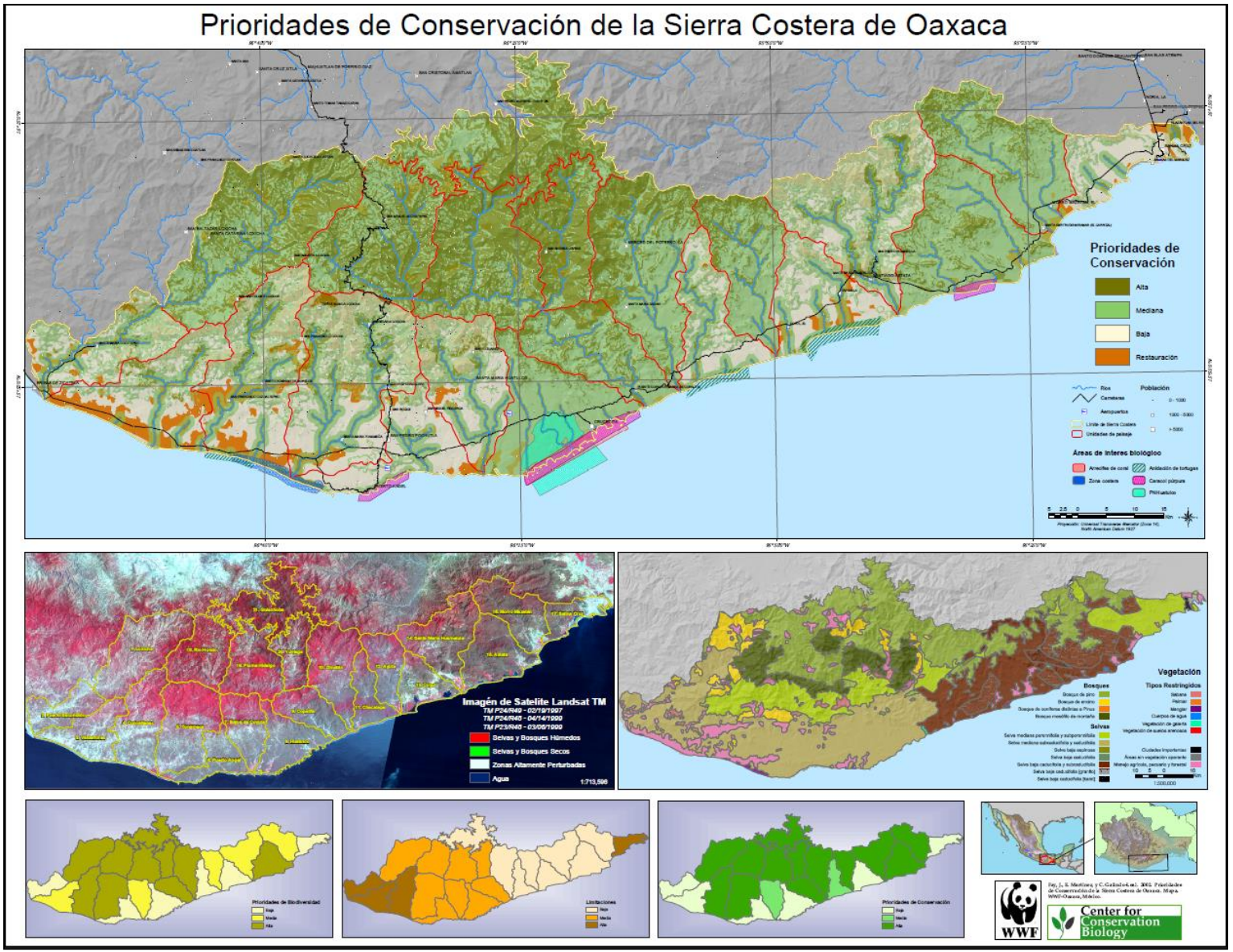
Duke
NICHOLAS SCHOOL OF THE ENVIRONMENT

Project 2:
Sierra Costera Site Analysis

ENVIRON 761

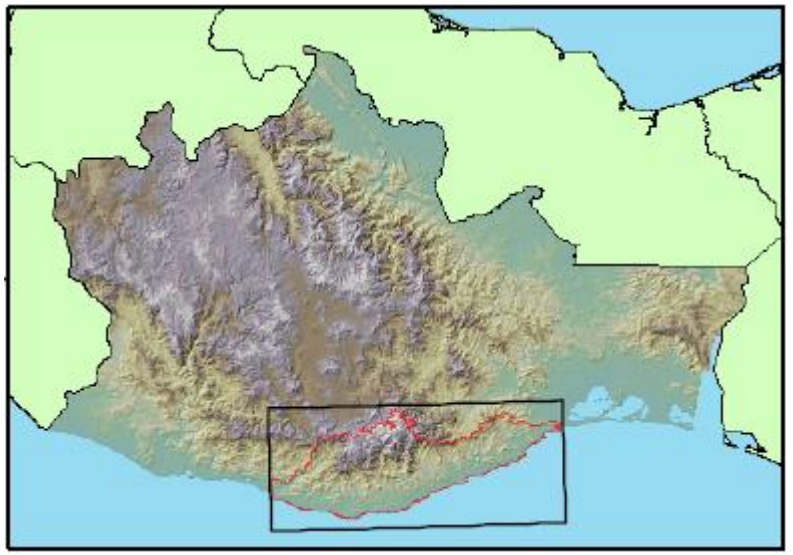
Geospatial Applications for
Conservation & Land Management

