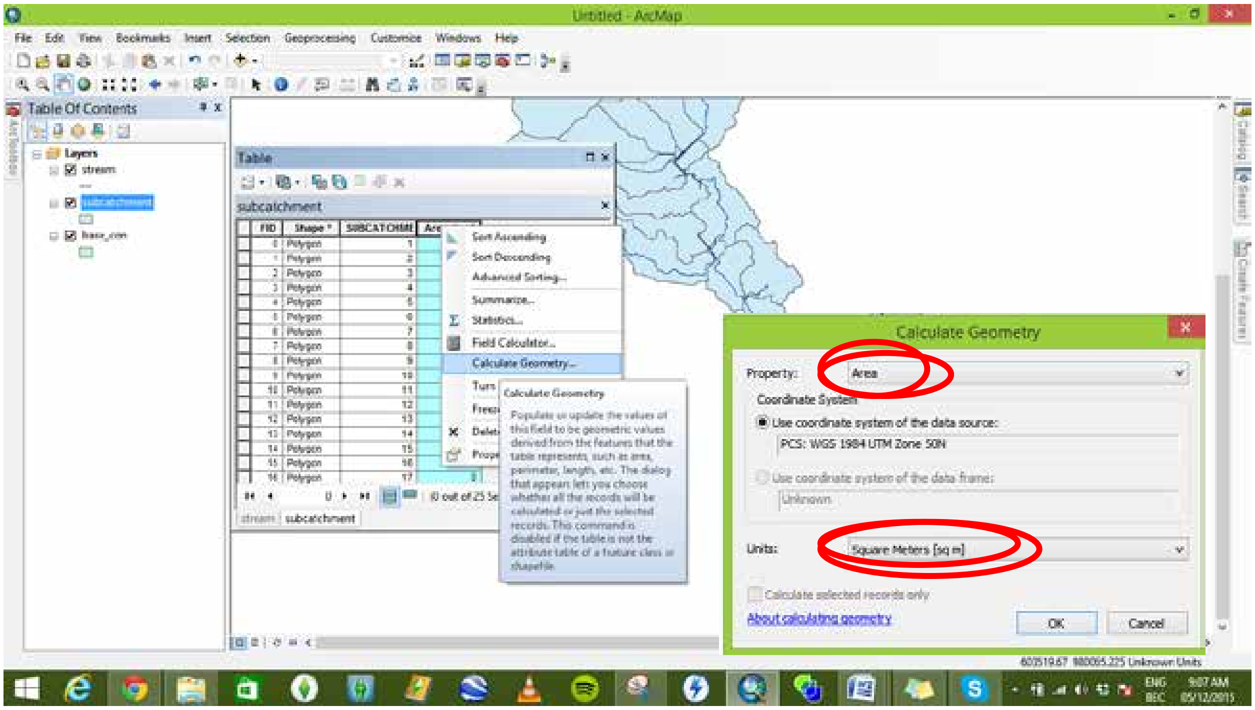
- Right click the file and check its “Attibute Table”



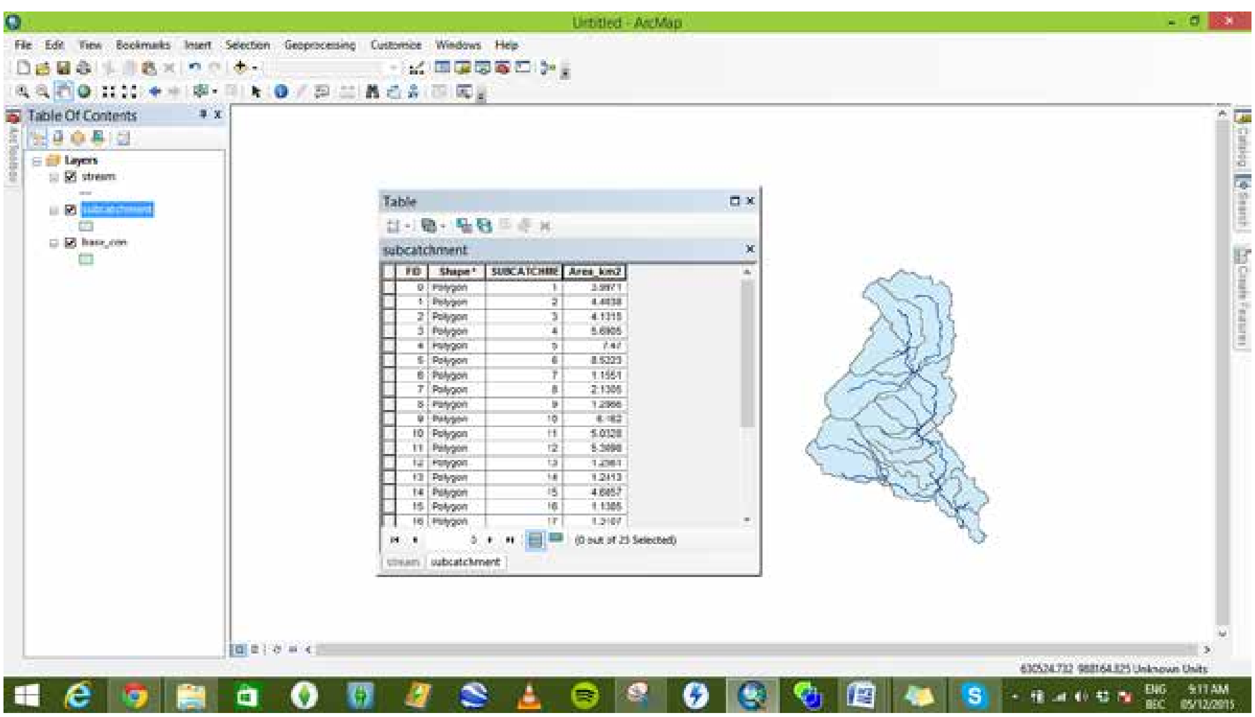
- Under “Table Options” click “Add Field”



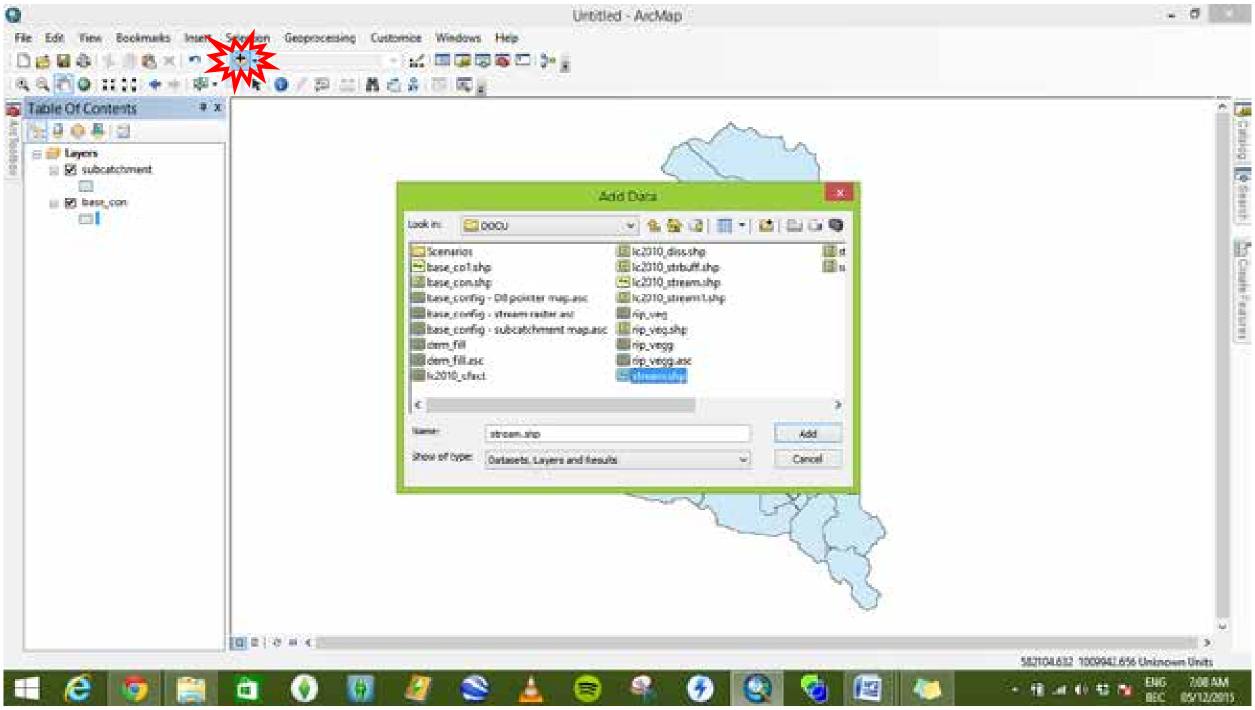
- Calculate area in square kilometers by right clicking the field "Area_km2", the click "Calculate Geometry".



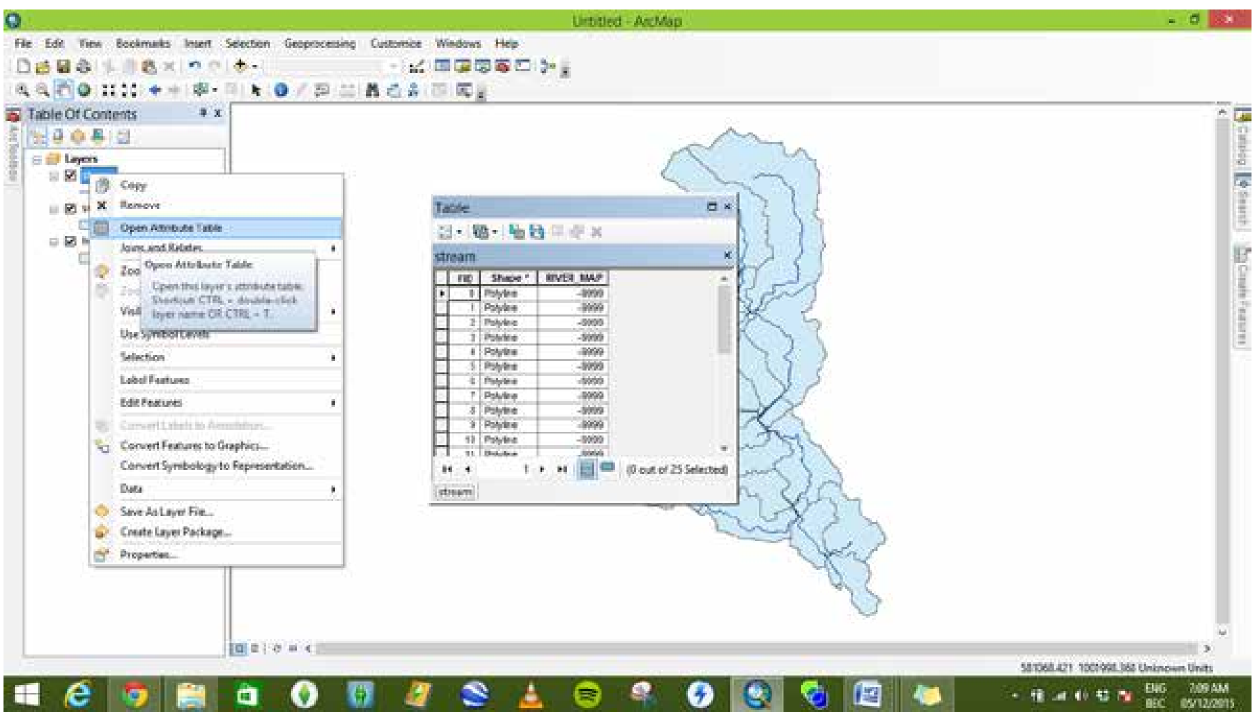
- Area in square kilometers of the subcatchment is now shown in its Attribute Table.



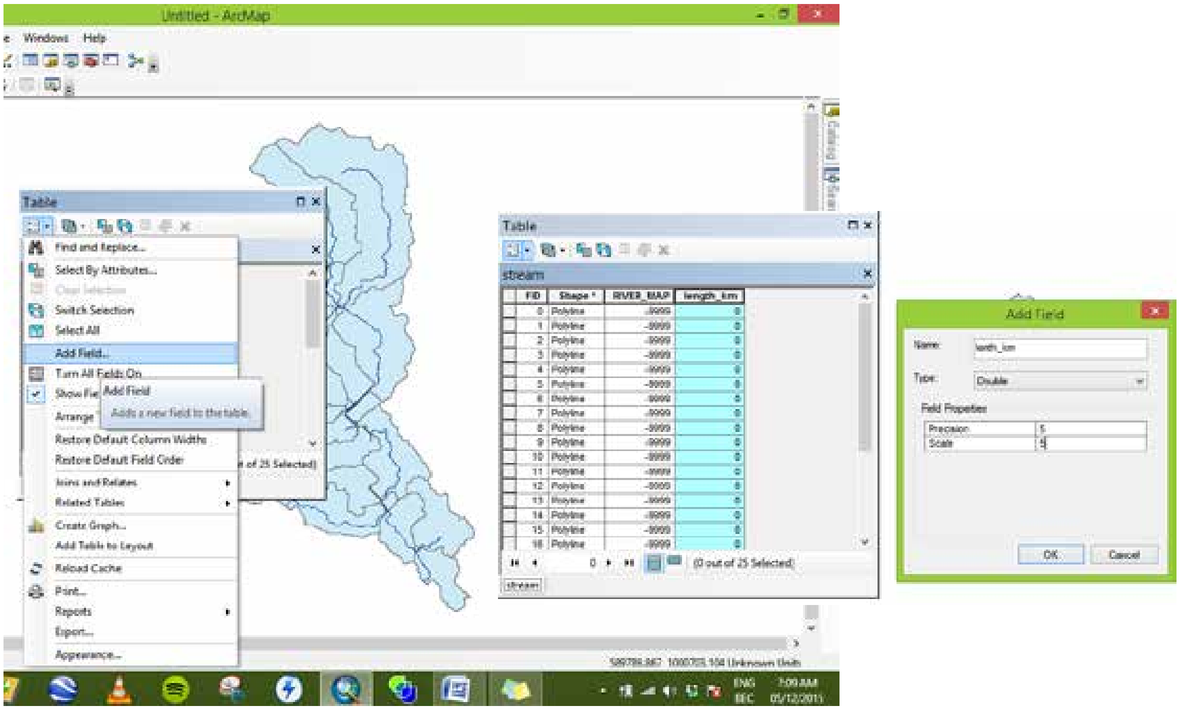
- Add your stream file “stream.shp”. in ArcMap by pressing “Add Data”.



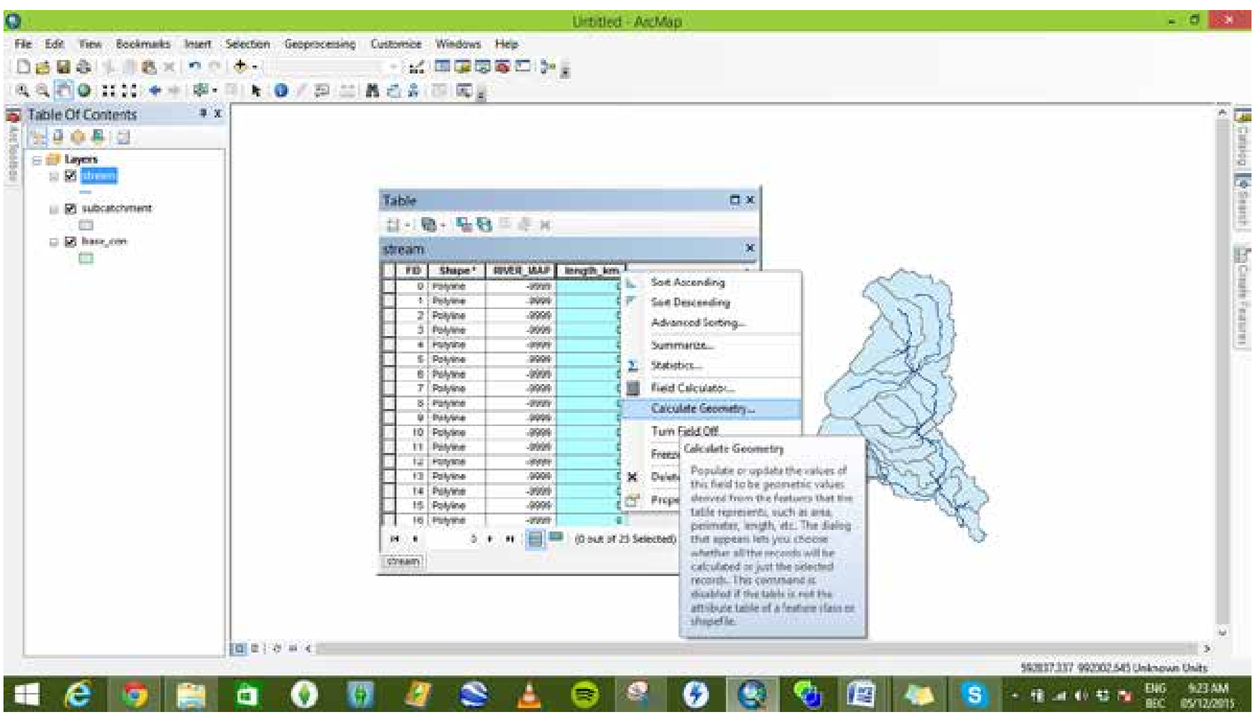
- Right click the file and check its “Attibute Table”



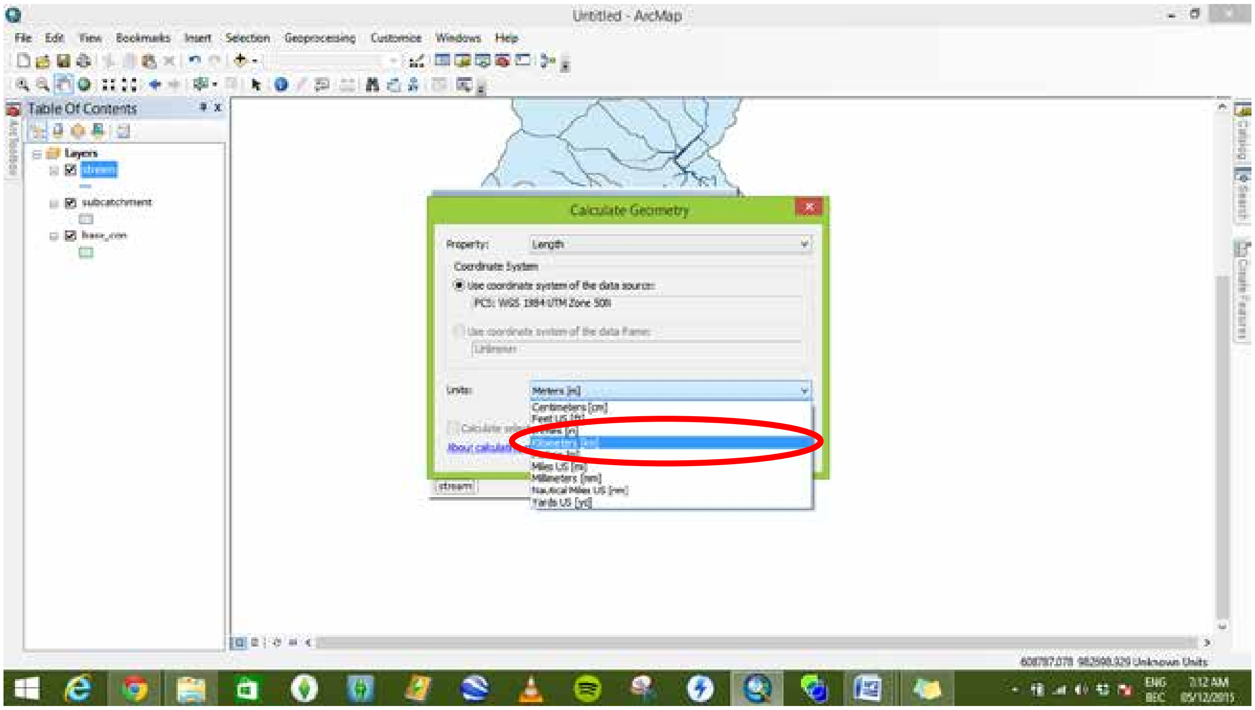
- Under “Table Options” click “Add Field”



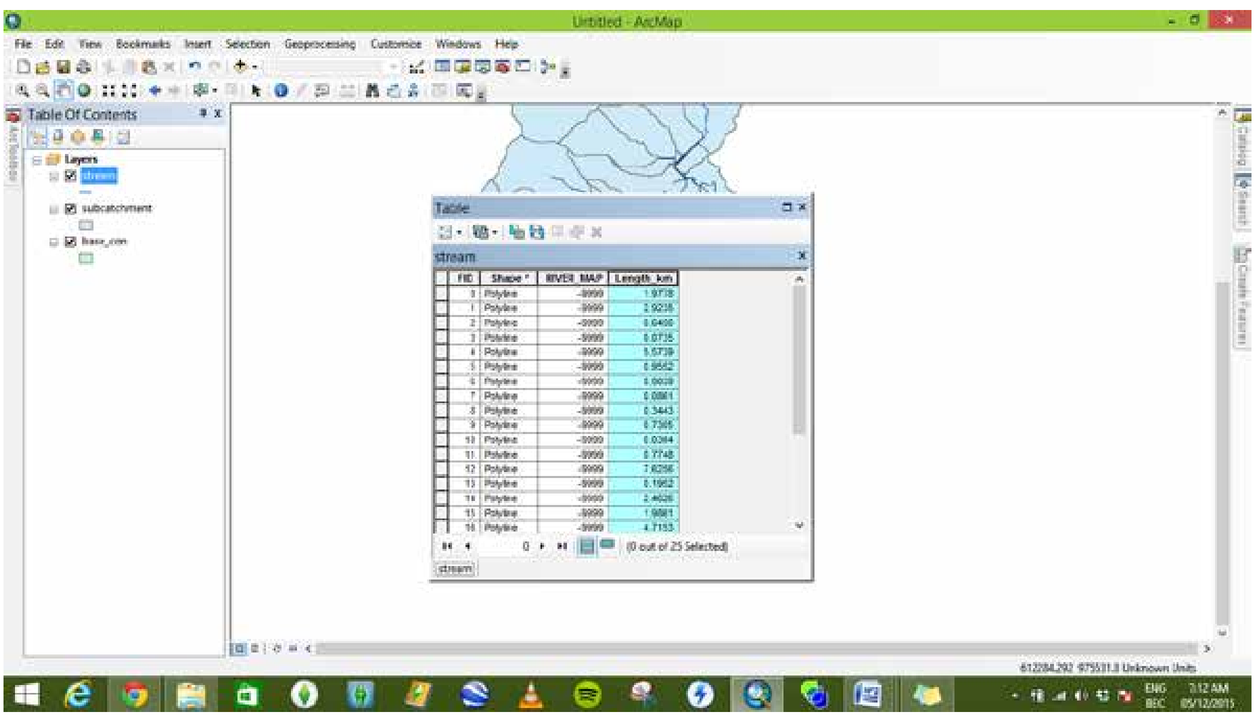
- Calculate area in square kilometers by right clicking the field "Area_km2", the click "Calculate Geometry".



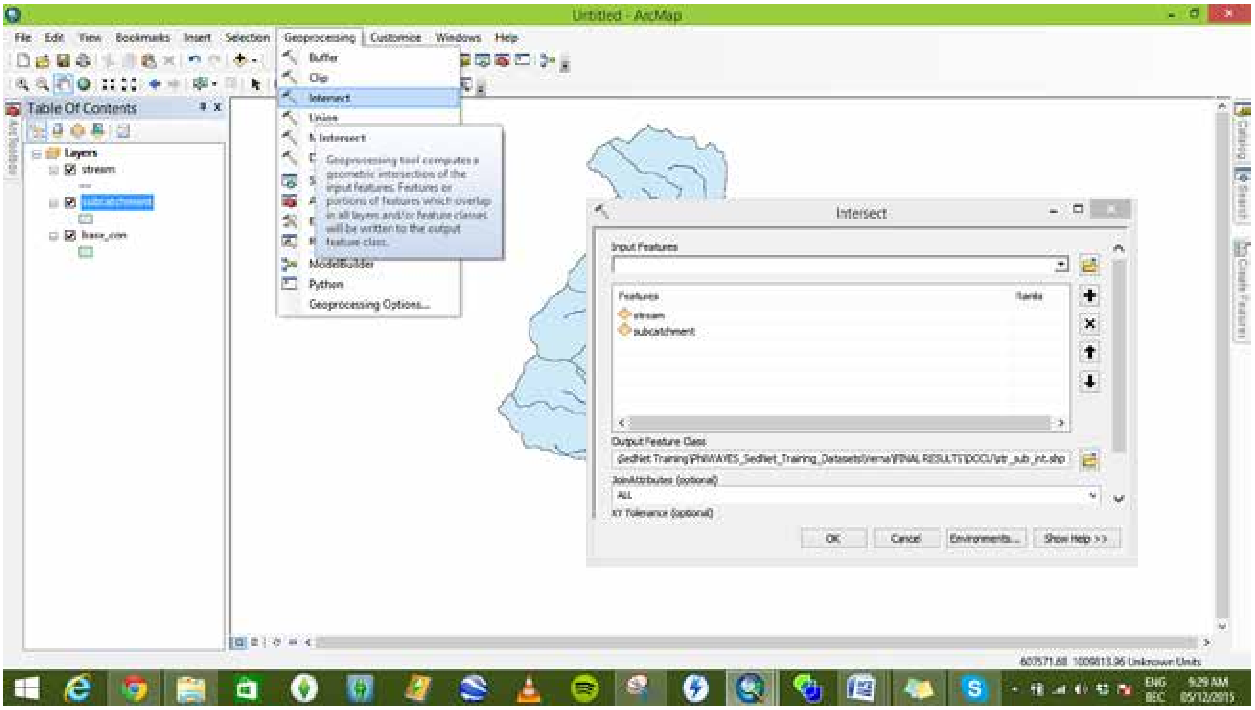
- Select “Length” in “Property” and “Kilometer” in “Units”.
- Click “OK” then click “YES”.



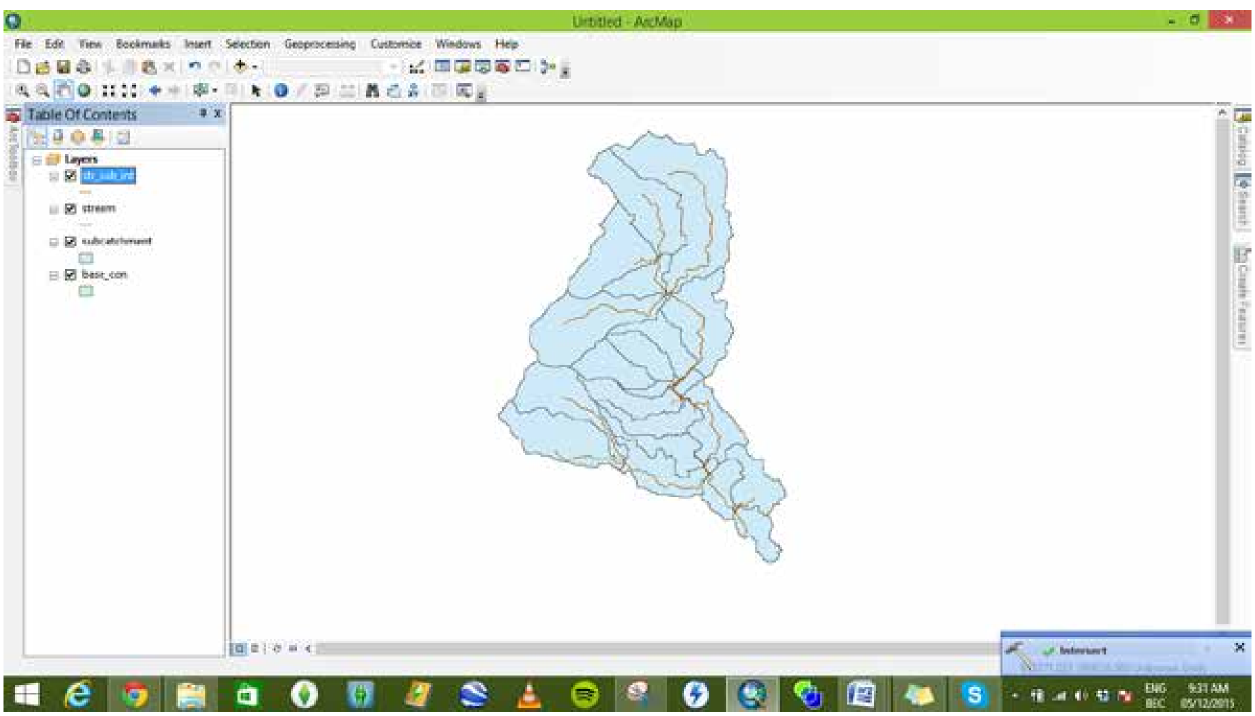
- The field “”Length_km” now contains the calculated length of the stream in km.



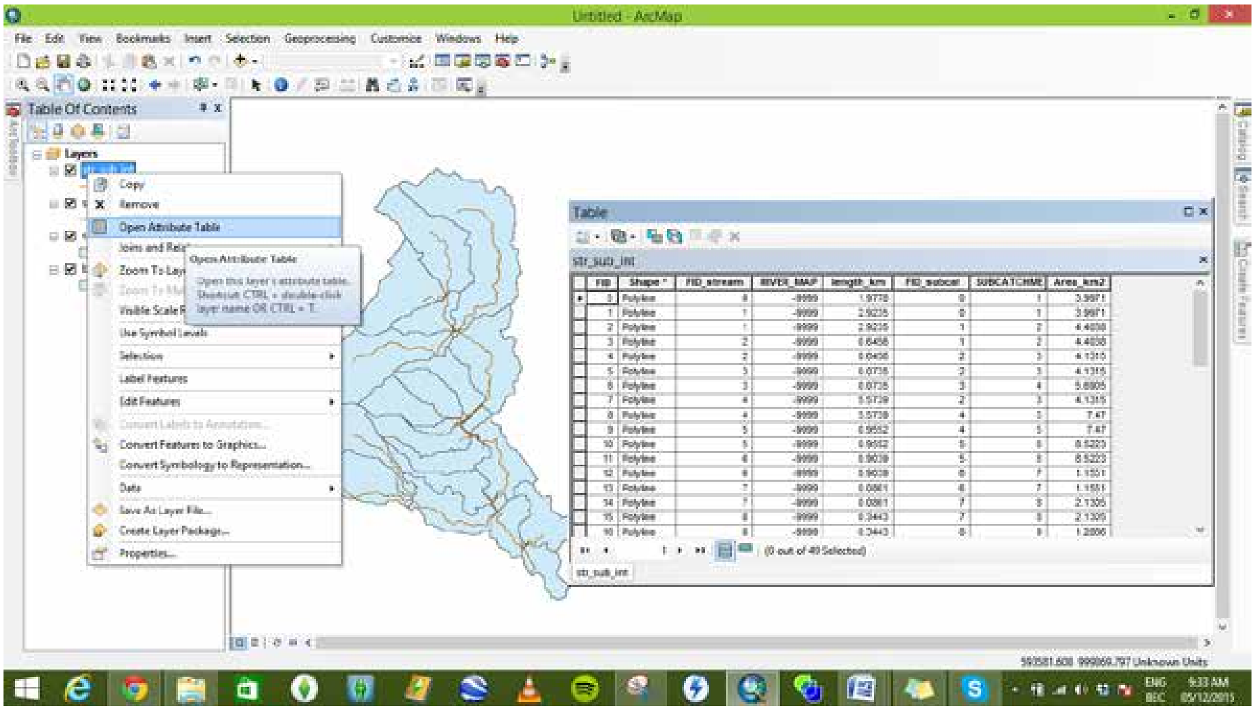
- Using the geoprocessing tool “Intersect” subcatchment and stream. Name the “Output Feature Class” as “str_sub_int”.



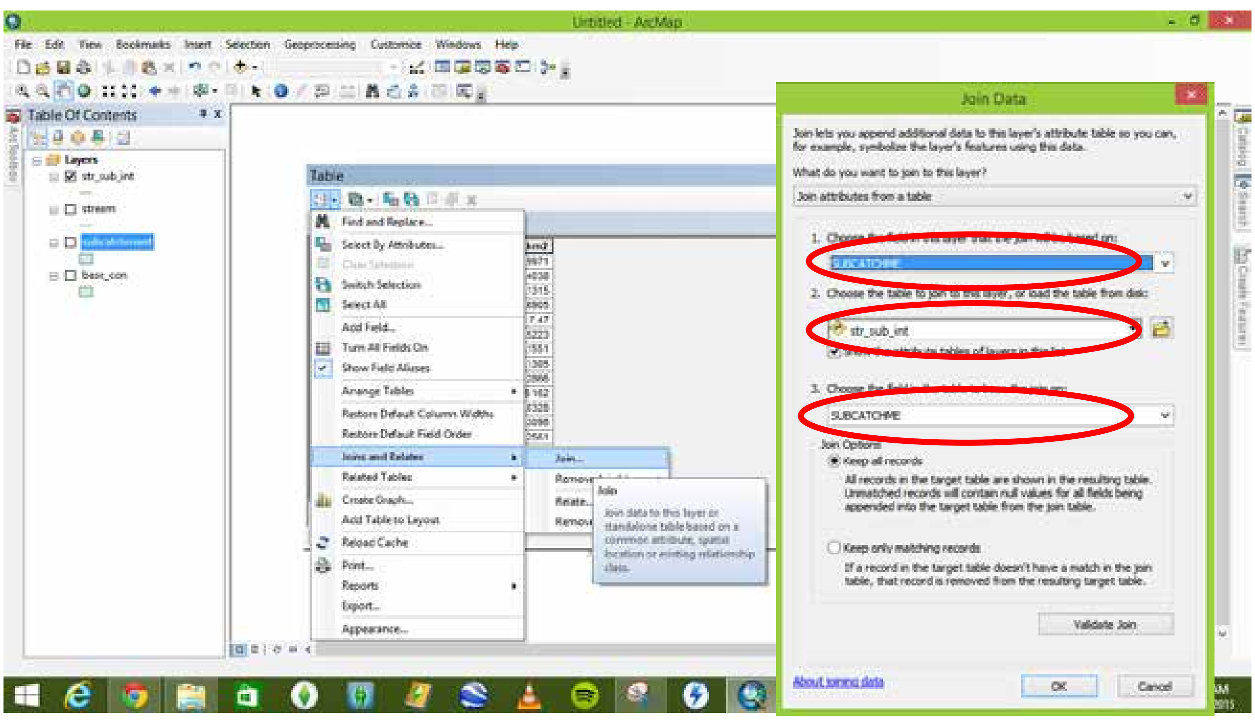
- When successful, the “str_sub_int” file will show in your map window.

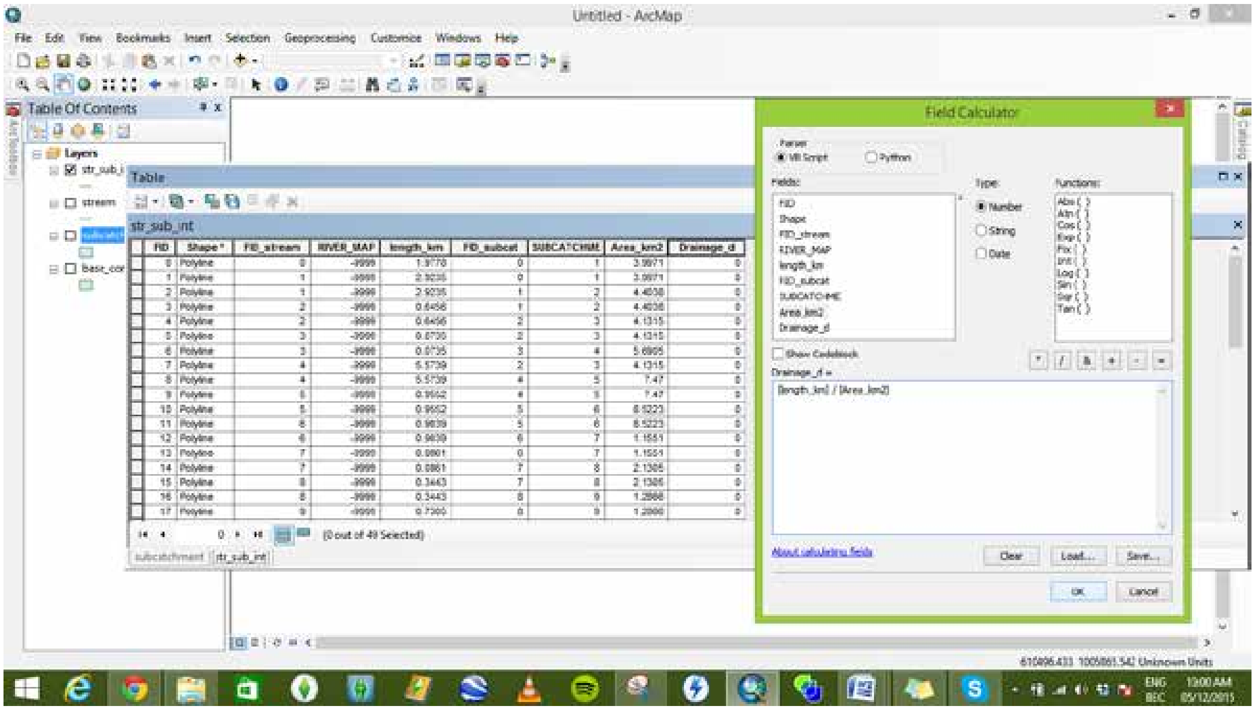


- Examine the “Attribute Table” by right clicking the file. Note that the table contains the “Subcatchment” identifier. This identifier will be use to join with the subcatchment shapefile.

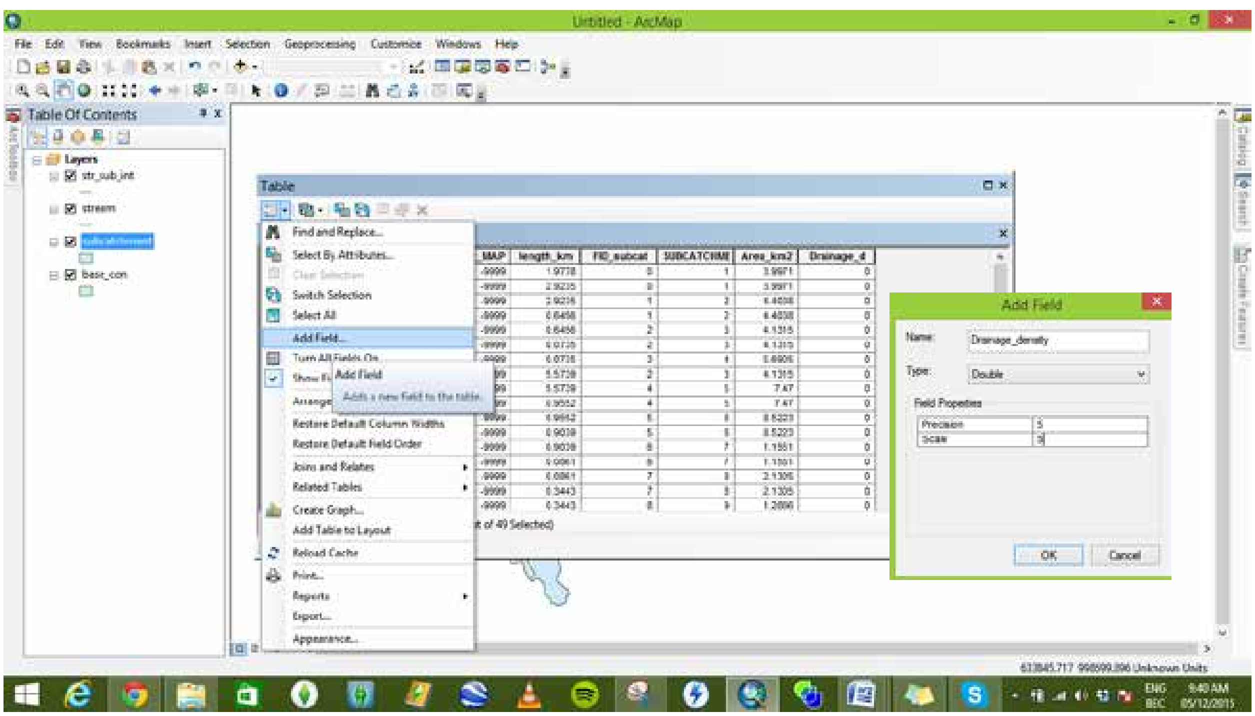


- Now join this table with the attribute table of the subcatchment shapefile.

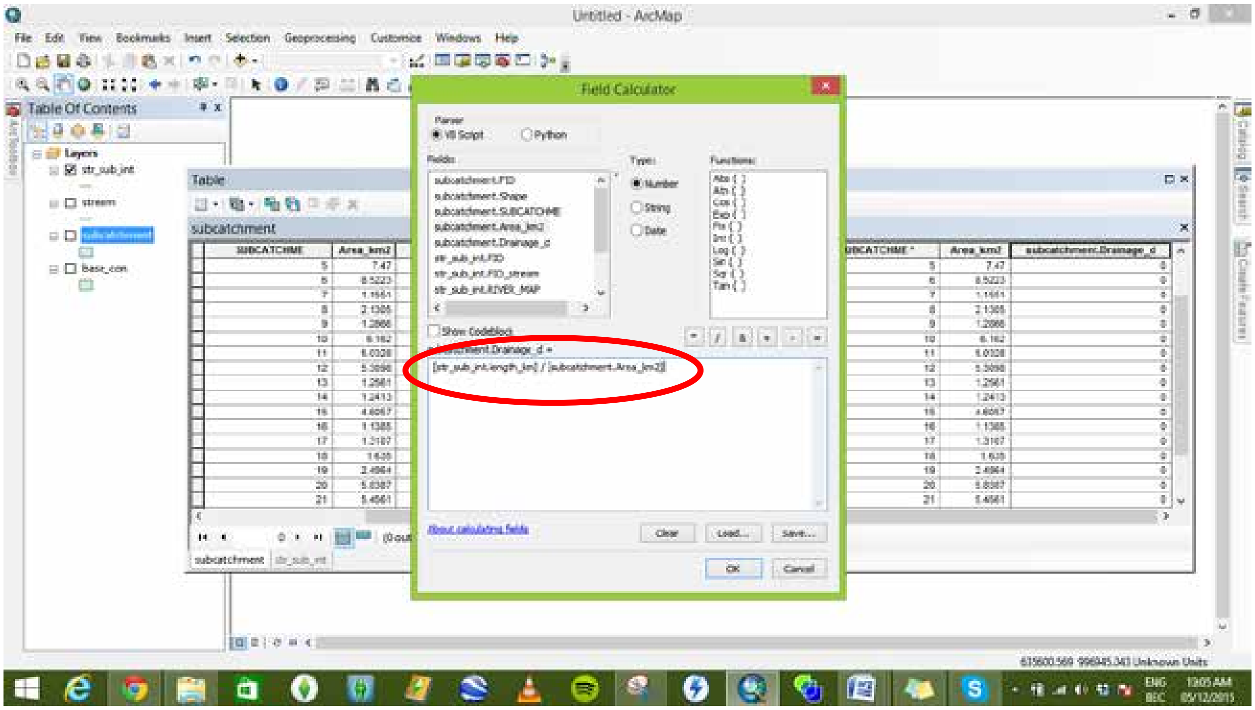




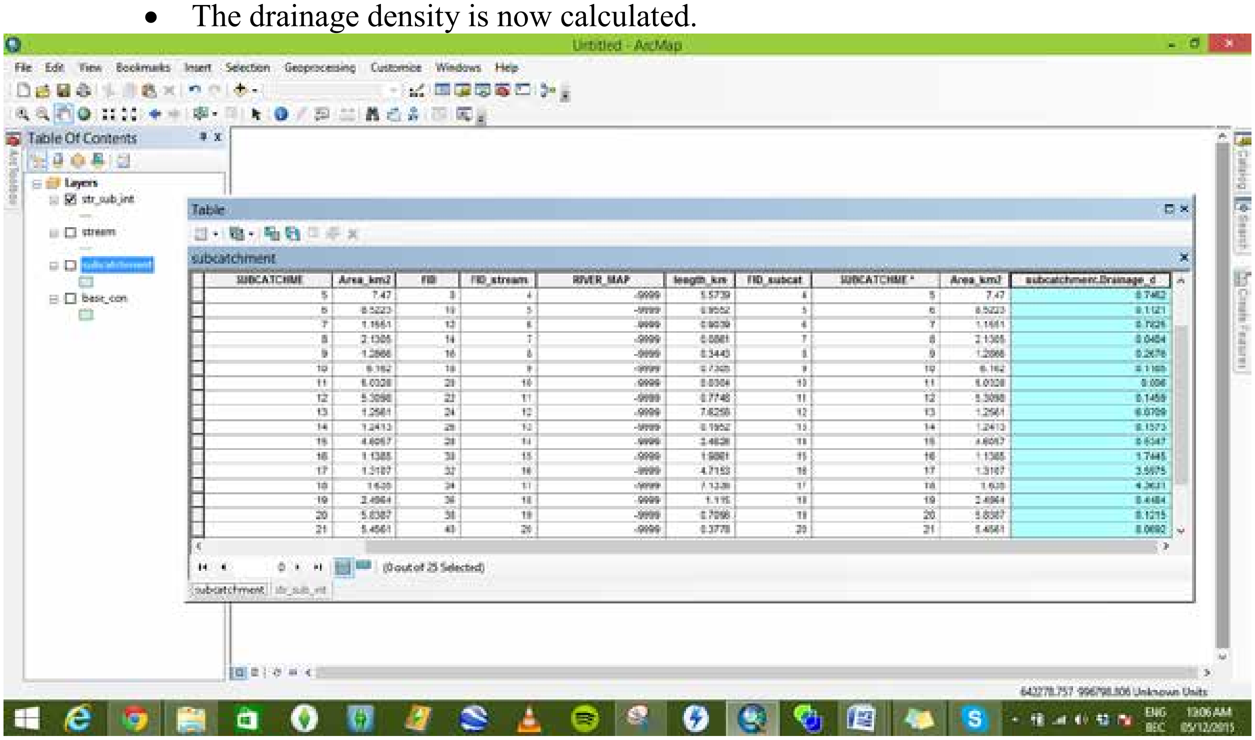
- Click “Add Field” in the “Table Options” to create the “Drainage_density” field.



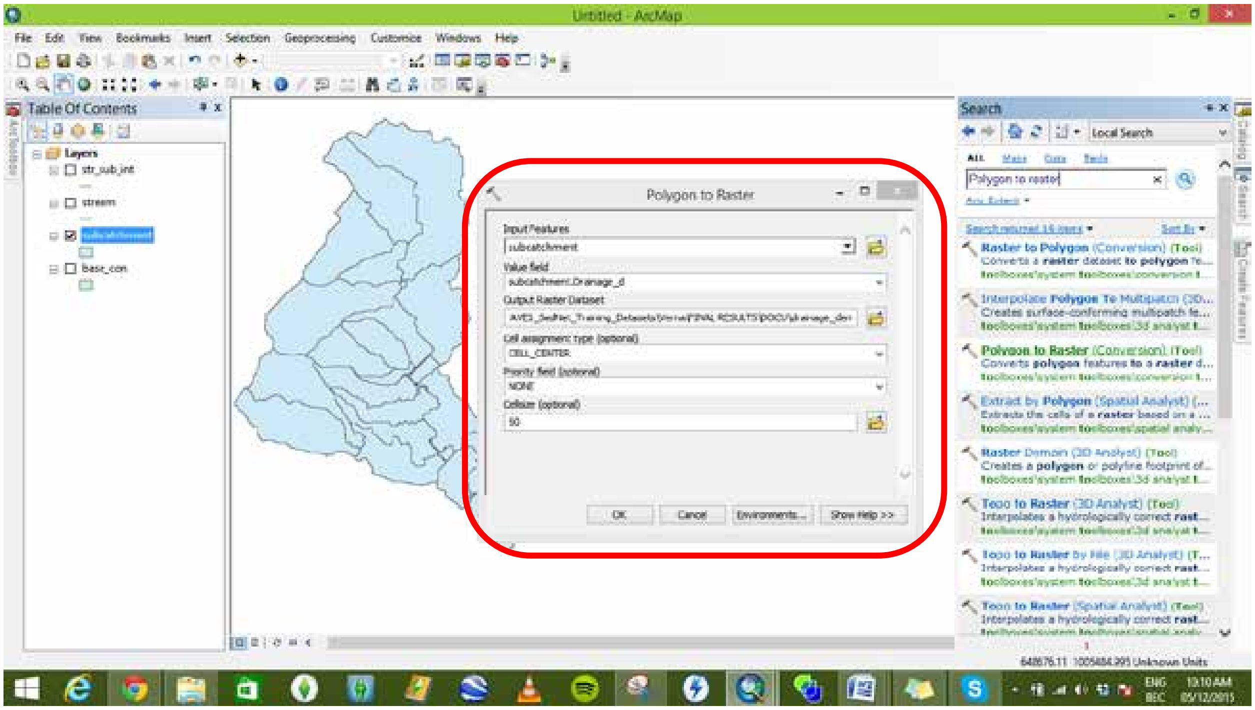
- Right click the “Drainage Density” Field and calculate drainage density using “Field Calculator” with this formula: Length (km)/Area (km2).
- Click “OK”



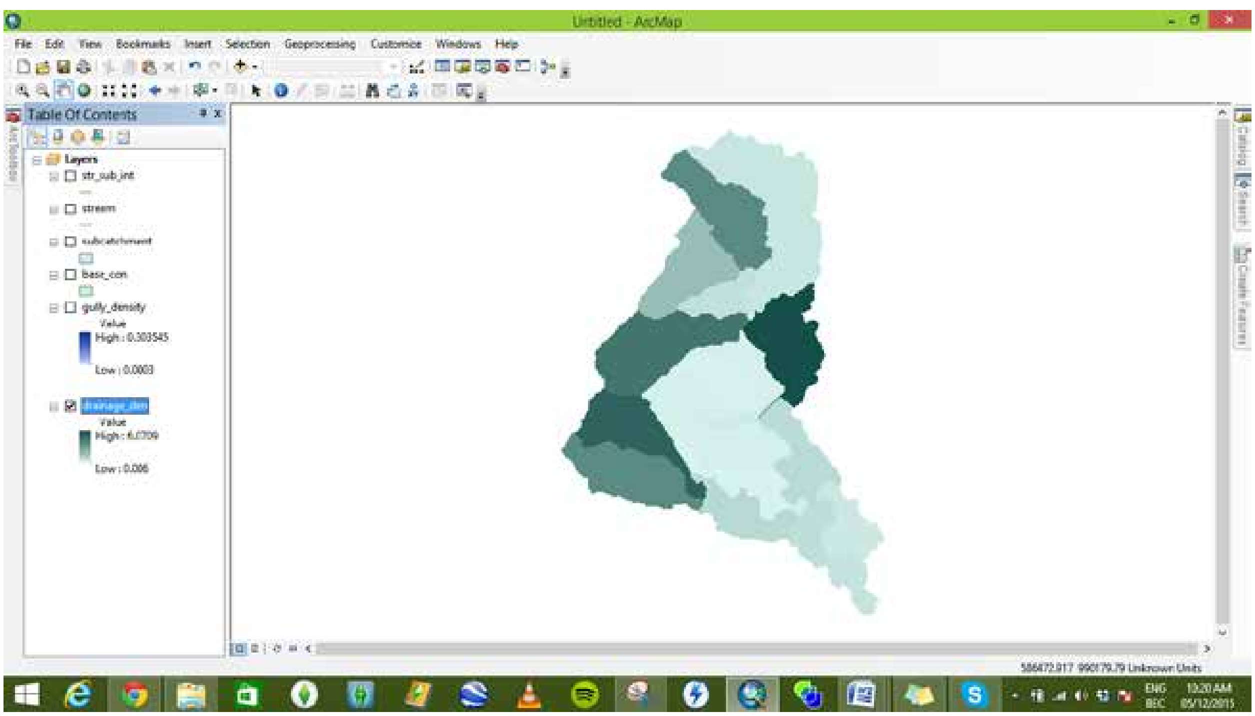
- The drainage density is now calculated.