Sierra Costera de Oaxaca



Sierra Costera de Oaxaca

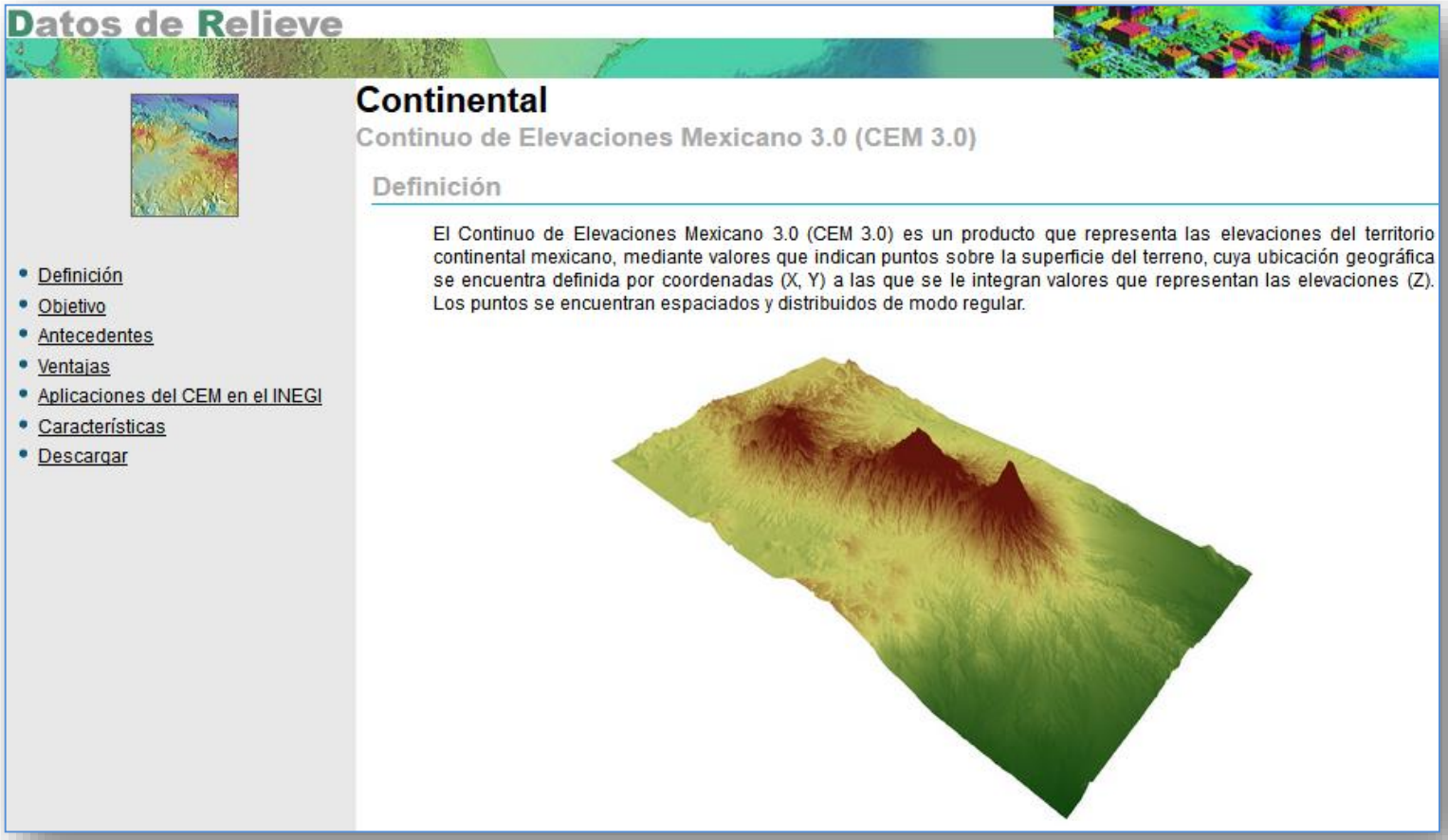
Scenario



- Create stream map from DEM…
- Determine drainage areas for 5 gauge sites and determine topographic characteristics for each…