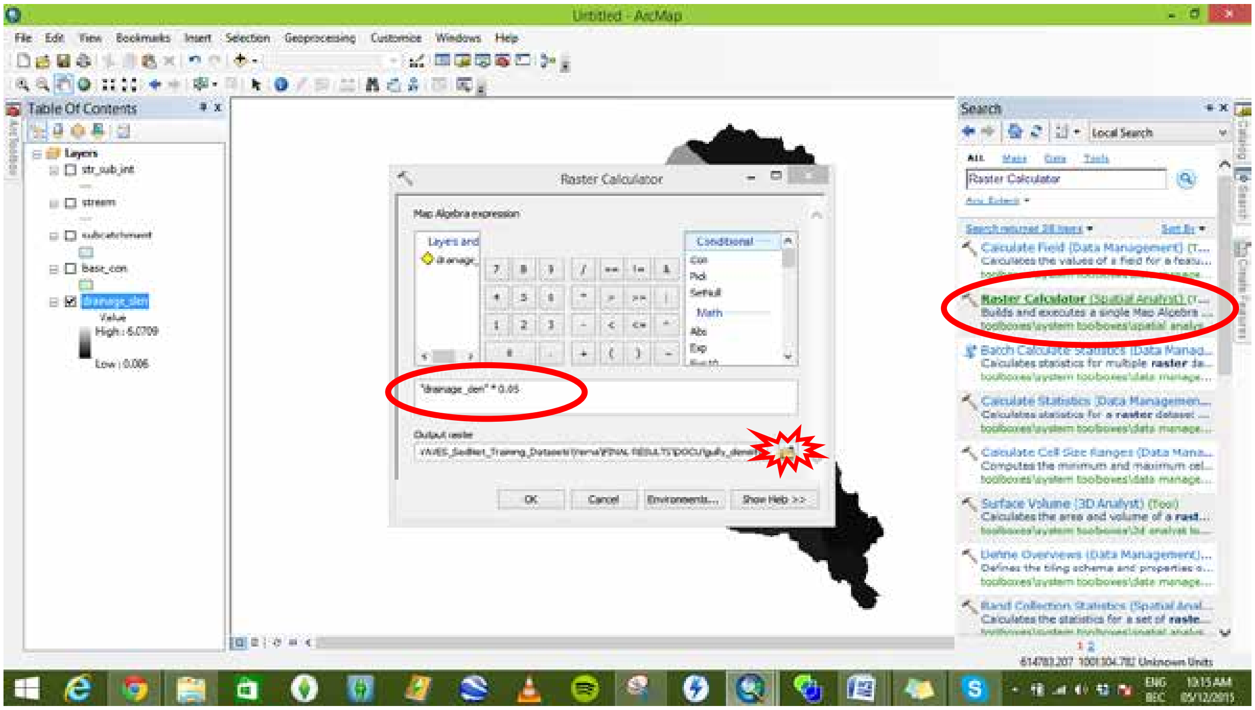
- Convert the shapefile to a raster file by clicking “Poygon to Raster (Conversion)” under “Search”. Take note of the inputs in the field. Click “OK”.



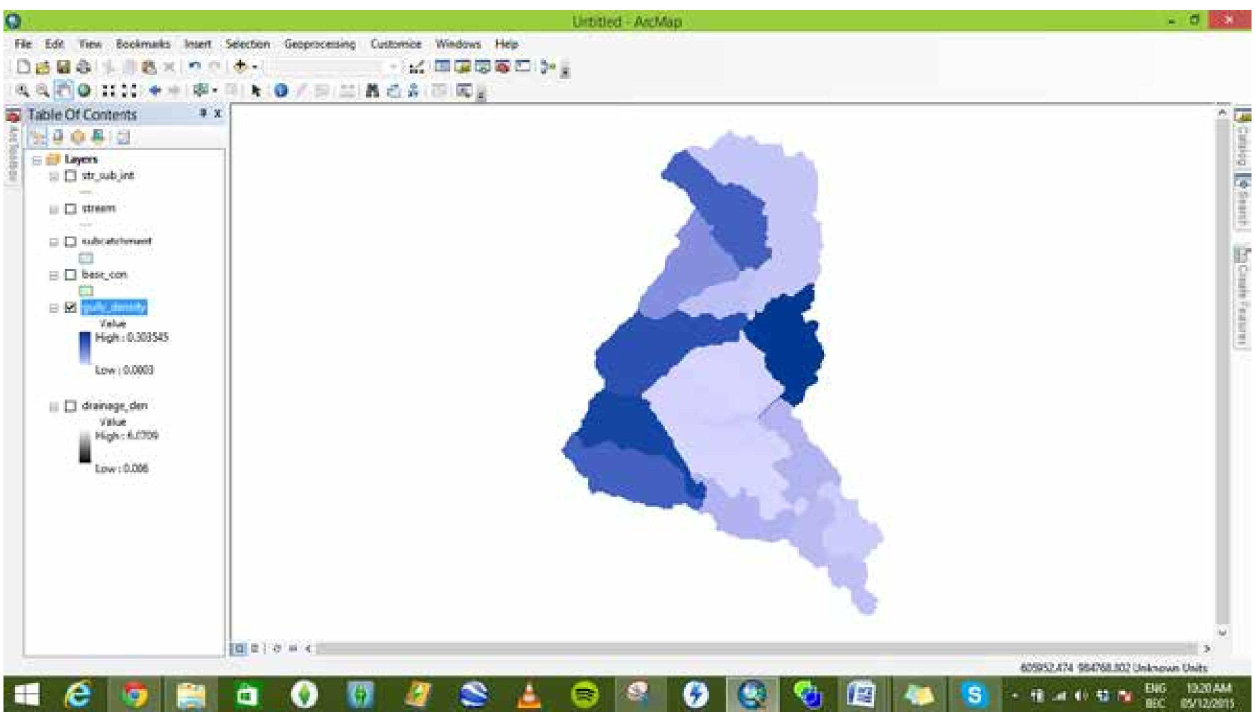
- Result of the conversion.



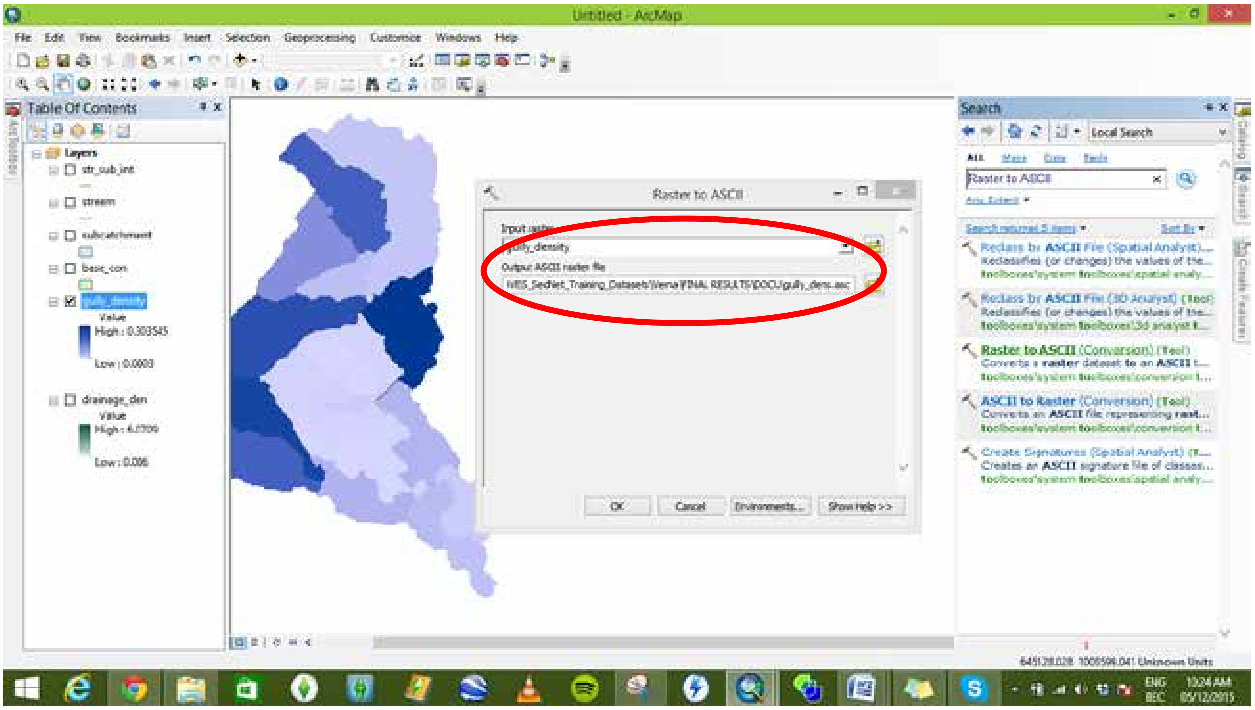
- Now compute for the Gully Density which is 5% of drainage density. This is done using “Raster Calculator (Spatial Analyst)” using the formula “drainage_dens*0.05”.
- Name the file “gully_den”.
- Click “OK”.



- The resulting gully density.



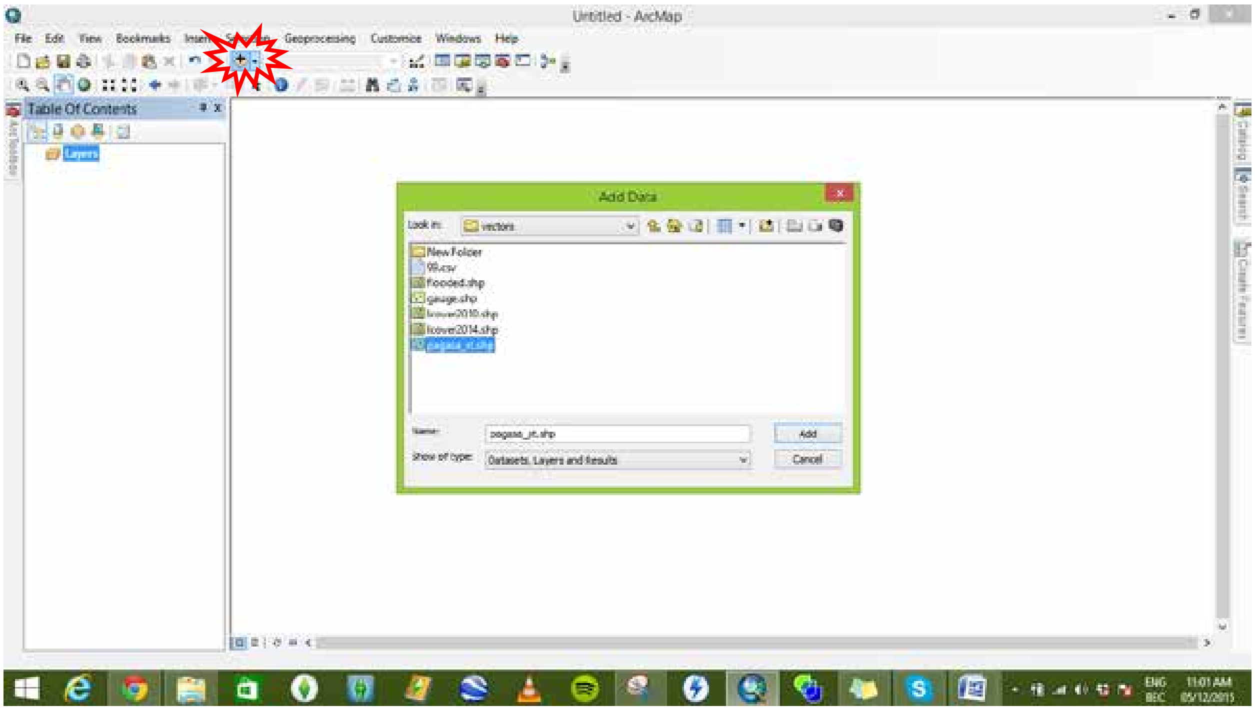
- Convert the raster to ASCII file using “Raster to ASCII (Conversion)”. Remember to remove the .TXT extension when you are saving to ASCII.



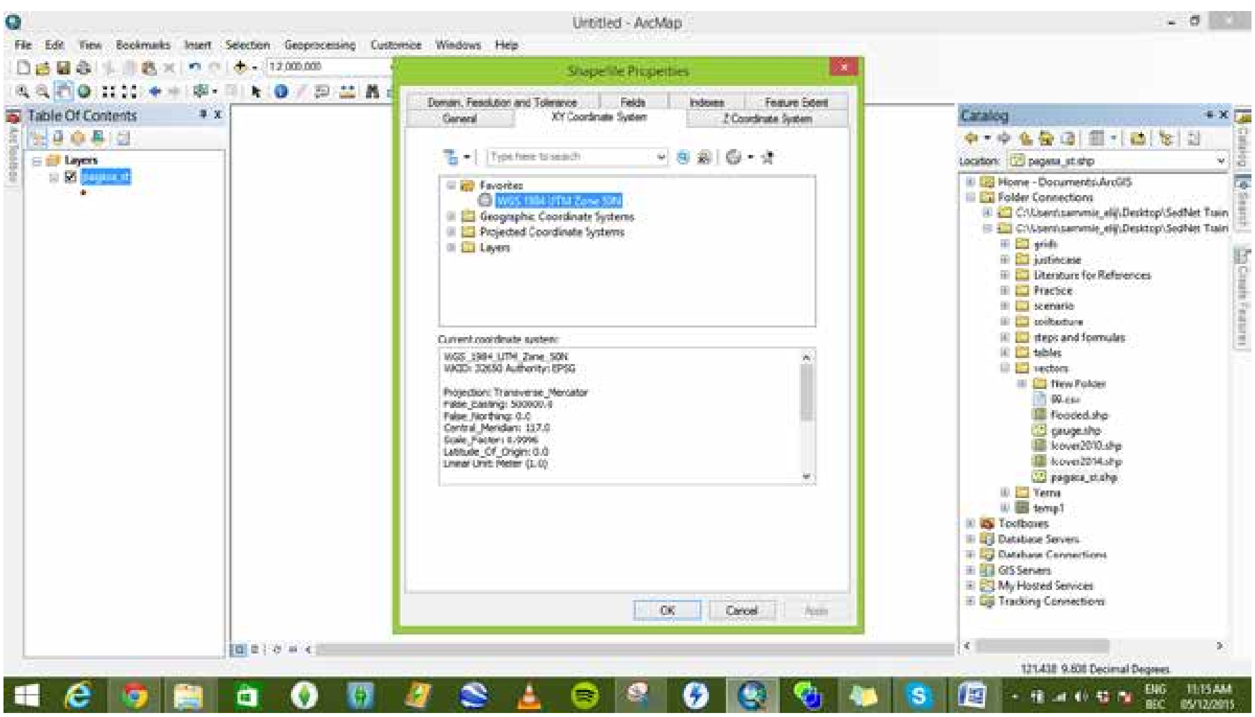
- Now your gully density is ready as input to SedNet.

2.1.5. Mean Annual Rainfall

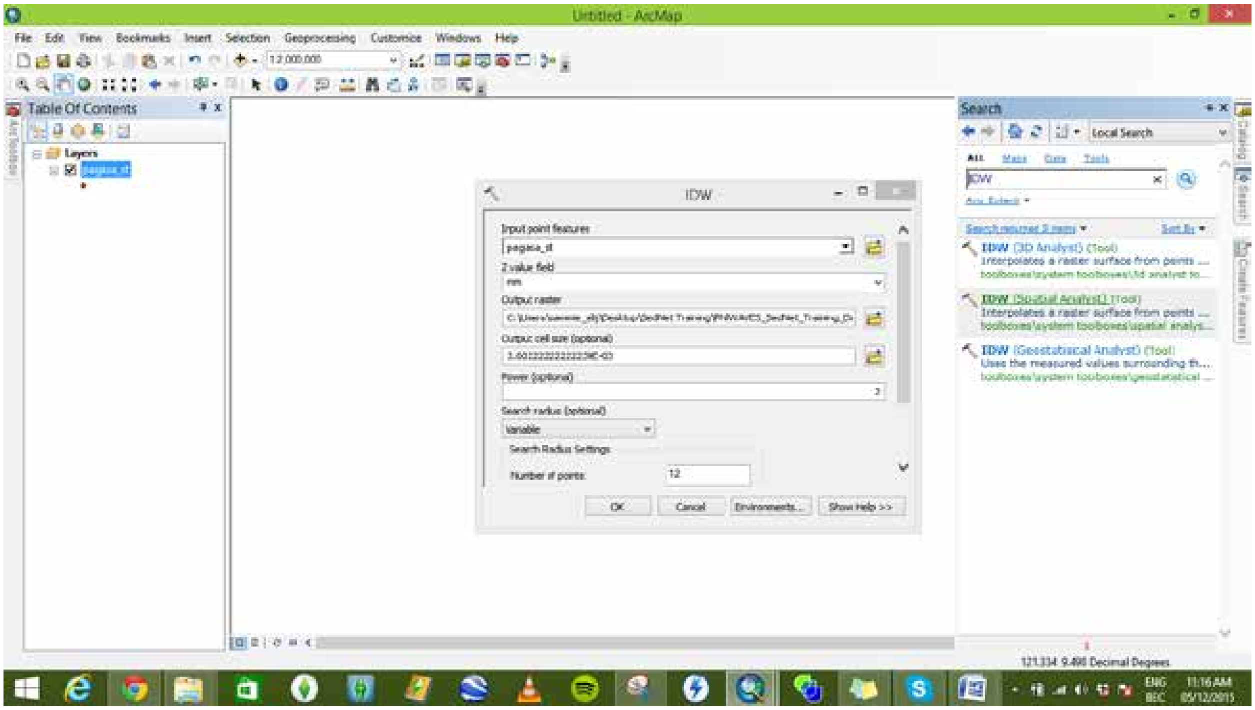
- Load “pagasa_st.shp” vector in “Datasets” under “Vectors” subfolder.



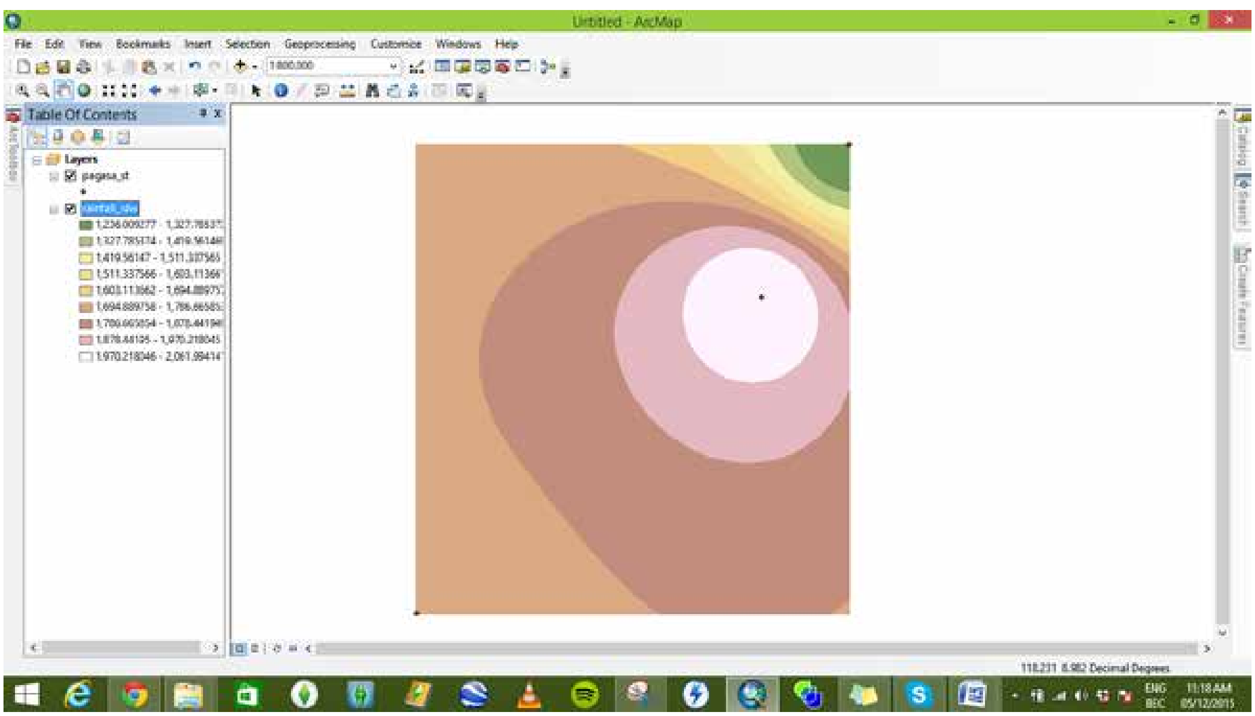
- Change projection to WGS 1984 UTM Zone 50N.



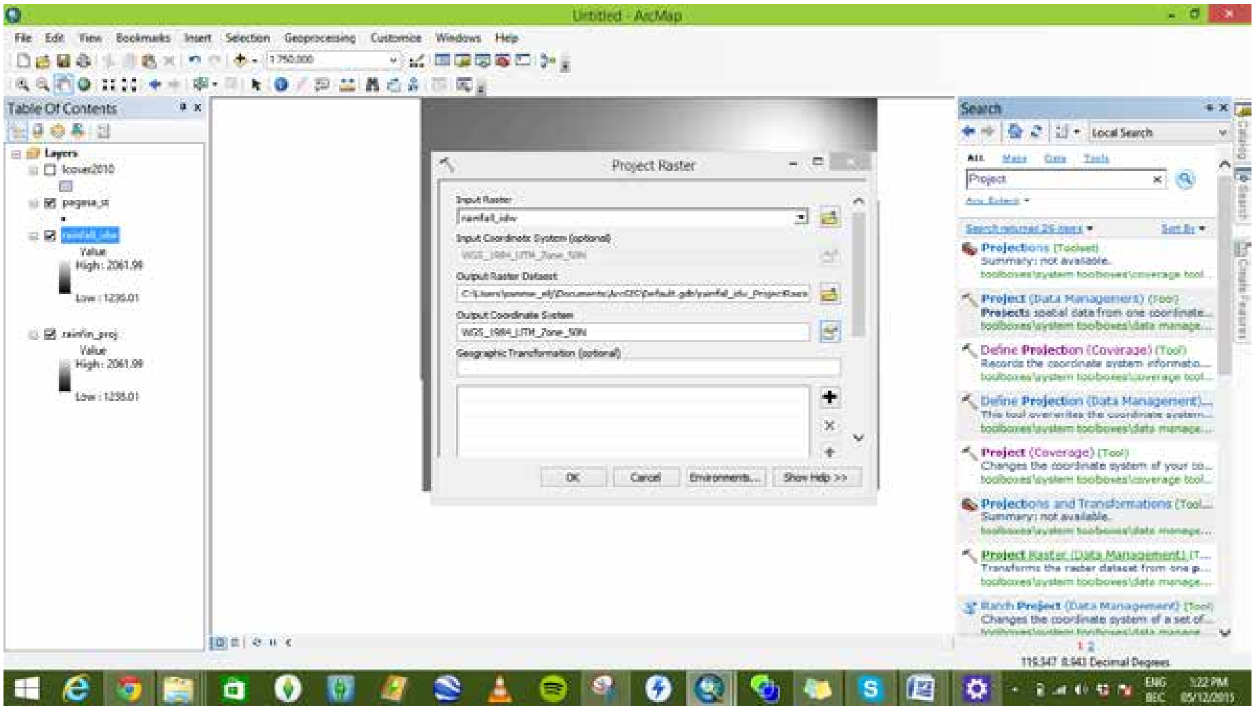
- Use “IDW (Spatial Analyst)” to interpolate rainfall. Z value field: “mm”; Output raster: “rain_idw”; number of points: “12”. All other fields are left constant.



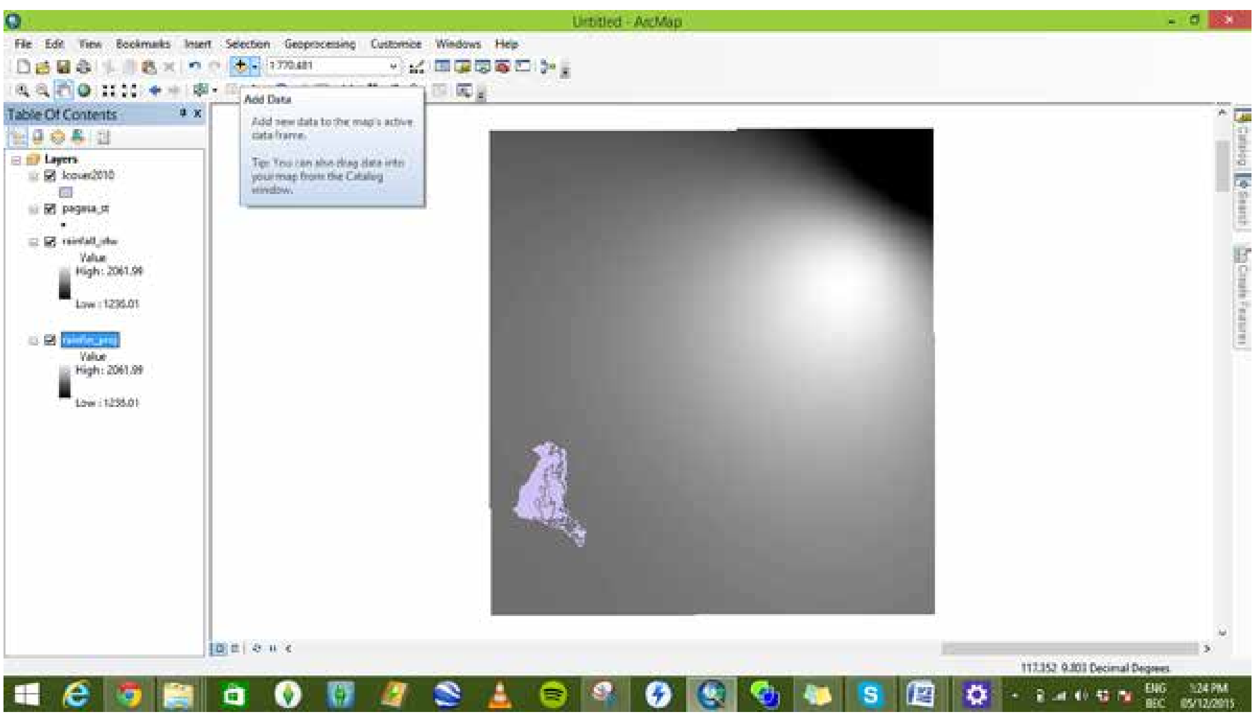
- Results of the interpolated rainfall.



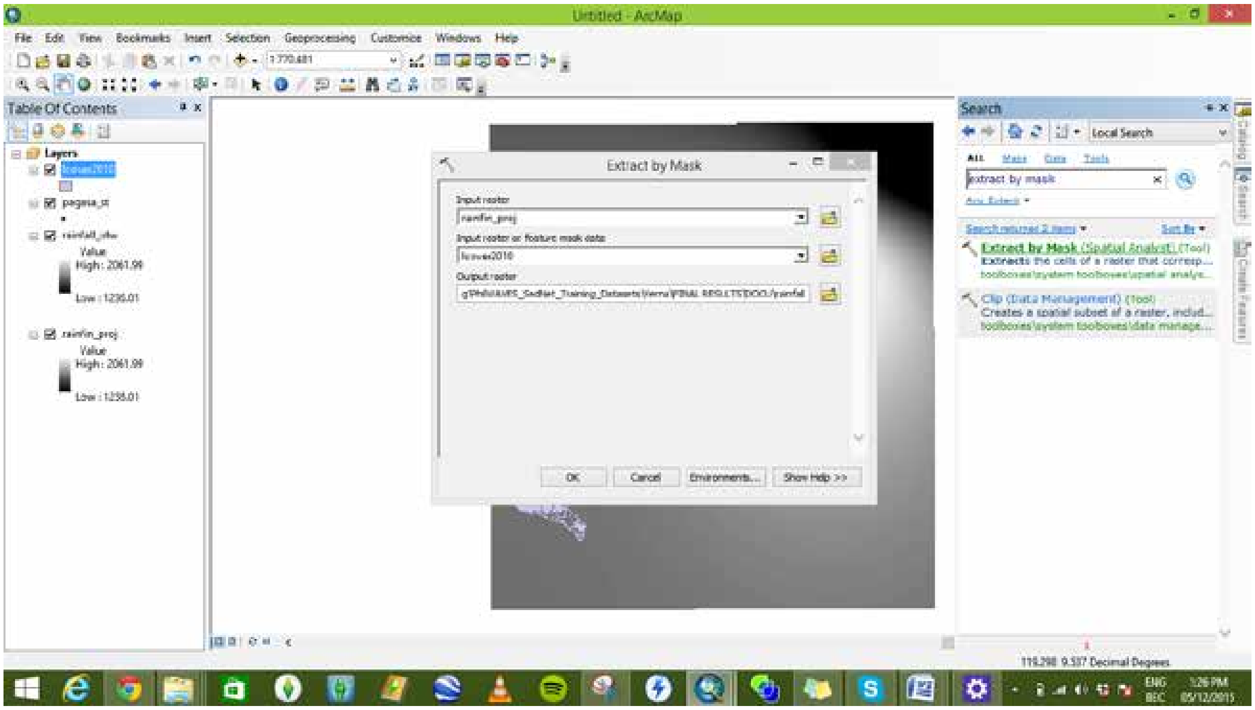
- Change projection using “Project Raster”



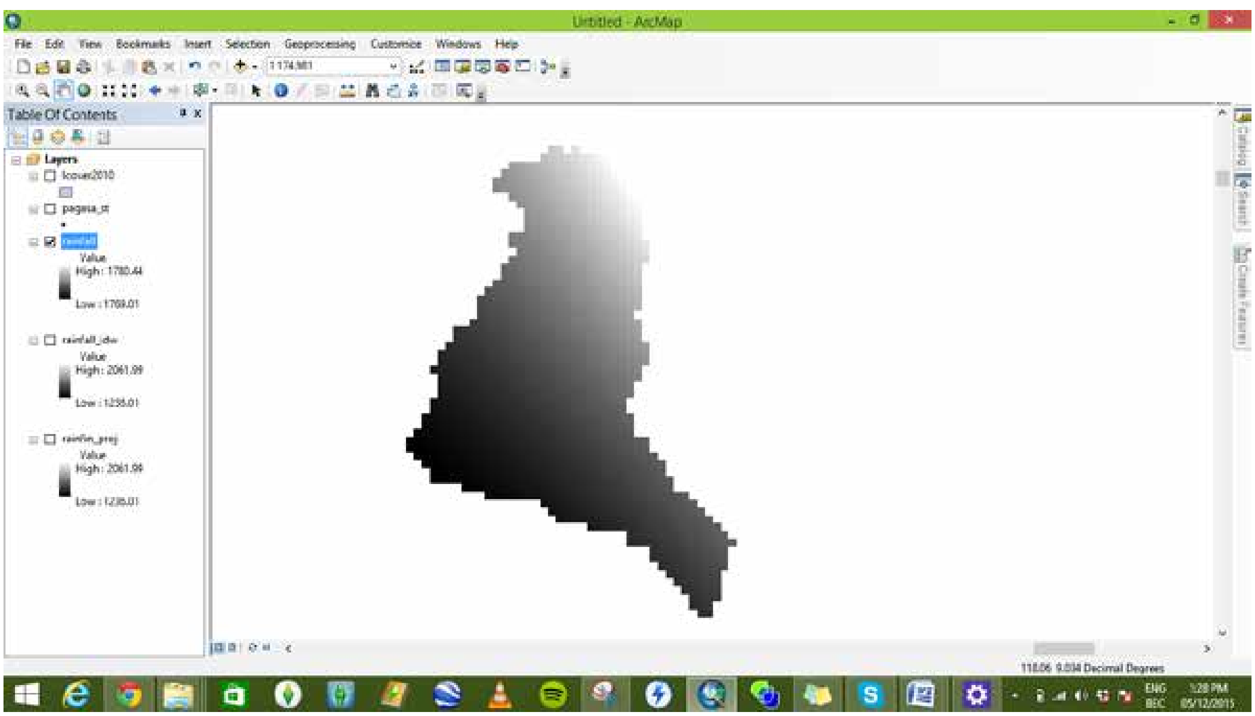
- Add “lcover2010” to the window



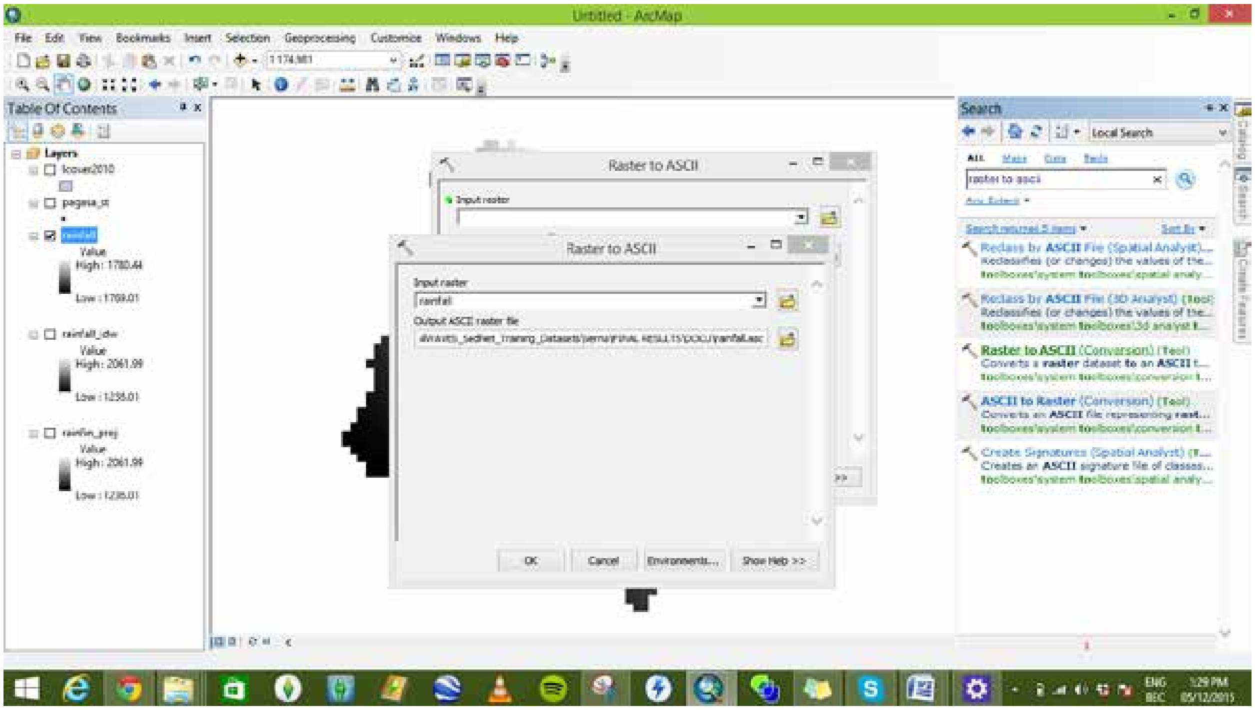
- Proceed with clipping the rainfall to the study area by using “Extract by mask”.



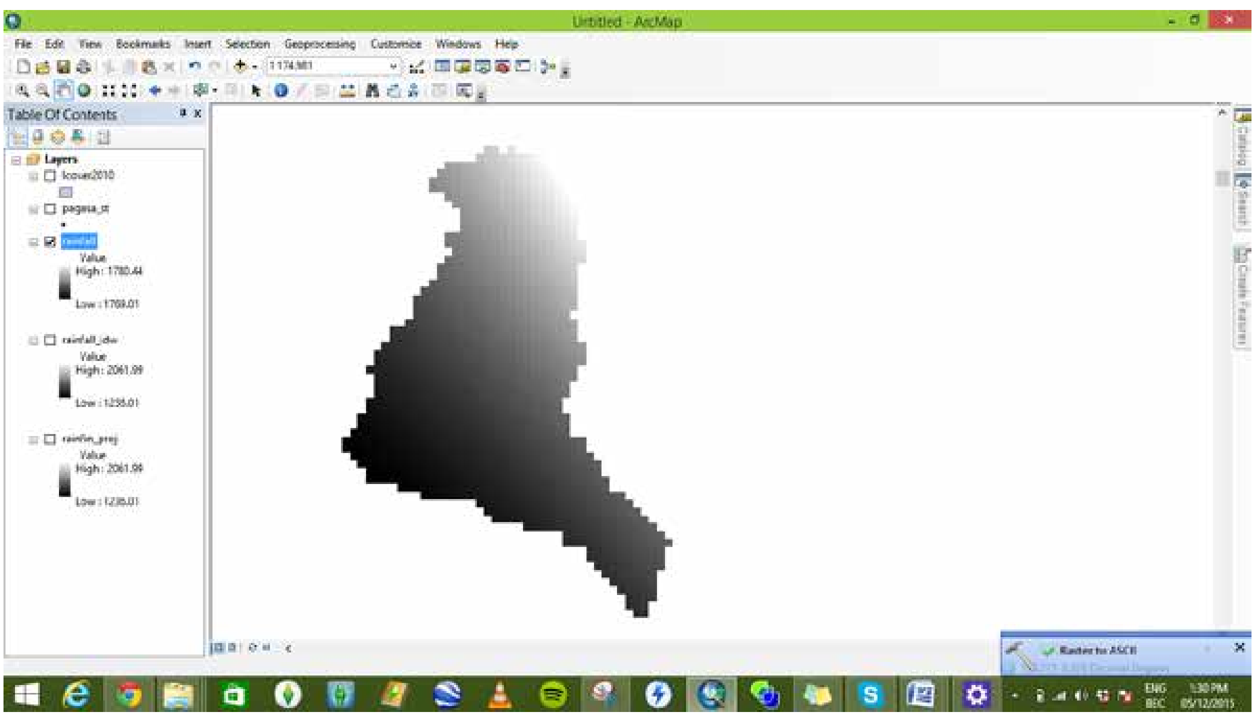
- Result of the masking operation is the rainfall map.



- Convert the raster file to ASCII file.



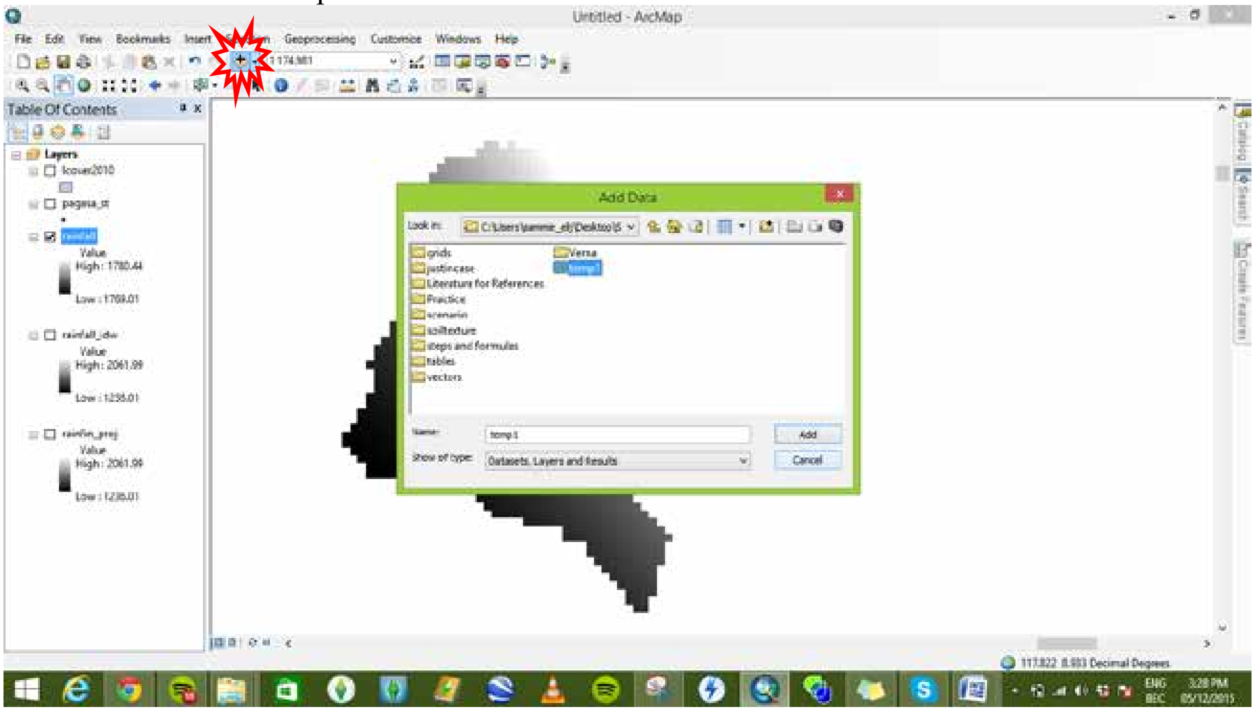
- Convert the raster file to ASCII file.



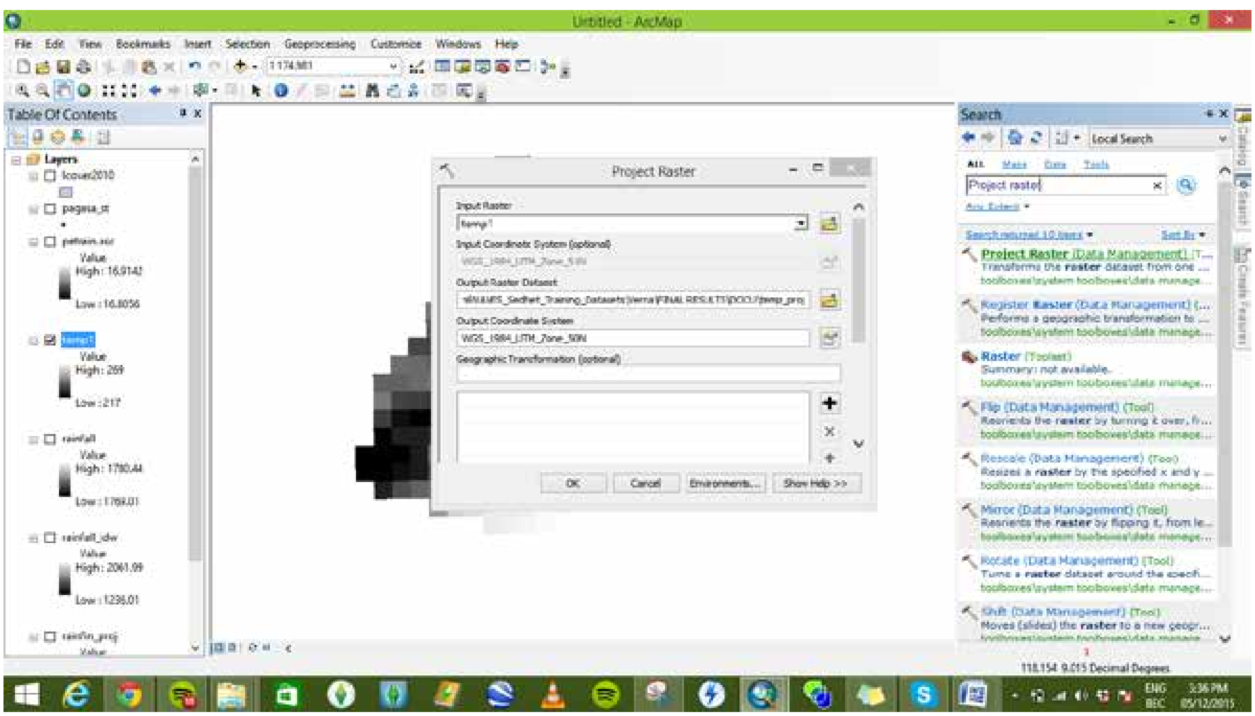
- Load to SedNet.

2.1.6. PET/Rainfall

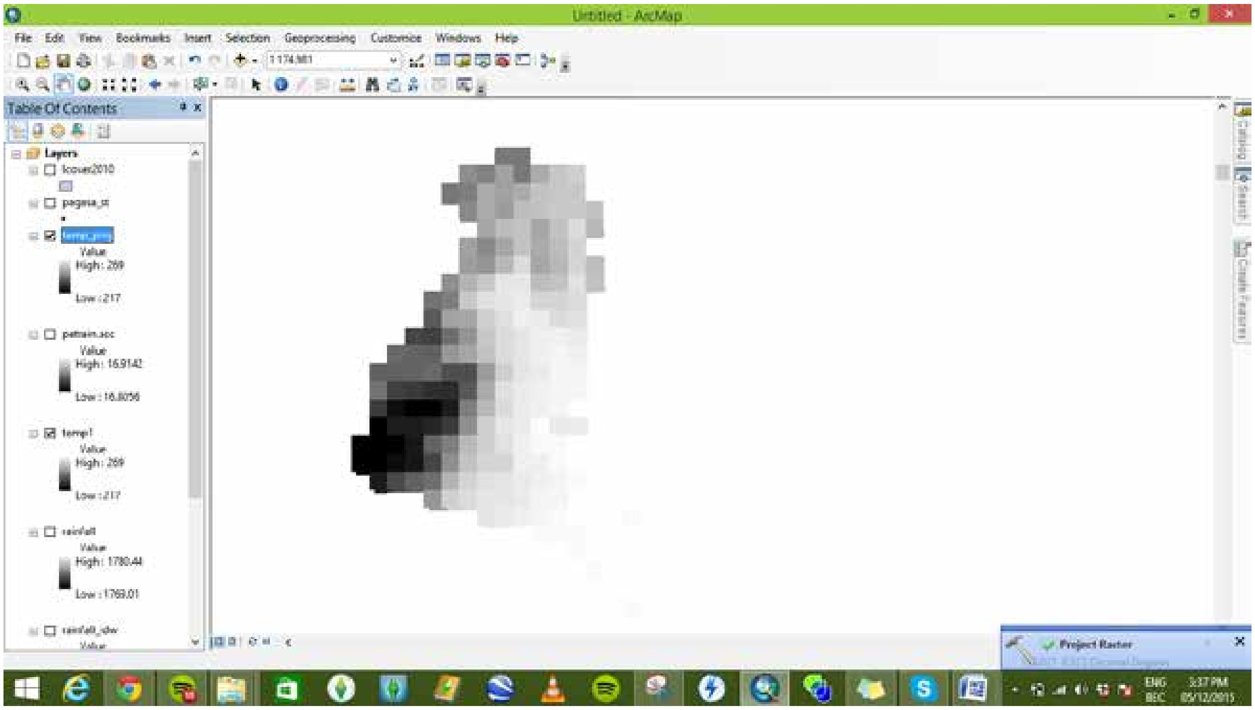
- Add "temp1" from the "Datasets" folder.



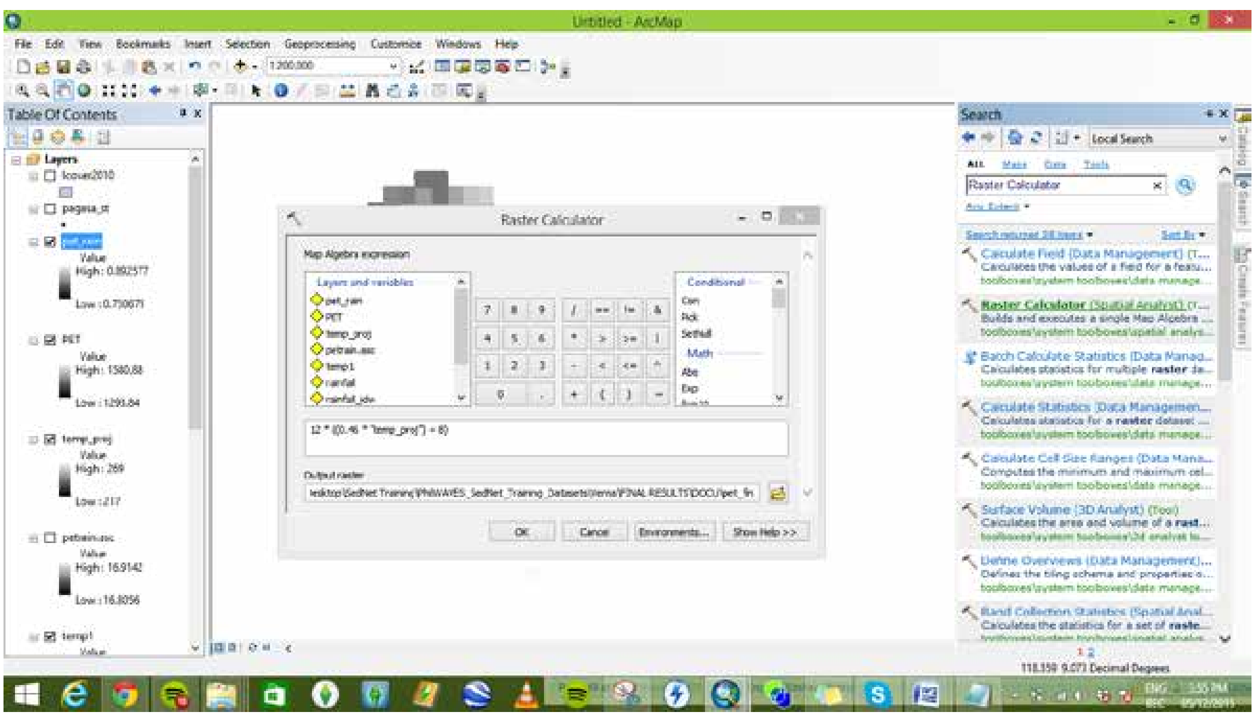
- Project Raster to WGS 1984 UTM Zone 50N using "Project Raster (Data Managament)". Name the output raster e.g. "temp_proj". Click "OK".



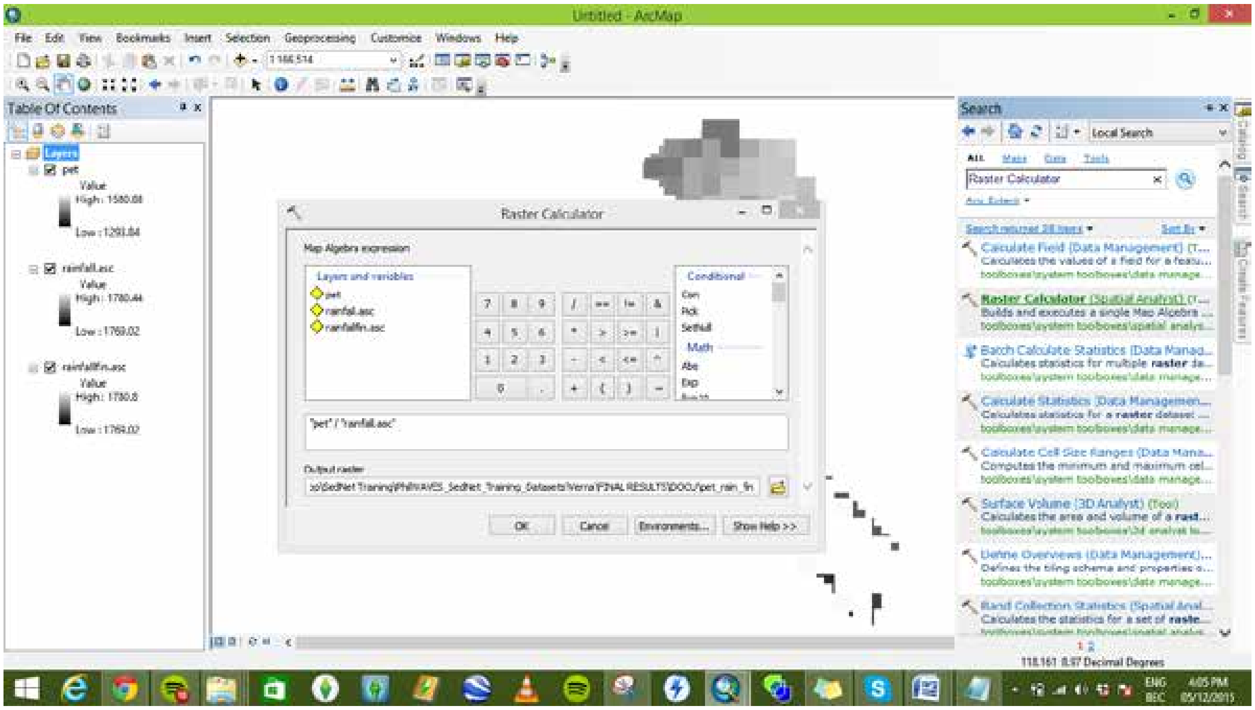
- The projected temperature.



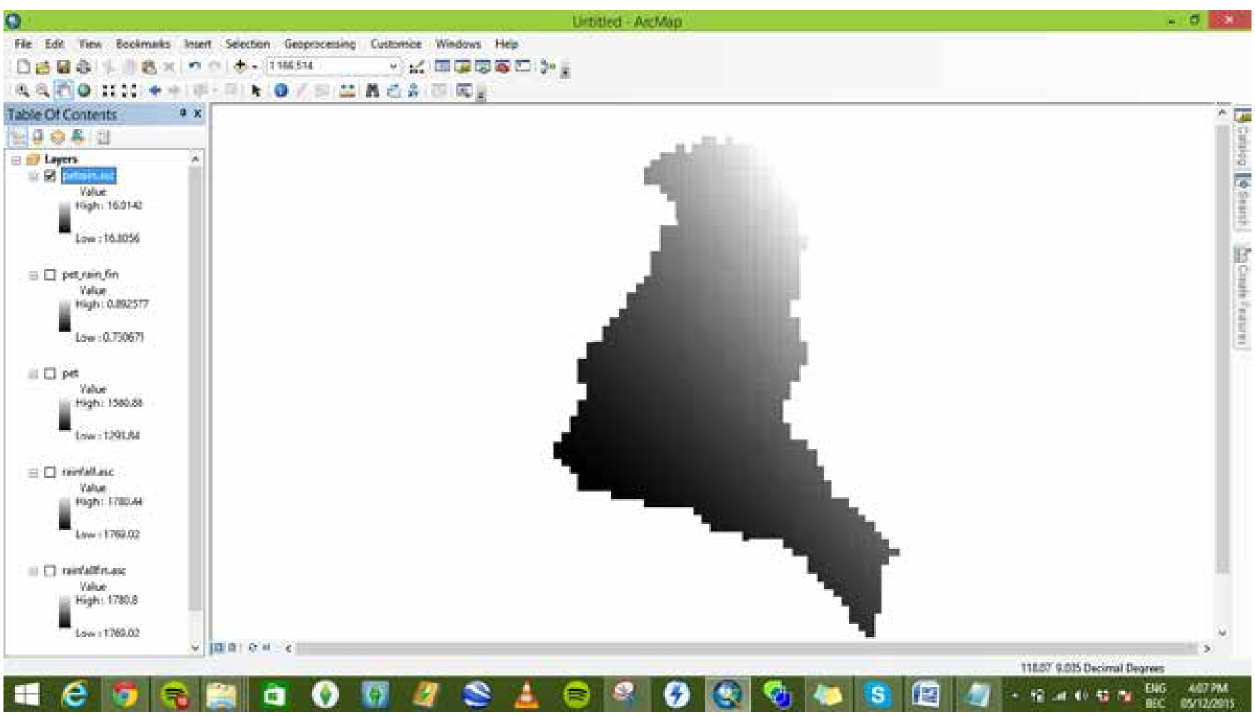
- Using the formula: “% of daytime hrs * (0.46*temp + 8)”, calculate the PET
- Assuming the daylight hours for Palawan is 12 hours: Daylight hours (today) = 12/24 = 12



- Calculate PET/Rain using “Raster Calculator”. Name the ouput raster as “pet_rain”. Click “Ok”.

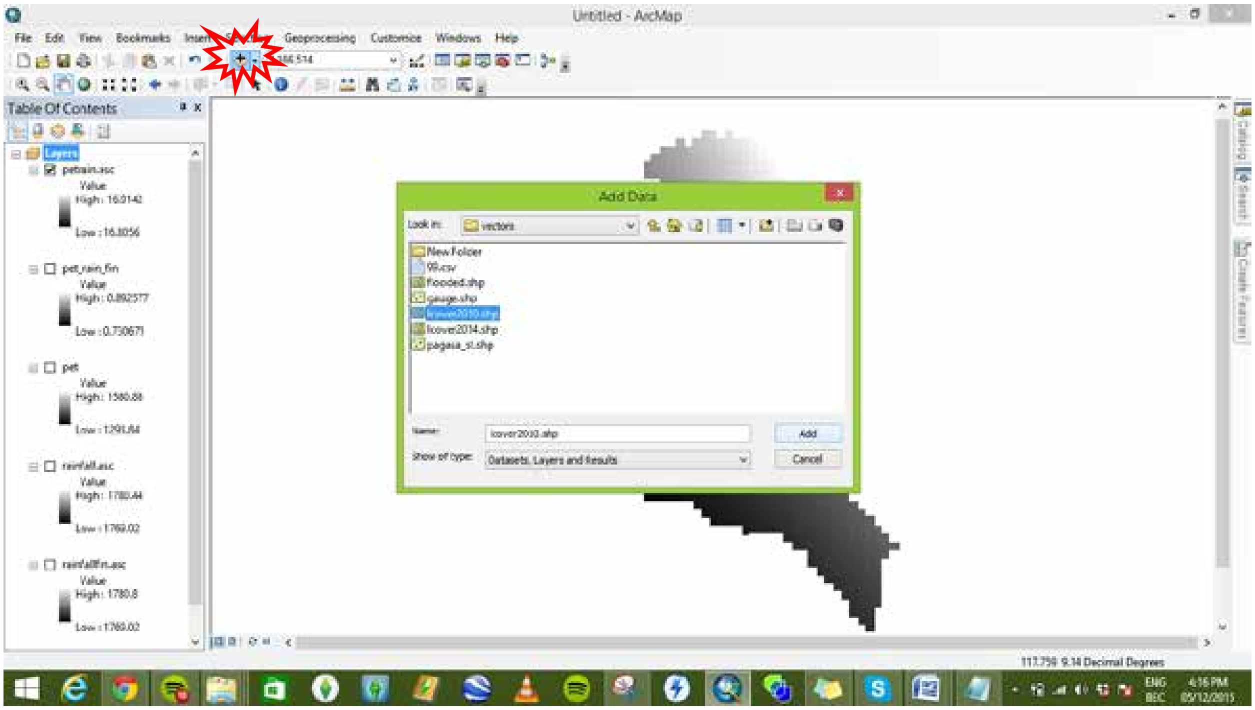


- Using the "Raster to ASCII", convert the pet_rain raster to ASCII format. Below is the result of the operation. Now the "pet-rain.asc" is ready for SedNet operation.

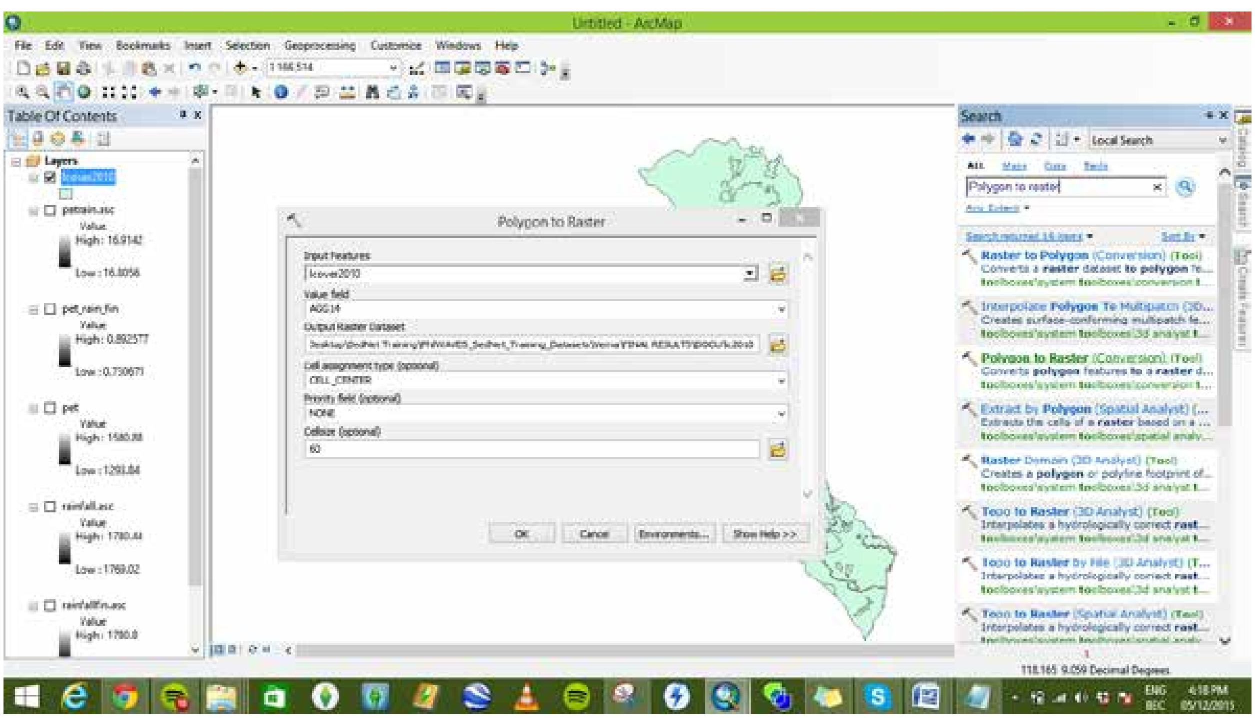


2.1.7. Landuse

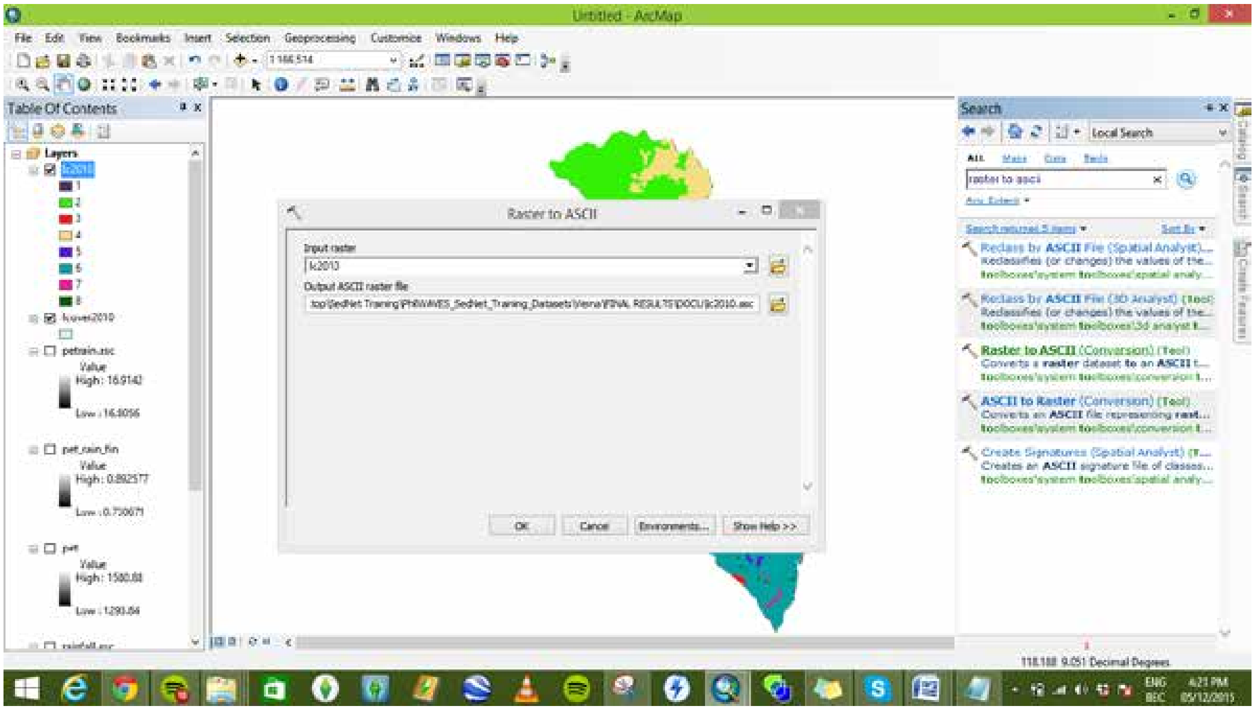
- Load “lc2010” from the “Vector” folder of the “Dataset”.



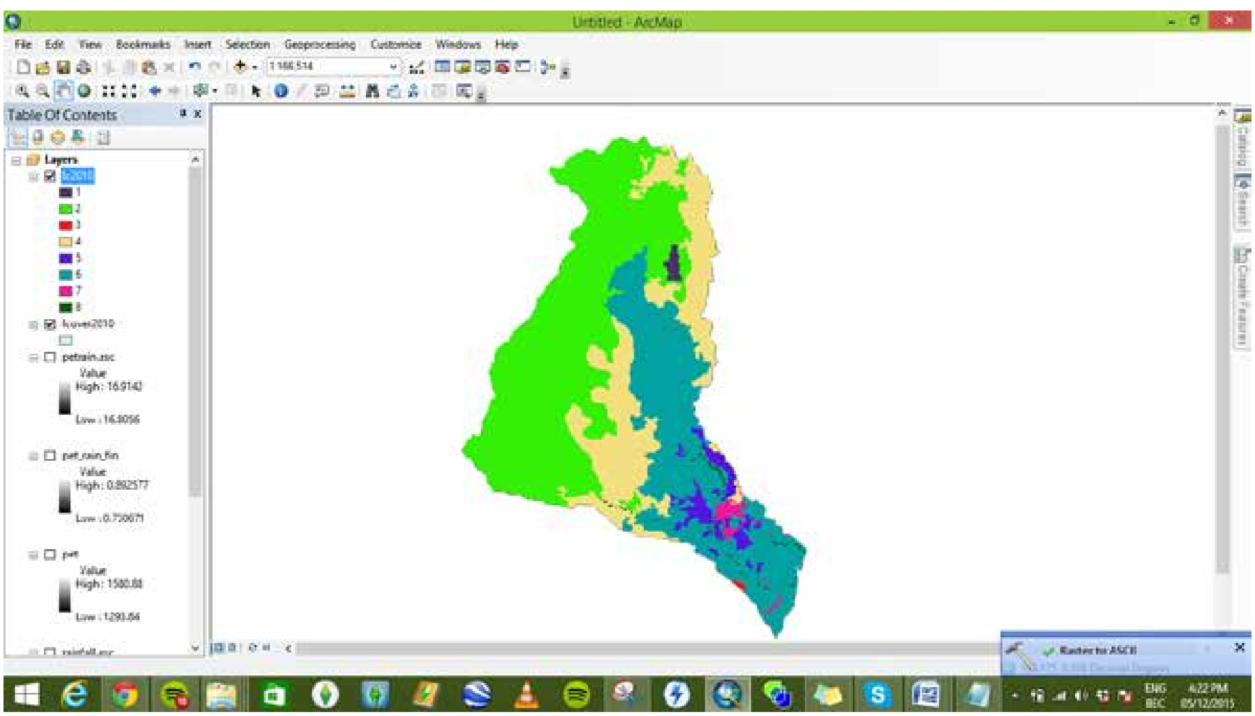
- Convert the shapefile to raster format using “Polygon to Raster” making ACG 14 as The “Value Field”. Name the output map as lc2010 and change the cellsize number to 60. Save this in your working folder. Click “OK”.



- Convert “lc2010” raster to ASCII format.



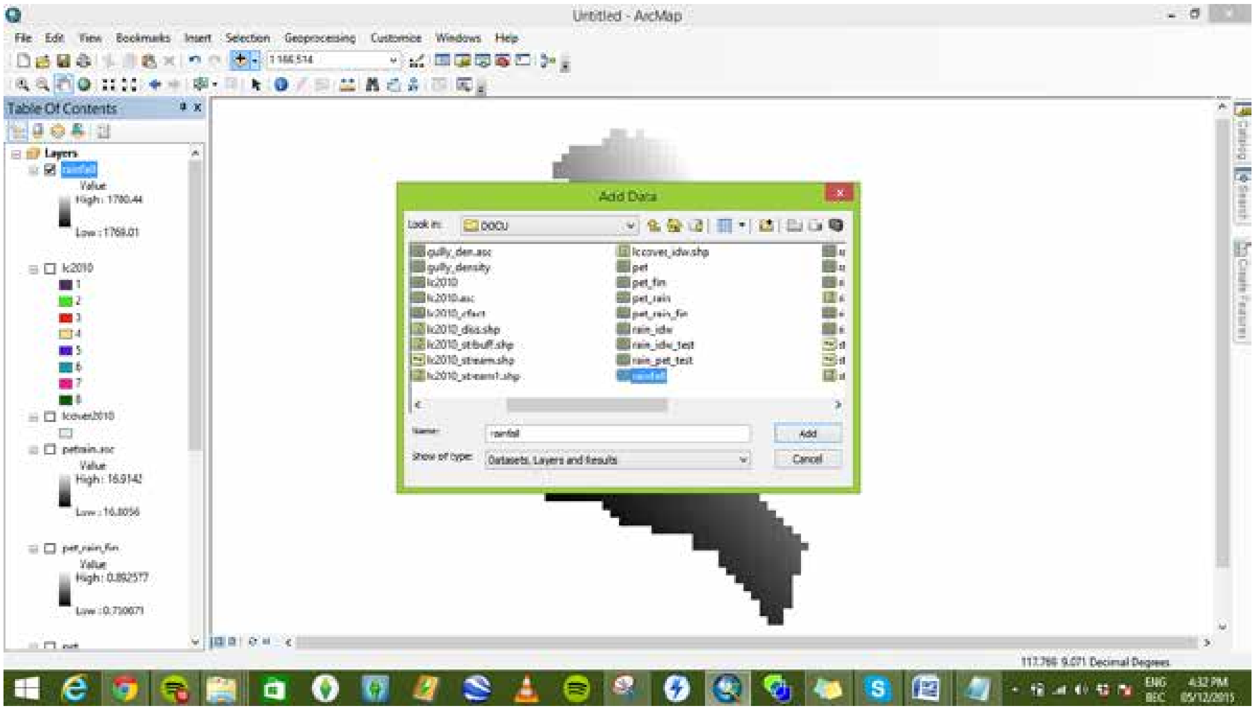
- Below is the “lc2010.asc” ready for SedNet.



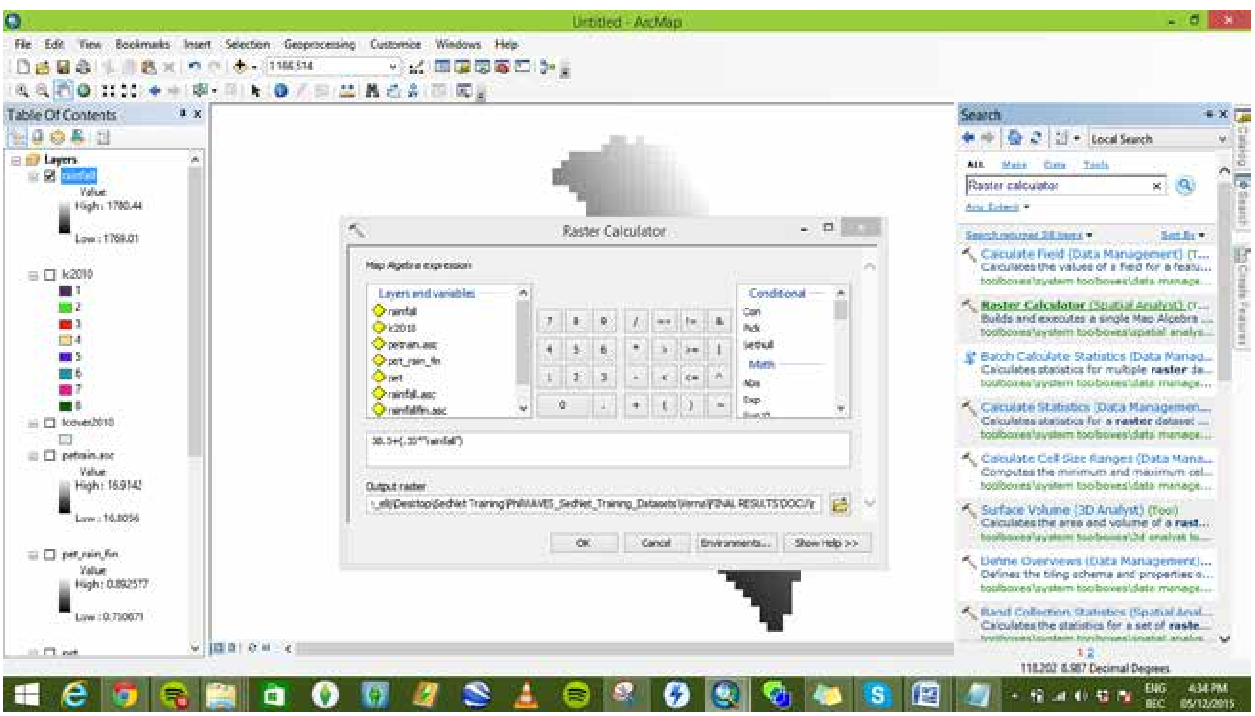
2.1.8. RKLSC

R factor

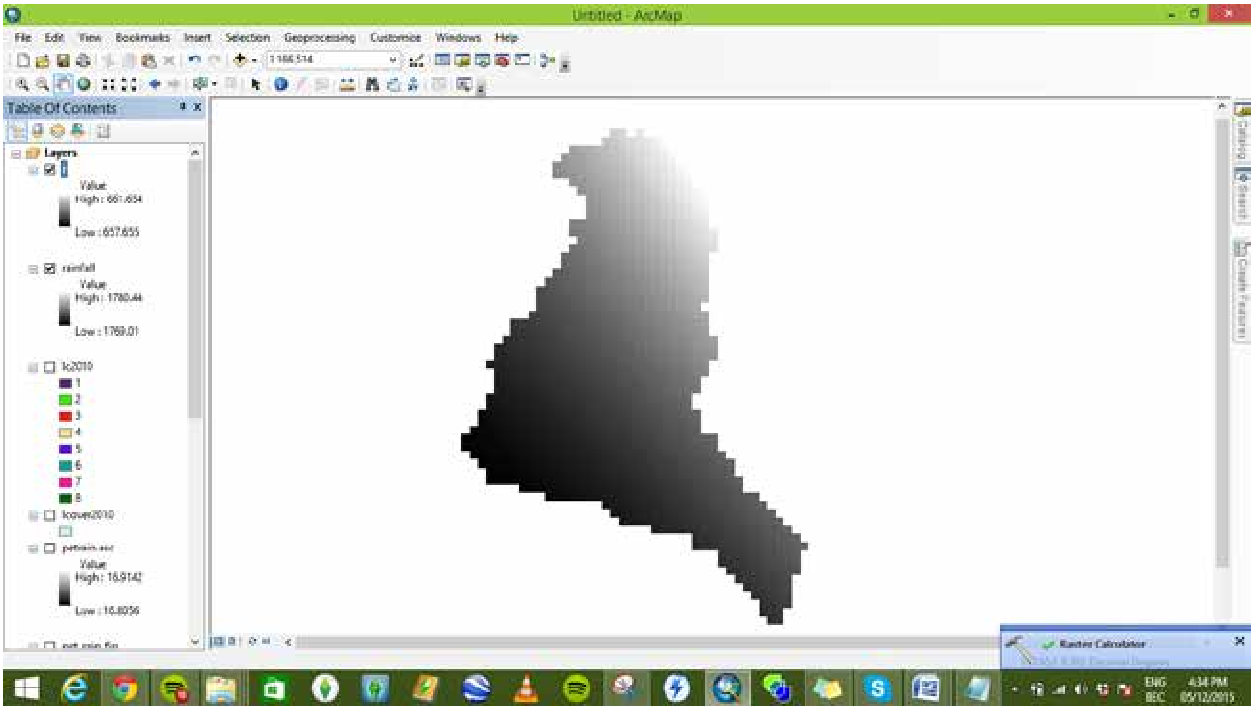
- Load rainfall.asc



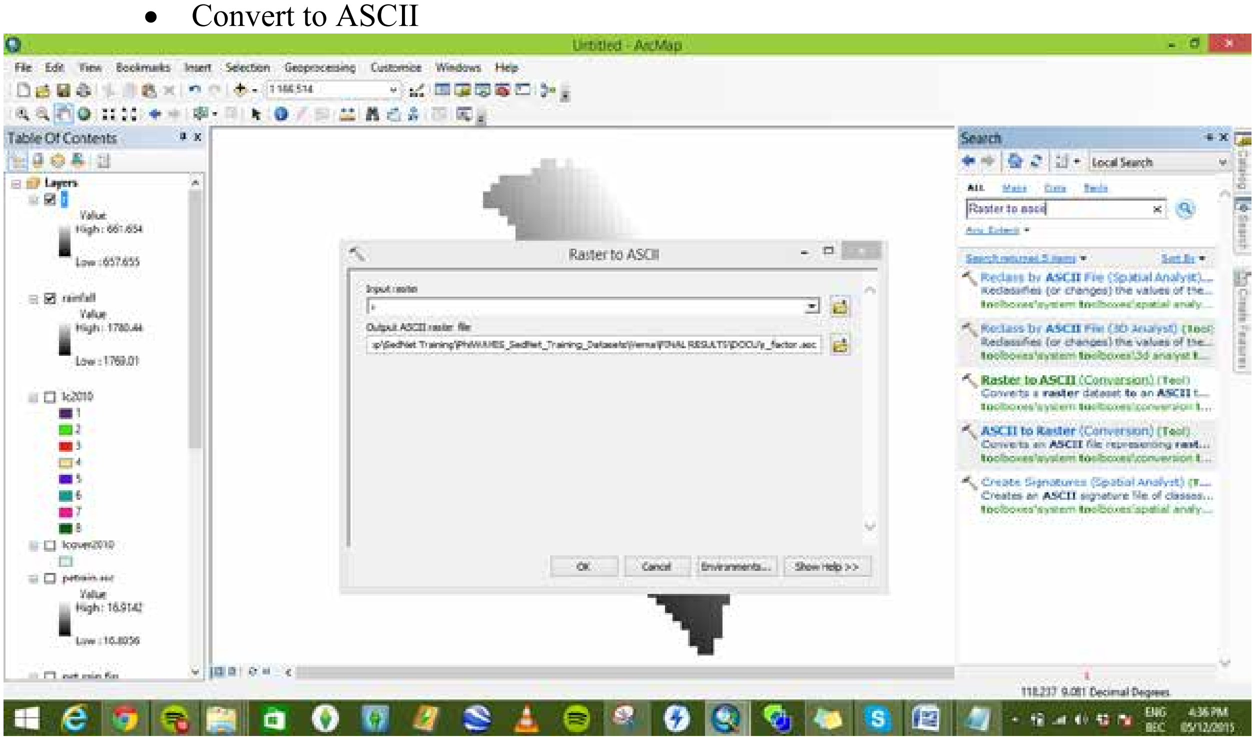
- Using "Raster Calculator" compute for R factor using formula: 38.5+(.35*"your own rainfall data").



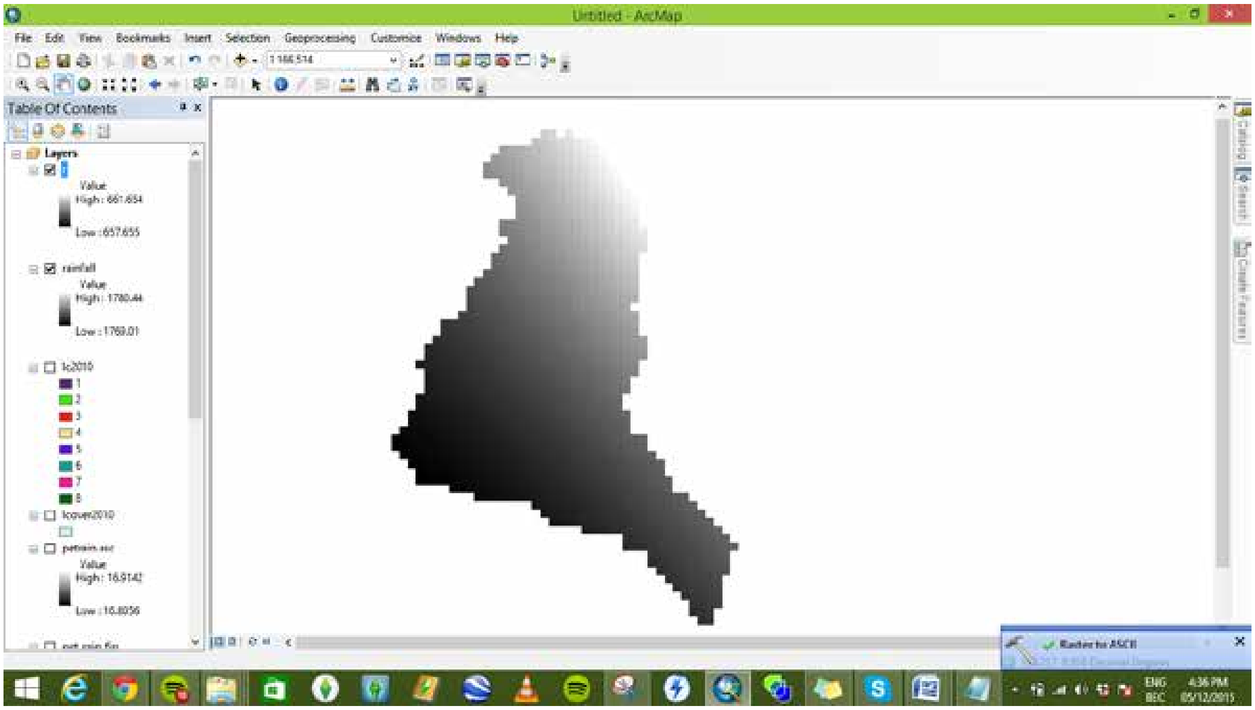
- The R factor.



- Convert to ASCII

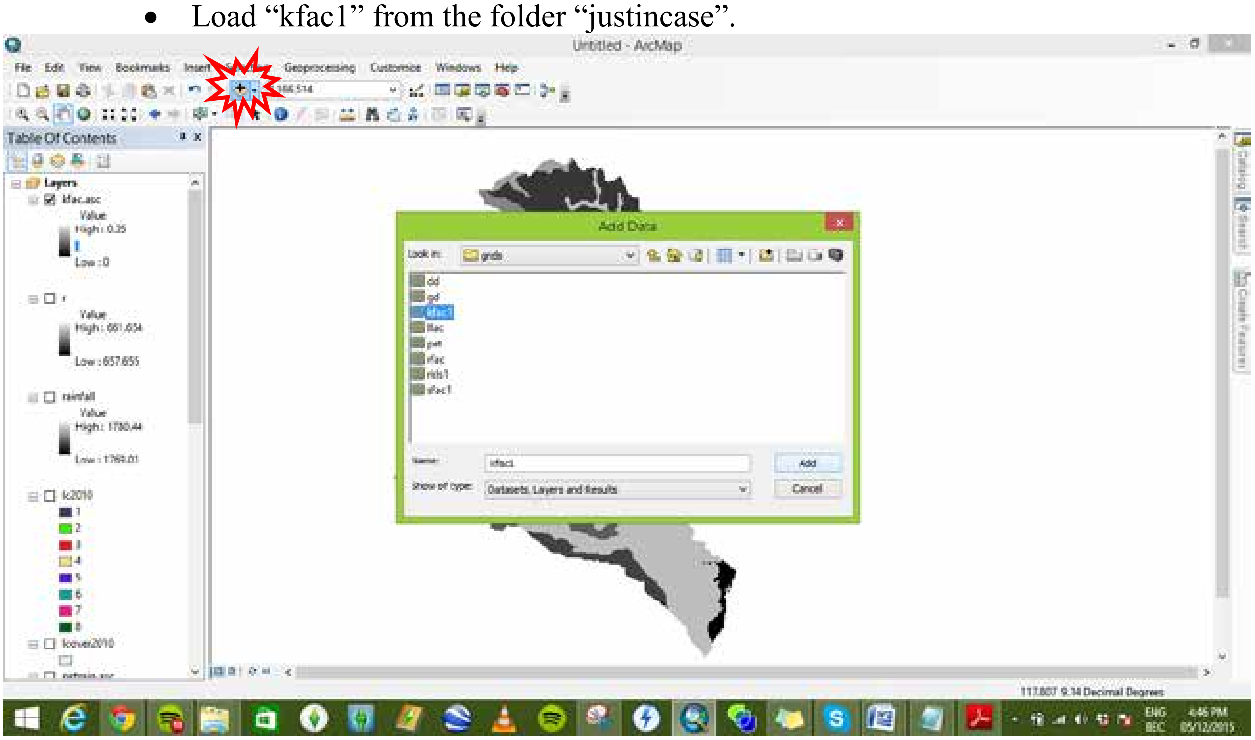


- The "r_factor" isnow ready for SedNet.



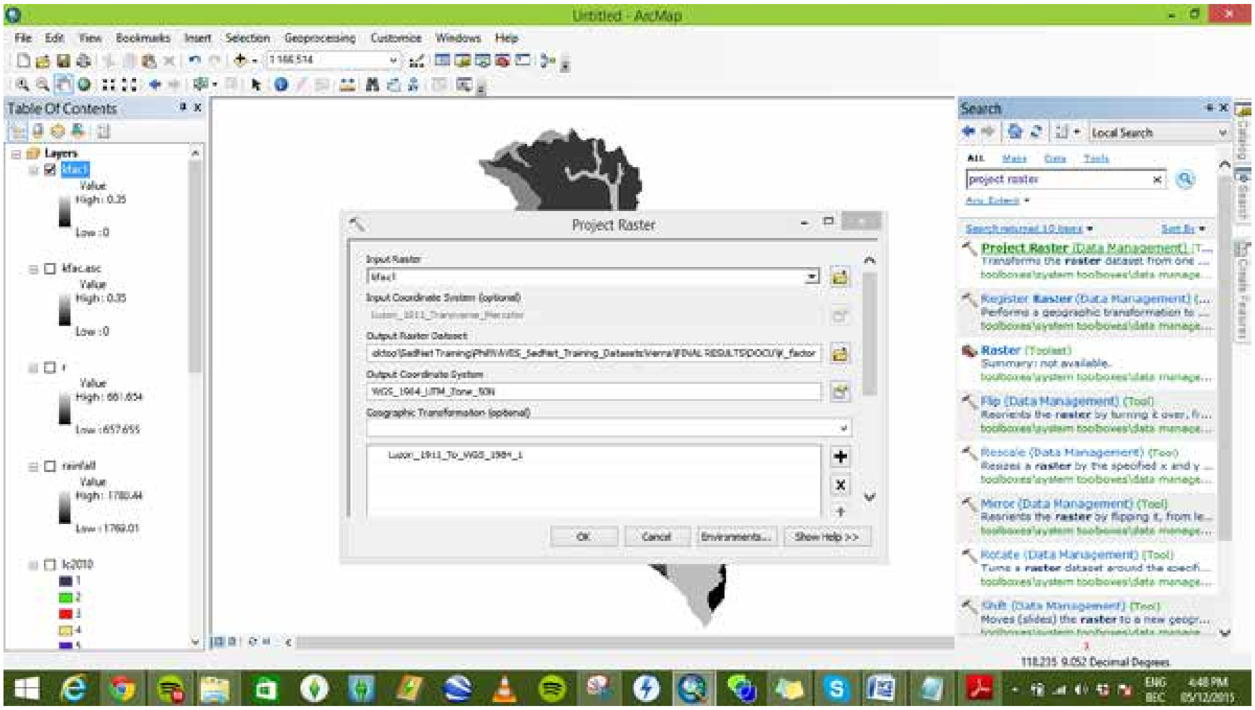
K factor

- Load "kfac1" from the folder "justincase".

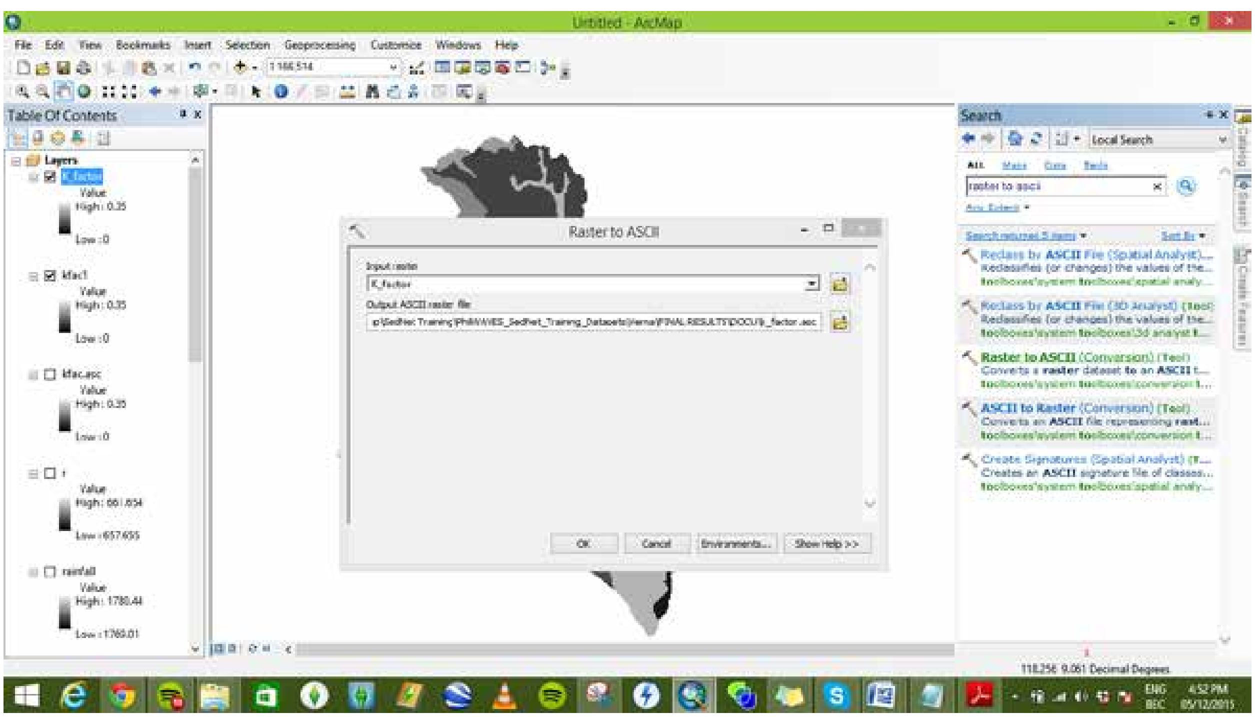


- Change projection using "Project Raster".
- Save output raster as "K_factor" in your working folder.
- "Output Coordinate System" should be WGS1984 UTM Zone 50N.

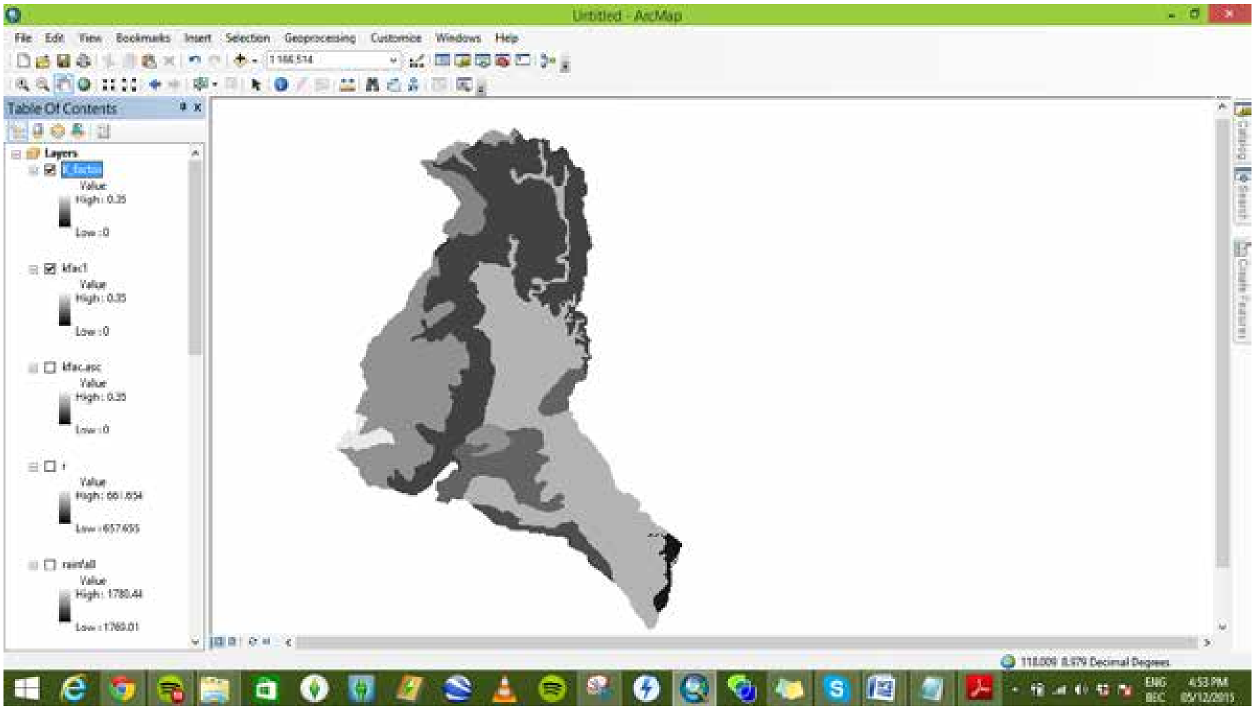
- Click “Ok”.



- Convert to ASCII format with output filename “K_factor.asc”. Note to remove the .TXT extension.
- Click “Ok”.

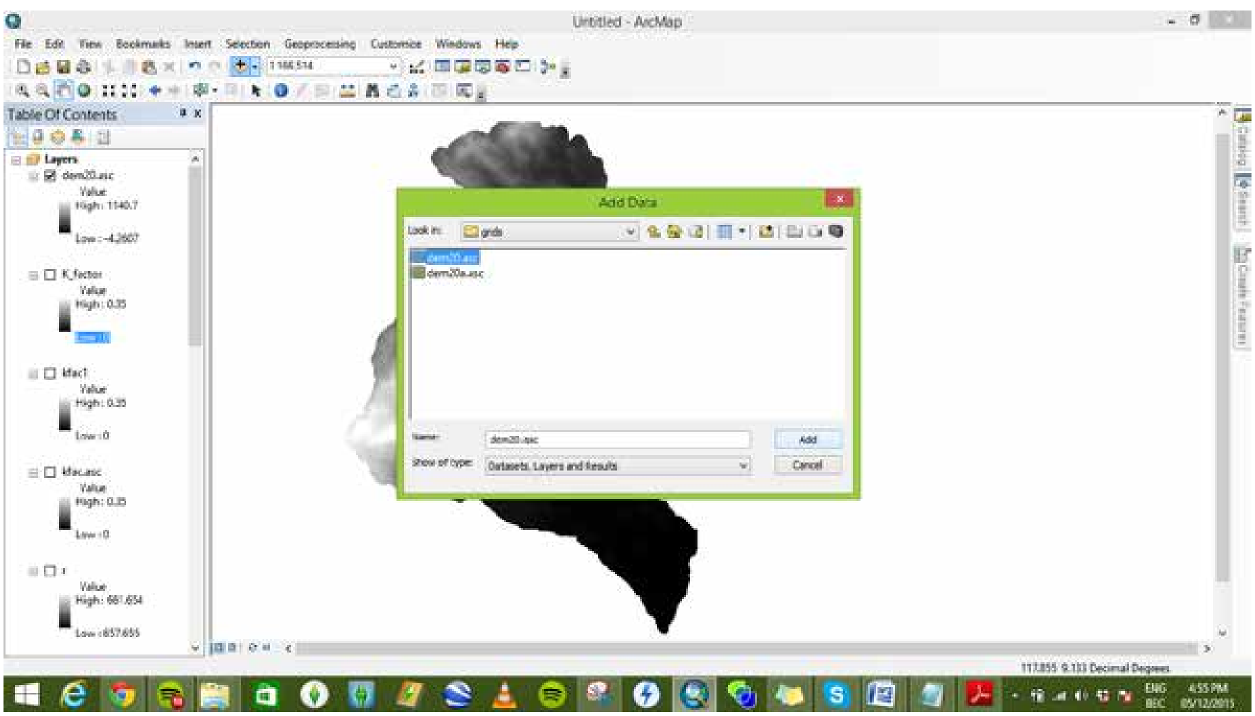


- Your “K_factor.asc” is now ready for SedNet.