Source data: 15 and 90m DEM

INEGI
INSTITUTO NACIONAL
DE ESTADÍSTICA Y GEOGRAFÍA

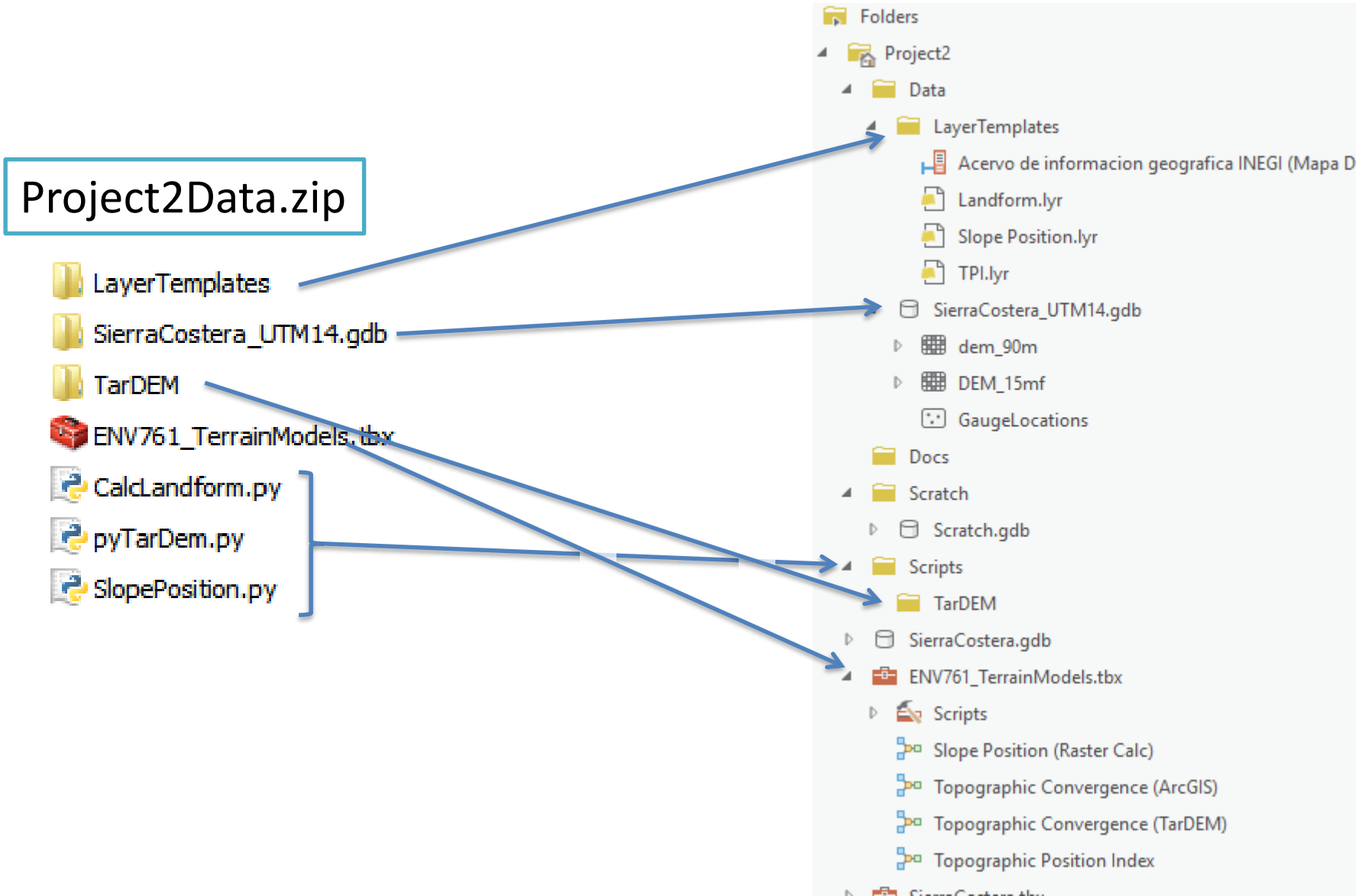


http://www.inegi.org.mx/geo/contenidos/datosrelieve/continental/continuoelevaciones.aspx

Overview

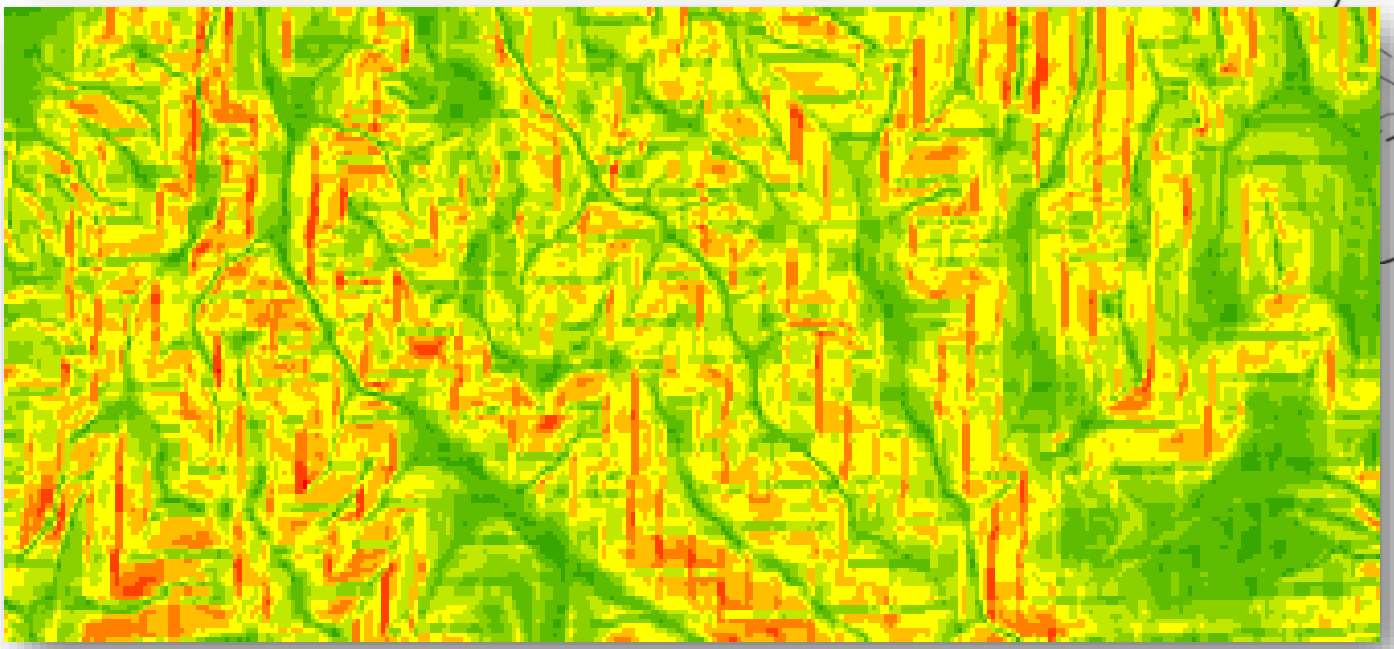
- **Prepare workspace**
- **Surface analyses**
  - Slope, aspect, hillshade, *analytical* hillshade
- **Hydrographic analyses**
  - DEM conditioning, stream network, catchments
- **Terrain analyses**
  - TCI, TPI, slope position, land form
- **Riparian analyses**
  - Flow length

Prepare workspace



Surface analyses

Resampling errors…



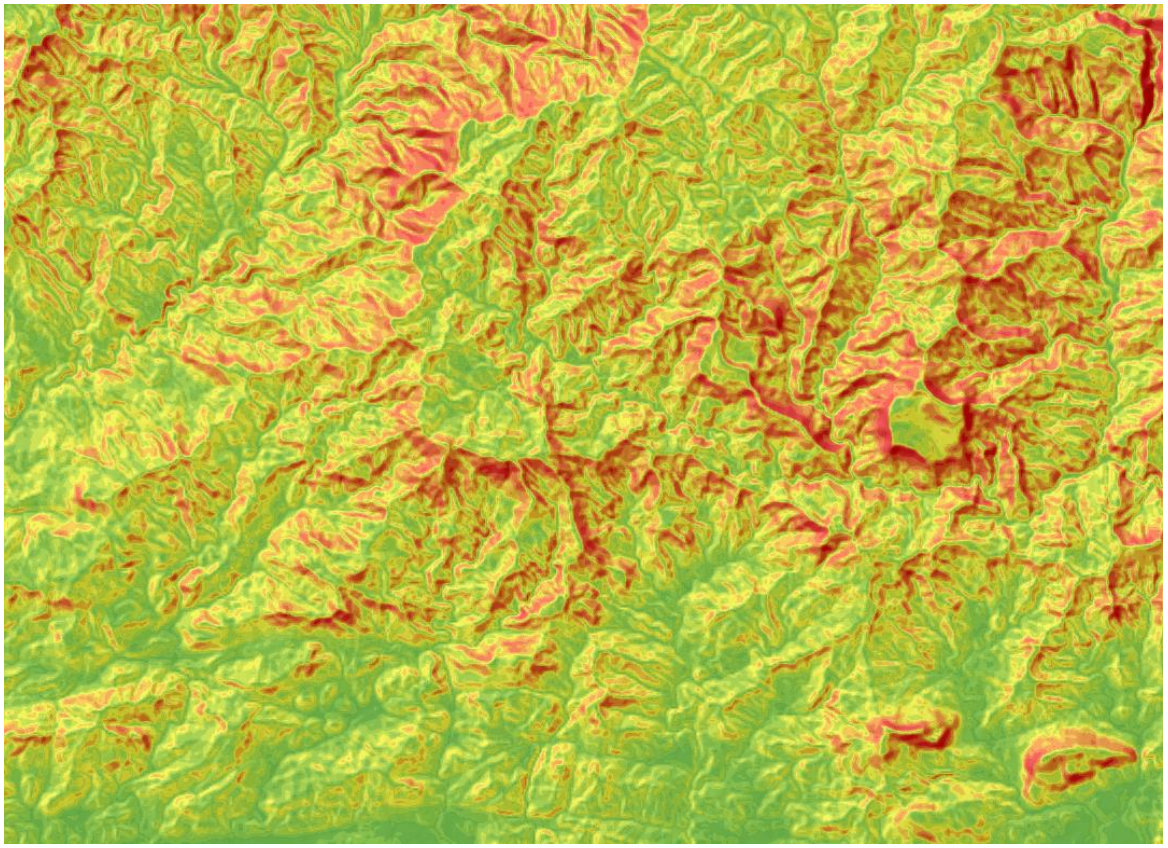
…an artifact of resampling elevation using nearest neighbor instead of bilinear interpolation!