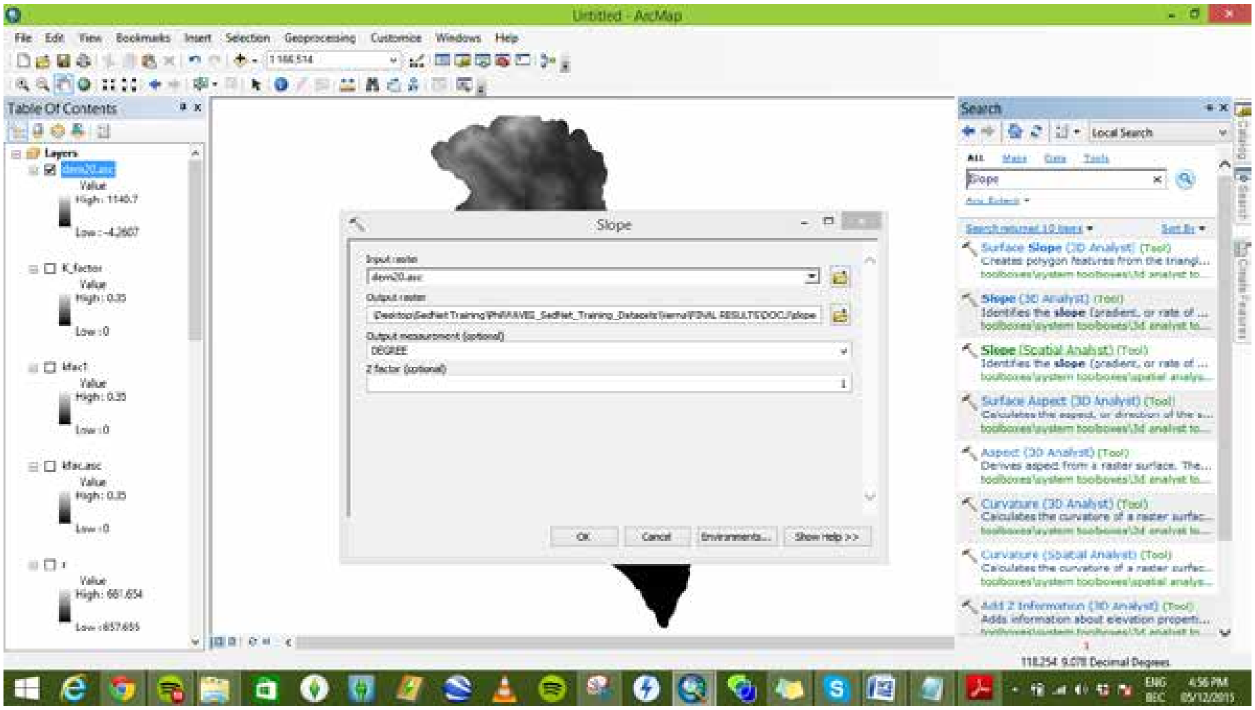


L factor

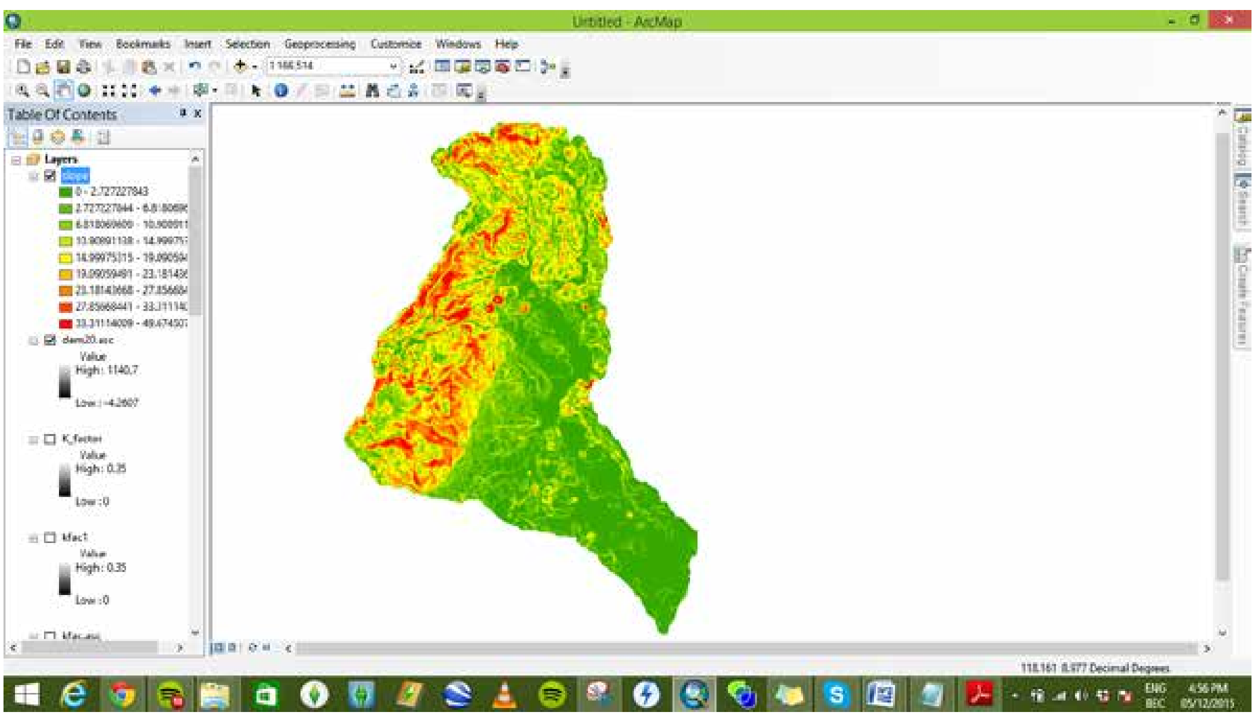
- Load filled dem



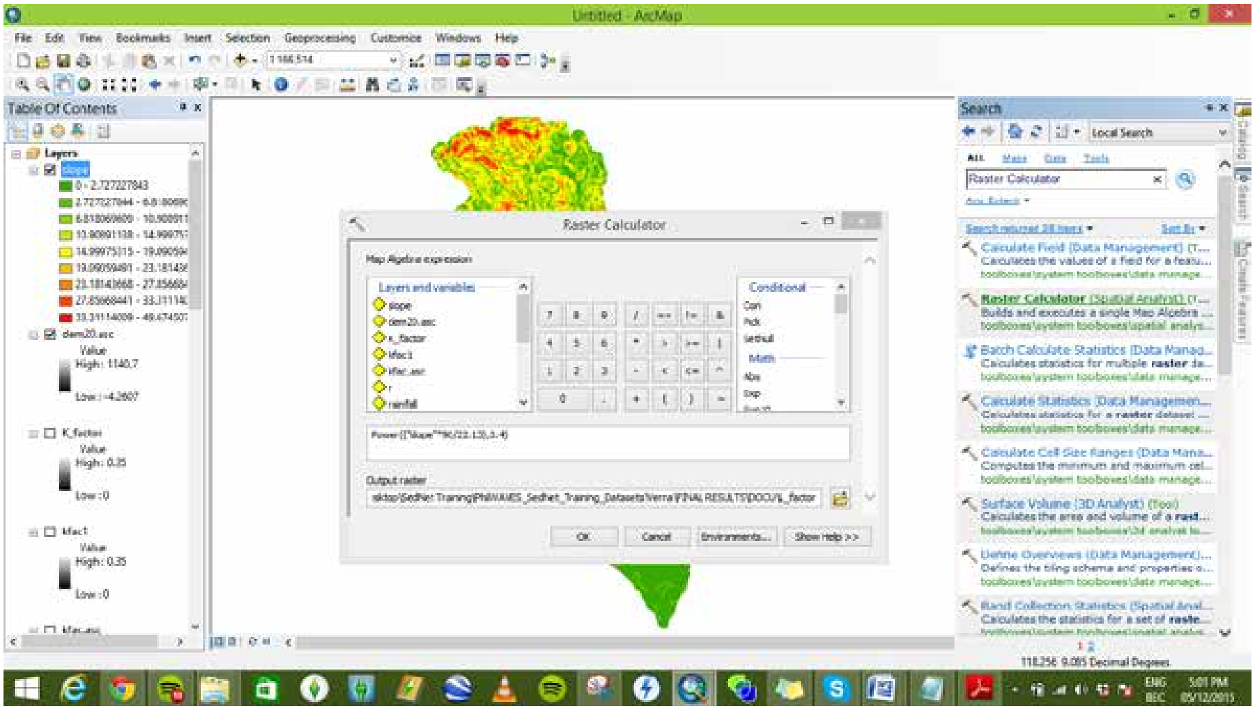
- Create a slope map in degrees using “Slope (Spatial analyst)”



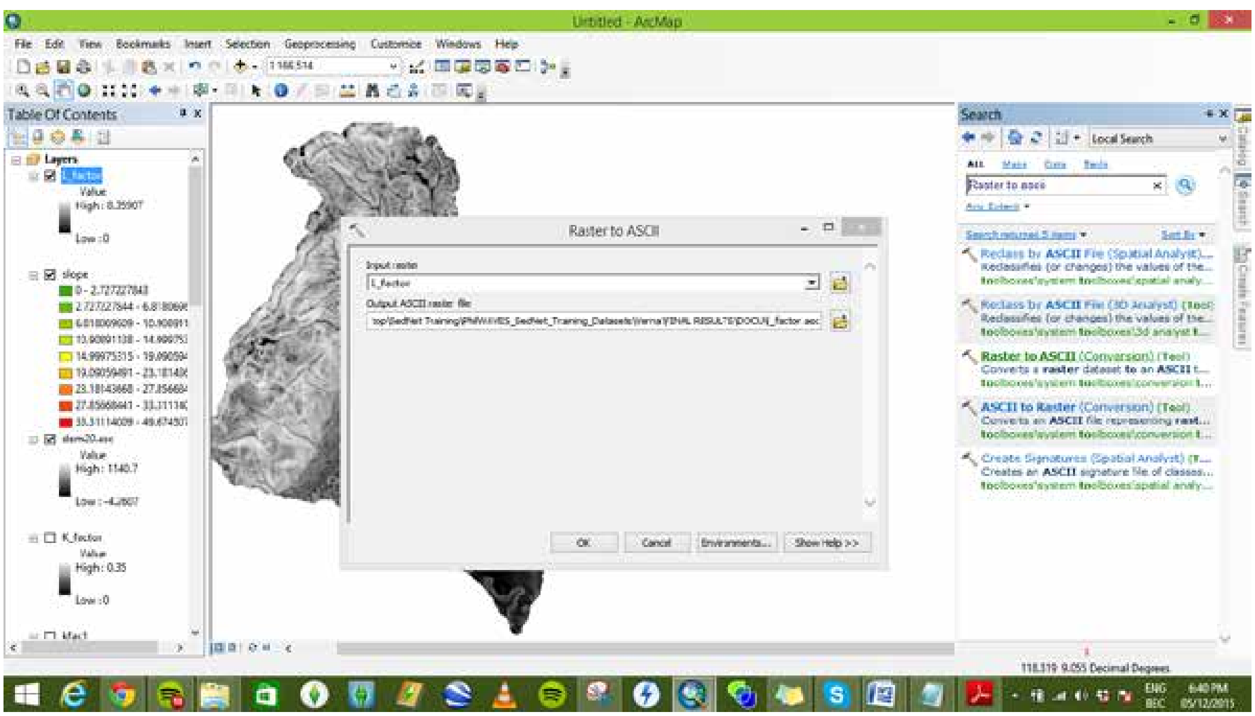
- The “slope” map.



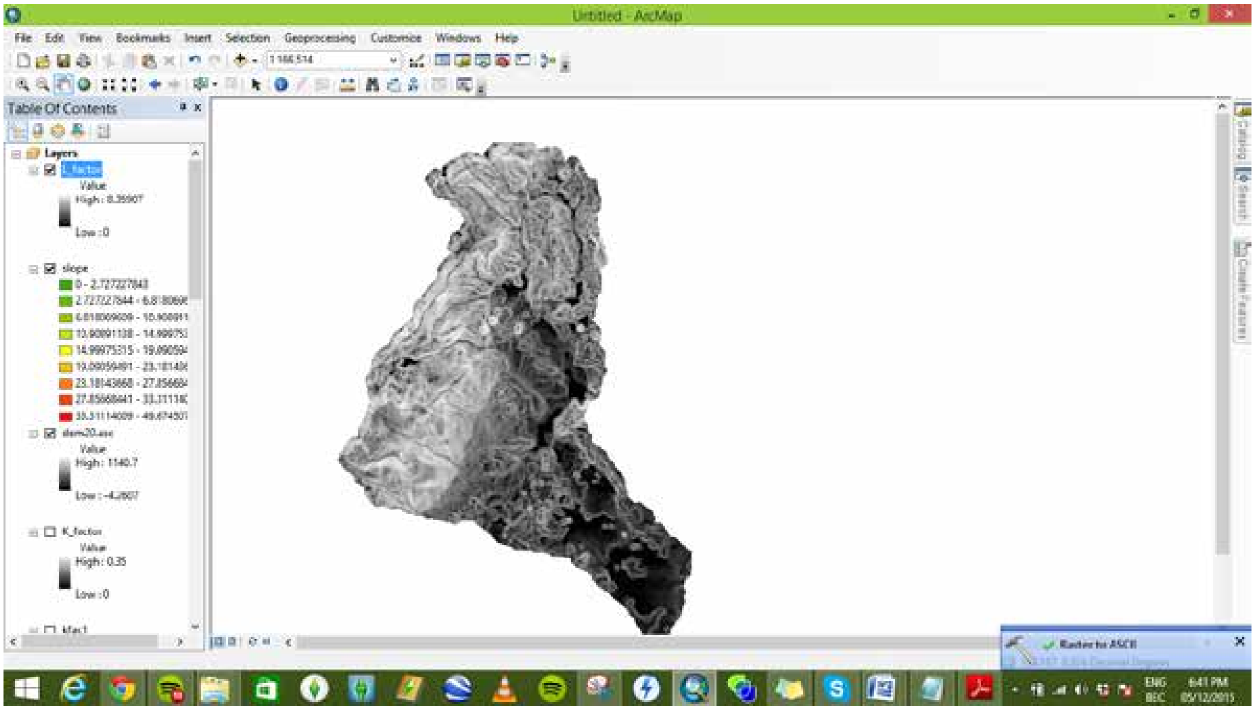
- Using “Raster Calculator” calculate for L factor using the formula: Power(("slope"*90/22.13),0.4)
- Click “Ok”.



- Convert to ASCII format with output filename "l_factor.asc". Note to remove the .TXT extension.
- Click "Ok".

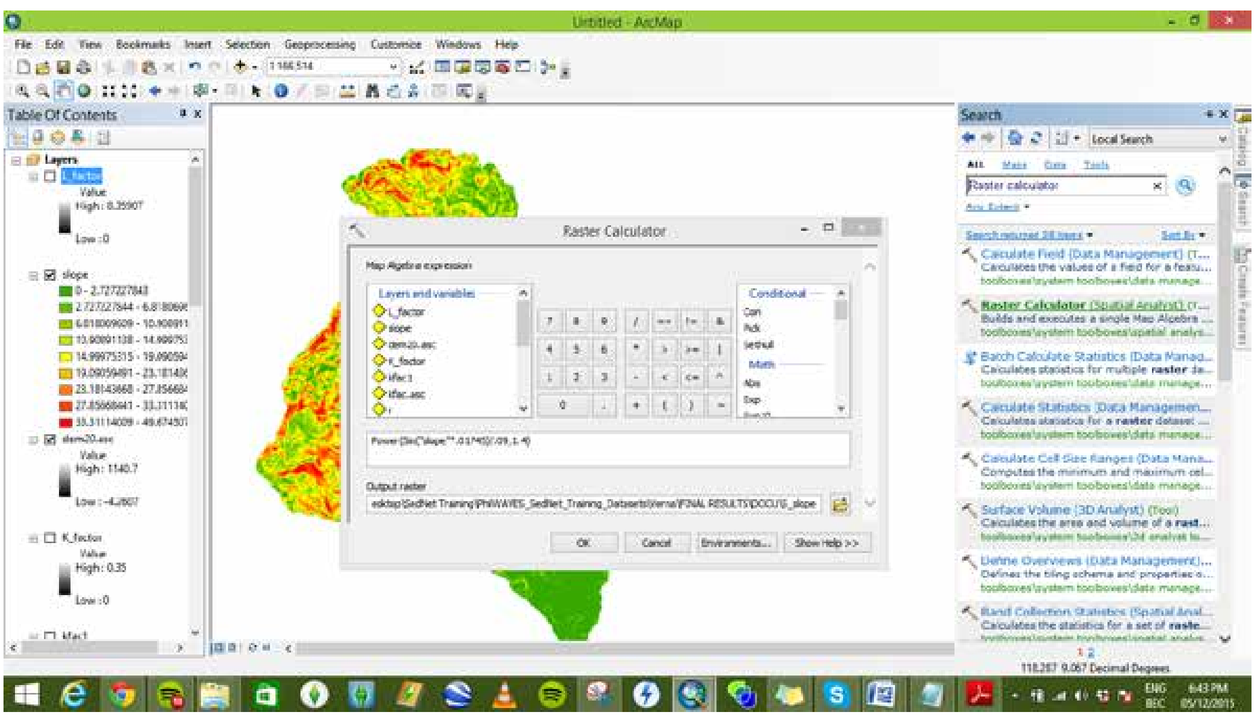


- Your "l_factor.asc" is now ready for SedNet.

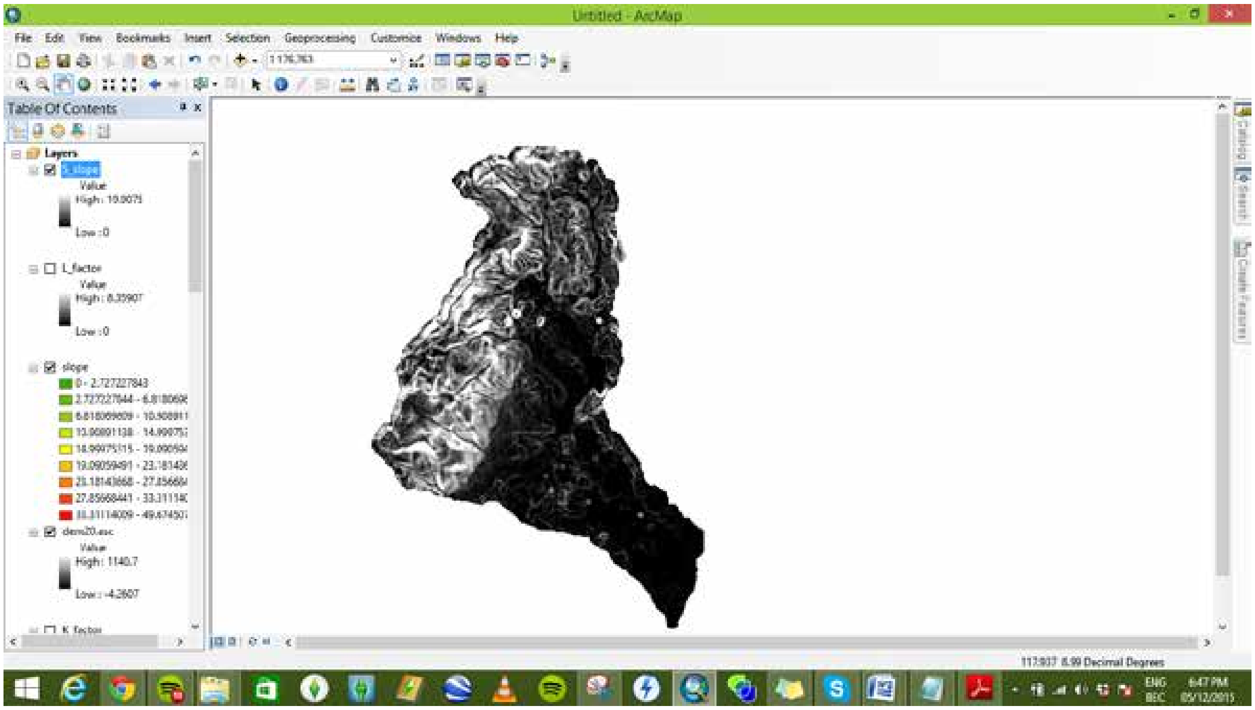


S factor

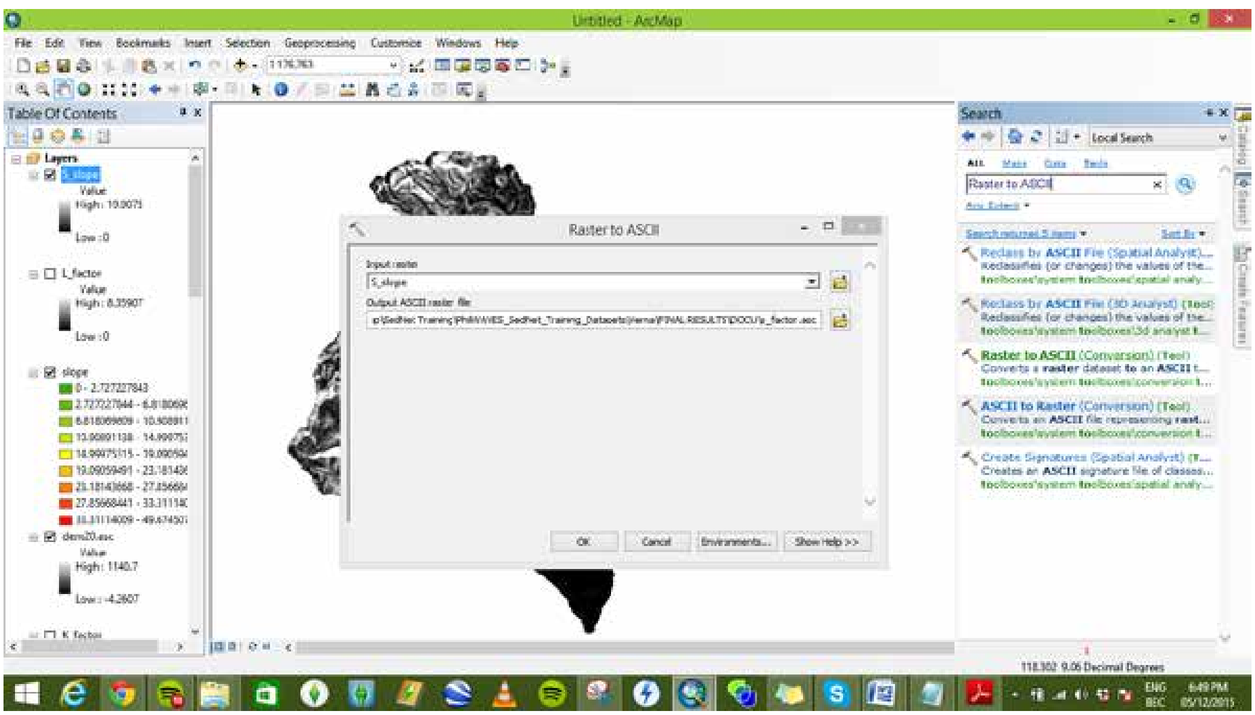
- Compute for S factor using the formula “Power(Sin("slope"*.01745)/.09,1.4)” in the “Raster Calculator”. The “slope” is your “slope” map created earlier.



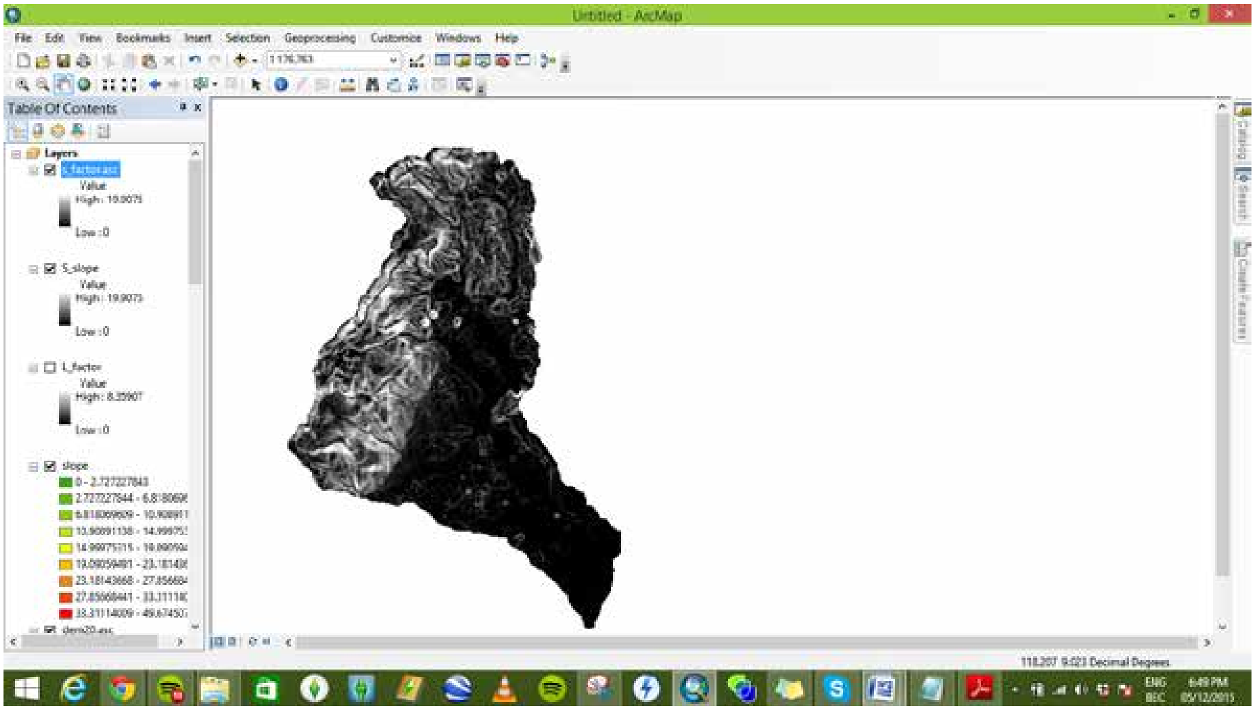
- Your “s_factor” map.



- Convert you “S_factor” to ASCII using “Raster to ASCII”.
- Click “OK”.

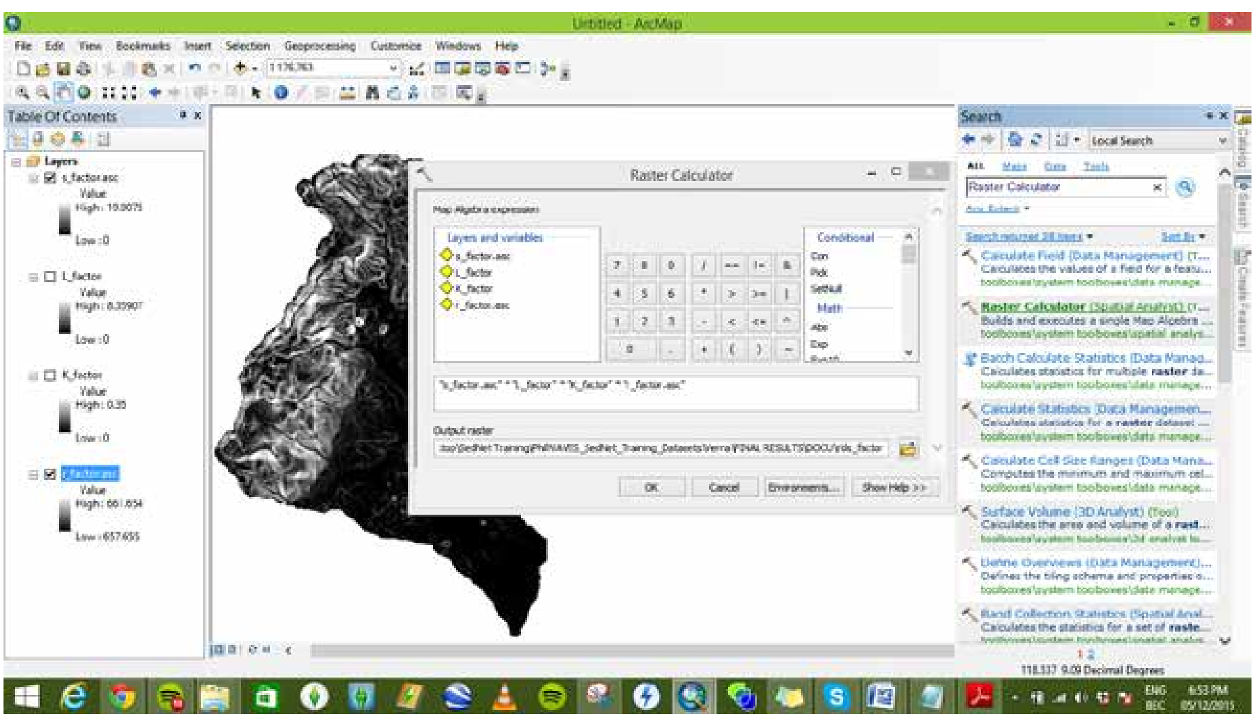


- Your “S_factor.asc” is now ready for use in SedNet.

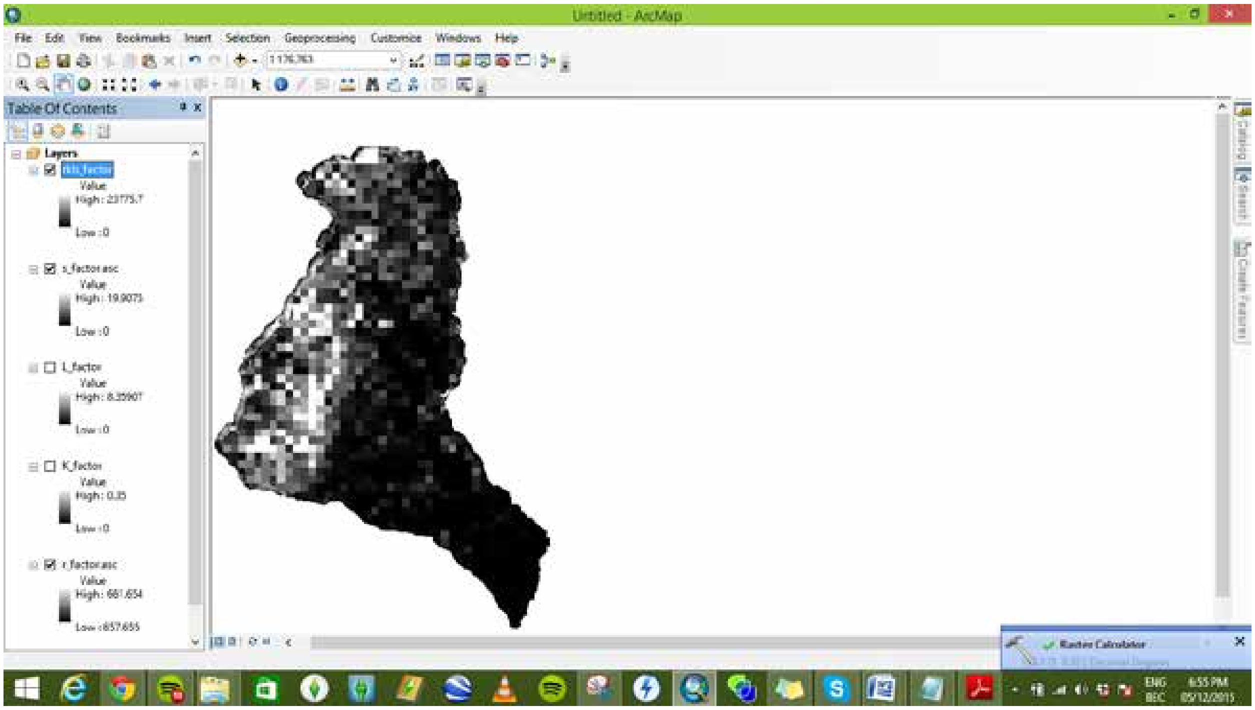


RKLS Factor

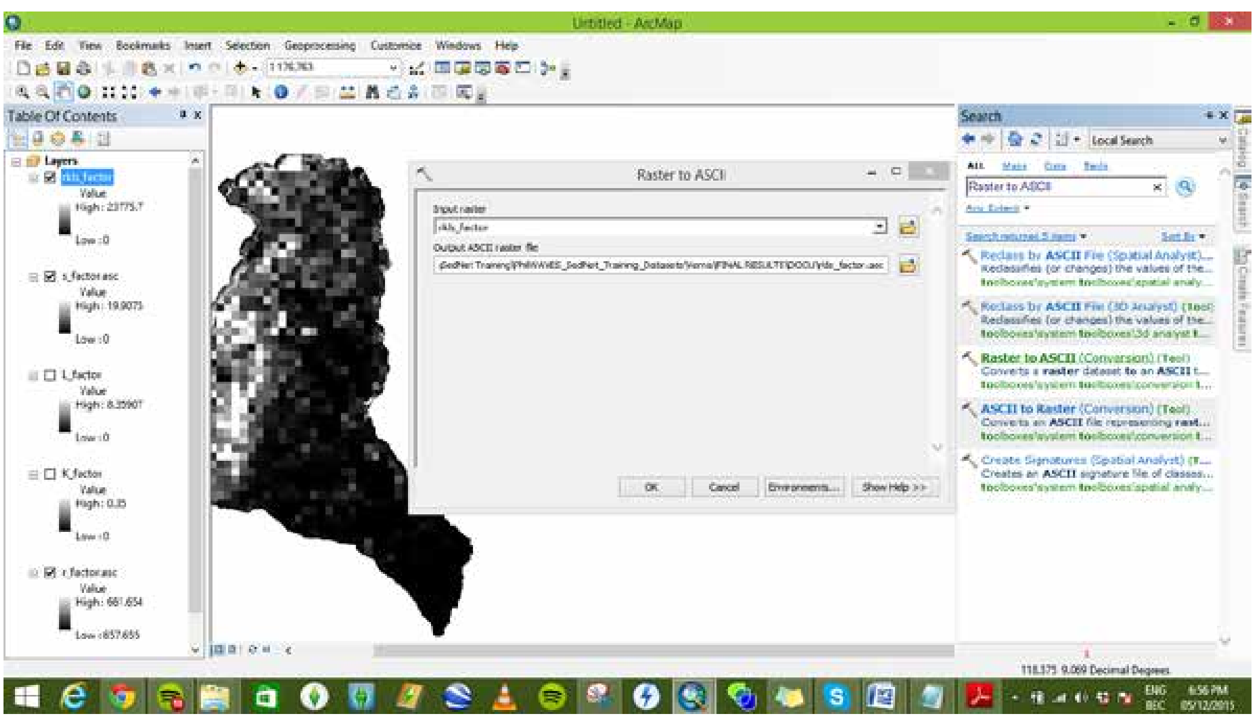
- Load your R, K, L, and S factor in ArcMap.
- With the "Raster Calculator" multiply all the map layers to compute for the RKLS Factor.
- Save the outpet raster as RKLS factor and click "OK".



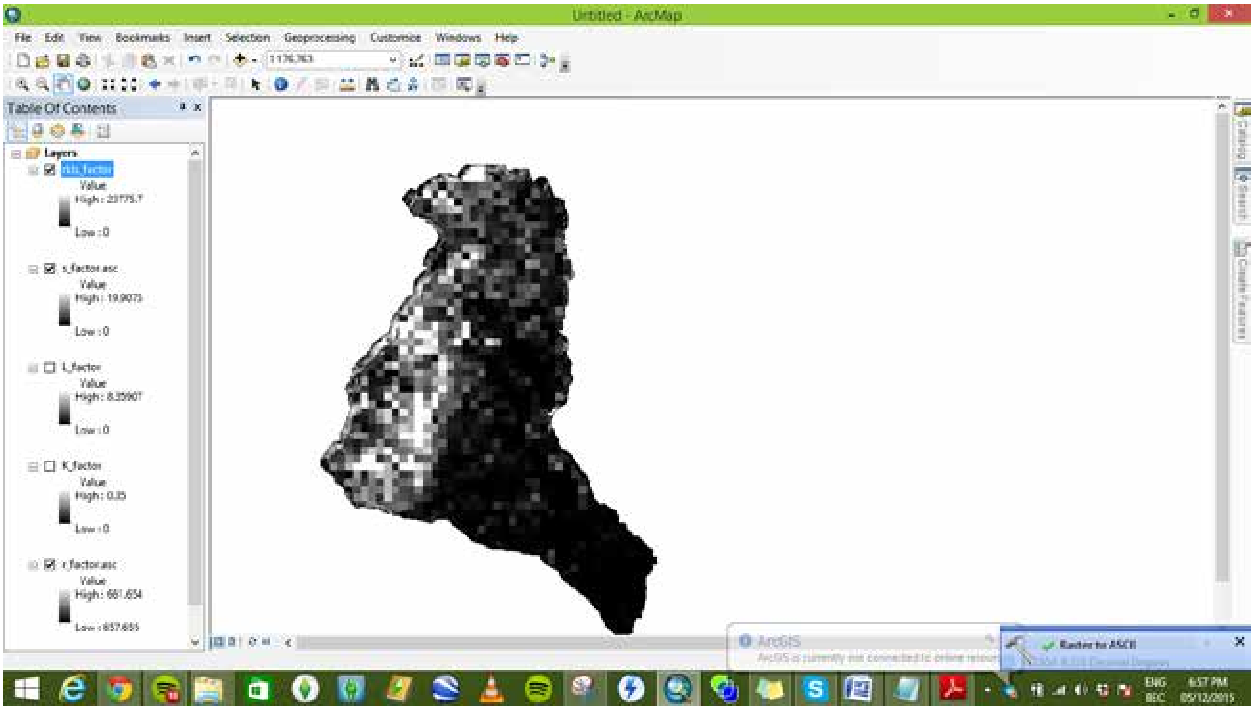
- Your RKLS factor.



- Convert you “RKLS_factor” to ASCII using “Raster to ASCII”.
- Click “OK”.

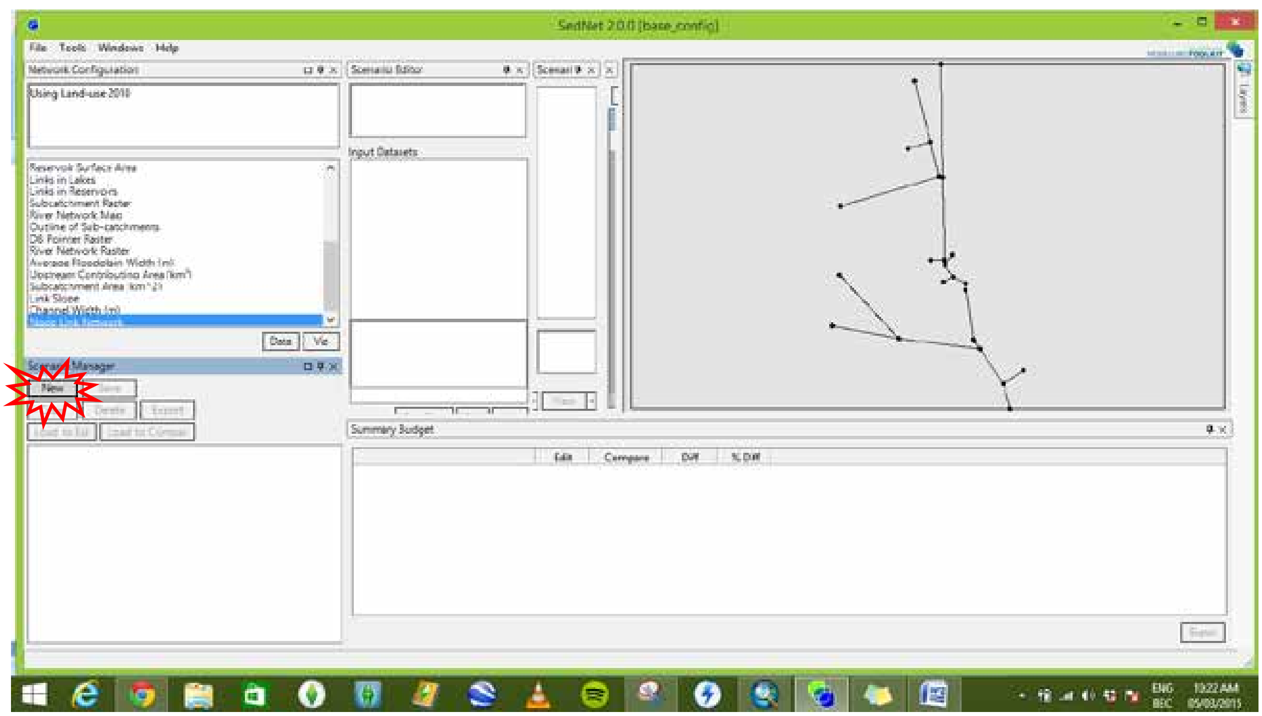


- Your “RKLS_factor” is now ready for SedNet.

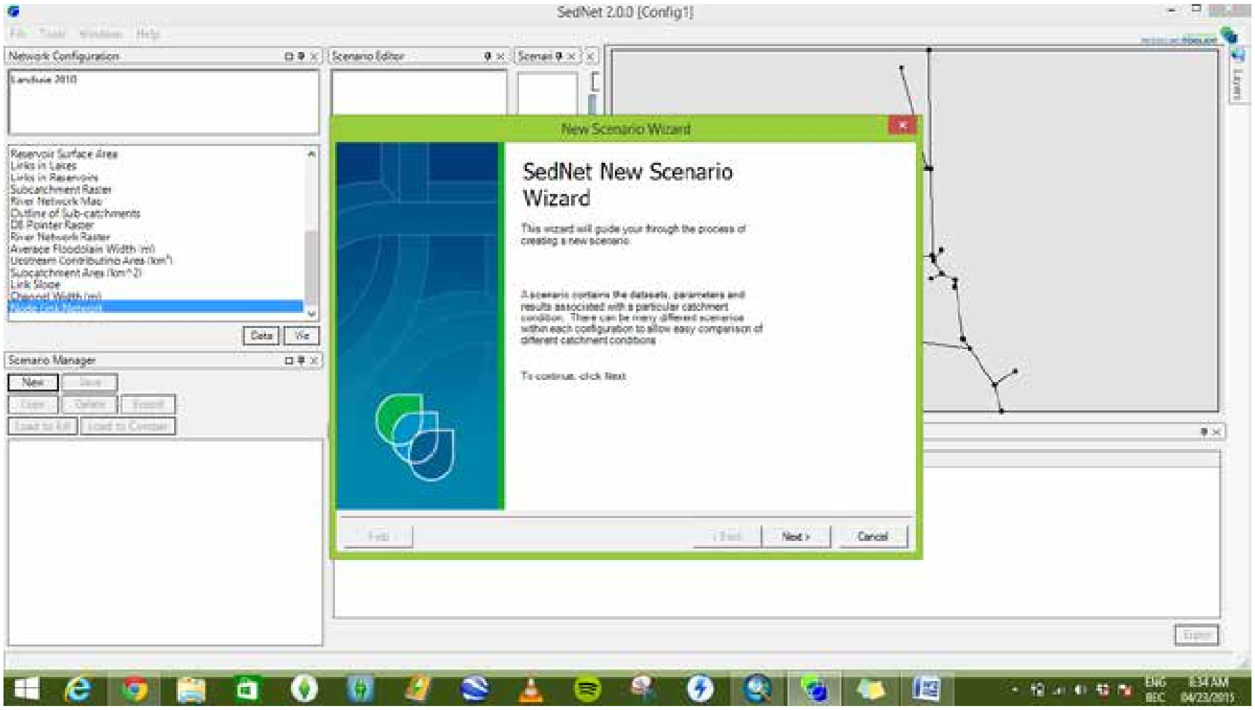


2.1.9. SedNet Interface: Scenario Manager

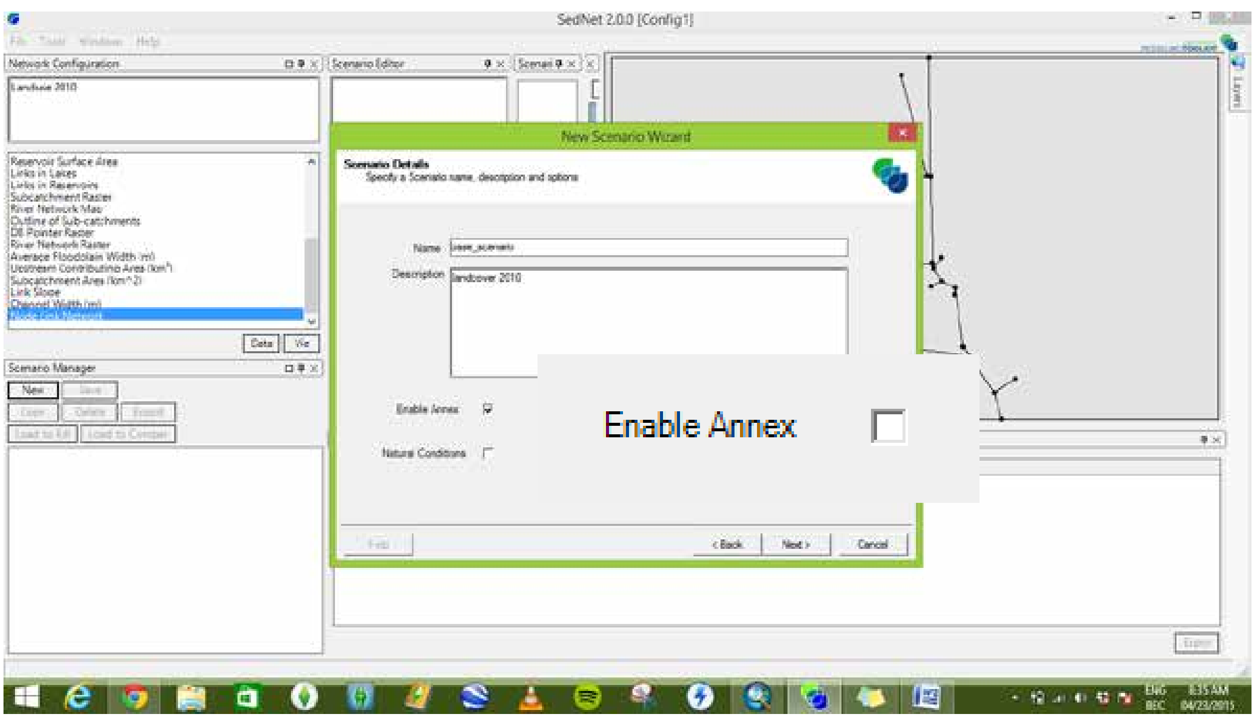
- Click the “New” icon that is now be activated in the “Scenario Manager” window.



- The “SedNet New Scenario Wizard” pop-up will appear. Click “Next”

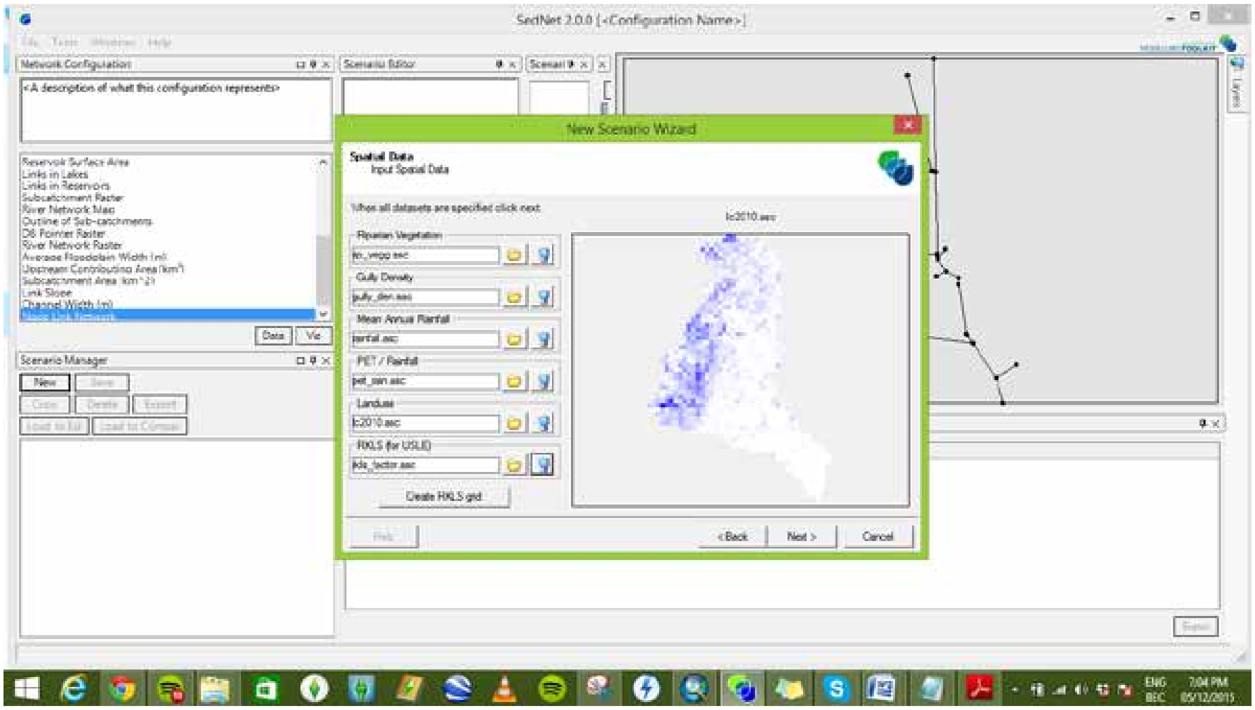


- On the “SedNet New Scenario Wizard” pop-up, designate a name for your scenario as well as the description of the scenario, e.g. base_scenario, landcover 2010.
- Unclick the “enable annex” then click “Next”.