Surface analyses

Slope

Degrees

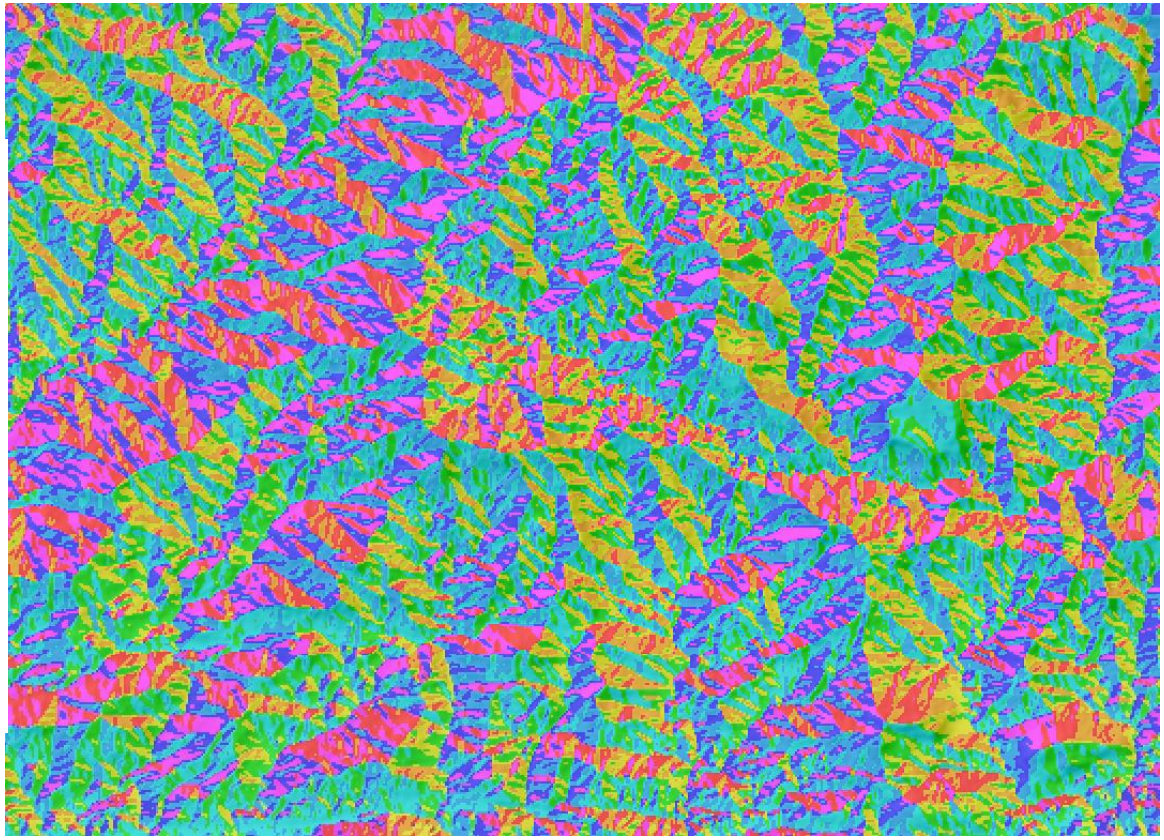
- 0 - 4
- 5 - 9
- 10 - 14
- 15 - 18
- 19 - 23
- 24 - 27
- 28 - 32
- 33 - 38
- 39 - 67