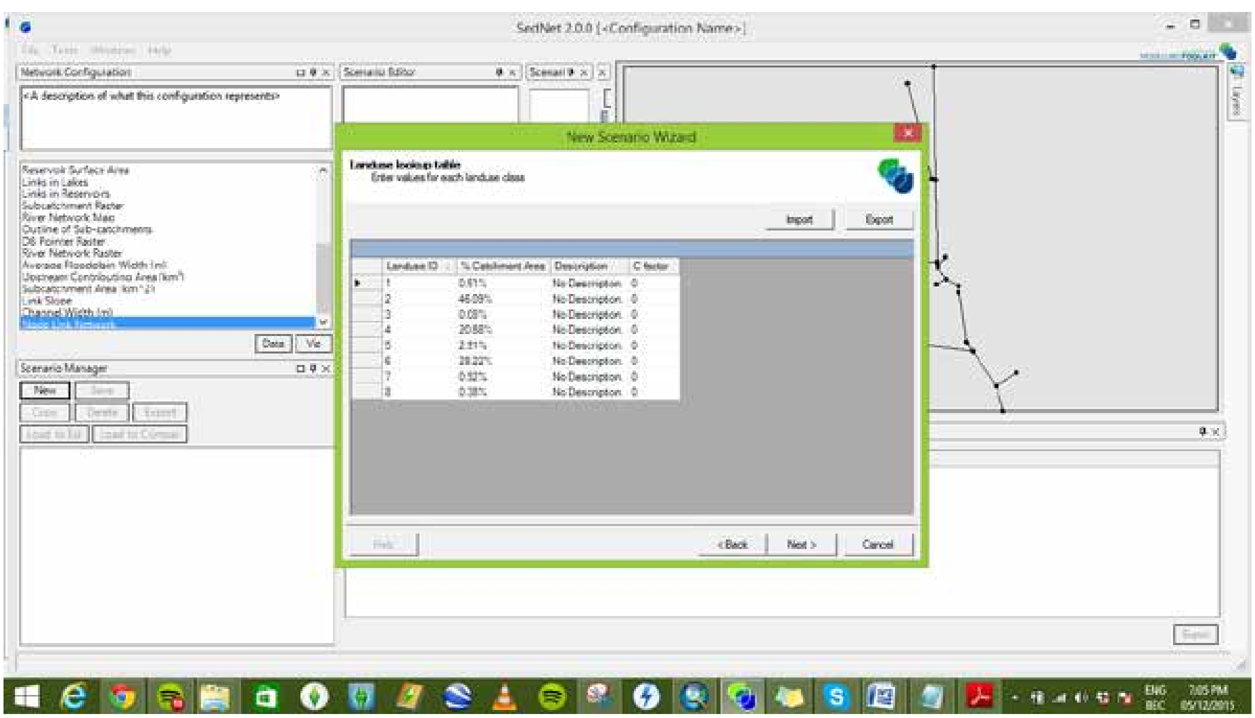
- The “Spatial Data” pop-up window will appear. Insert all the input data converted to ASCII file.

- Click “Next”.

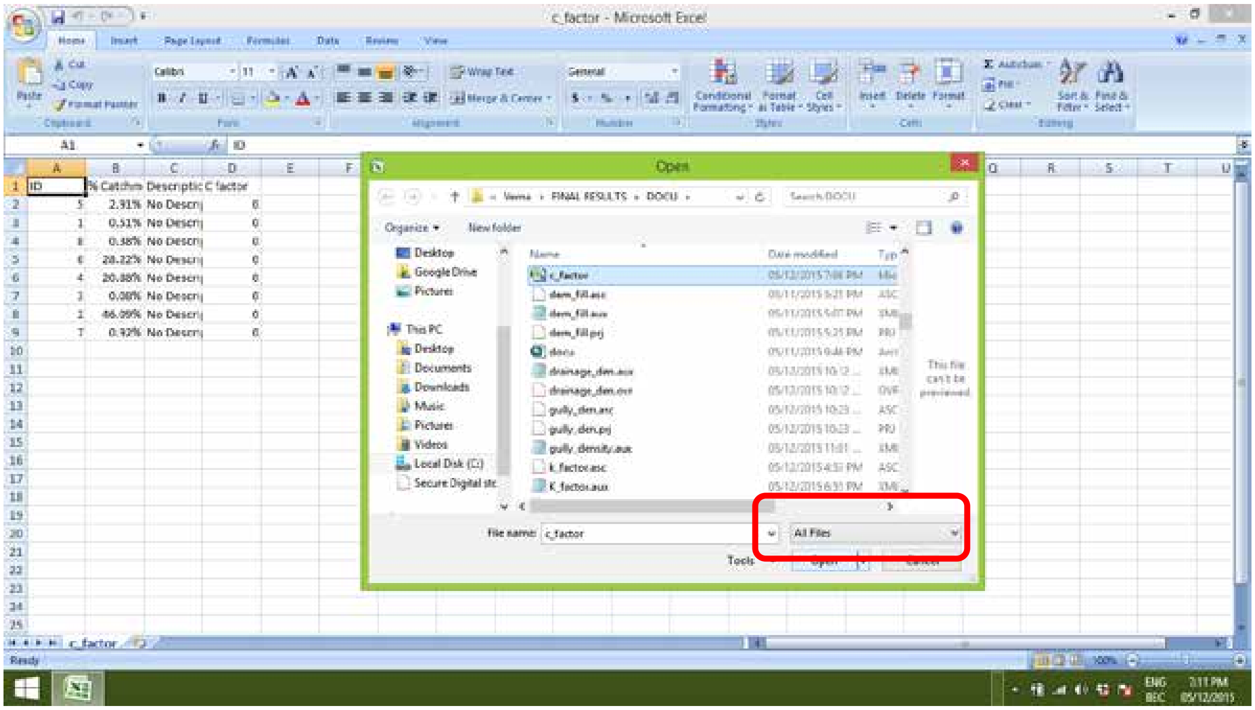


2.1.10. Land-use look-up

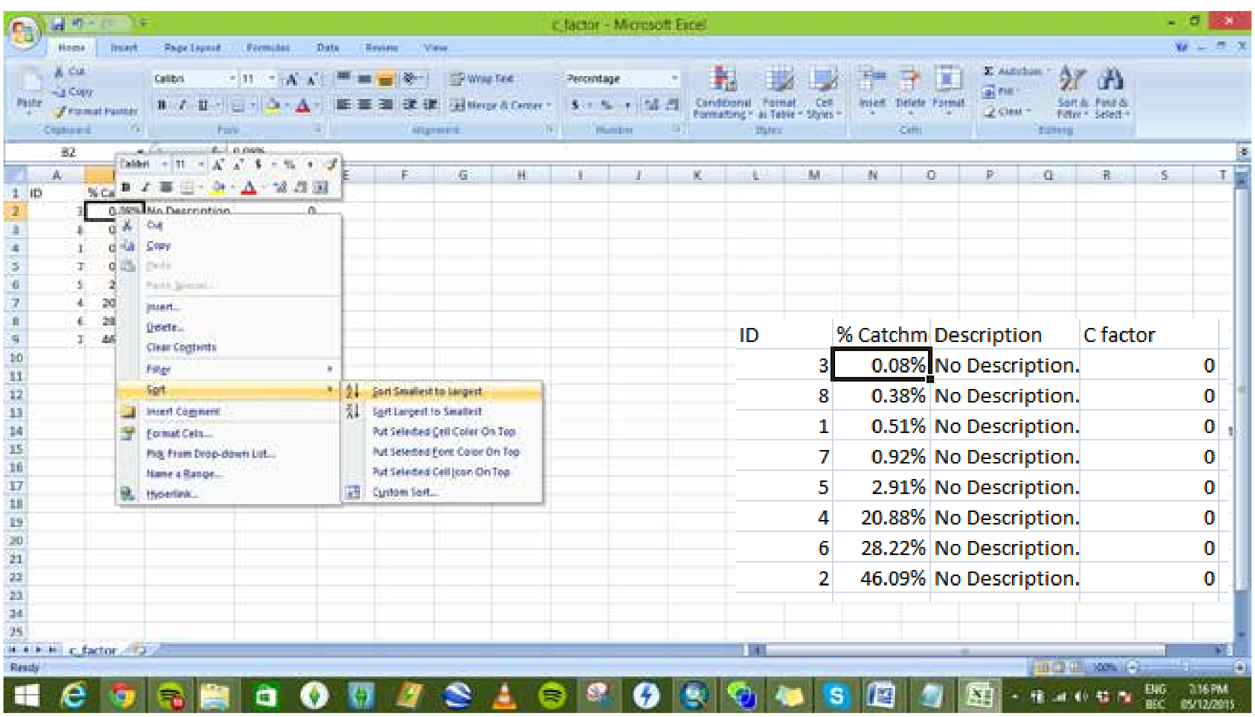
- Export the table to Excel as a “CSV” file by clicking “Export”.
- Save the file as “c_factor.csv” in your working folder.



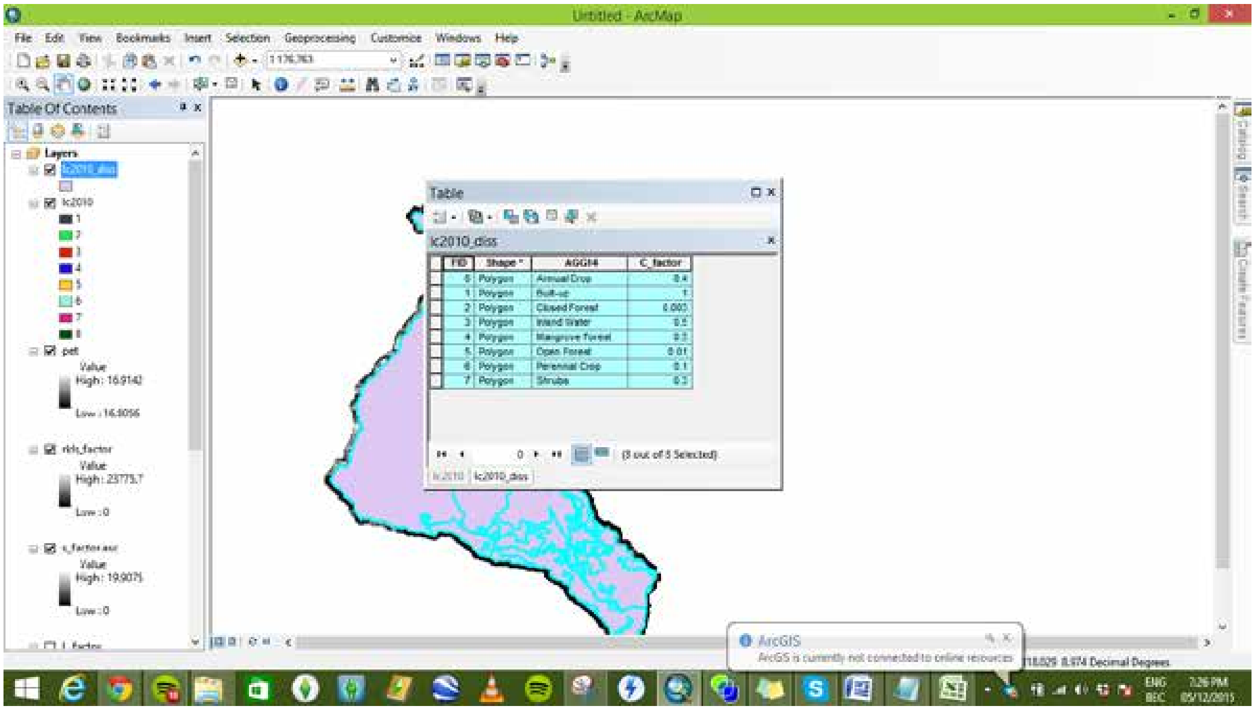
- Open the “c_factor.csv” in Exel.



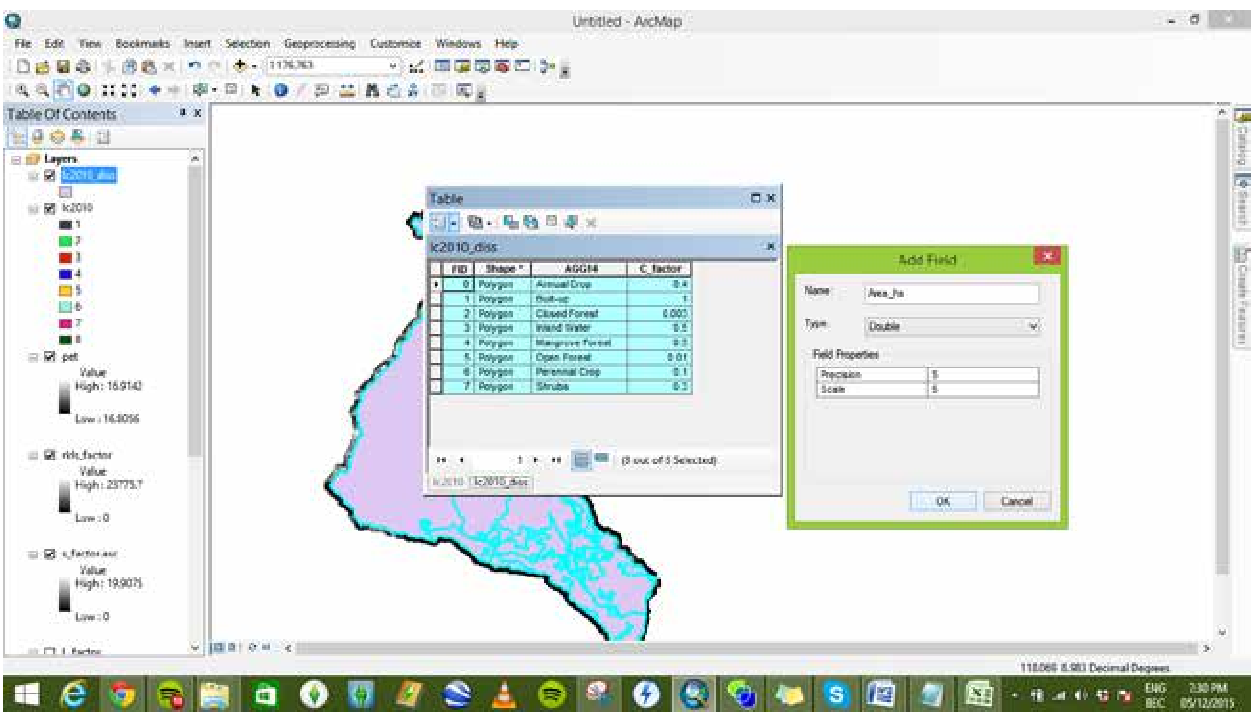
- Edit the excel file by putting the corresponding C factor for each land cover.
- Sort the file from “smallest to largest”. This will sort the percentage area of the catchment.



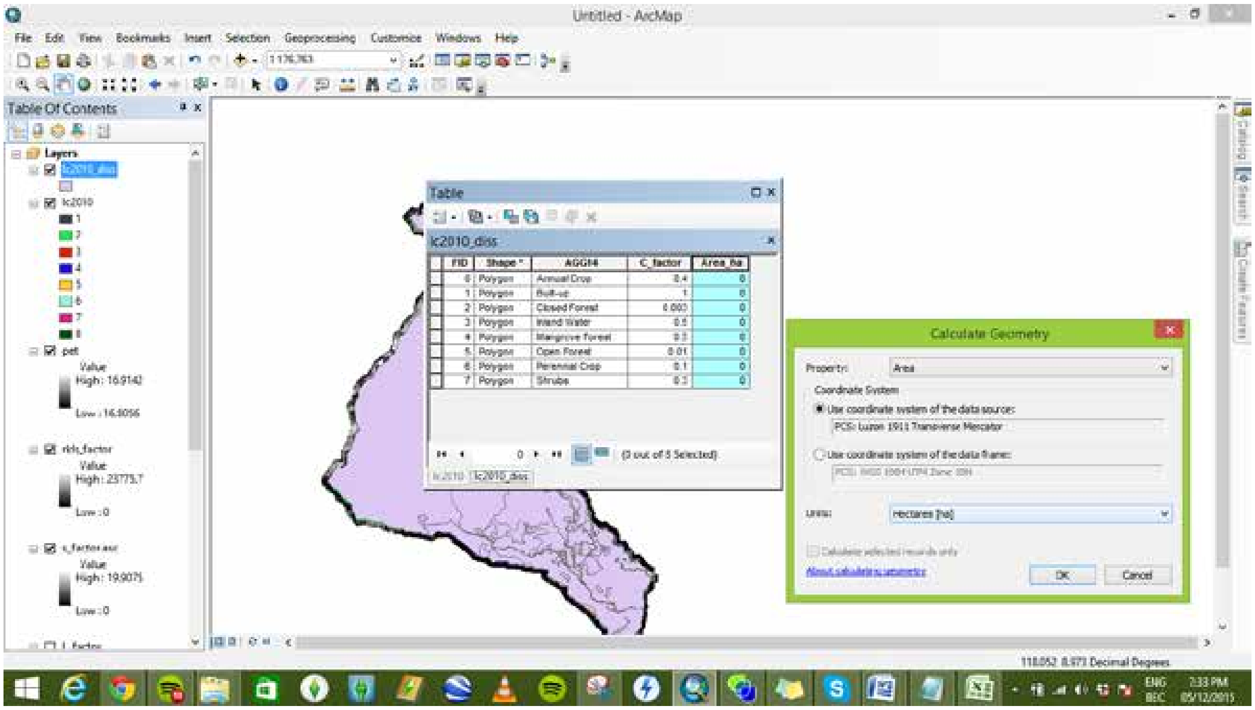
- Open the “Attribute Table” of your dissolved land cover map “lc2010_diss”.



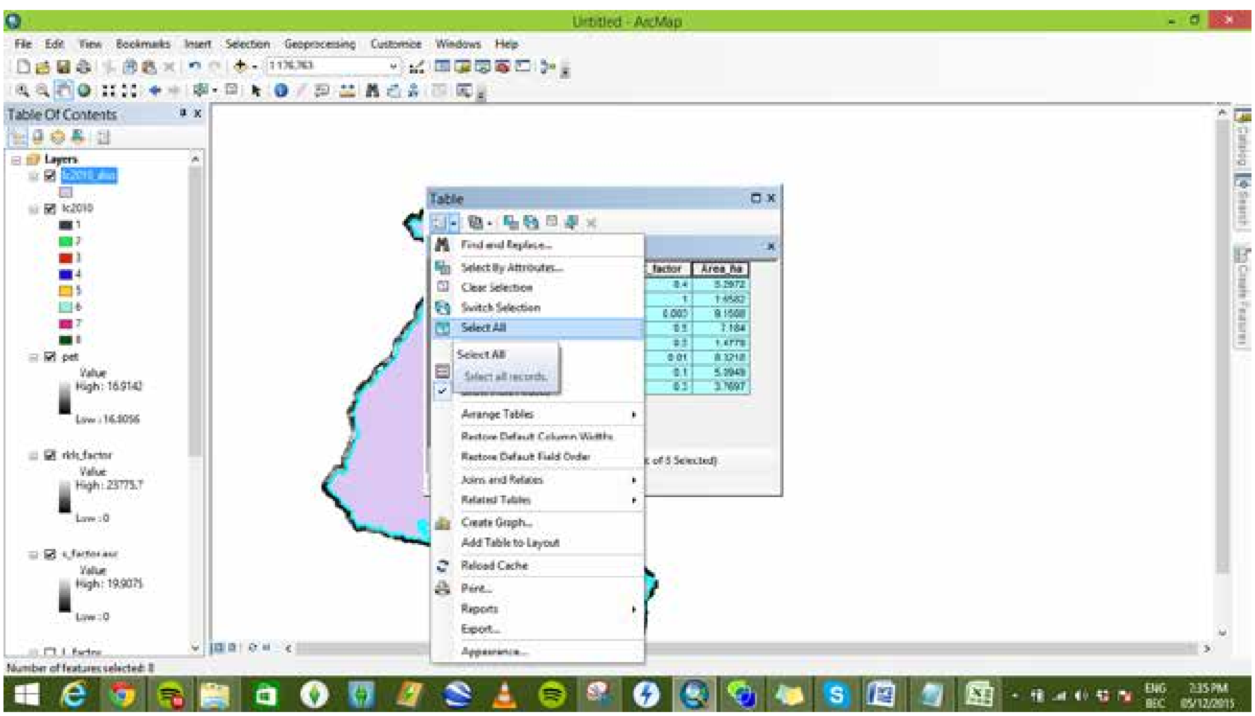
- "Add Field" to compute for the area in hectares



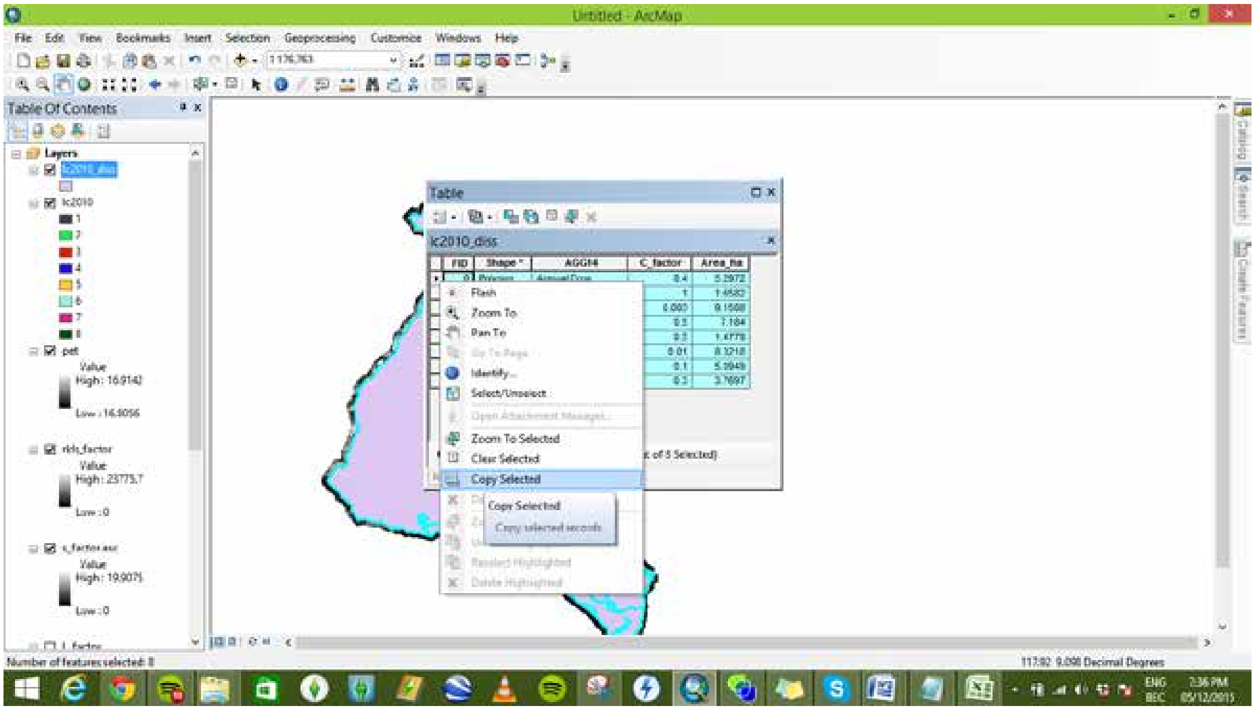
- Right click the newly added field and click "Calculate Field". Calculate "Area" in "Hectares". Click "OK".



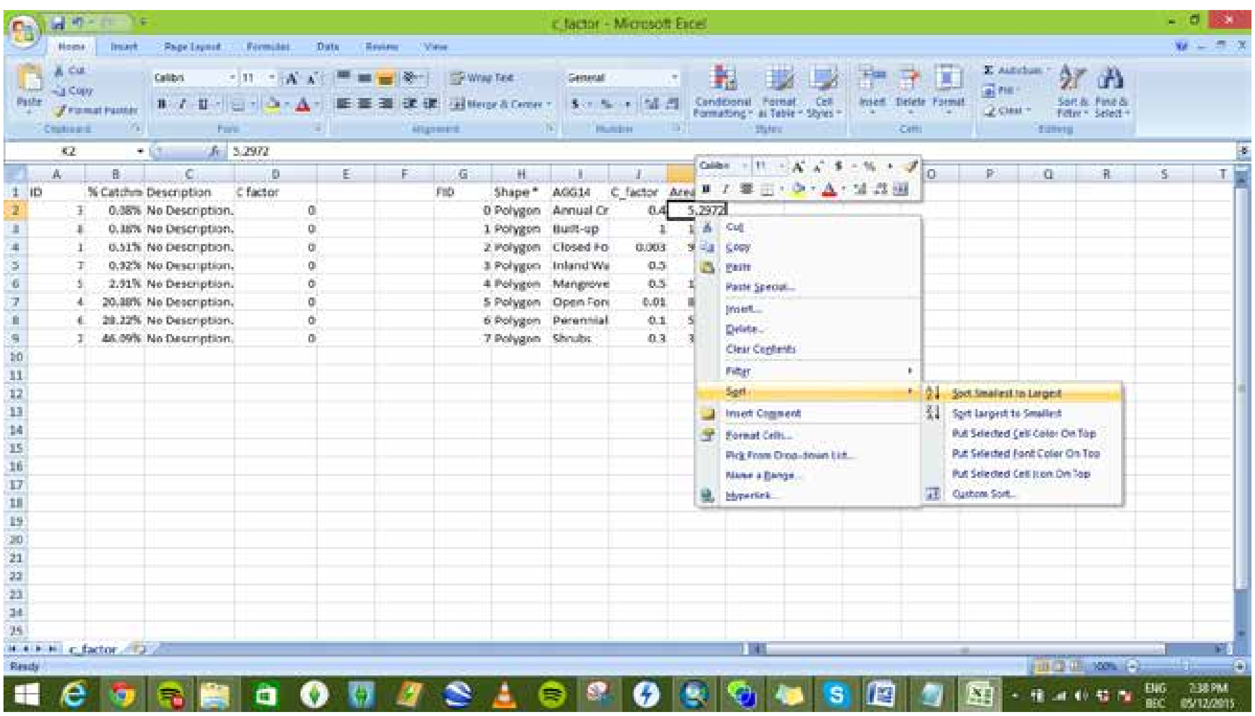
- After calculation, click “Select All”.



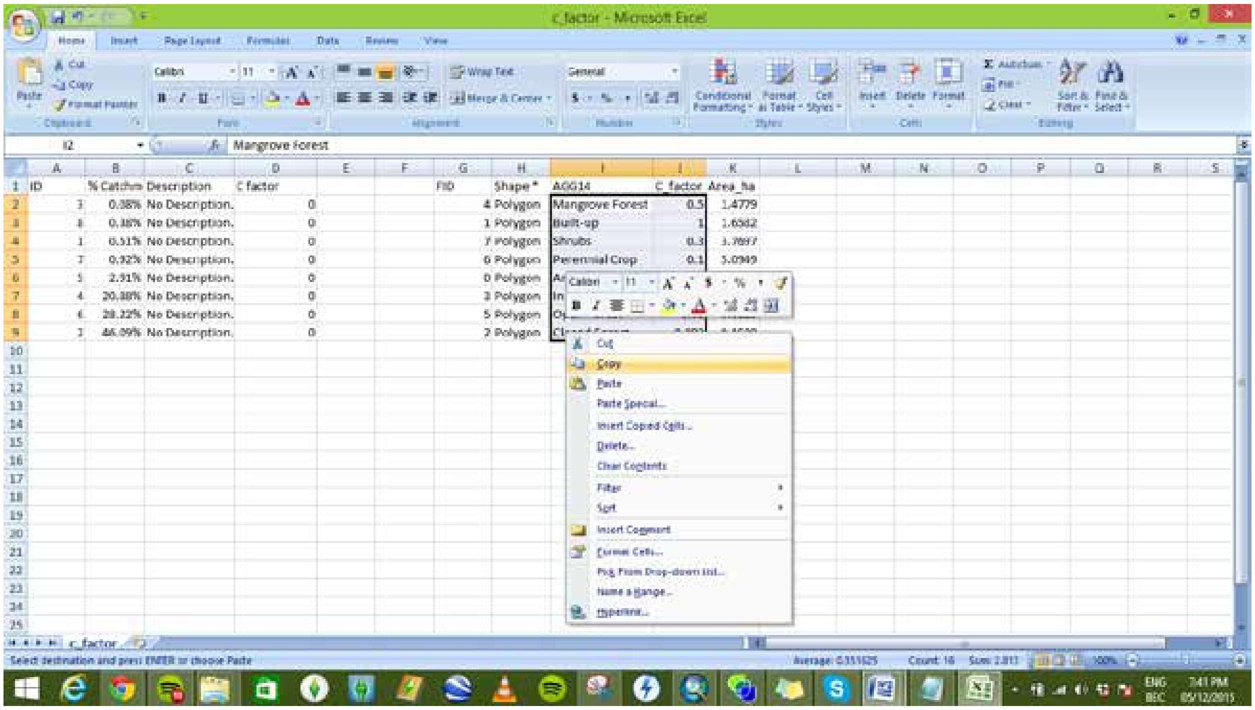
- Right click on the first row of the table and click “Copy Selected”.



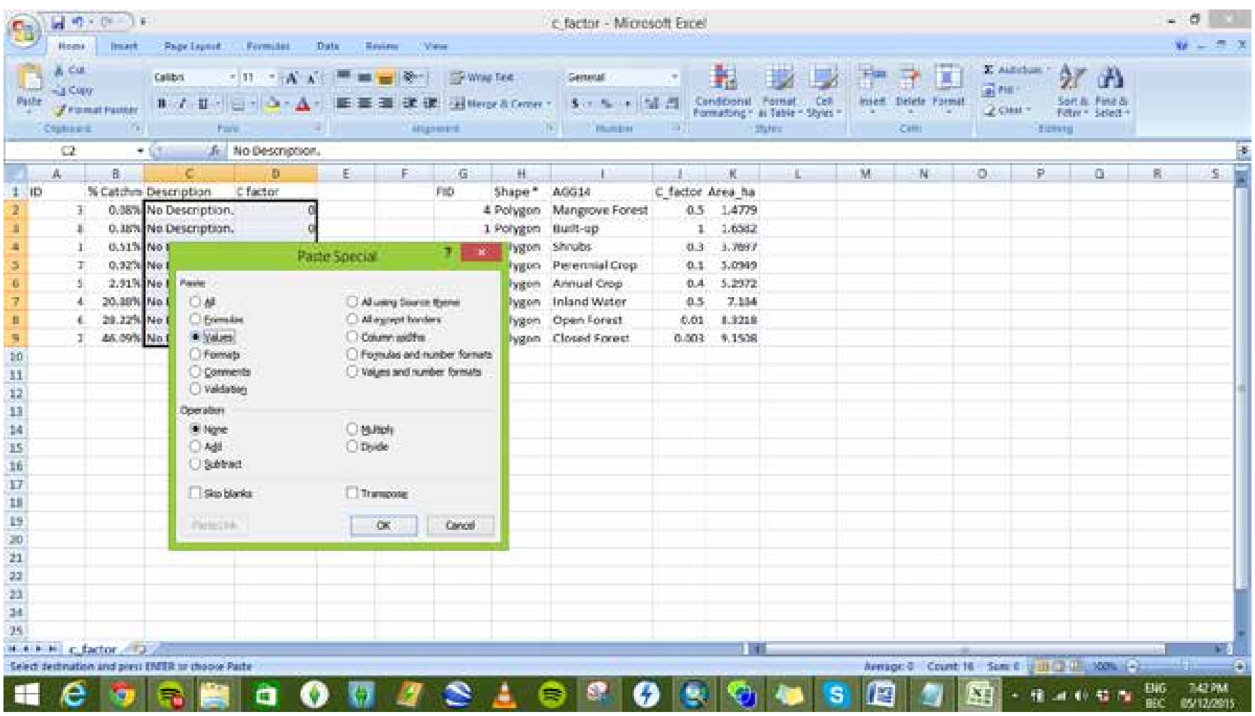
- Paste the selected table to your exported "C_factor" that is opened in Excel and "Sort" it from "Smallest to Largest". The area will be the basis of the arrangement of the % catchment. Naturally the smallest % catchment will also correspond to the smallest area in the watershed.



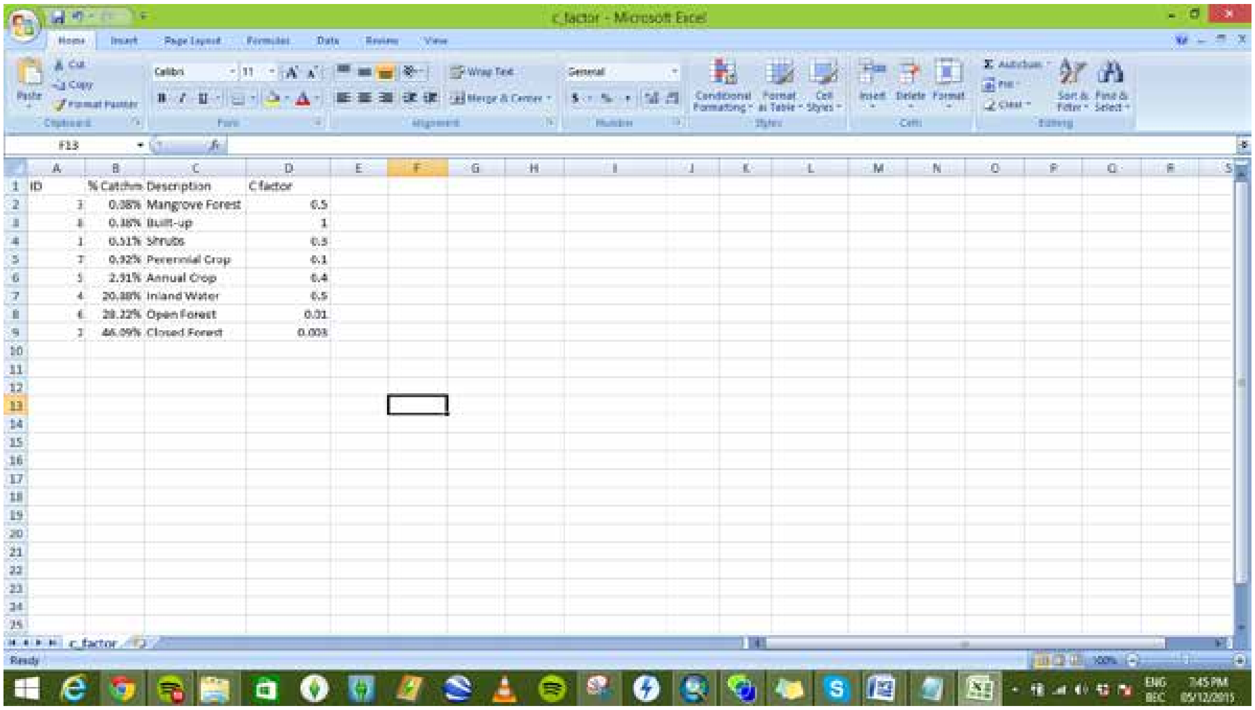
- Copy the land-cover and the value of C_factor.



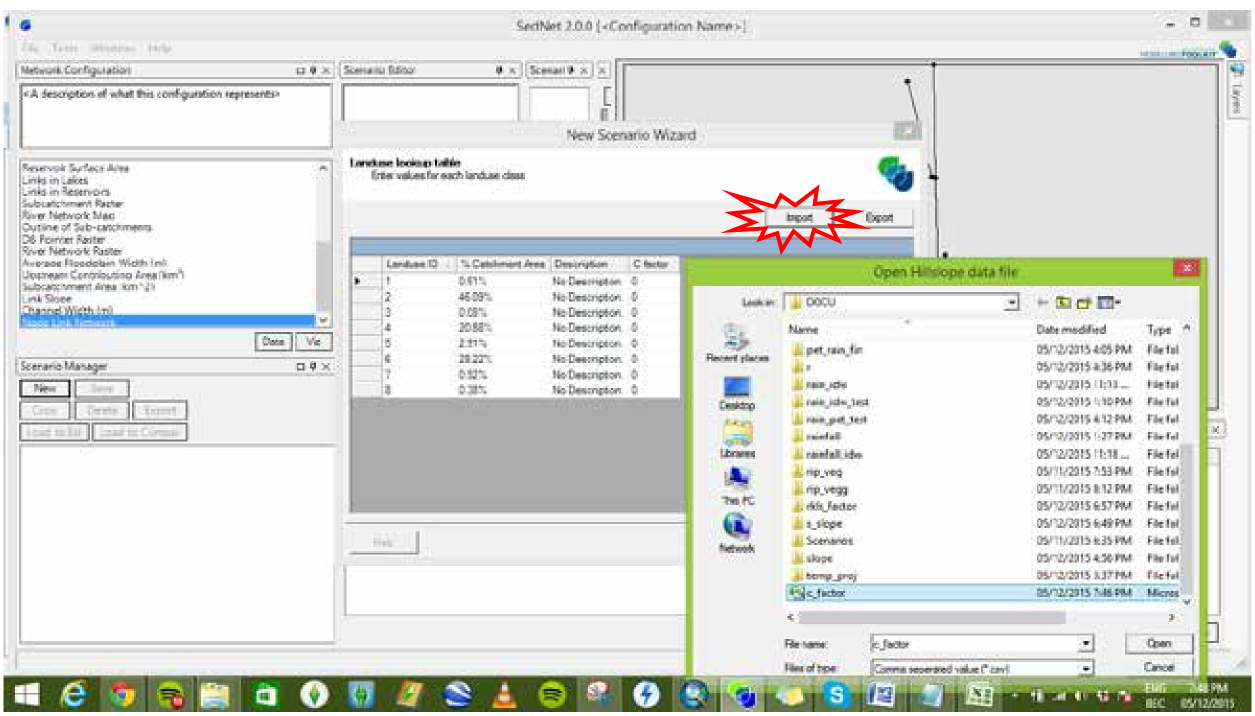
- Paste these values under the "Description" and C_factor.



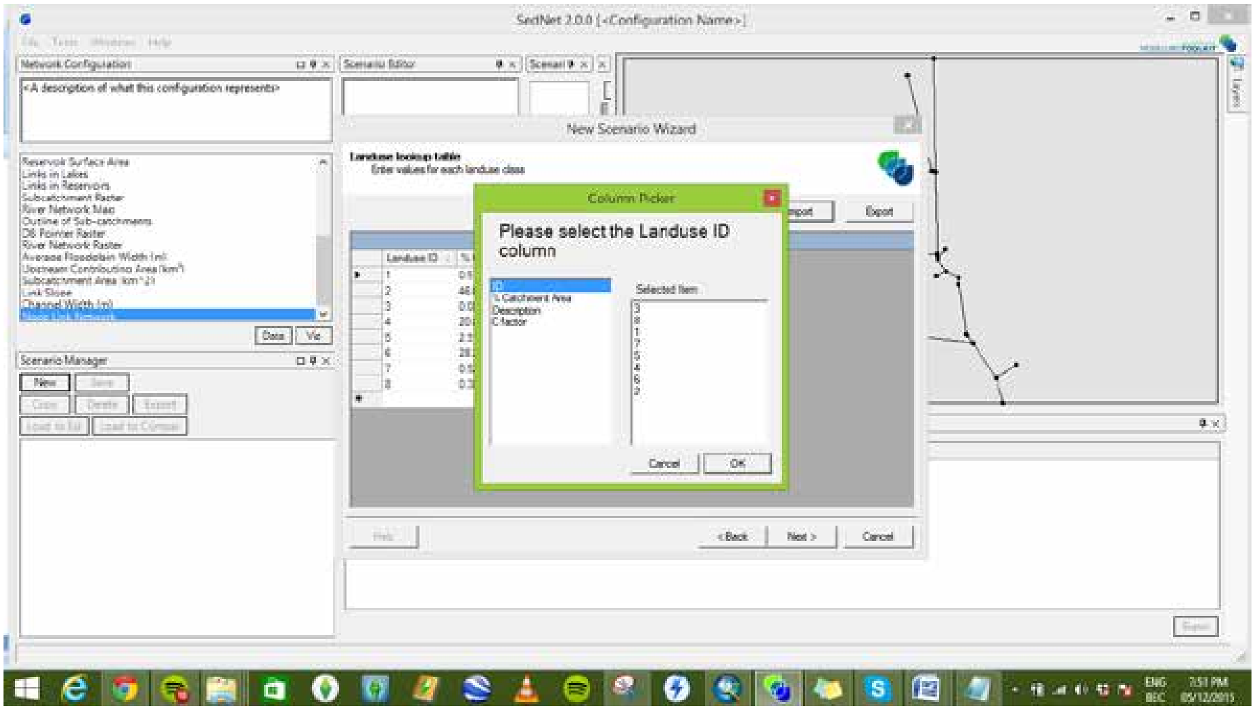
- Delete the other information and "Save" the CSV file.



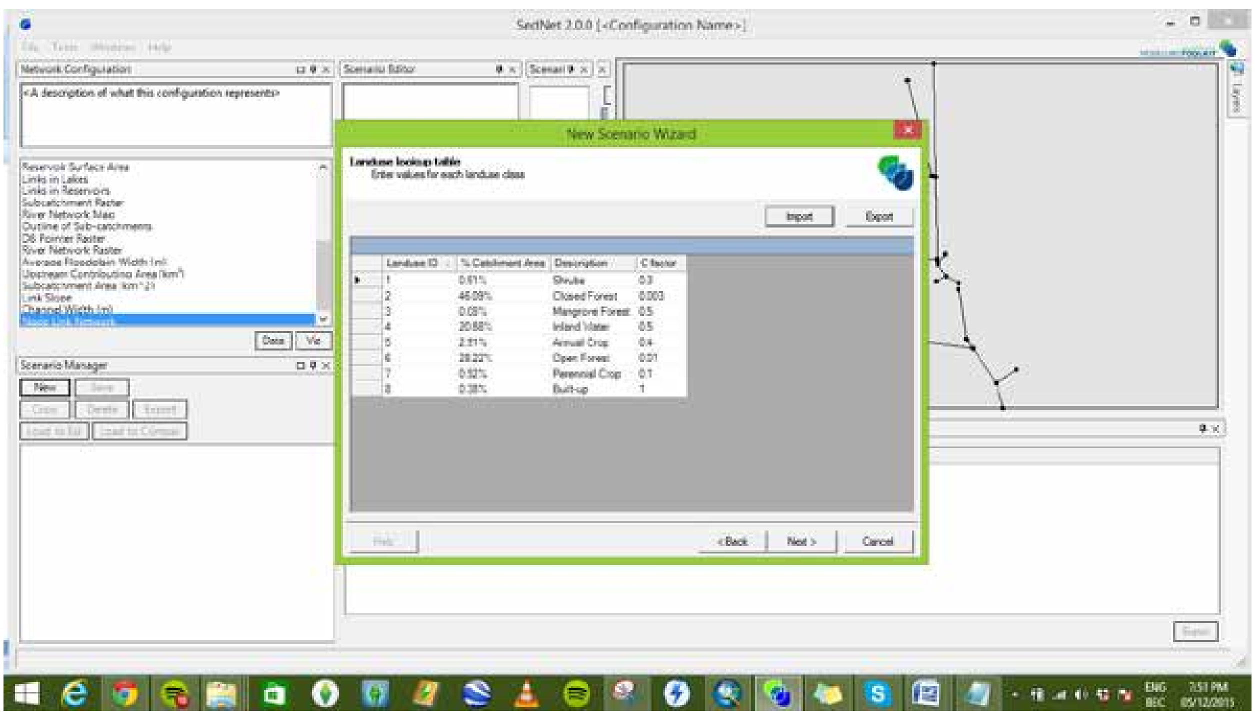
- Go back to SedNet and “Import” the newly saved look-up table “C_factor”.