Surface analyses

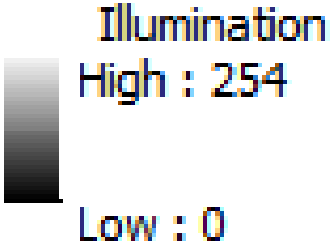
Aspect

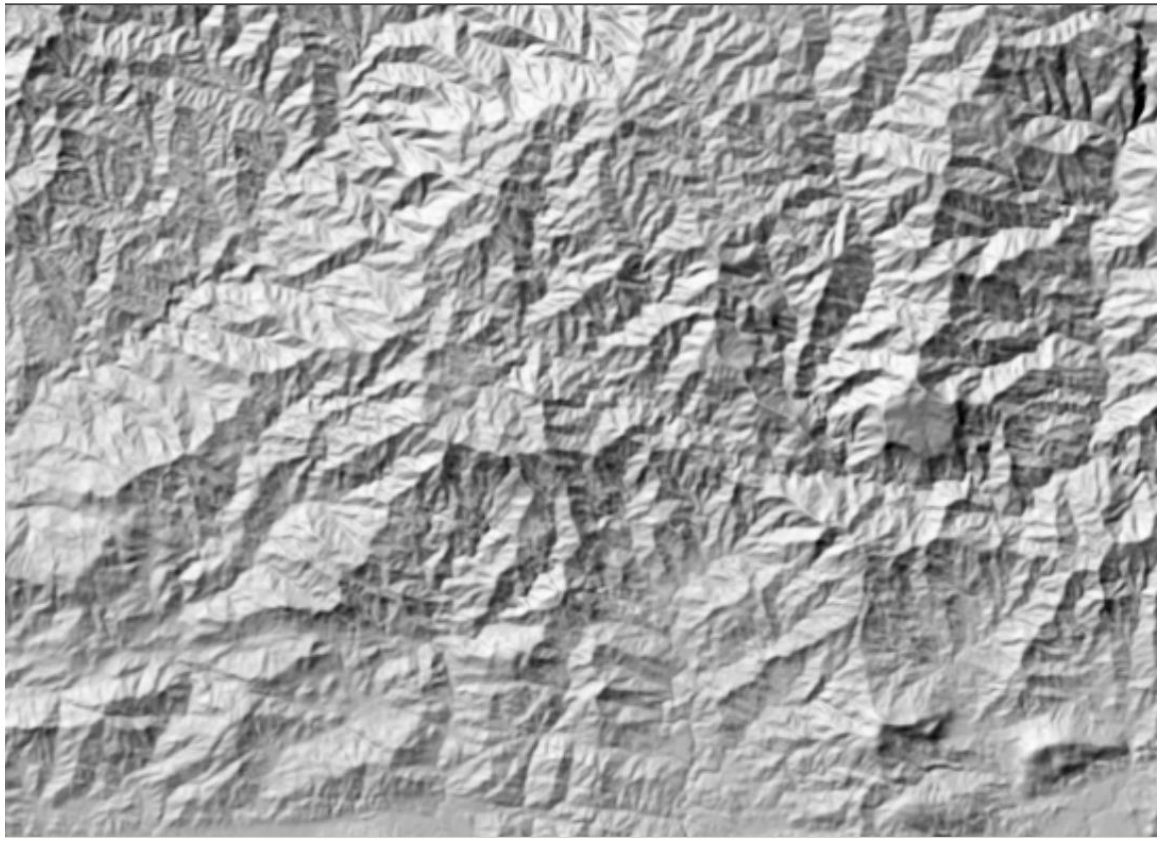
- Flat (-1)
- North (0-22.5)
- Northeast (22.5-67.5)
- East (67.5-112.5)
- Southeast (112.5-157.5)
- South (157.5-202.5)
- Southwest (202.5-247.5)
- West (247.5-292.5)
- Northwest (292.5-337.5)
- North (337.5-360)