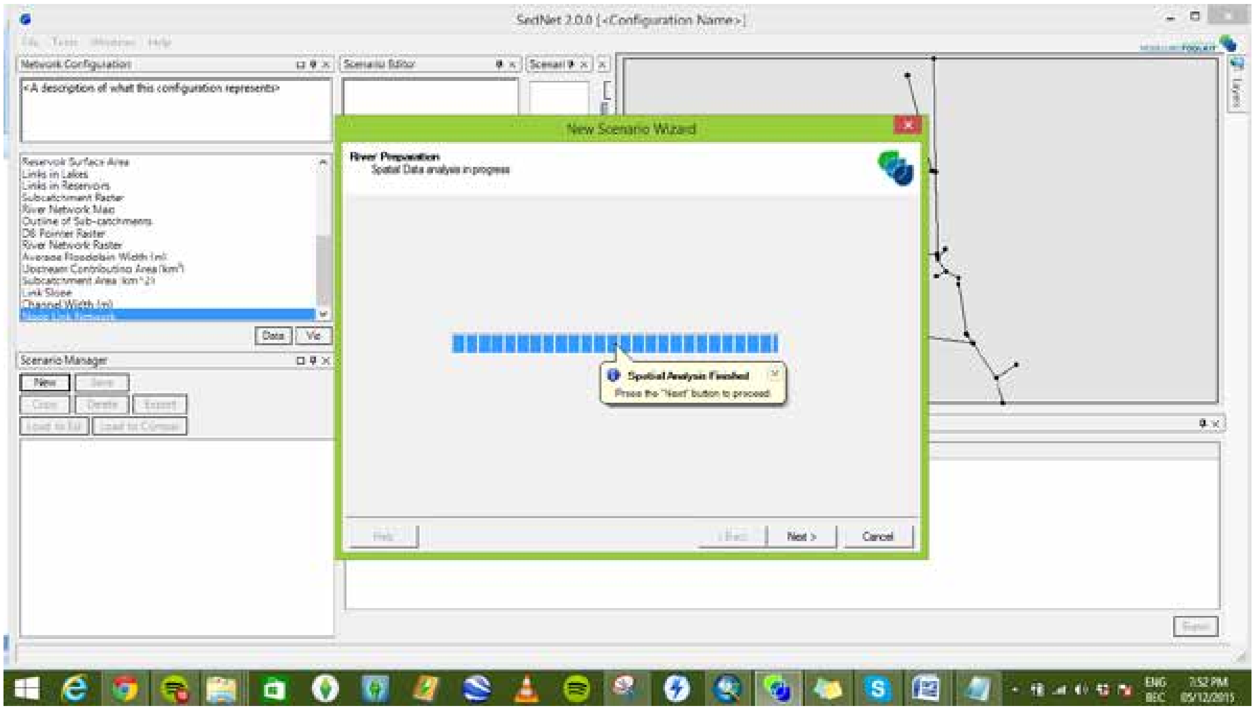
- Select “ID” as the identifier and click “Ok”



- You now have the filled up table complete with land cover and C_factor.
- Click "Next"



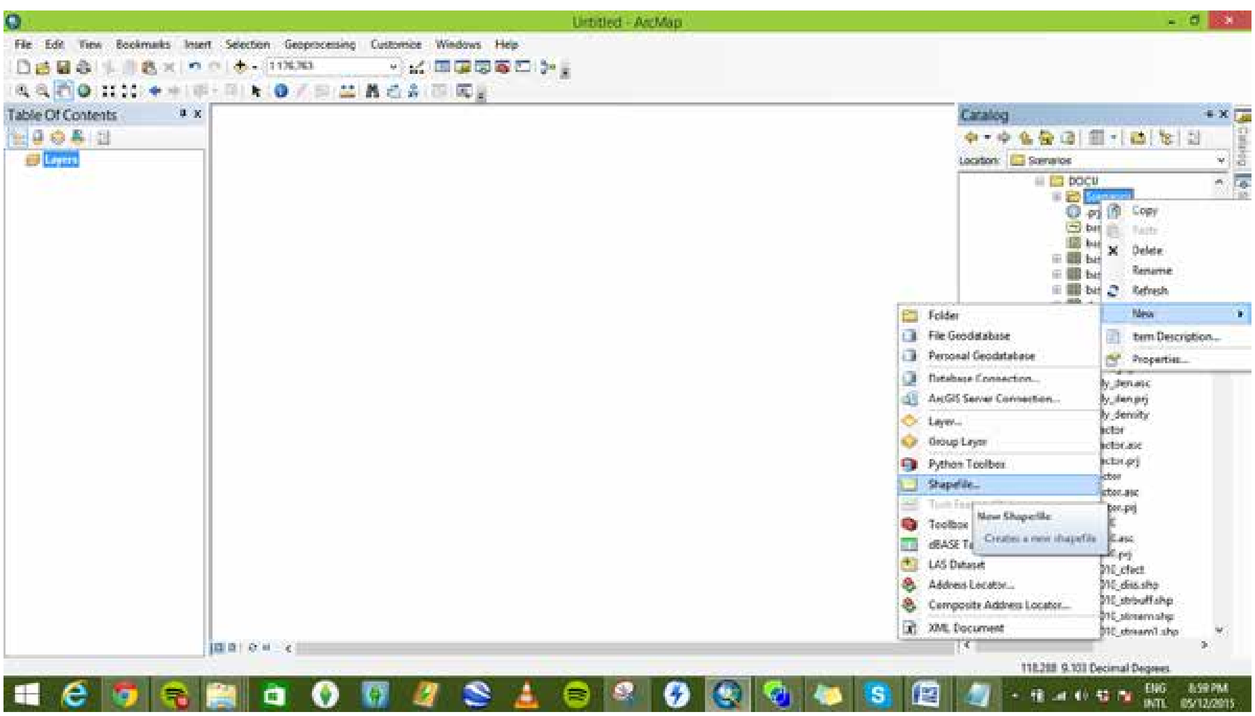
- Click "Next"



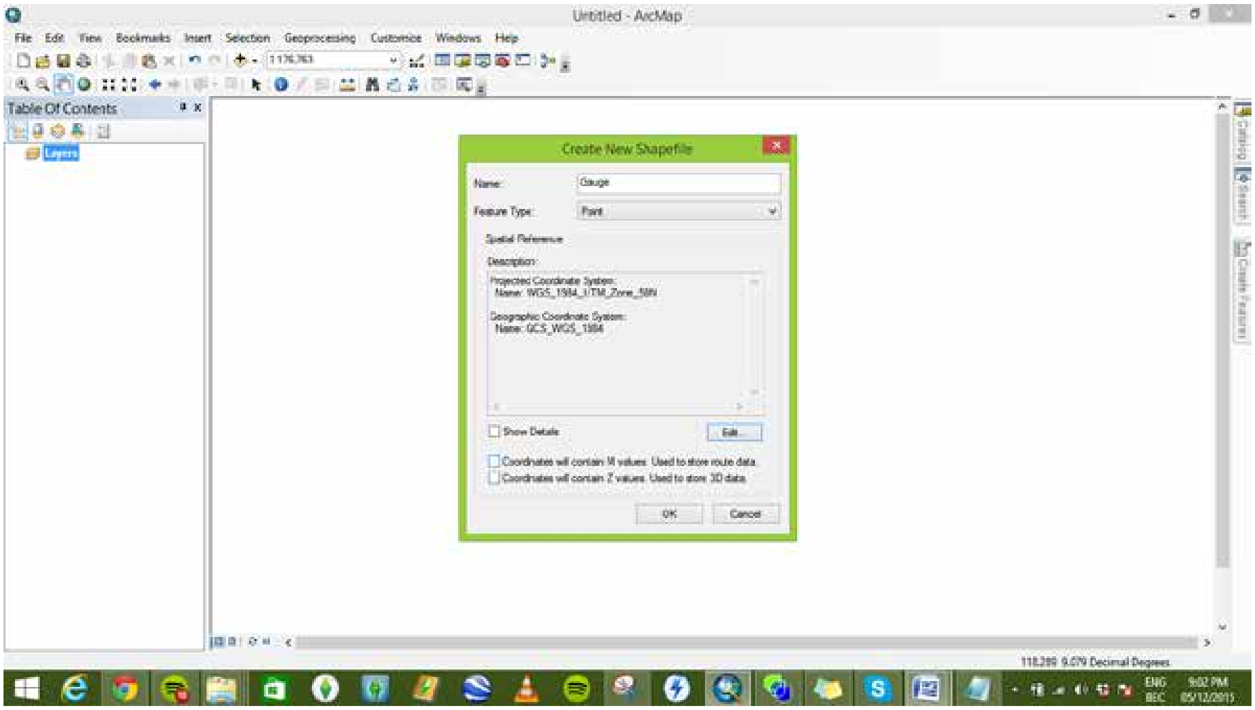
2.1.11. Loading the Gauge File

Creating "Gauge" Shapefile:

- In ArcMap, go to arc catalog and folder directory
- Right click your working folder, click "New" and click "shapefile"

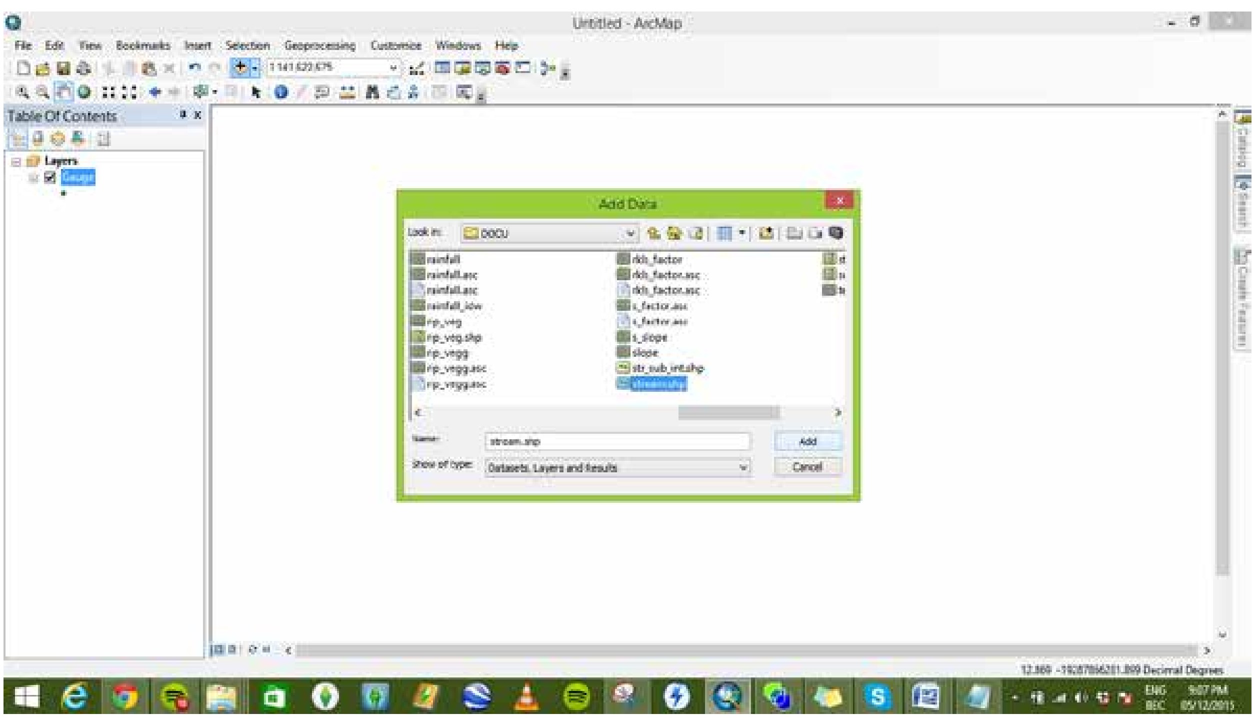


- Put “Gauge” as the name and “Point” as the feature.
- “Edit” the Projection to WGS 1984 UTM Zone 50N
- All the rest remains constant.
- Click “Ok”

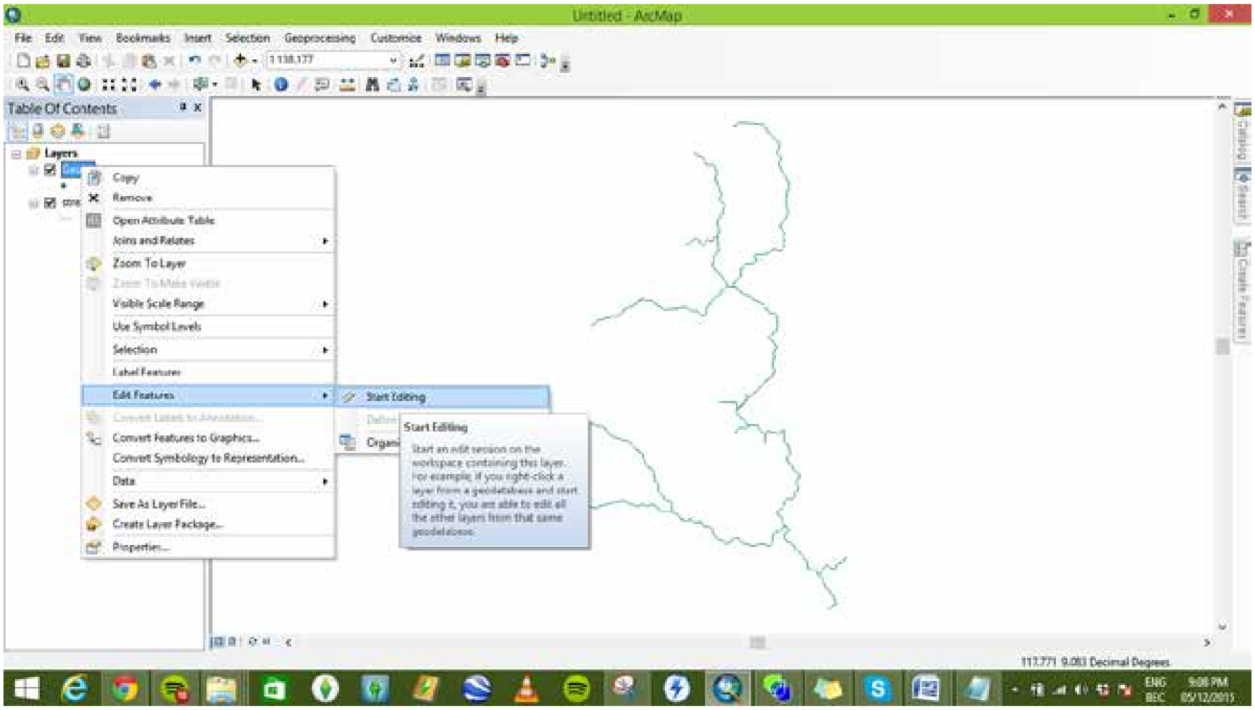


Editing features:

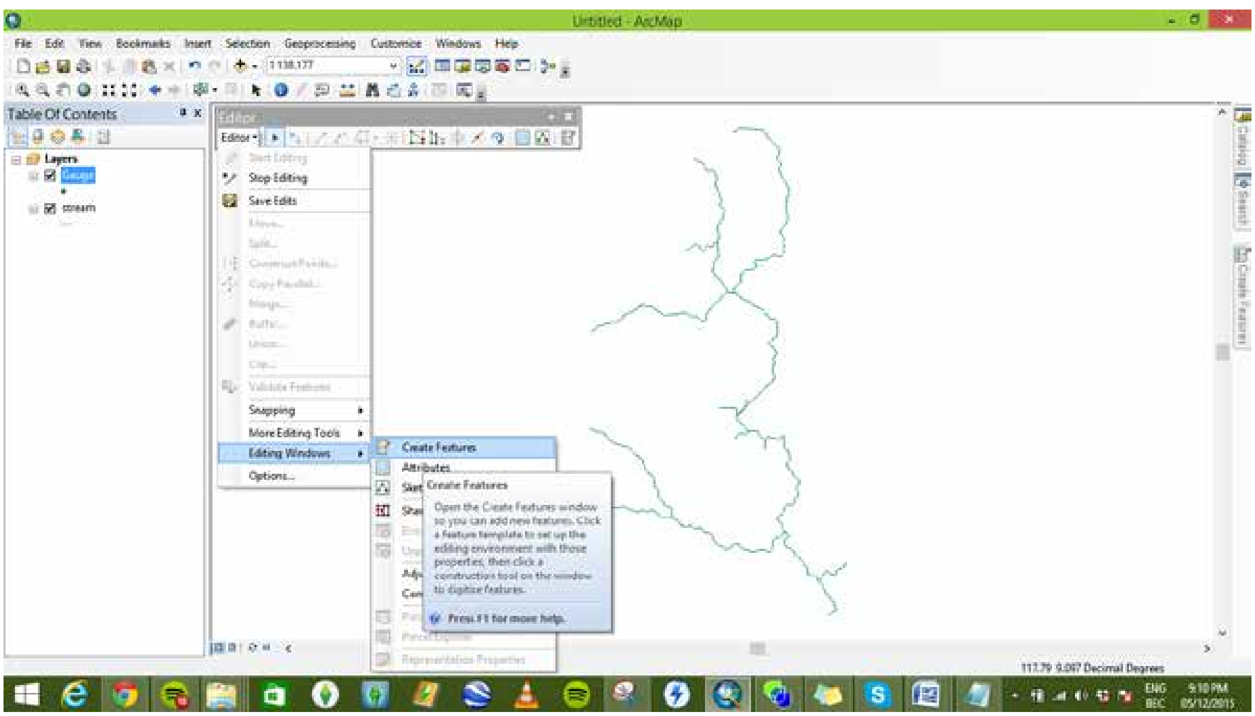
- Load the “stream” shapefile in your ArcMap window.



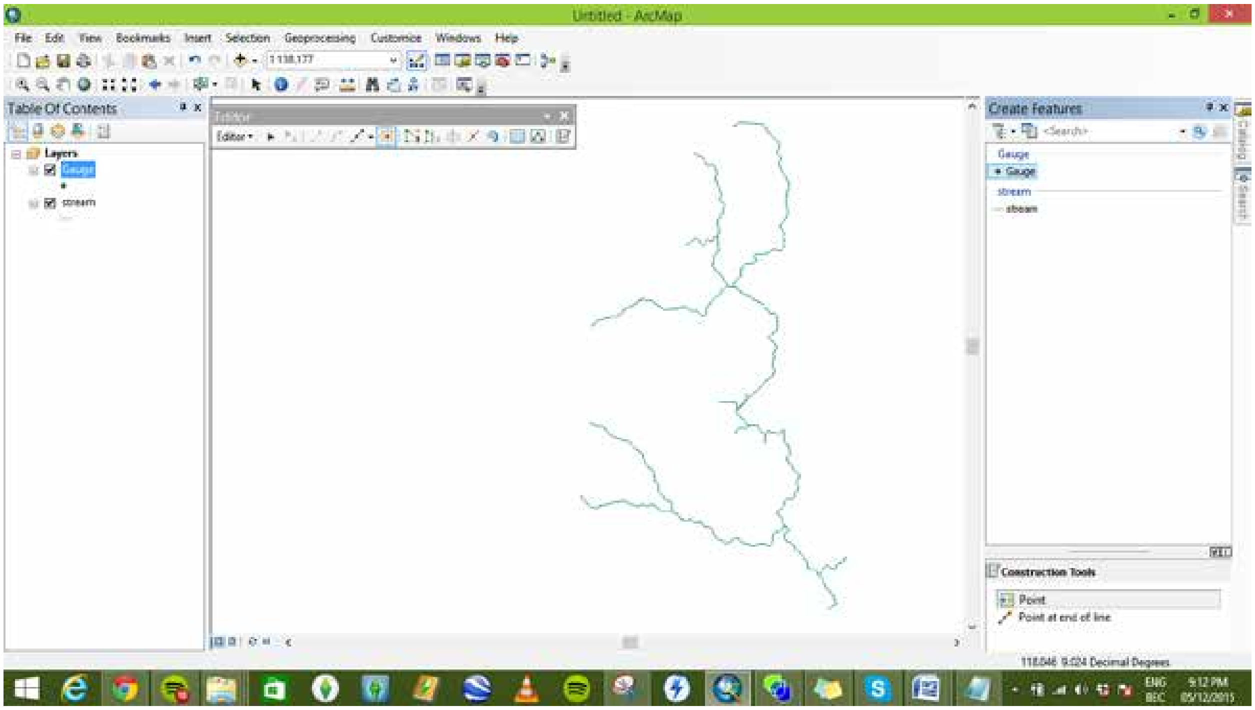
- Right click your “Gauge” shapefile click “Edit Features” and “Start Editing”.



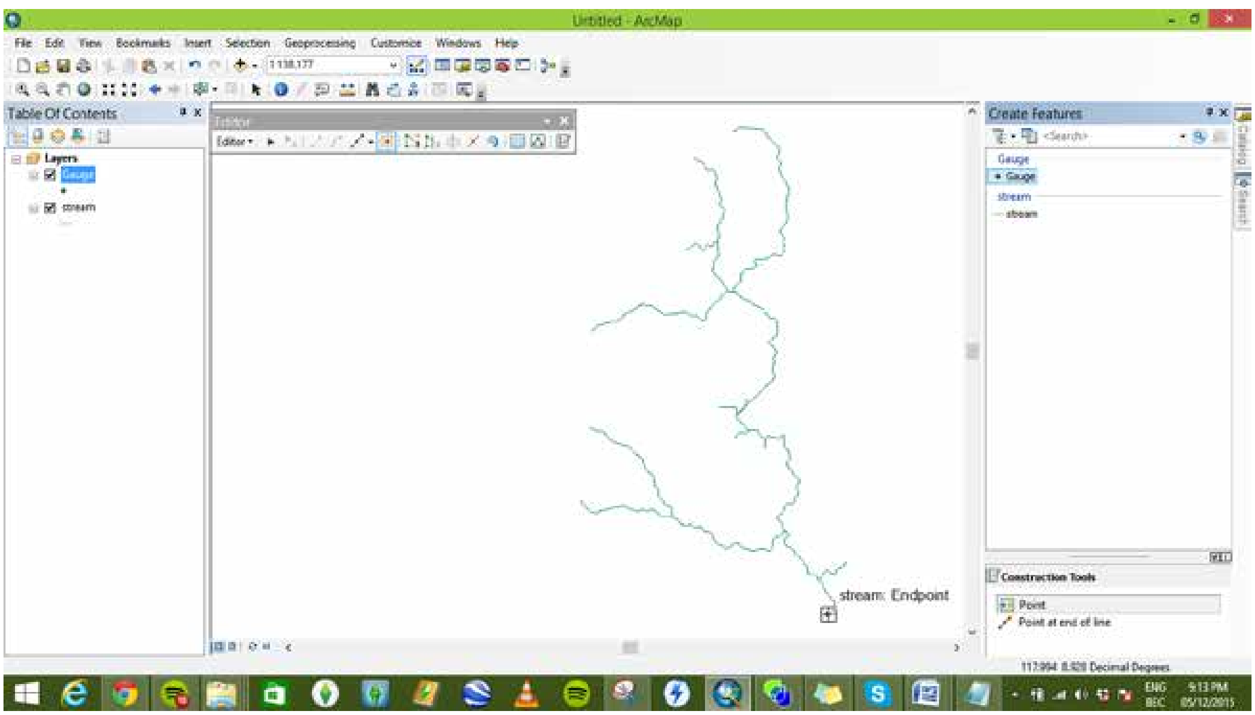
- In the “Editor” , click “Editing windows” and “Create Features”



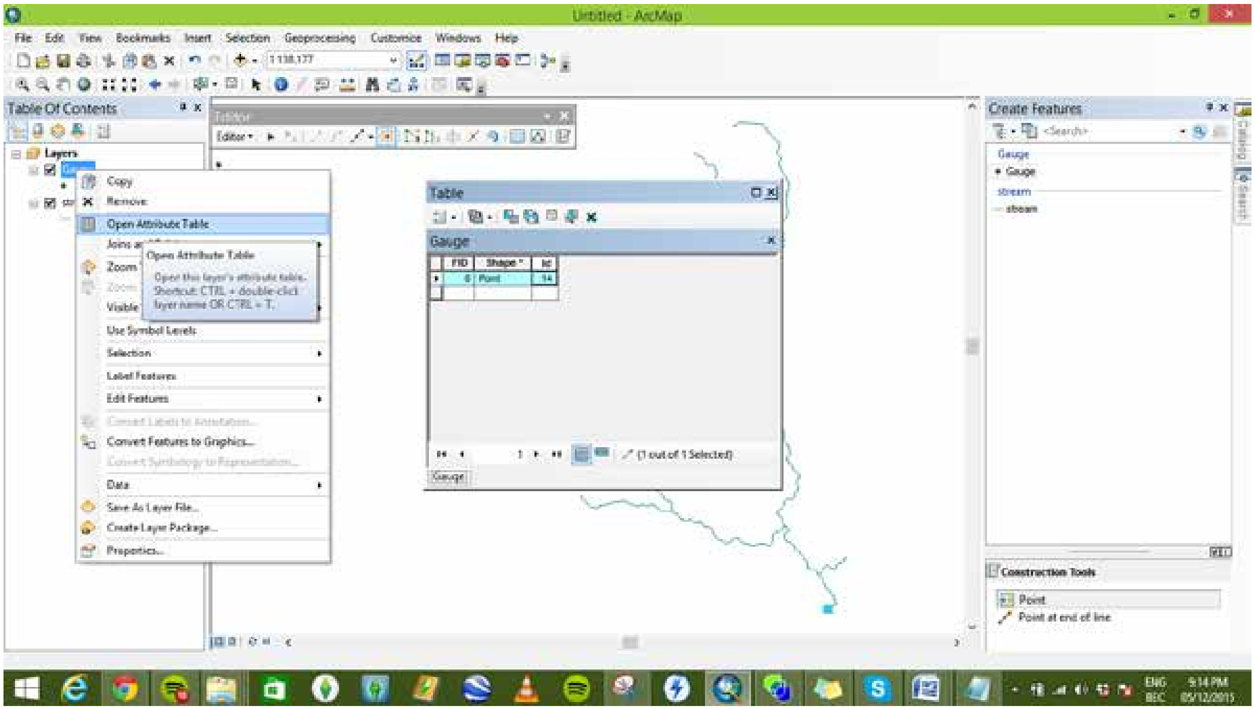
- Click the “Gauge” notice that the cursor will change to a point with a cross-hair



- Click this to the discharge point of river.



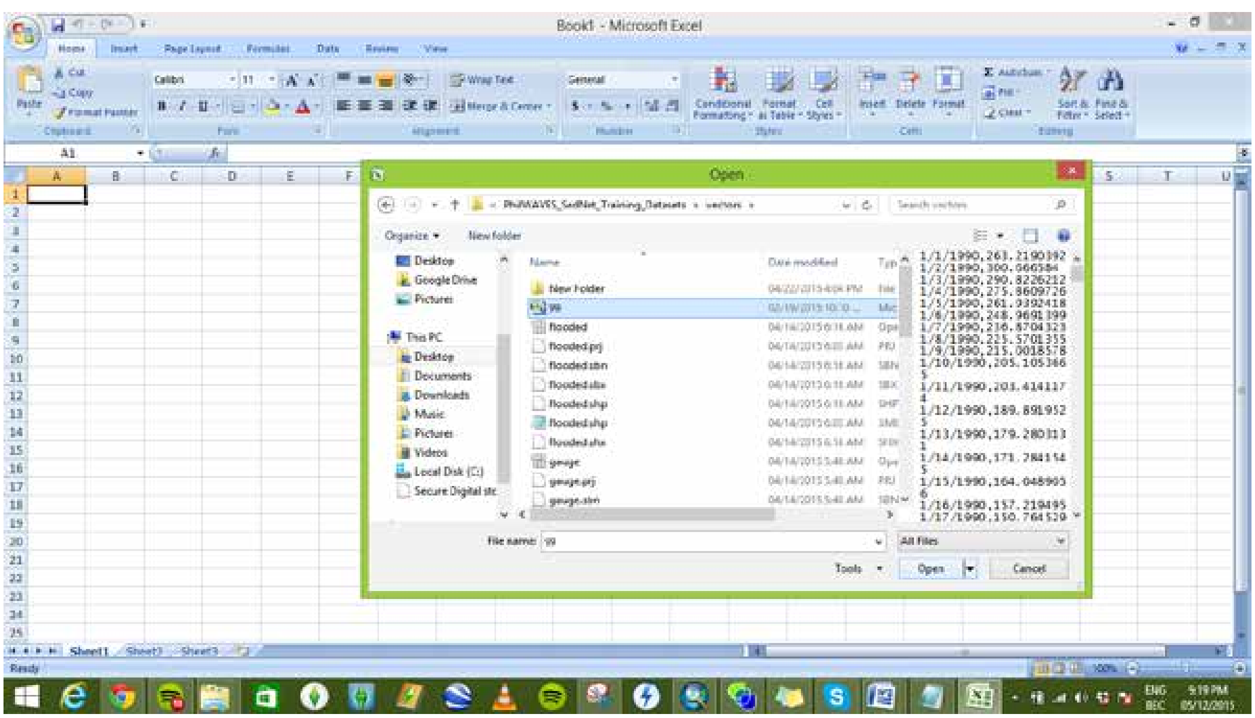
- Open the “Attribute Table”of the “Gauge”
- Name the 'ID' into the sub-basin number e.g. “14”



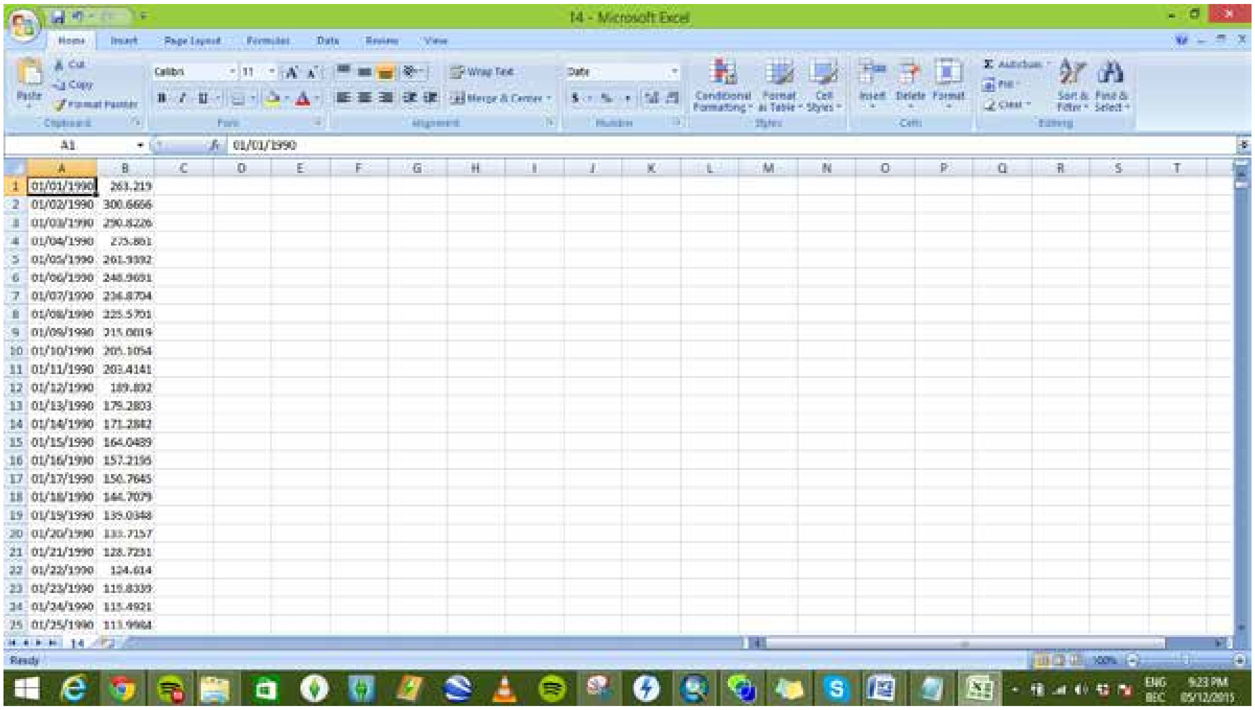
- Under “Editor”, “Save” edits and “Stop” edits.

Discharge table:

- Open discharge table “99” in excel. The fileis located in the “Vector” folder.

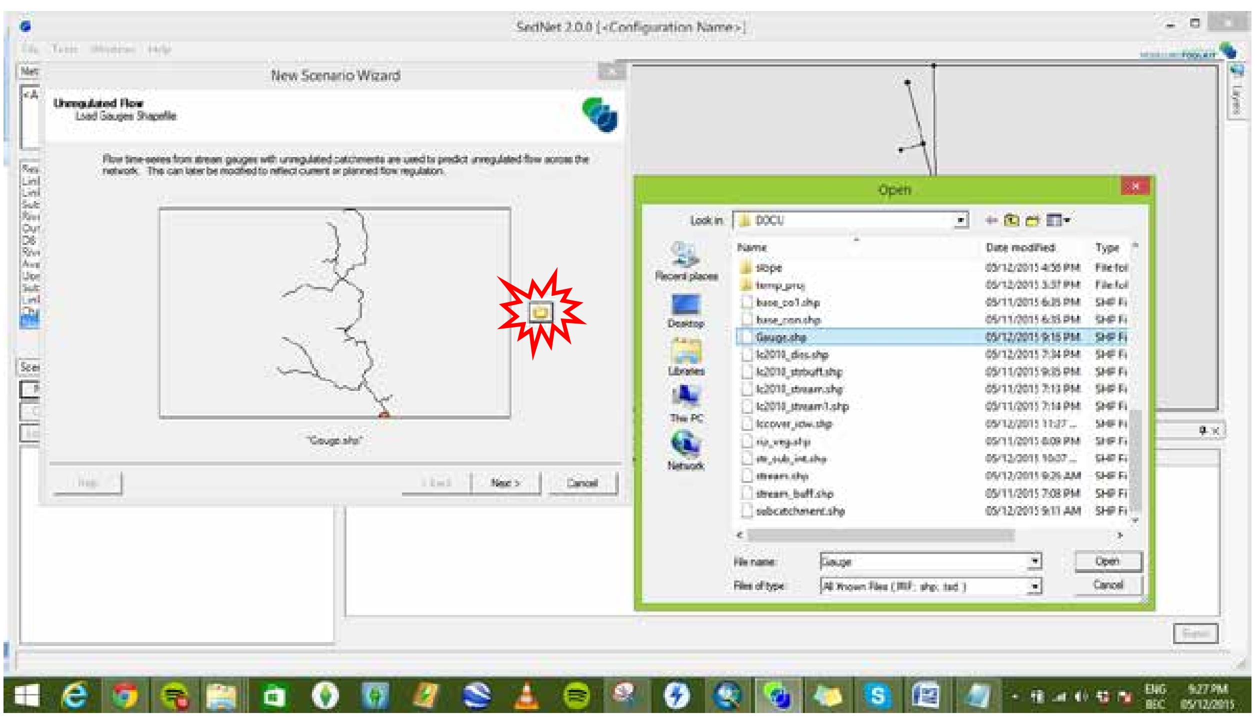


- Save a copy to your working folder where your “Gauge” shapefile is. Name the file “14.csv”. This will serve as the Identifier to your “Gauge”

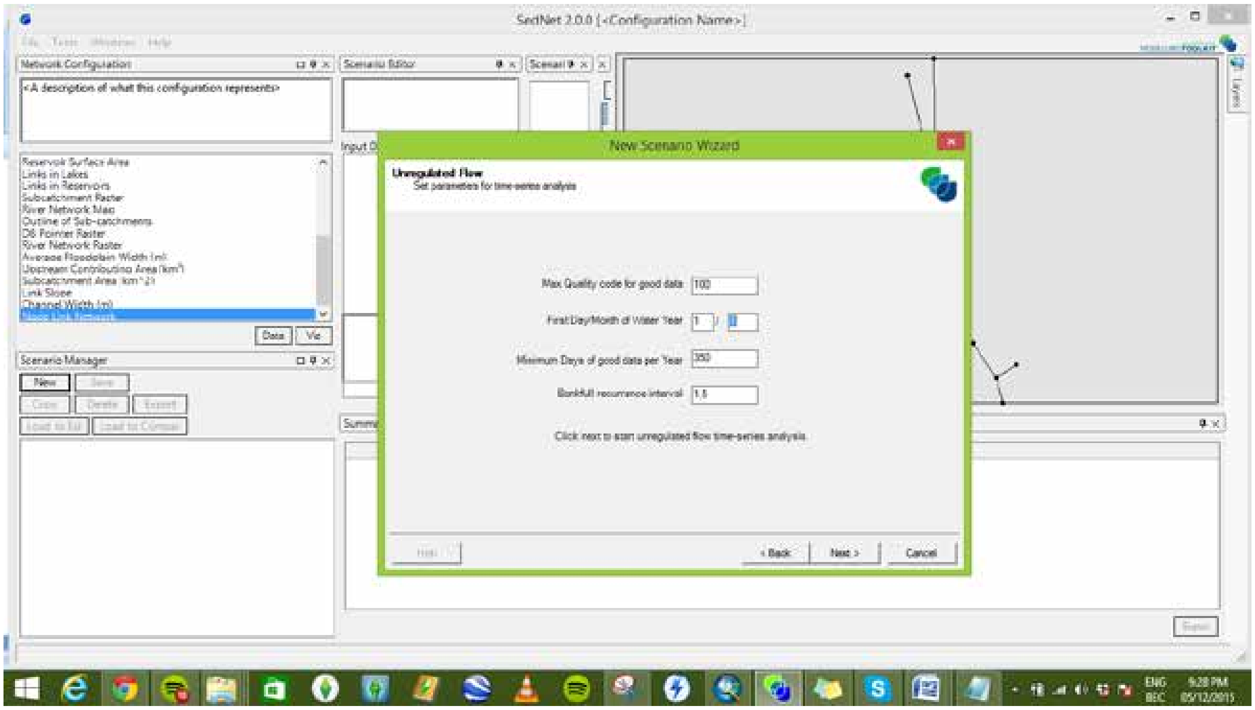


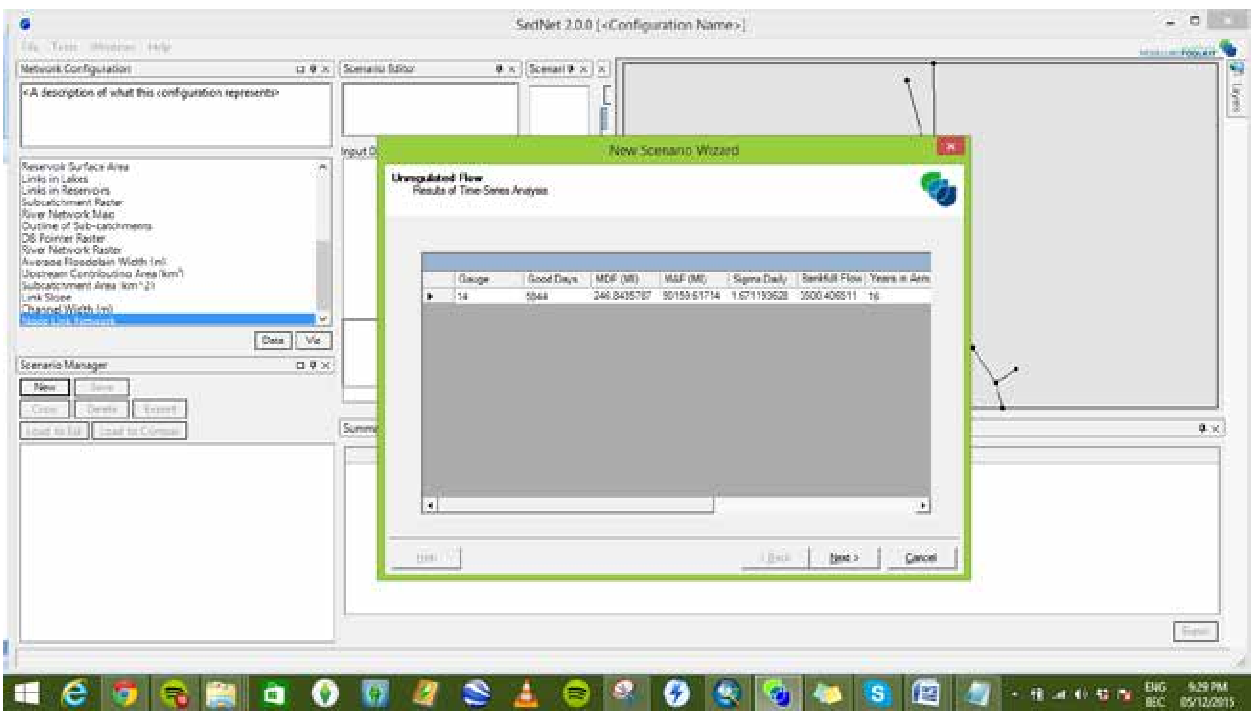
2.1.12. SedNet interface, loading your “Gauge” shapefile.

- Load the “Gauge” Shapefile.
- Click “Next”.

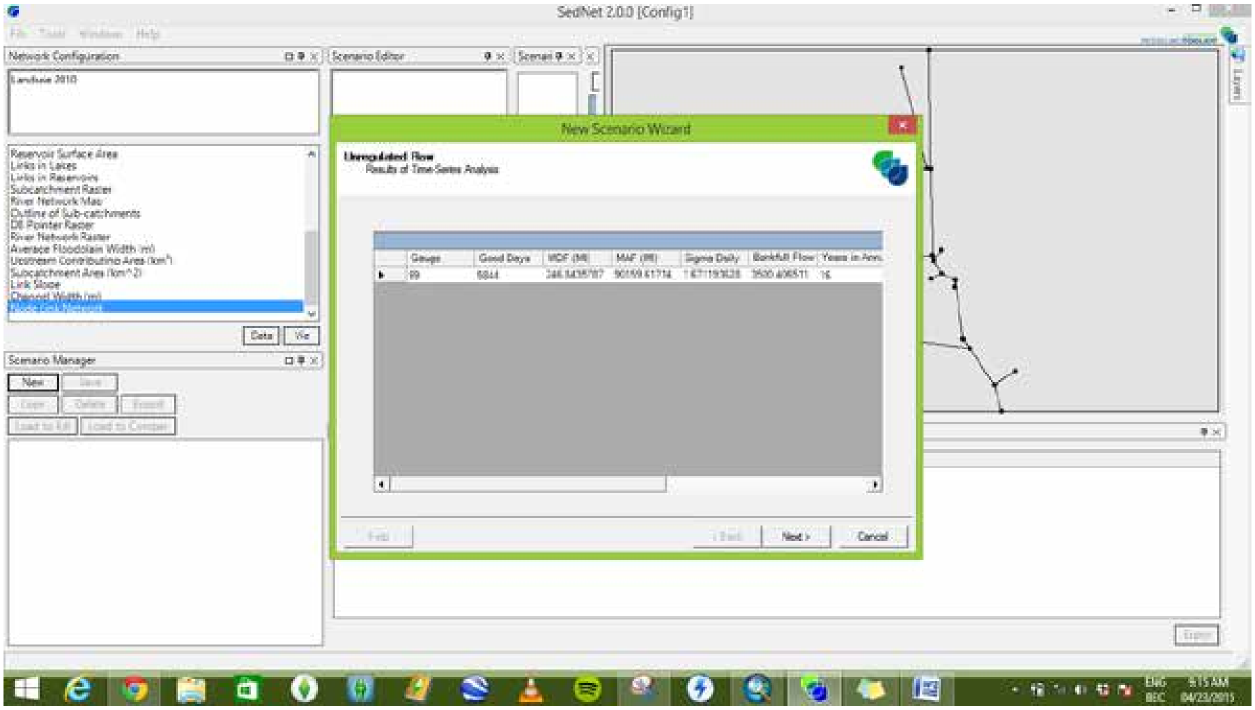


- Click “Next”.

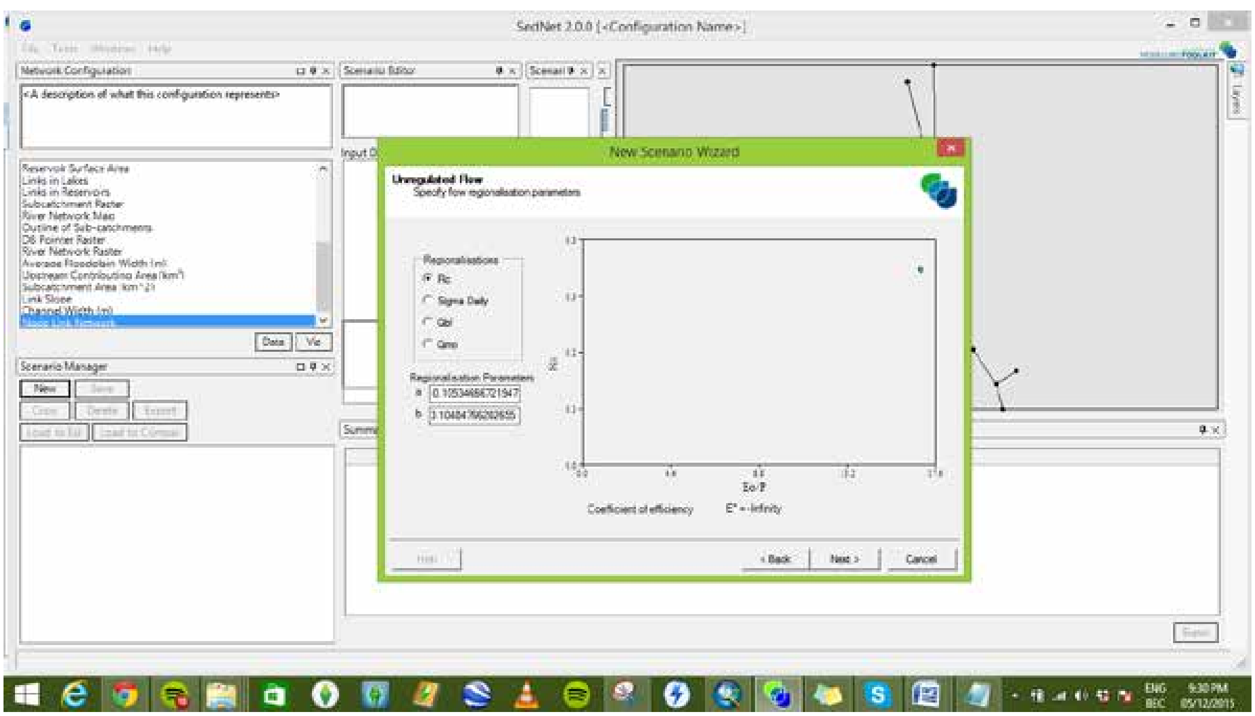




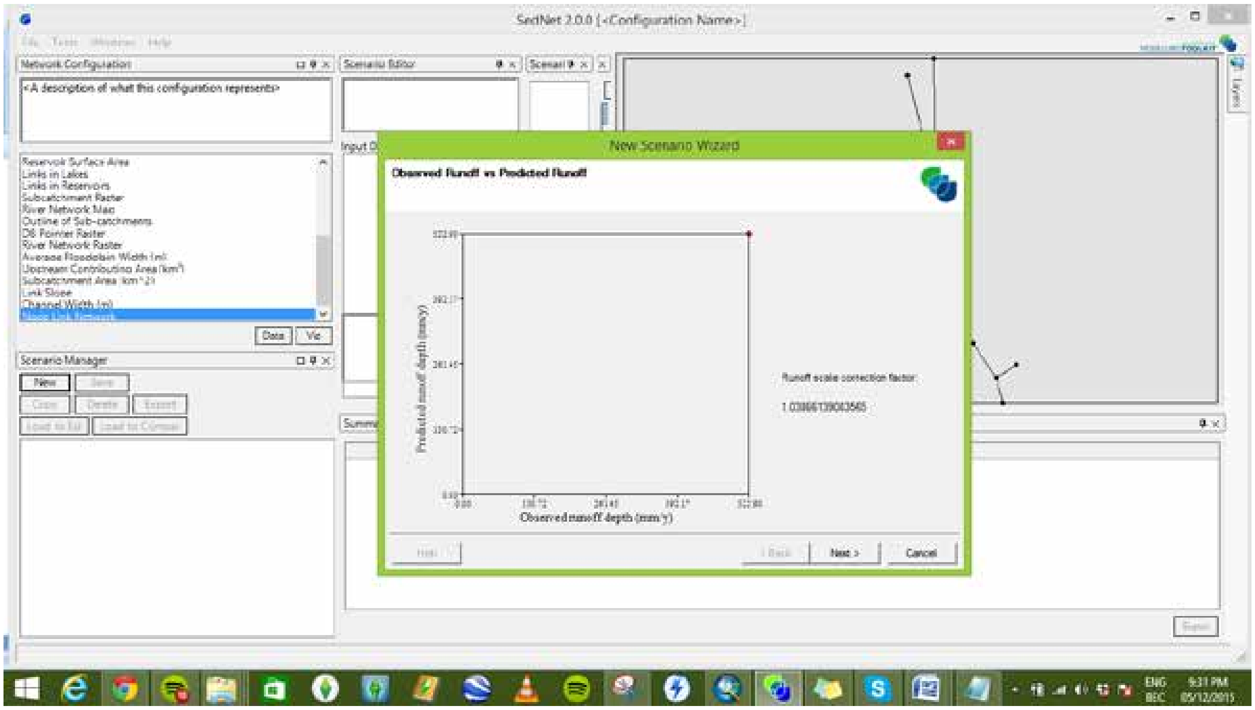
- You will see this table once the run was successful.
- Click “Next”.



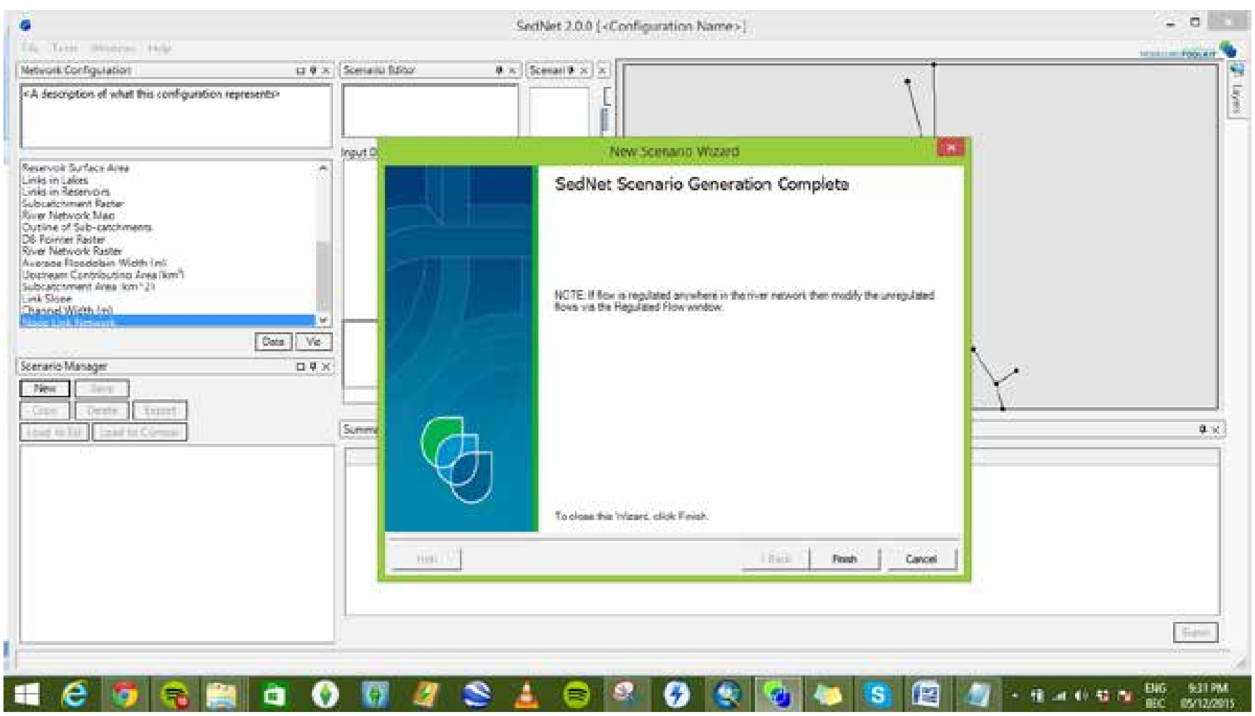
- Click “Next”



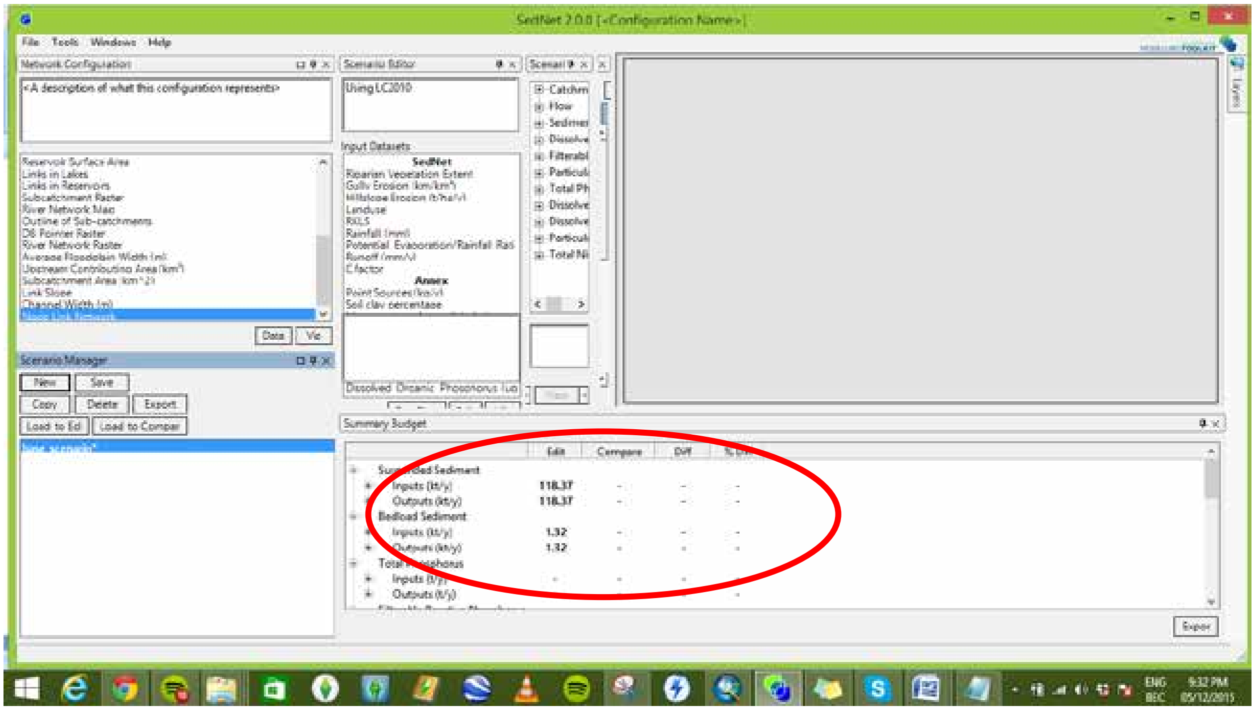
- Click “Next”



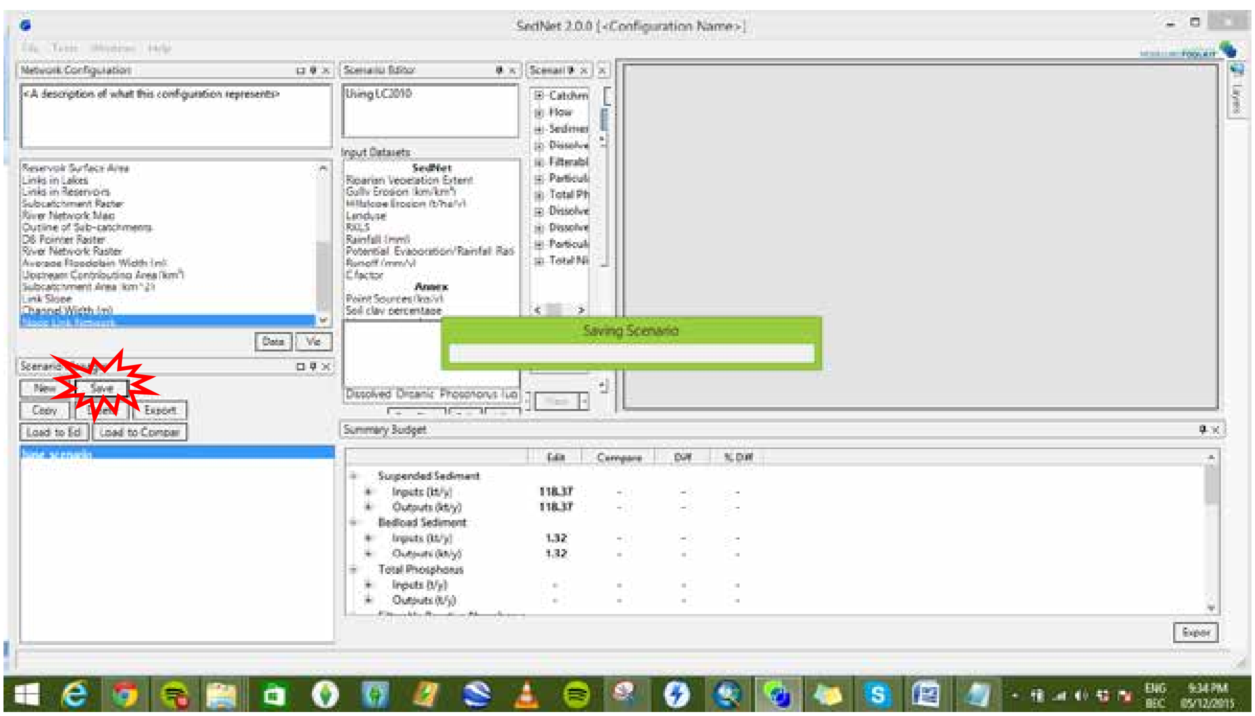
- Click “Finish”.



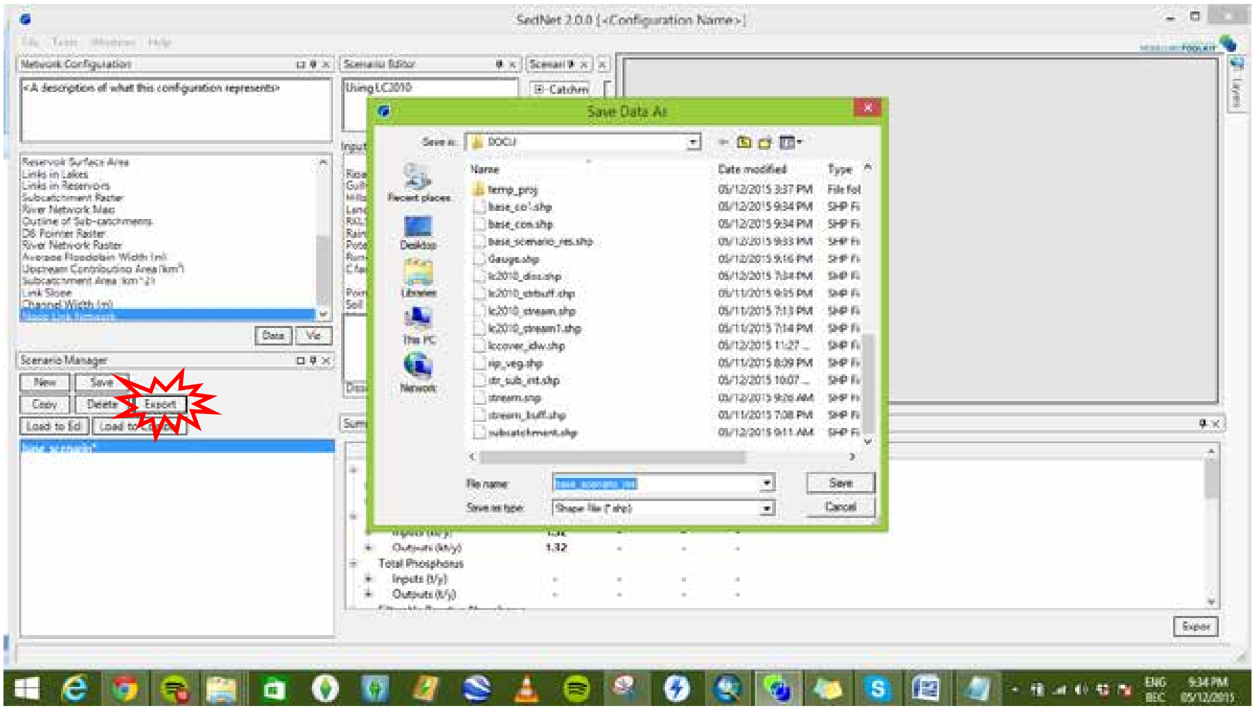
- You are now done running your “base_scenario”. The results are shown in the right side window of SedNet.



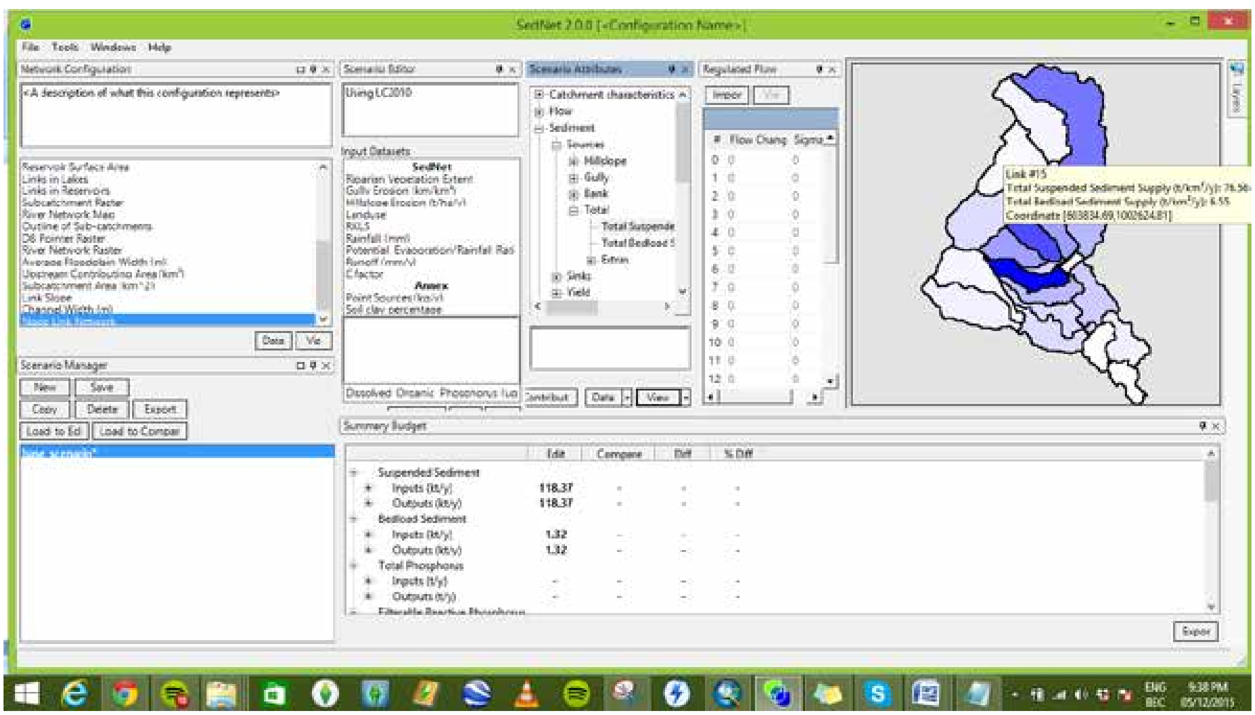
- “Save” your scenario results.



- “Export” the shapefile of the results to your working folder.

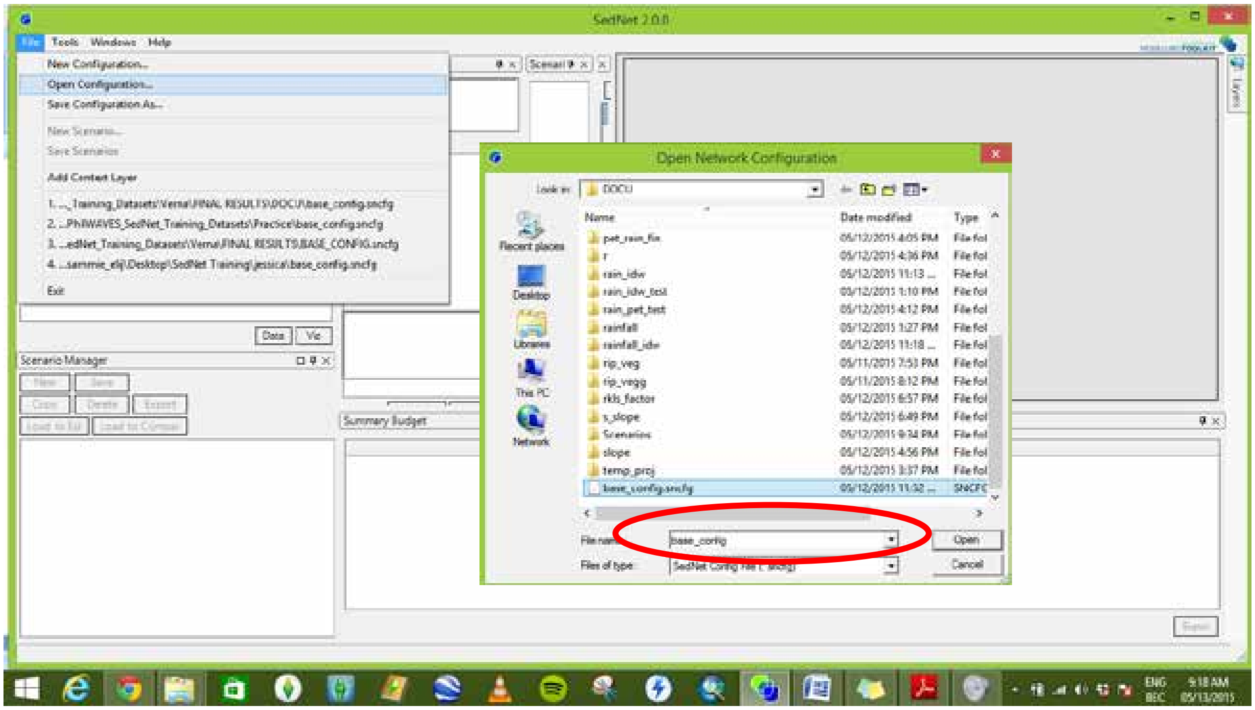


- The saved shapefile will come with a .csv file that can be opened in Excel.
- Below is the result of SedNet.

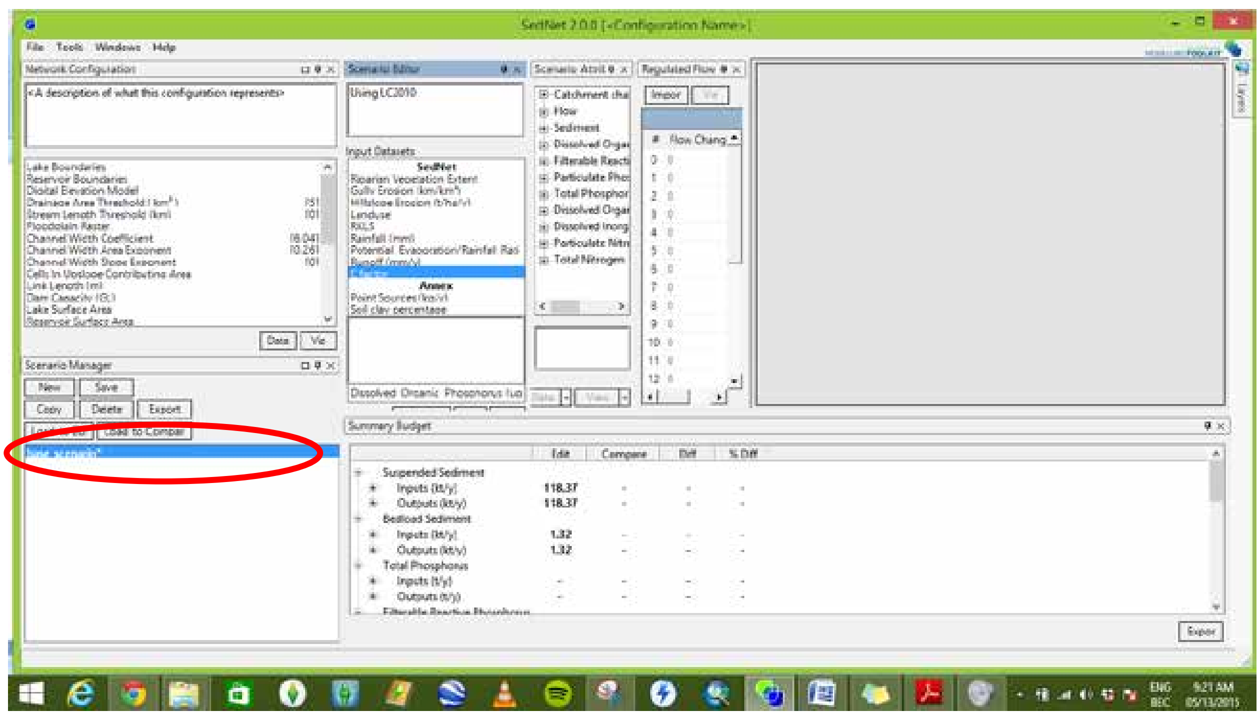


2.1.13. Scenario Analysis: "No semi/natural vegetatation" Scenario

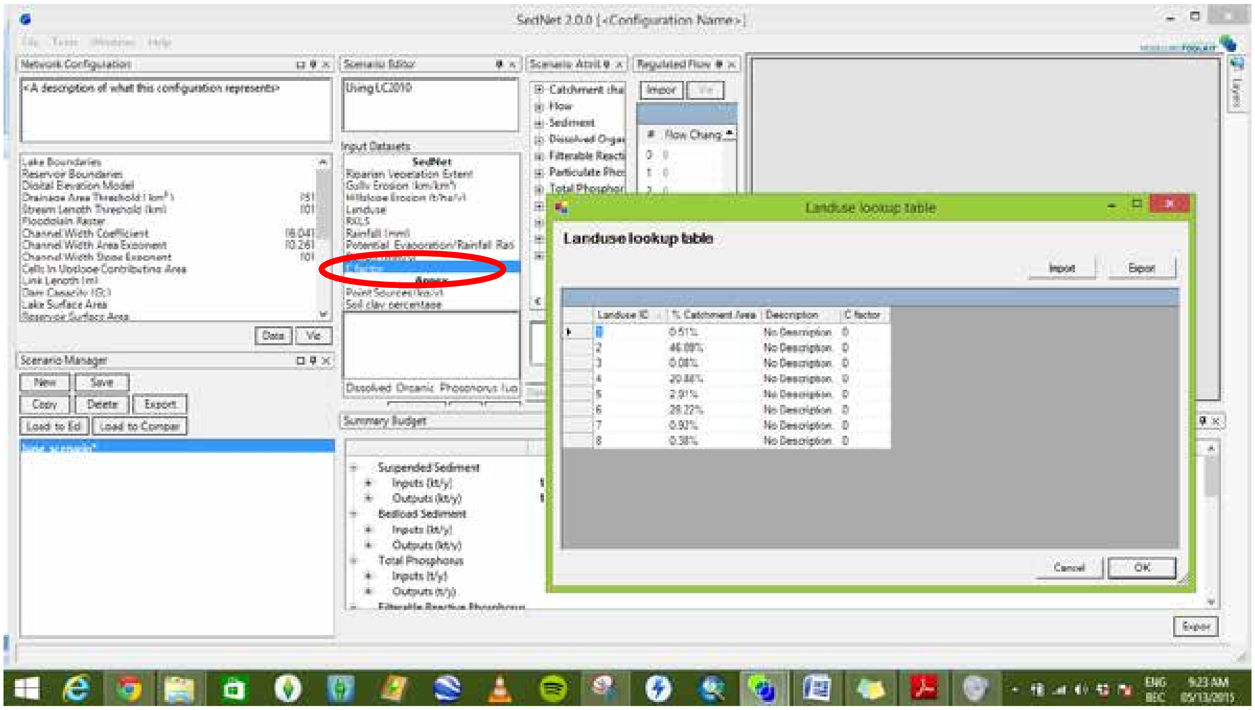
- Open the SedNet Programme and load the "base_config" from your working folder.
- This will automatically load your "base-scenario" results as well.



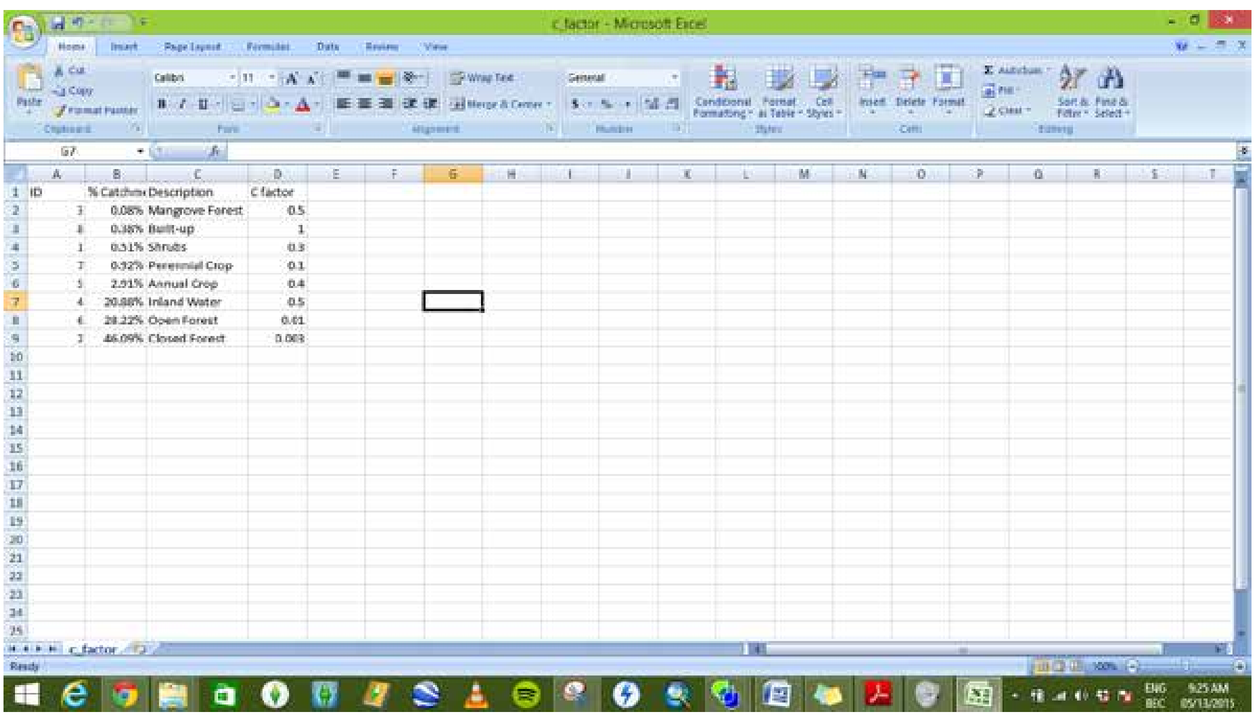
- This will automatically load your “base-scenario” results as well.



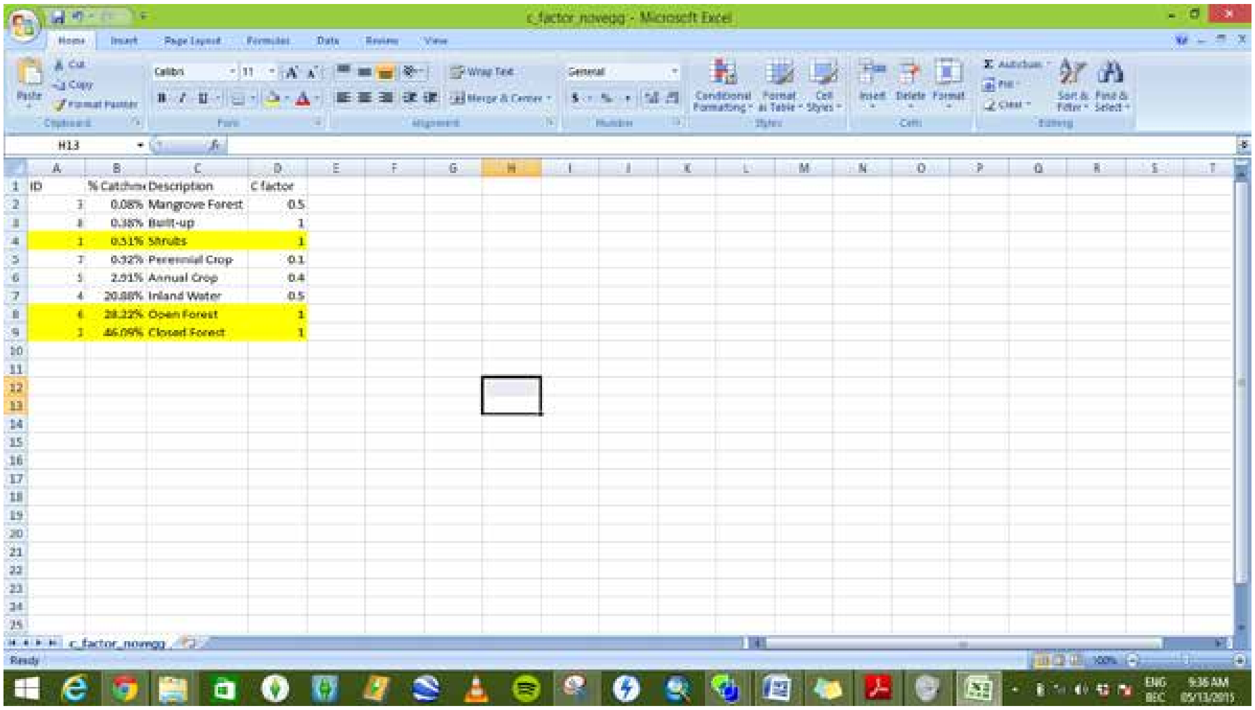
- Double click on “C_factor” to change the “base” scenario to “no vegetation” scenario.



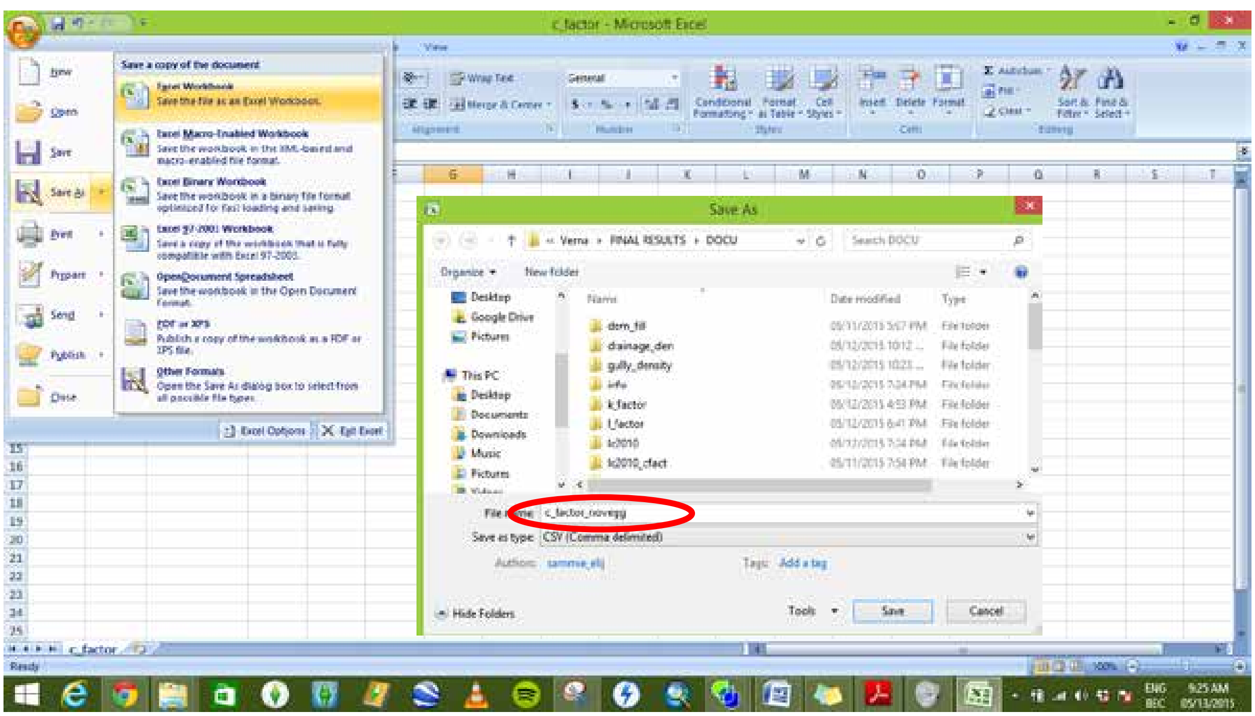
- Open your “C_factor.csv” in Excel, this file is located in your working folder



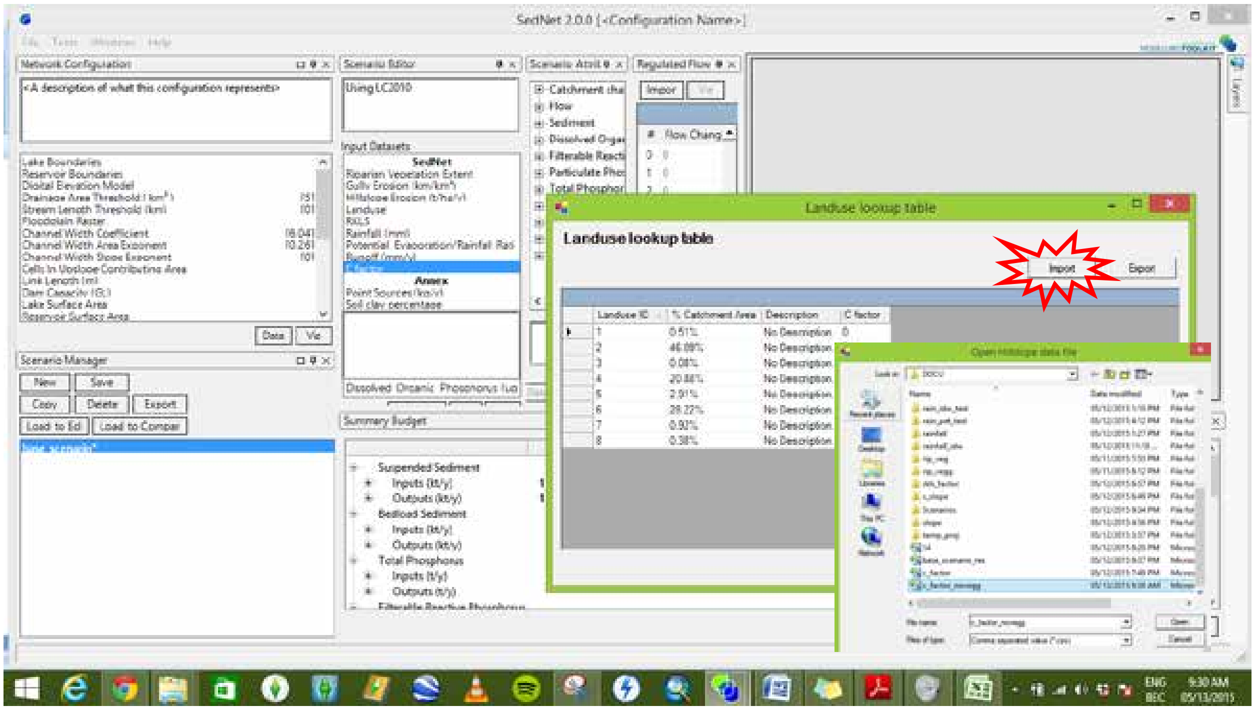
- Change the C_factor of all semi natural and natural vegetations to 1, assuming that all these land-covers were converted to bare lands.



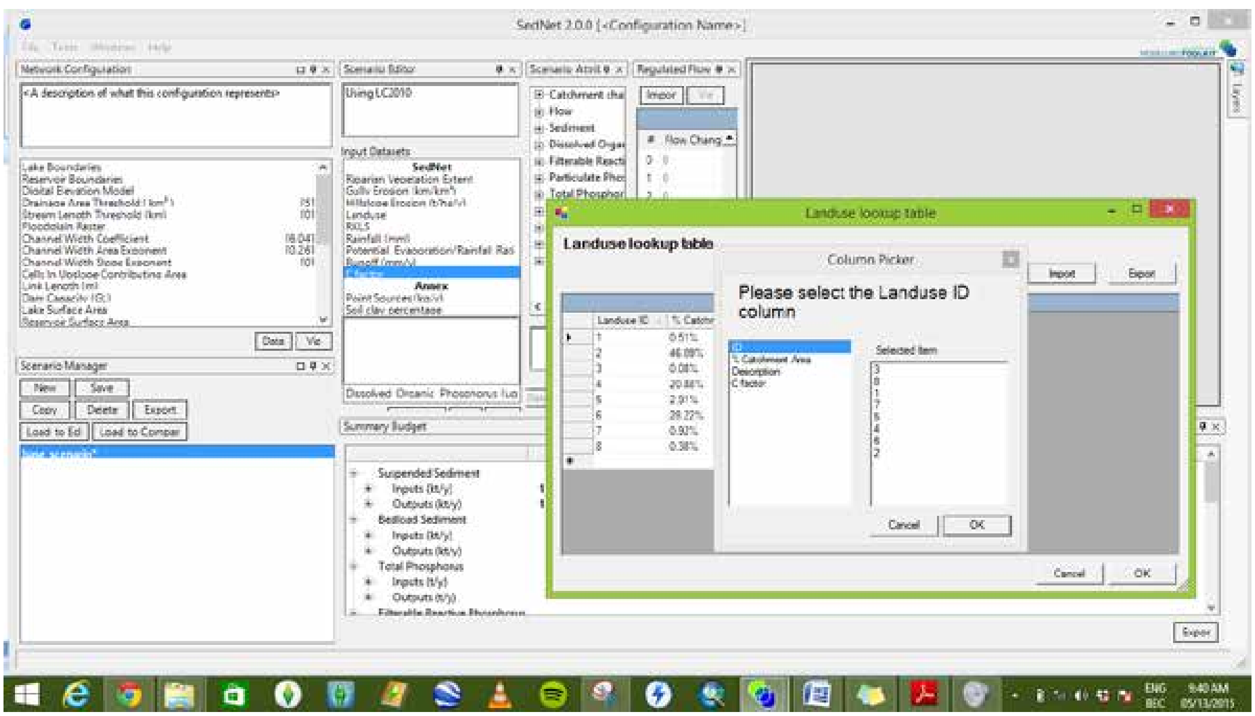
- Save the file as “c_factor_novegg.csv” in Excel. Make sure that the file extension is “Comma delimited”.
- Close the Excel file.



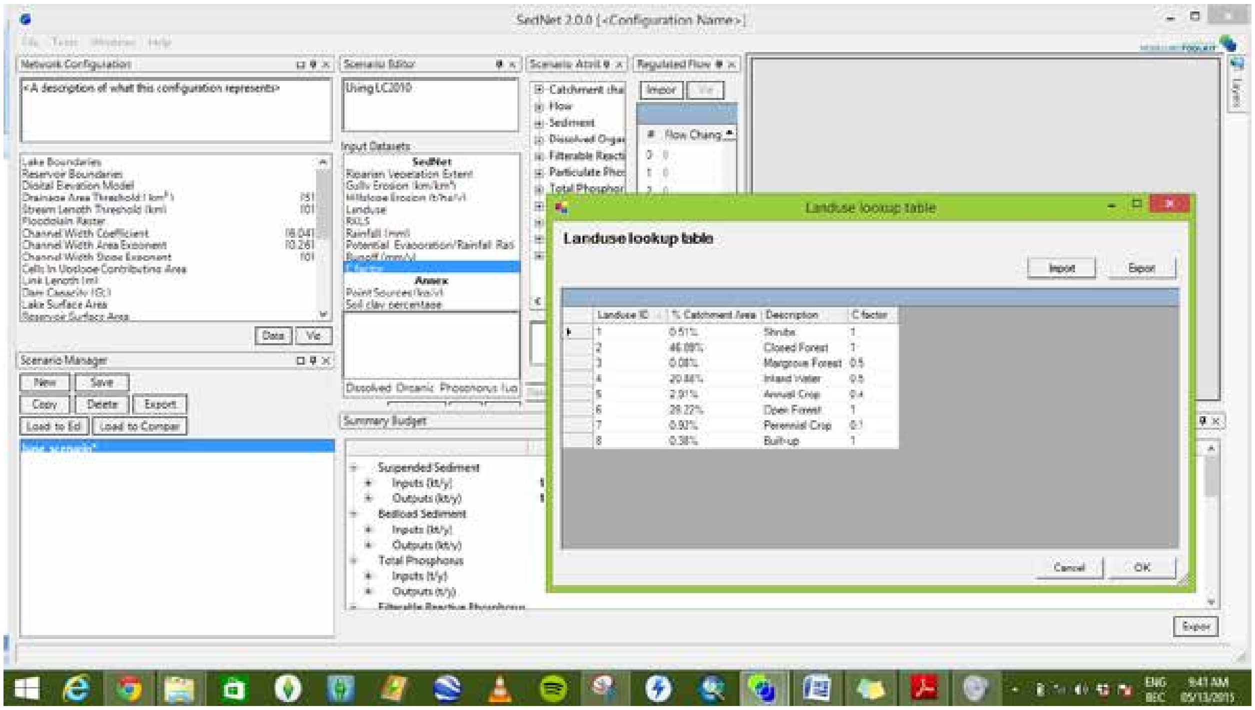
- Go back to SedNet and “Import” the no vegetation look-up table.



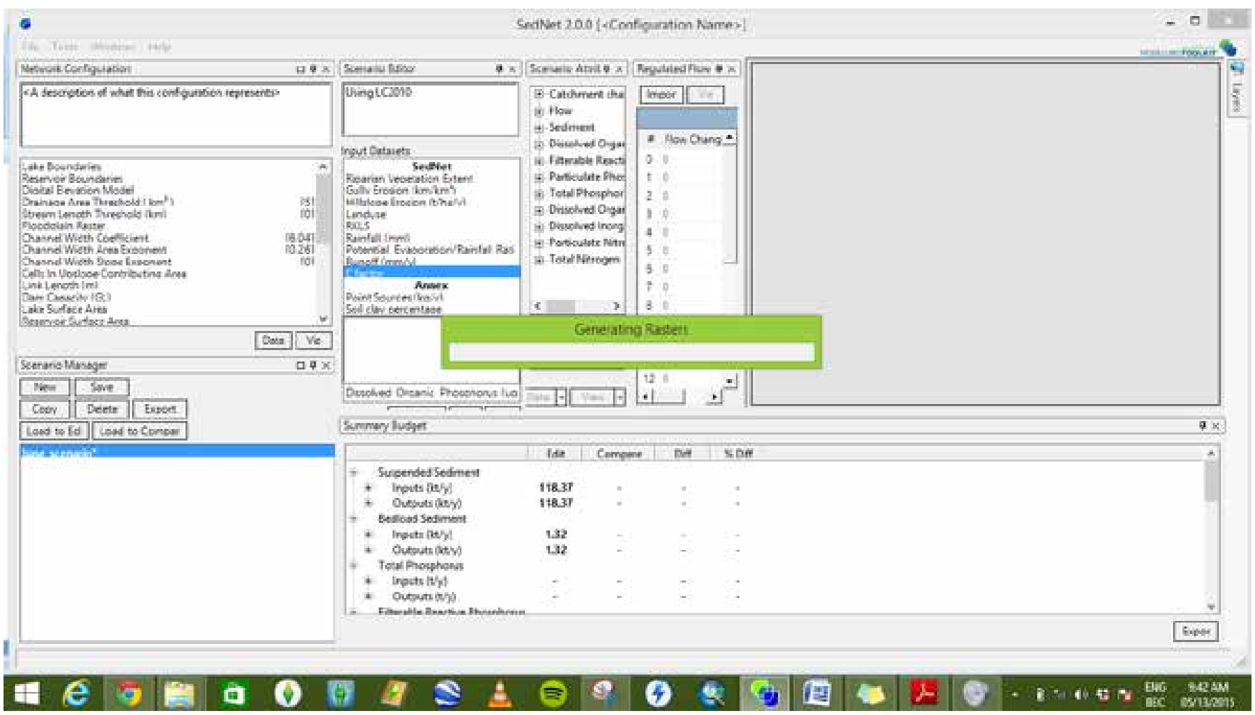
- Use “ID” as the identifier.
- Click “OK”.



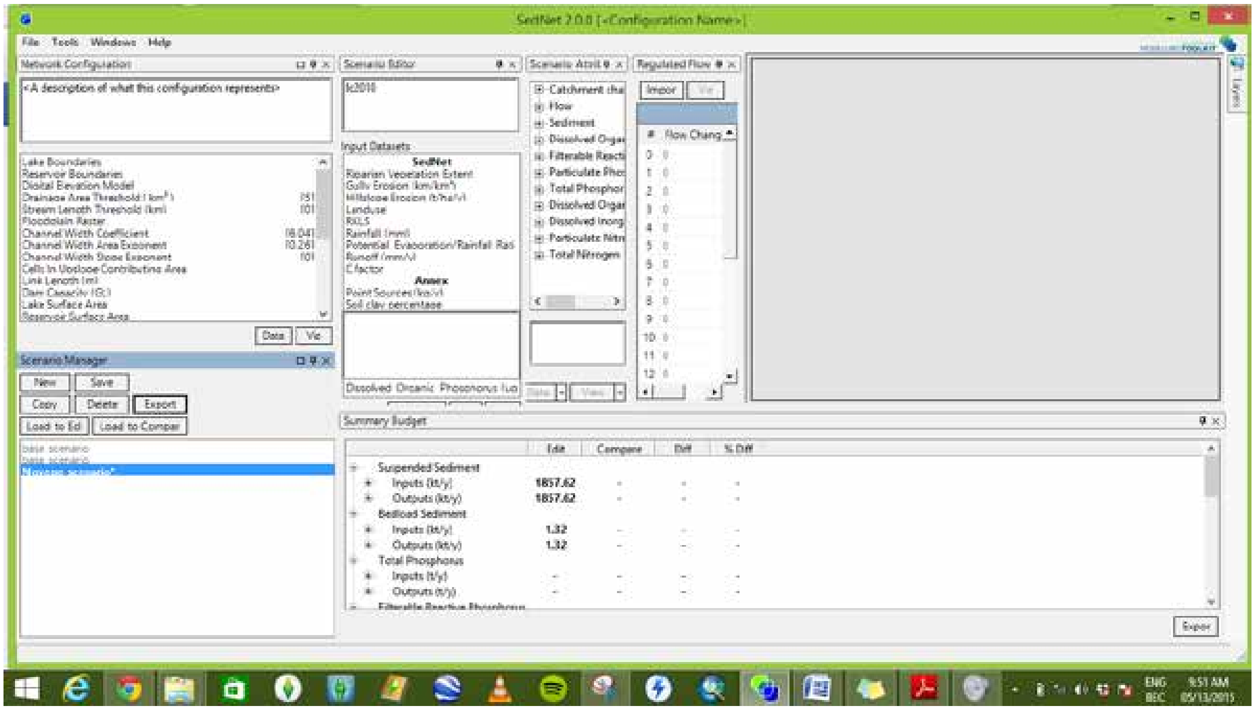
- Upon successful loading of your no vegetation scenario, click “OK”.



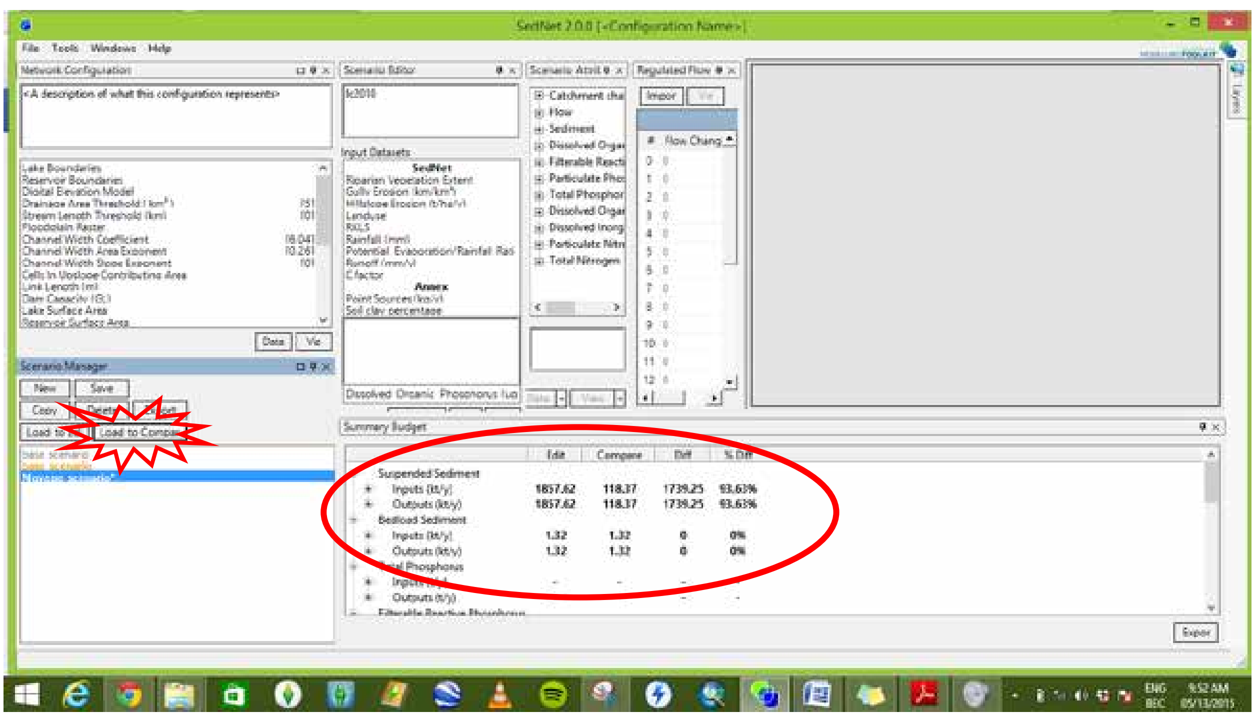
- This will generate a new scenario raster



- When finished, click “Export” and name the file name “novegg_scenario” scenario.



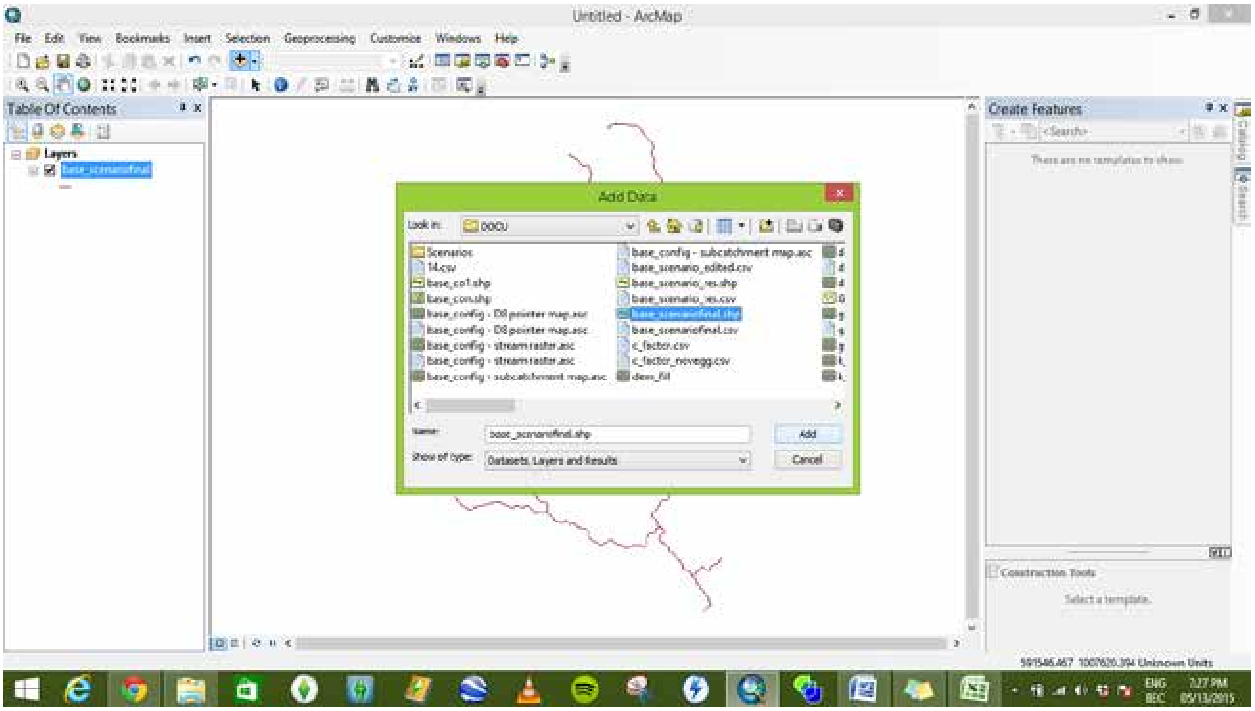
- To compare the no vegetatation scenario and the base scenario, simply click “Load to compare”



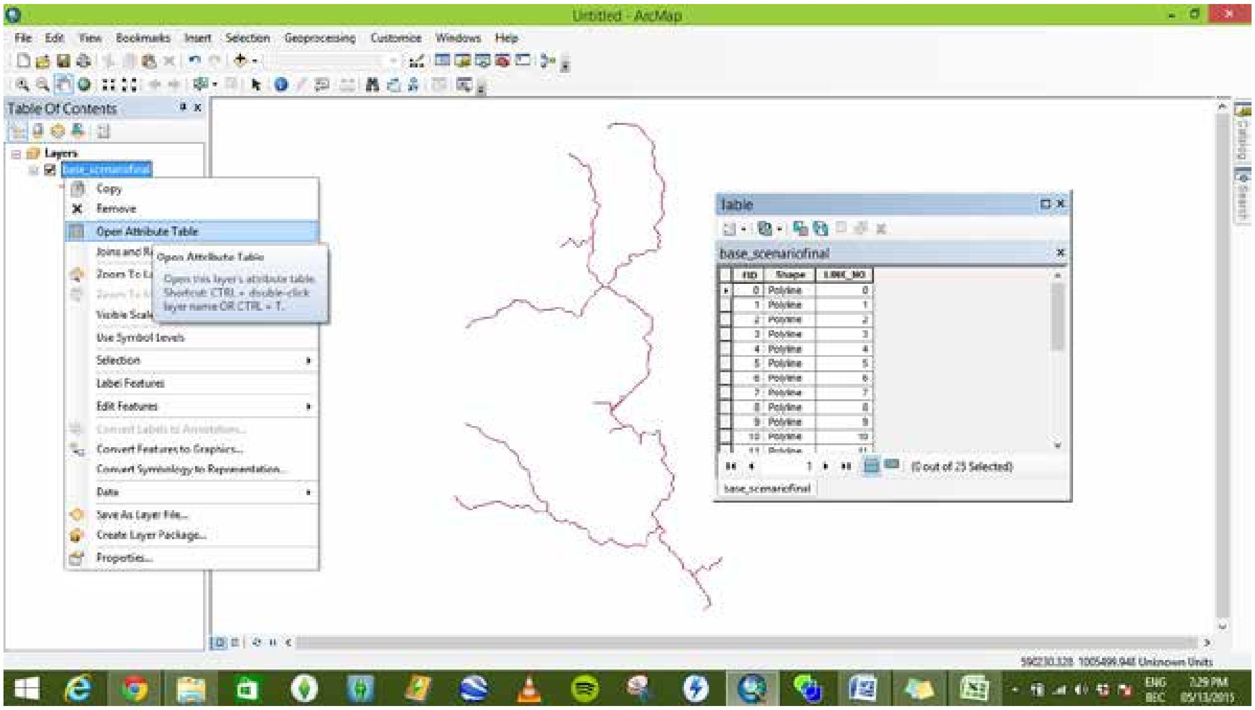
- You can now proceed to post-processing in ArcMaps.

2.2. Post-processing of output data

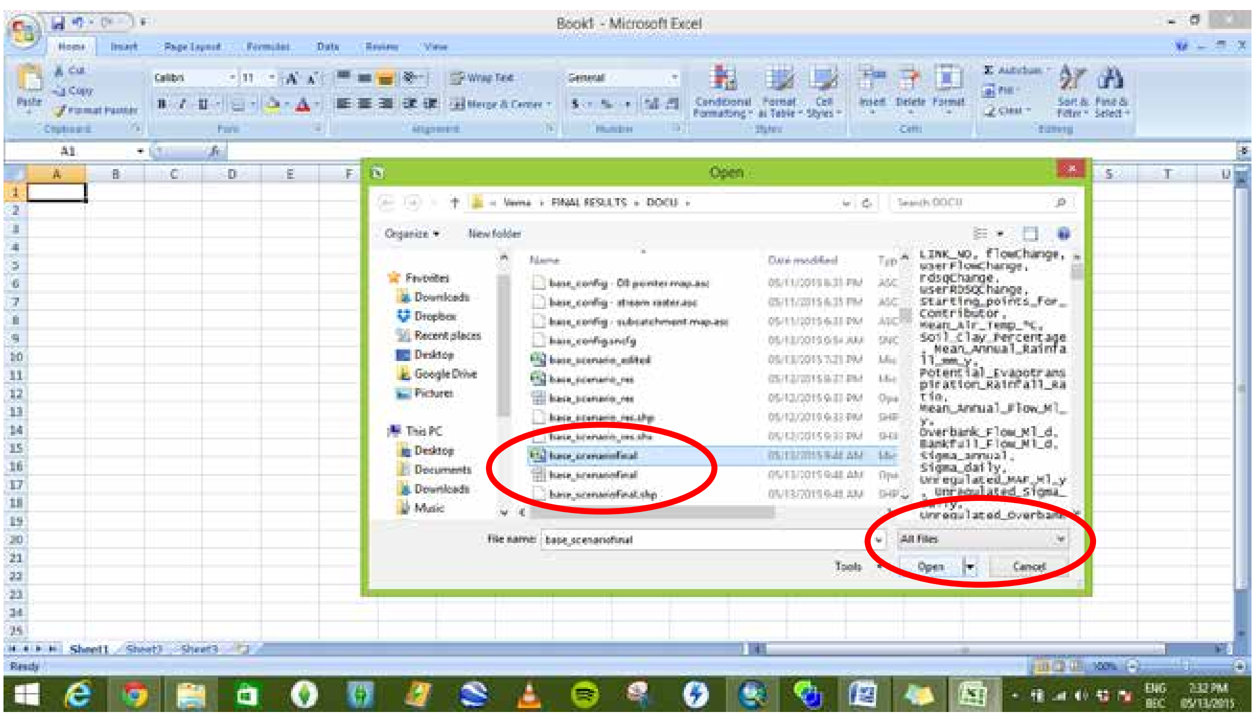
- In order to visualize the sedimentation results, post-processing of the SedNet results is required. To do this, open your ArcMaps and load your “base_scenariofinal” results which is a shapefile.



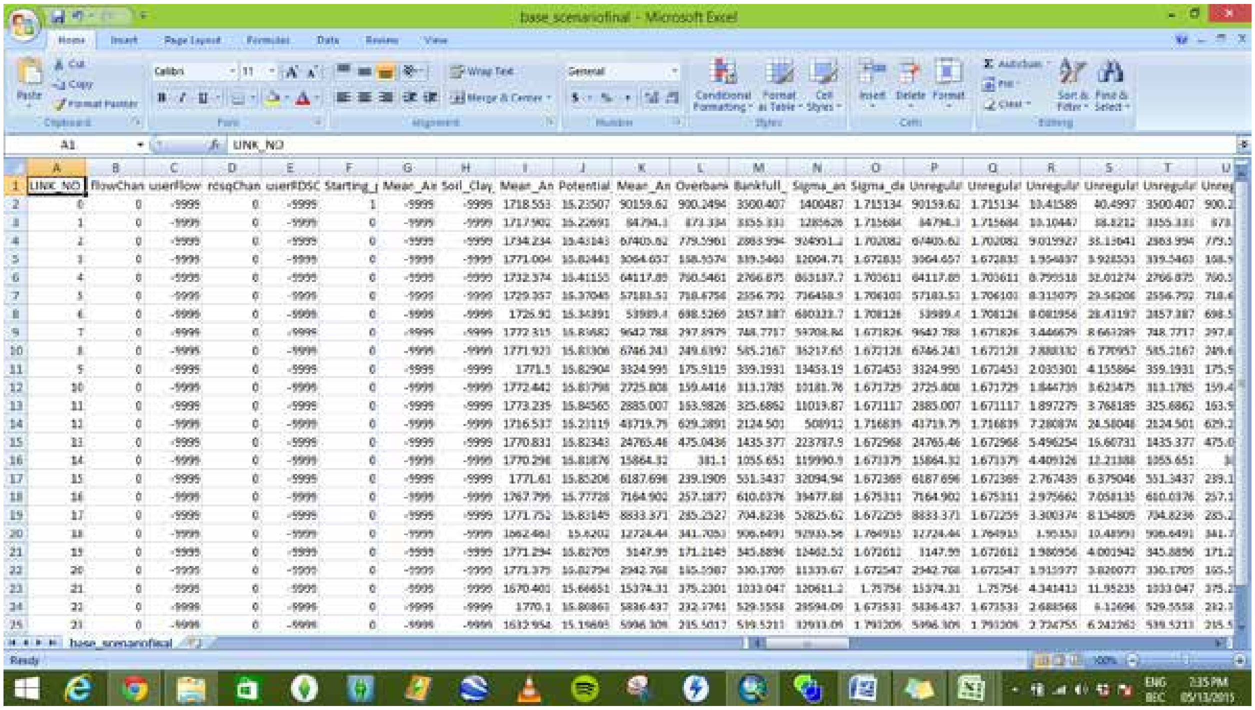
- Examine the “Attribute Table”. Note the “Link No” field. This will be used as the identifier when joining tables.



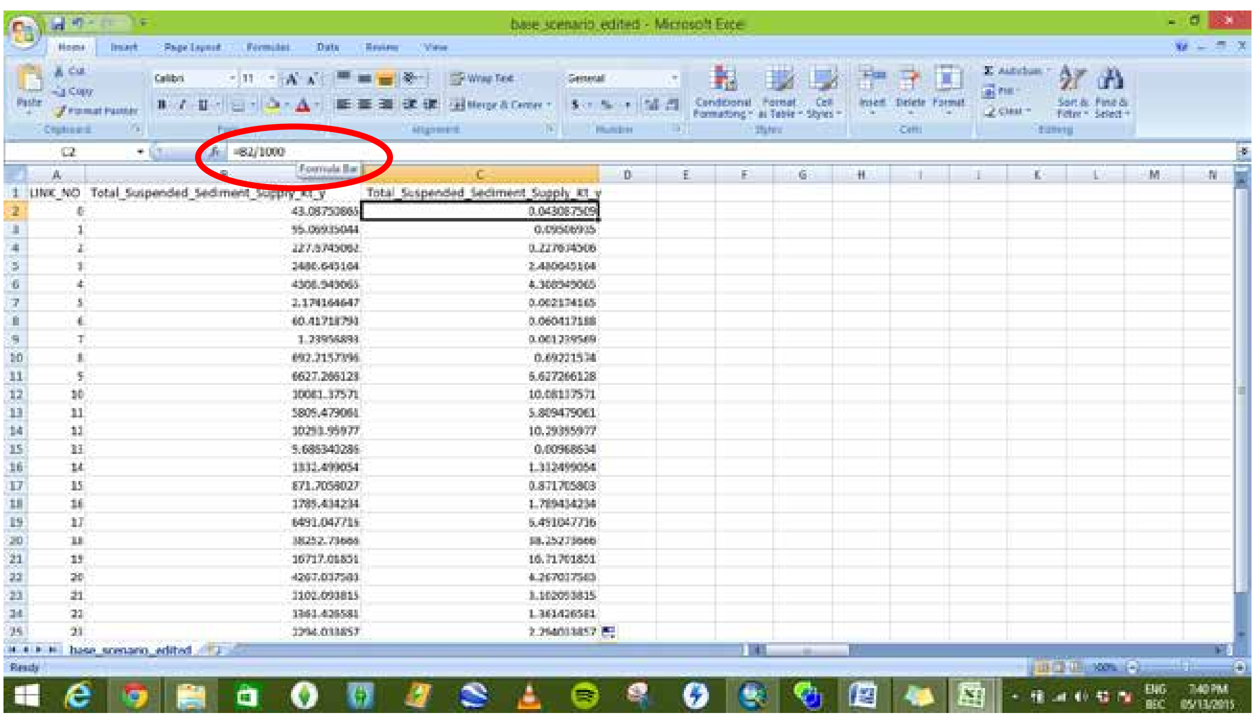
- Open the corresponding CSV file (base_scenariofinal.csv) of the “base_scenariofinal.shp”



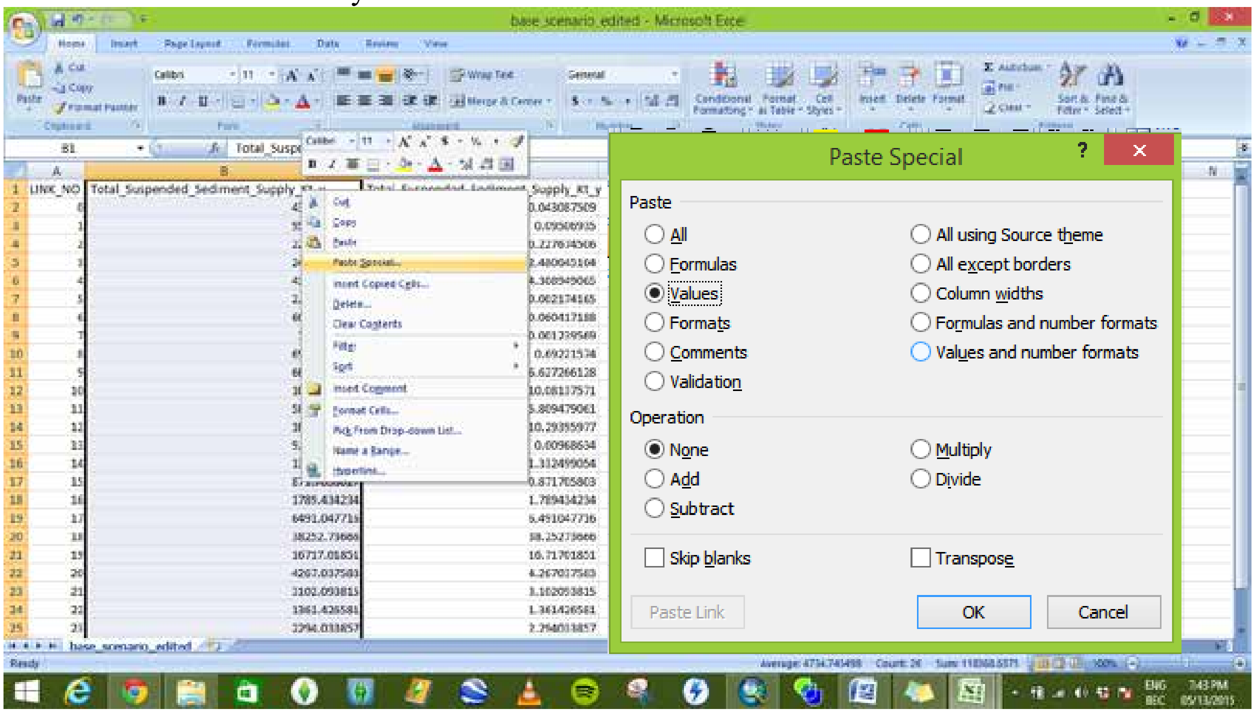
- Examine the excel table and find the column “Link No” and “Total_suspended_sediment_supply_t_y”



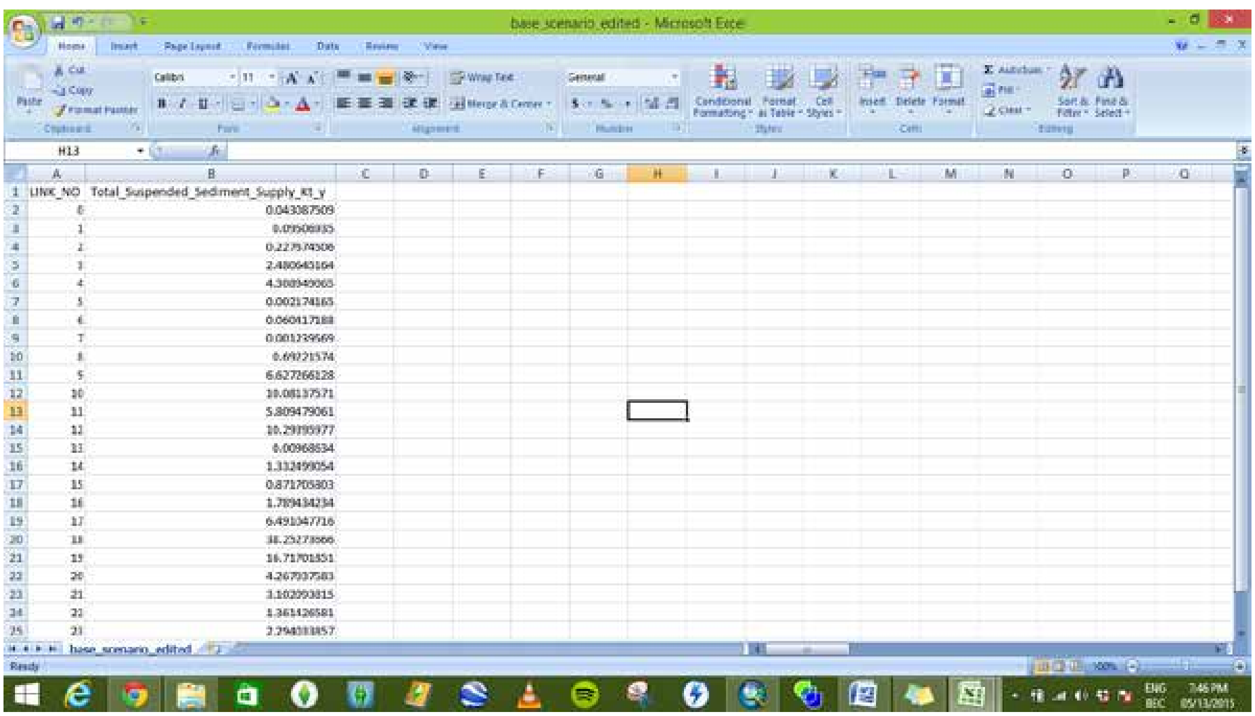
- Save the table as a new “*.csv” file e.g. “base_scenario_edited”.
- Delete all other columns except “Link No” and “Total_suspended_sediment_supply_t_y”
- Convert the values of “Total_suspended_sediment_supply_**t_y**” into “Total_suspended_sediment_supply_**Kt_y**” by dividing the value by 1000.



- Copy the column of “Total_suspended_sediment_supply_**Kt_y**” and paste it over the column “Total_suspended_sediment_supply_**t_y**” using “Paste Special” “Values Only”

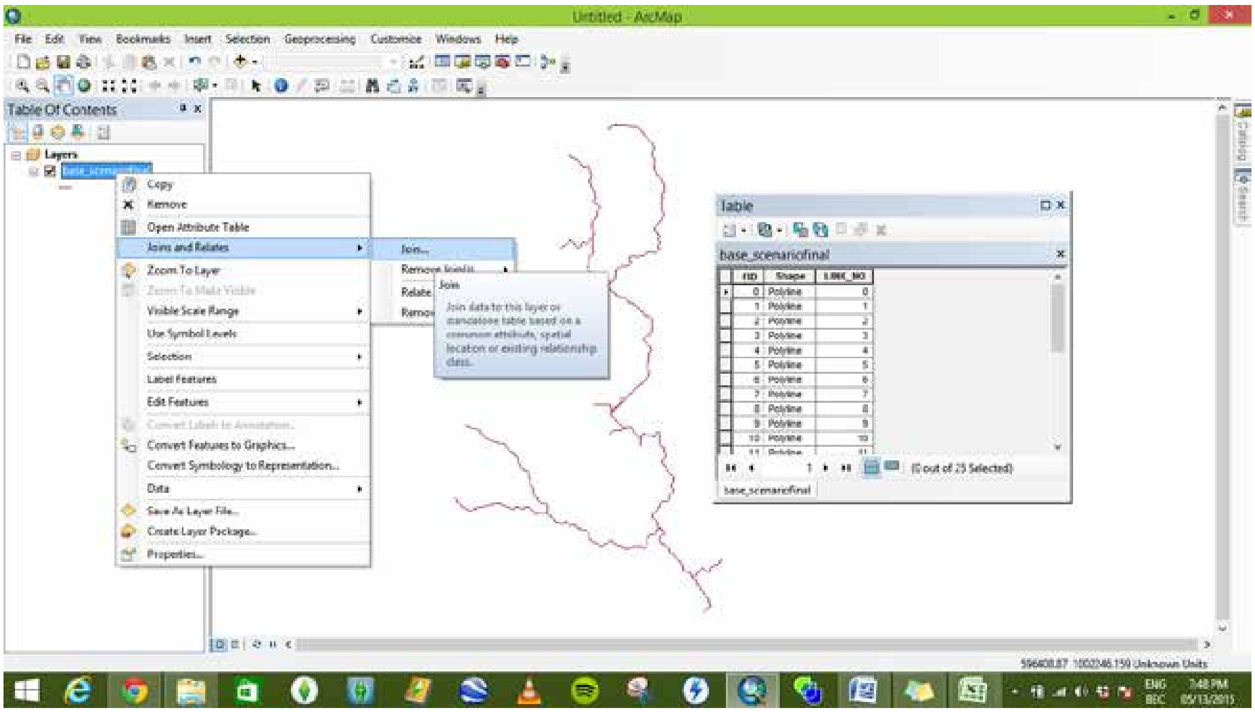


- The final table will appear to be like this.

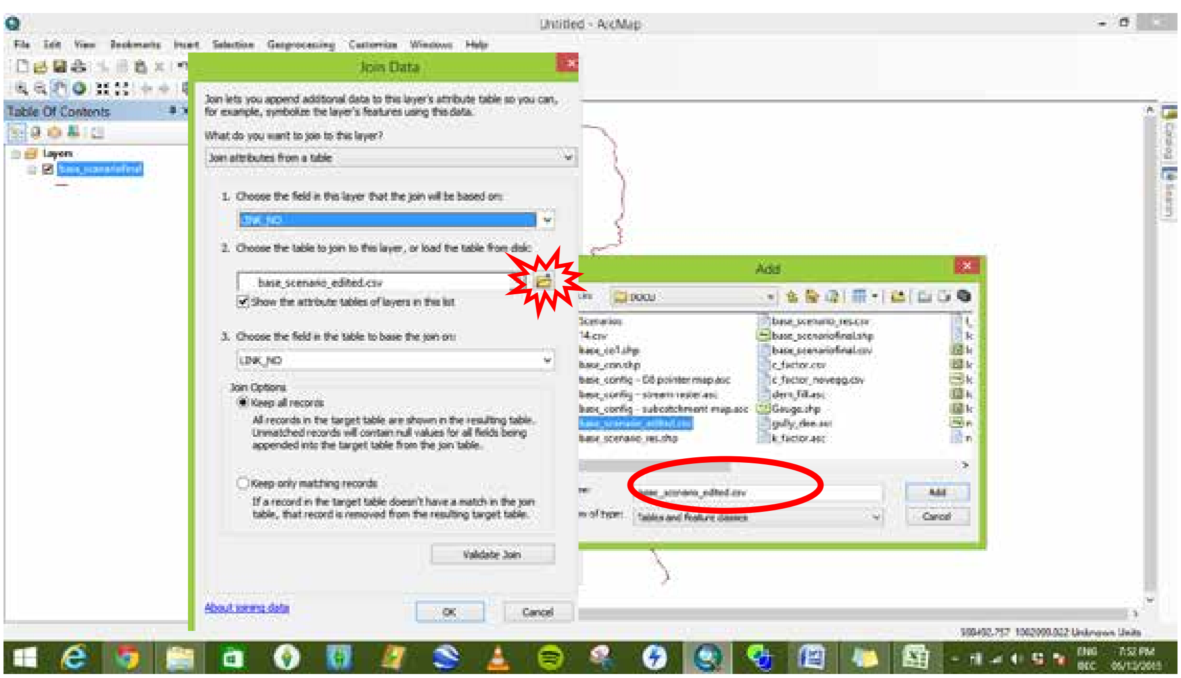


- “Save” the .csv file and close the file.

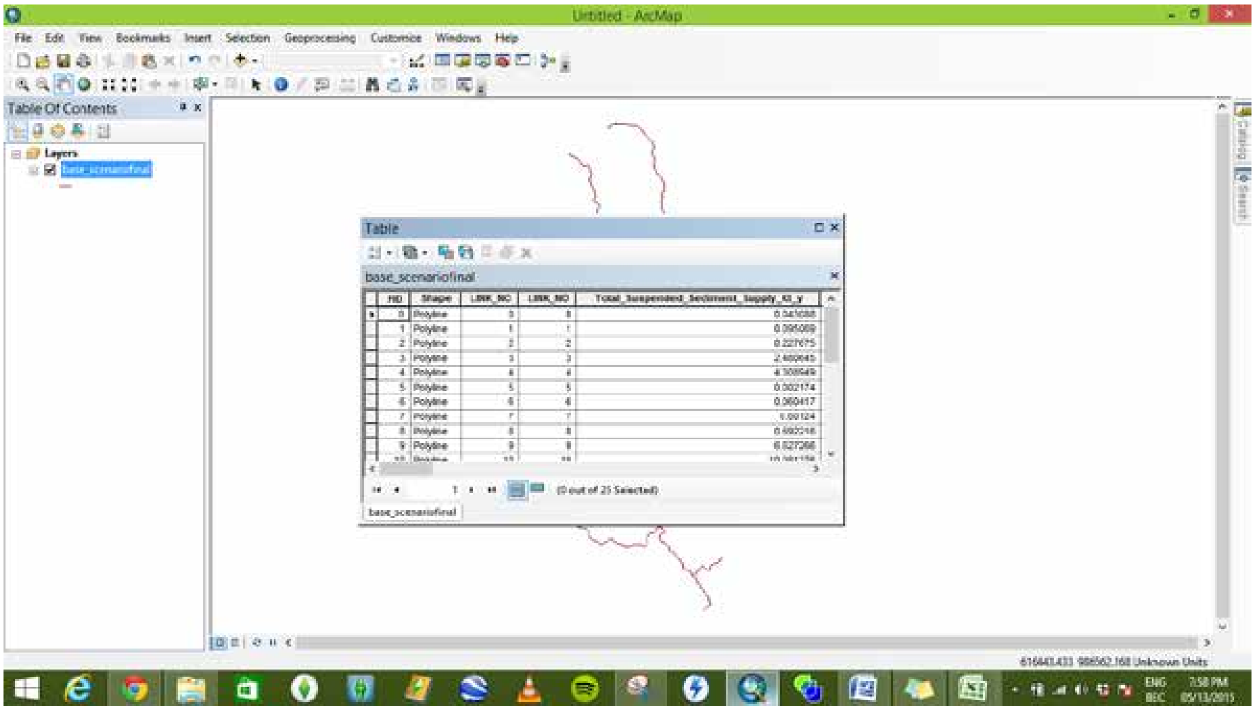
- In ArcMap, join the newly created table "“base_scenario_edited.csv” with the “base_scenario_final.shp”. This is done in order to incorporate the value of the total suspended sediment load in KT/year in the shapefile.



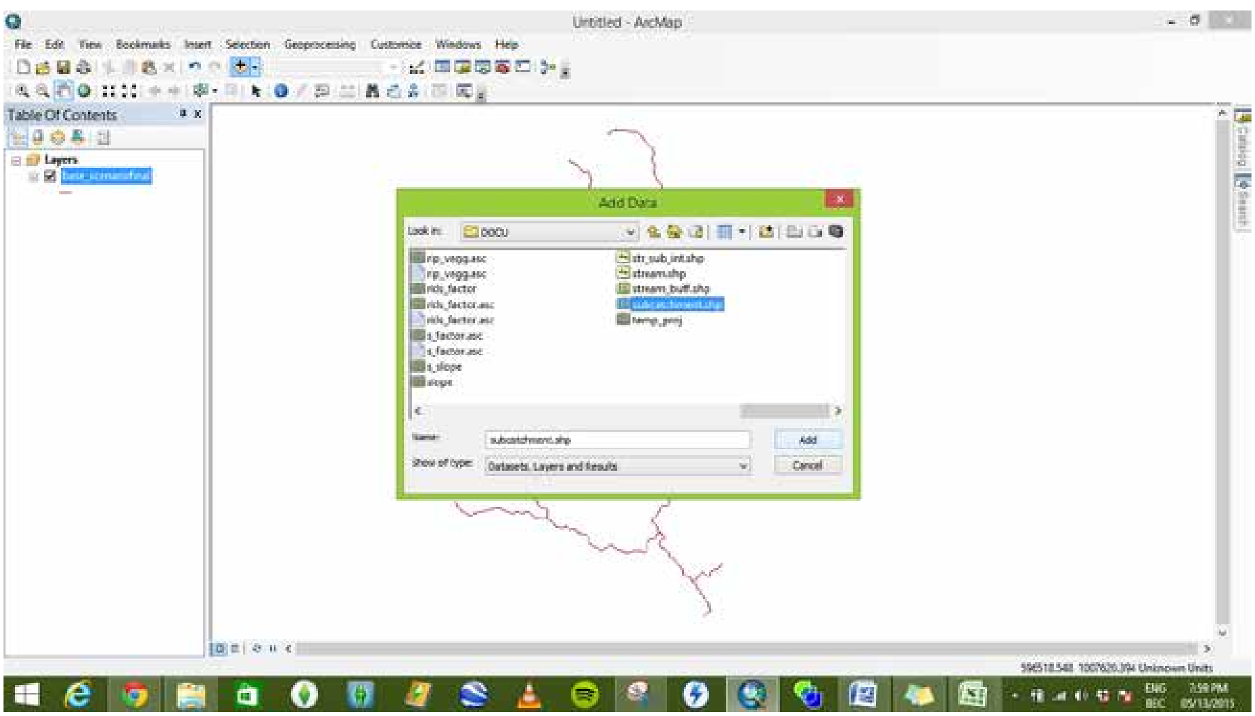
- In the “Join Data” pop-up, open the “base_scenario_edited.csv”. The common identifier should be “Link No.”

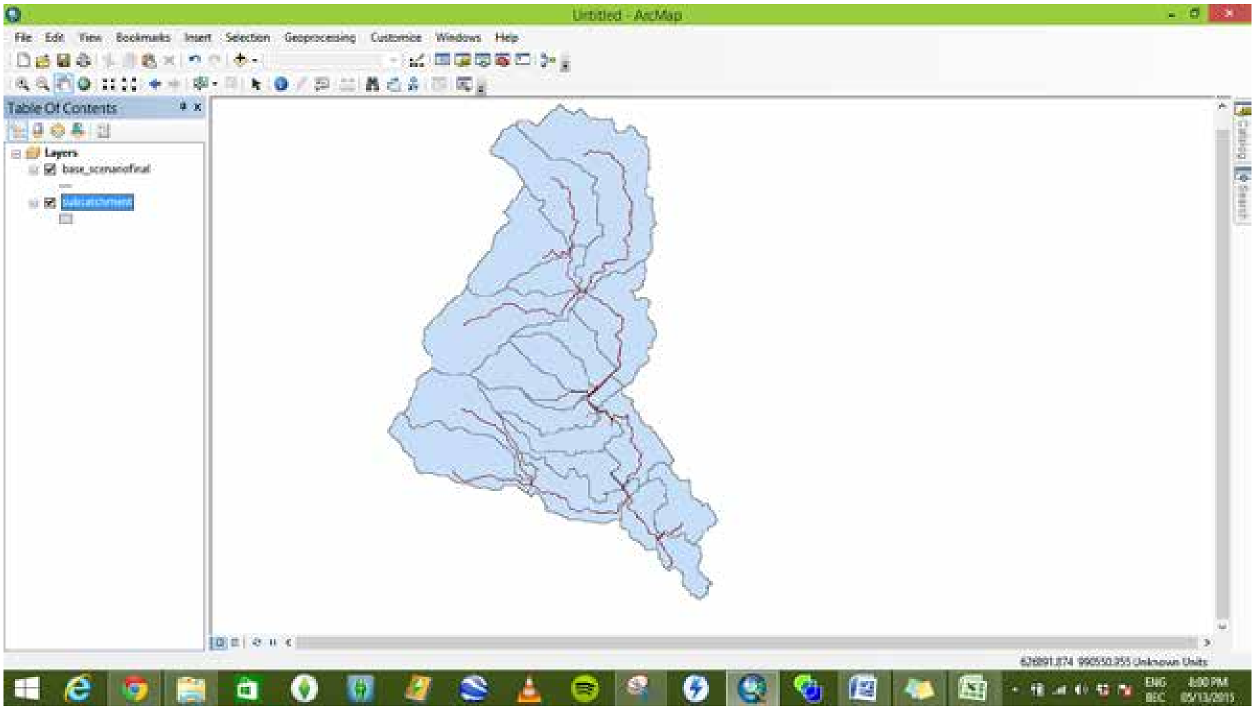


- Examine the “Attribute Table” of the “base_scenario_final.shp”. Note that the “Total_suspended_sediment_supply_**Kt_y**” field has now been added to the attribute table.

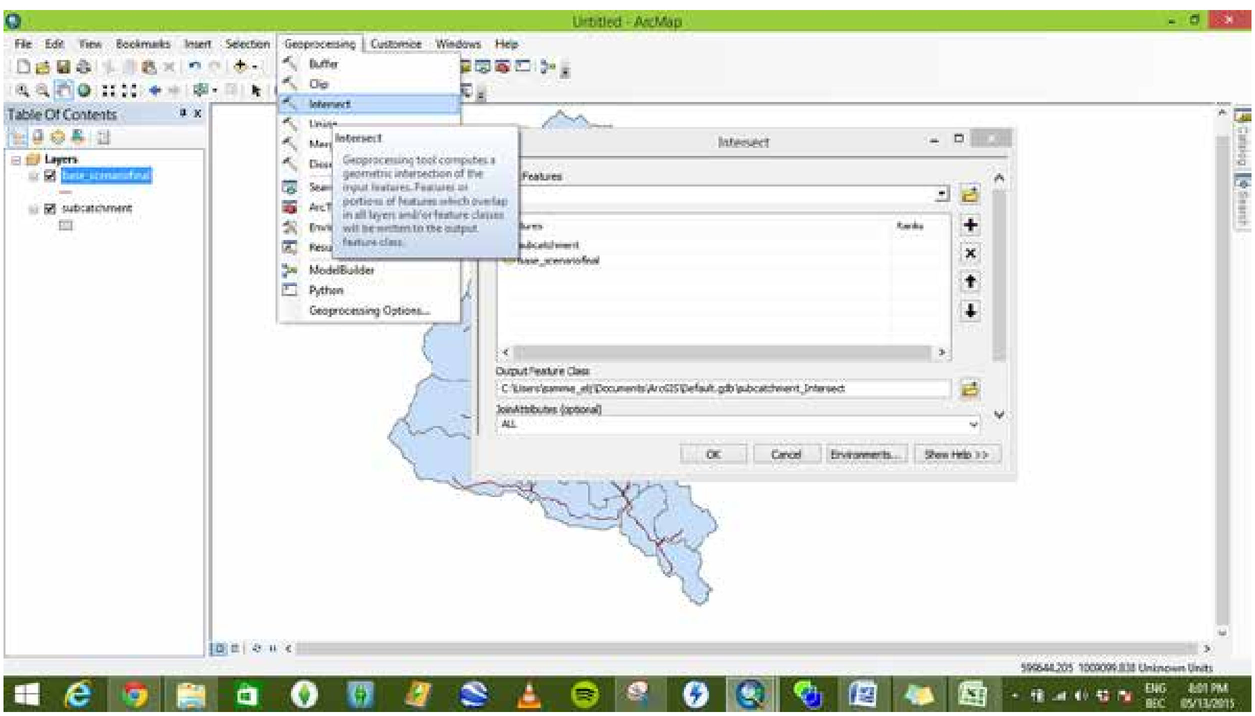


- Open the “subcatchment.shp” file in ArcMap.



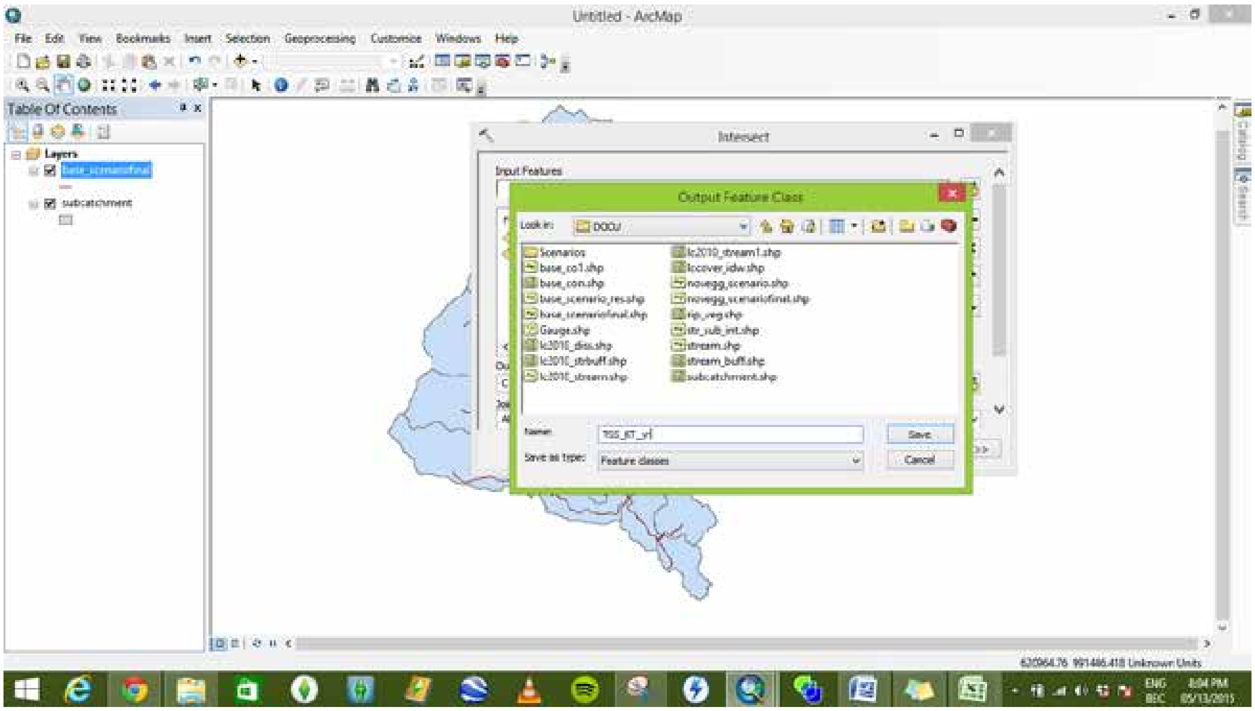


- Using "Geoprocessing" tool, "Intersect" the "subcatchment.shp" and the "base_scenariofinal".

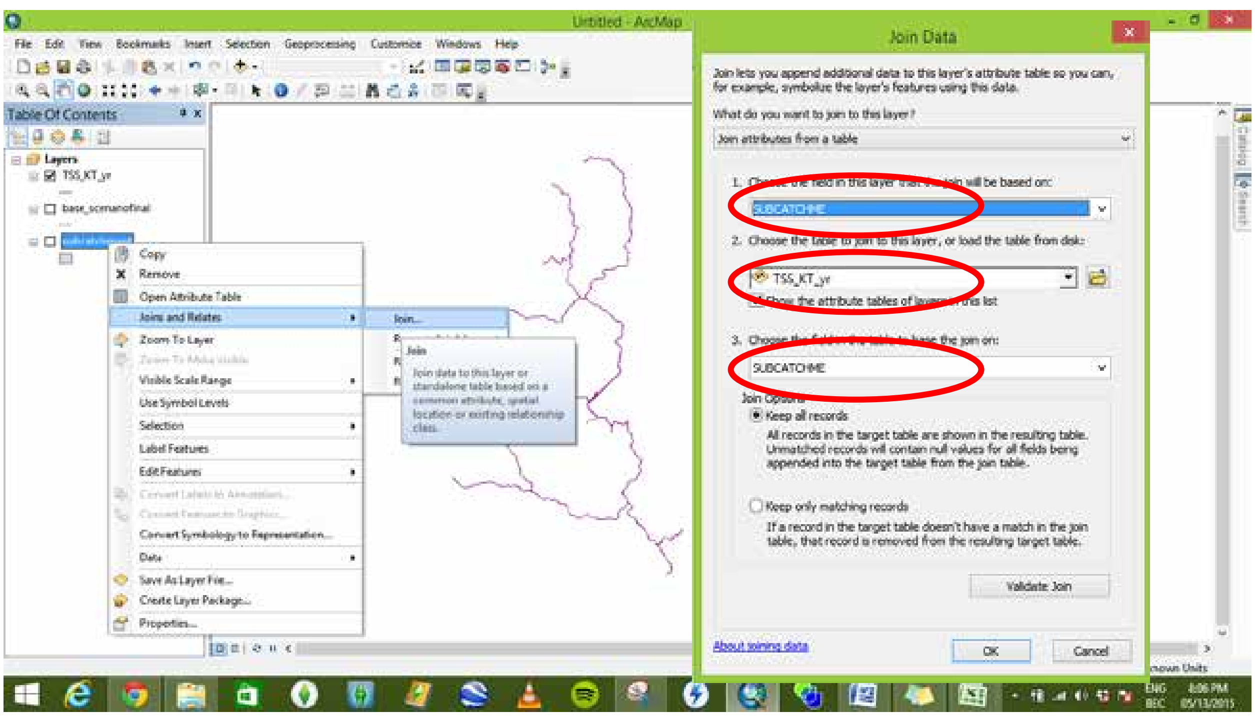


- Name the output feature class "TSS_KT_yr".

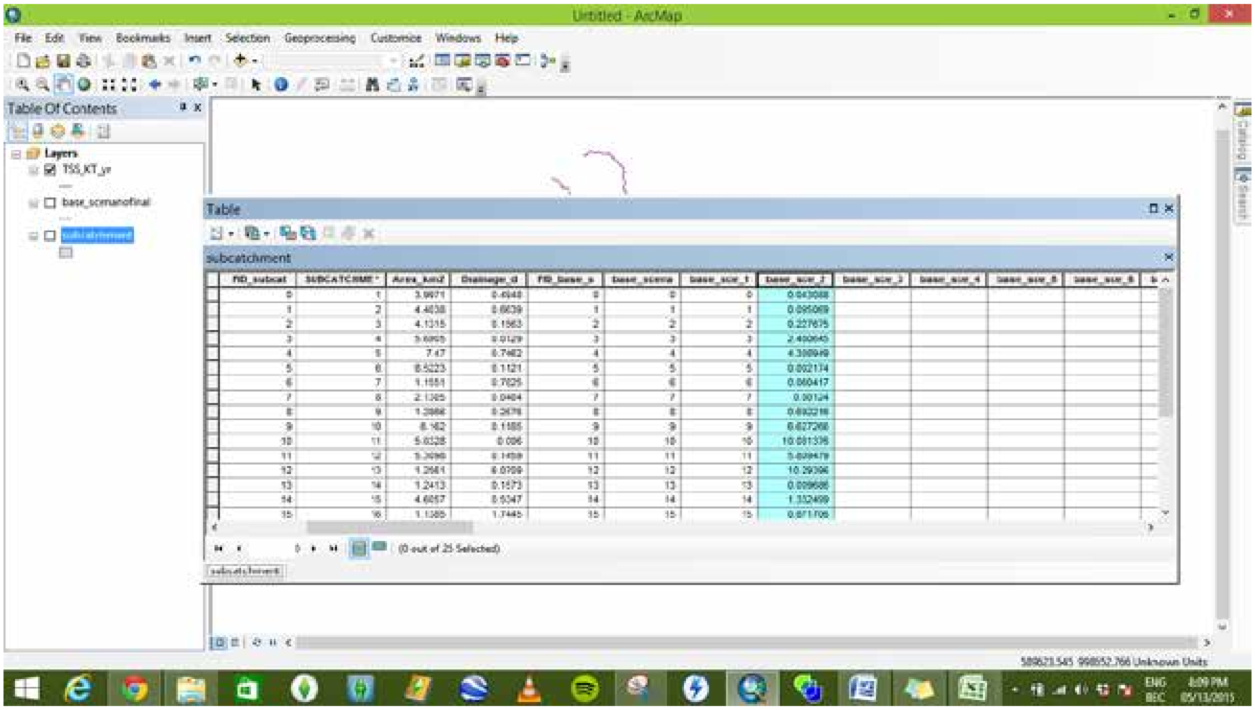
- Click "OK".



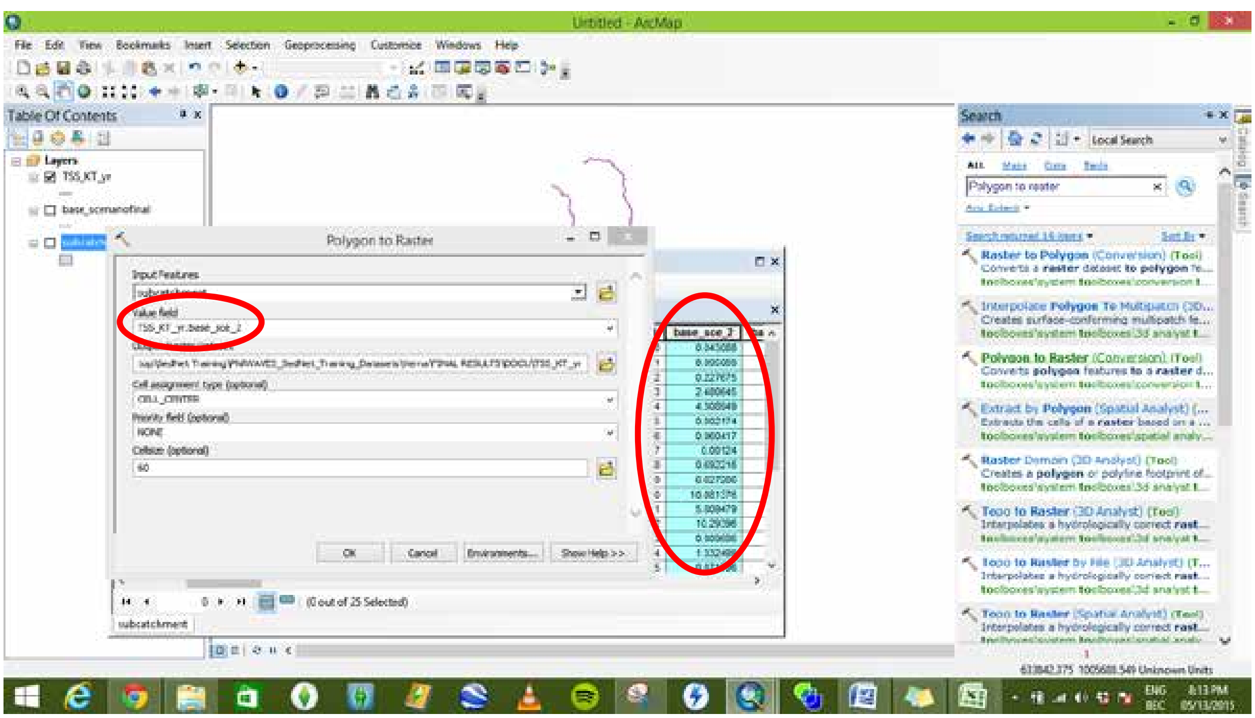
- Join "subcatchment.shp" and "TSS_KT_yr" by right clicking the subcatchment file and then "Join and relate" and finally "Join".



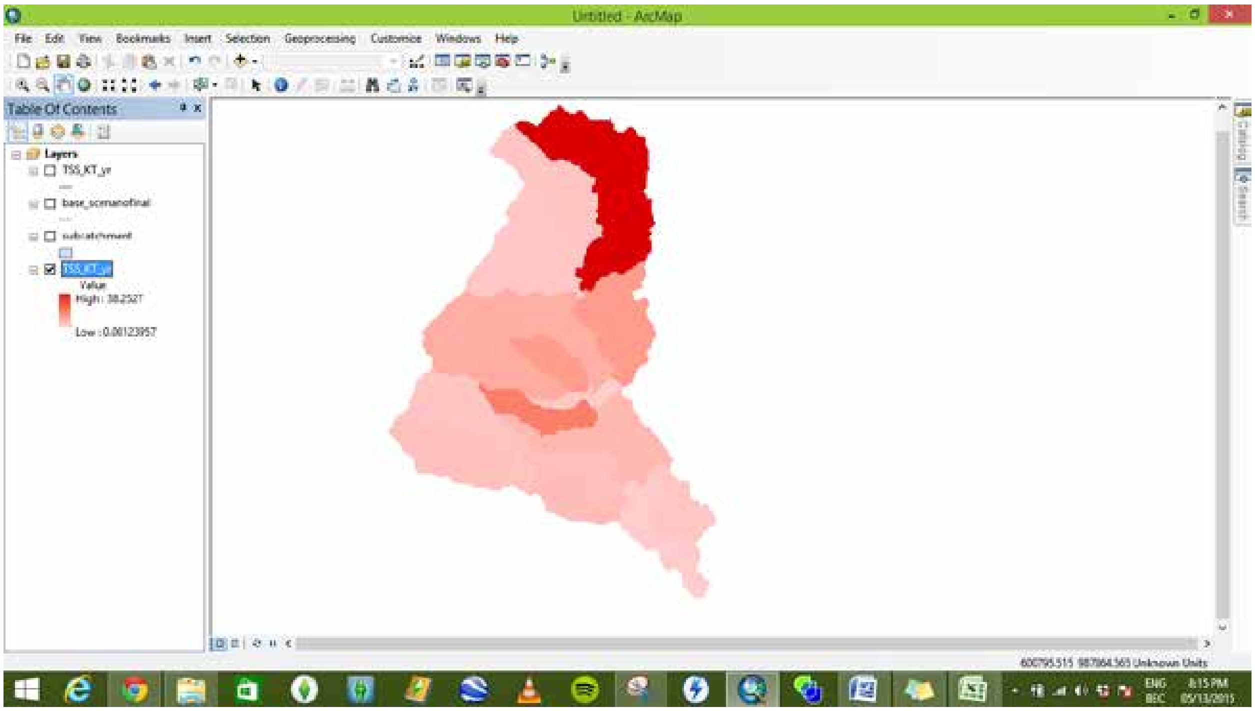
- Now the "subcatchment.shp" contains the values of the total suspended sediment load per KT/yr.



- Convert the shapefile to a raster file using "Value Field" "base_sce_2" which contains the value of the TSS in KT/yr.
- Click "OK"



- This represent the final map of the total suspended sediment load in kilo tons per year.



2.3. Computation of Ecosystem Services in terms of erosion avoidance

The base scenario was used to provide the current condition of soil erosion in Pulot Watershed. Meanwhile, SedNet's scenario analysis capabilities wad used to show the ecosystem services of avoided erosion. In this scenario, all semi-natural and natural ecosystems, like close and open forest, shrublands, grasslands and wooded grasslands were changed into bare lands. The effects on sediment loads and exports were analyzed by rerunning the model for this simulated scenario. Result of the base scenario was then deducted from the results of the no vegetation scenario to elucidate the avoided erosion service.

The sample calculations are provided below:

Watershed	Sediment generated under 2010 land cover (kton sediment/year)	Sediment that would be generated under bare land cover /1	Ecosystem service (avoided erosion)
Unit	(kton sediment/year)	(kton sediment/year)	(kton sediment/year)
Pulot Watershed	118.37	1857.62	1739.25
TOTAL	**118.37**	**1857.62**	**1739.25**

Key: /1 assuming that all closed forest, open forest, shrubs and wooded grasslands would be converted to bare land
Note: We calculate the erosion control service generated by natural and semi-natural ecosystems, in particular closed forest, open forest, shrubs and wooded grasslands (and excluding the erosion control service from perennial and annual croplands). The reason for this is that in particular the natural and semi-natural ecosystems are subject to degradation.