Surface analyses

Hillshade

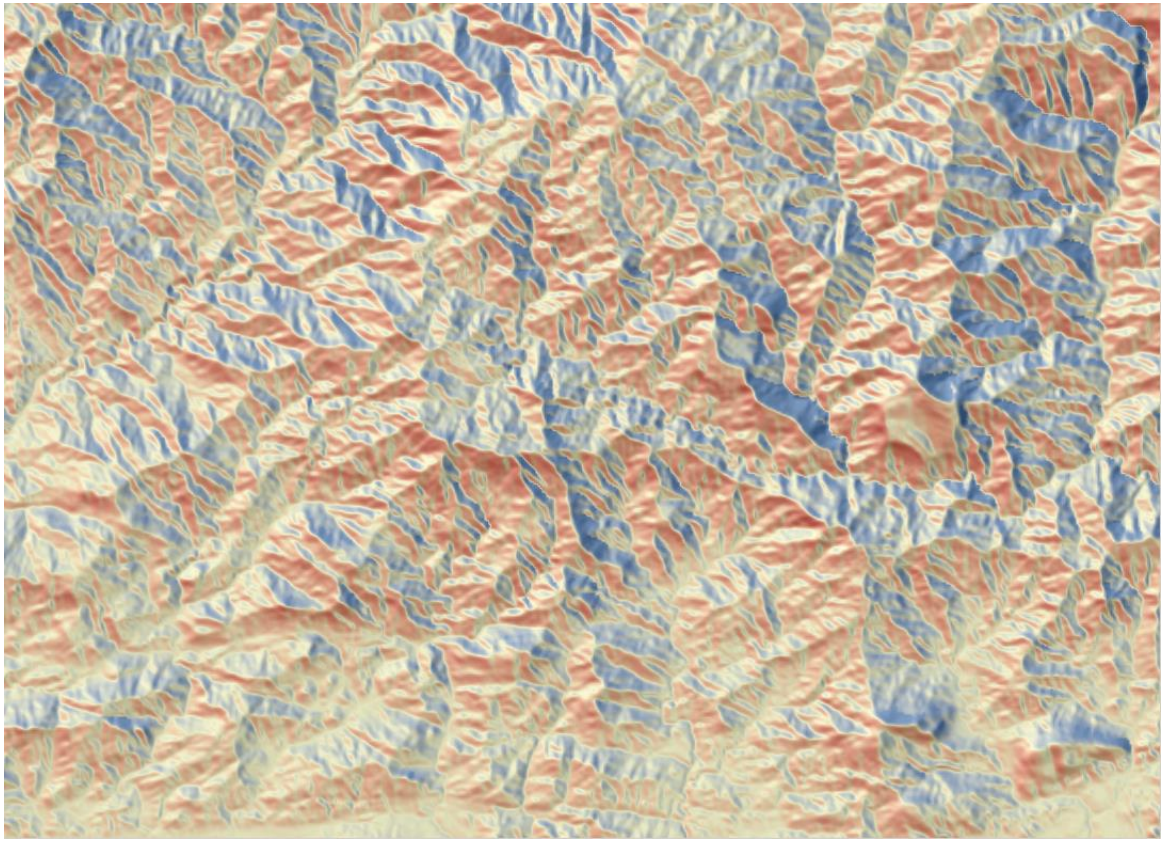




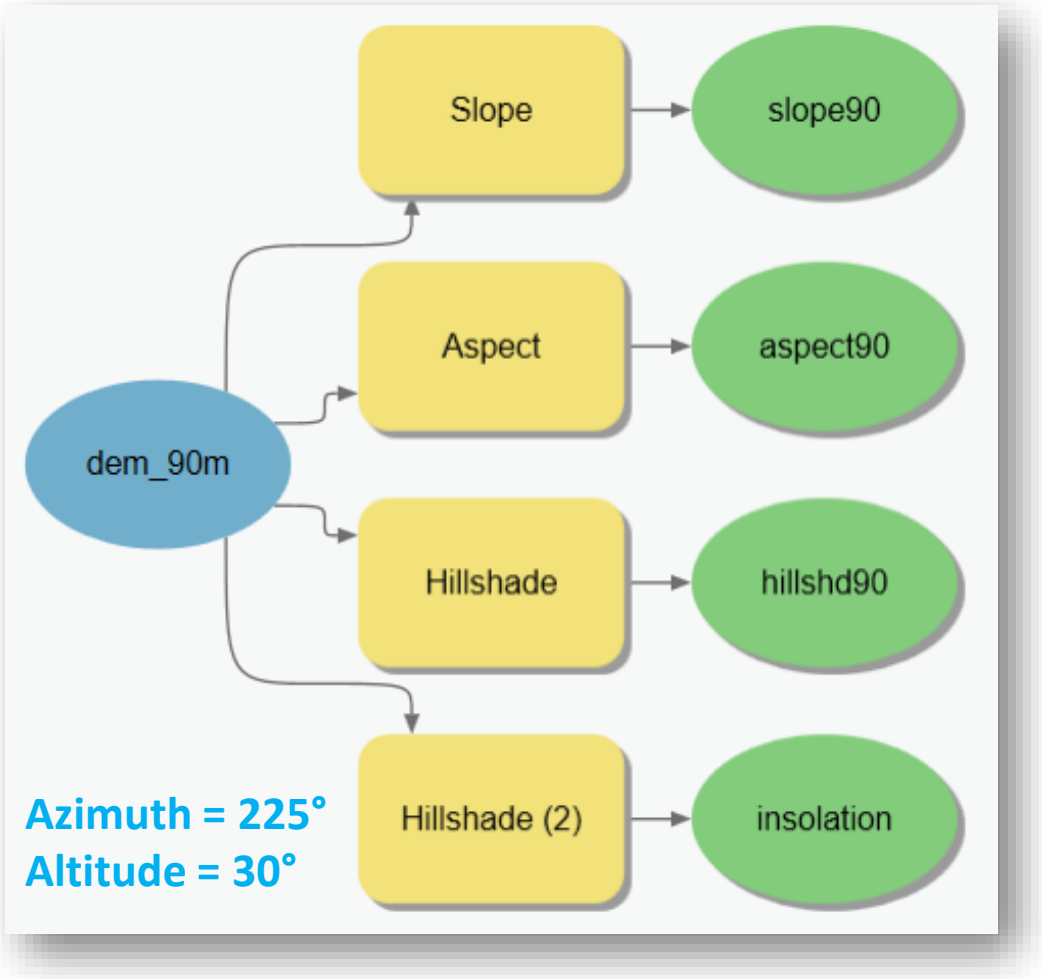
Surface analyses

Analytical
Hillshade

Azimuth = 225°
Altitude = 30°



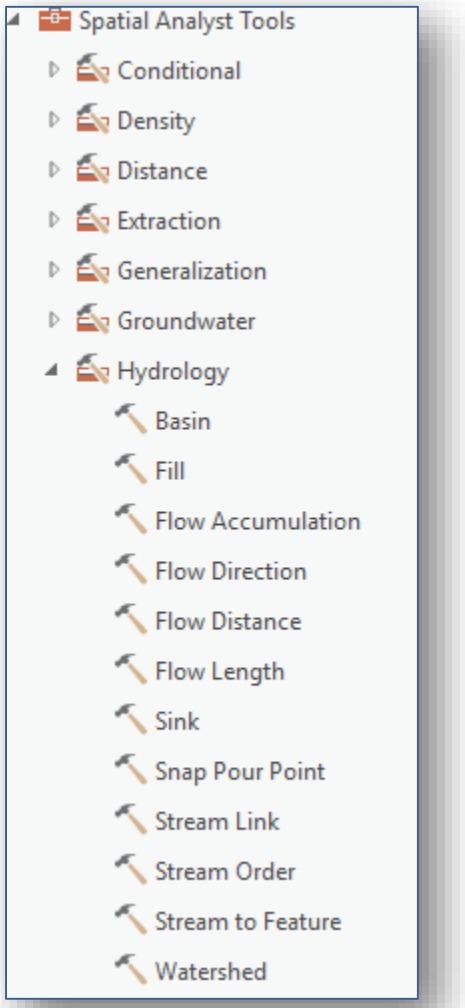
Surface analysis

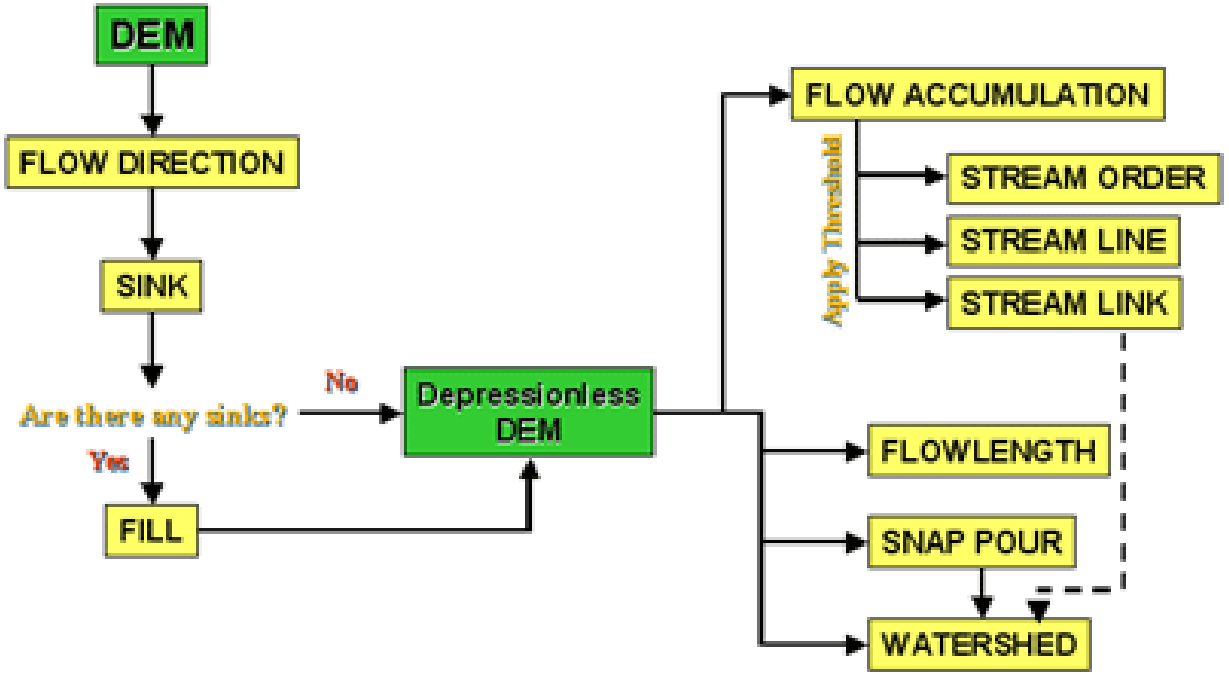


Geodesic or planar?

If you examine the help note associated with the choice of using planar or geodesic distances, you'll find that our extent falls a bit in the gray area between the two. You could very well argue that geodesic is the best answer. However, we'll stick with planar in our choices just to be consistent.

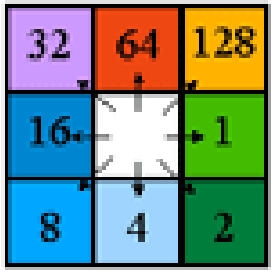
Hydrographic Analyses





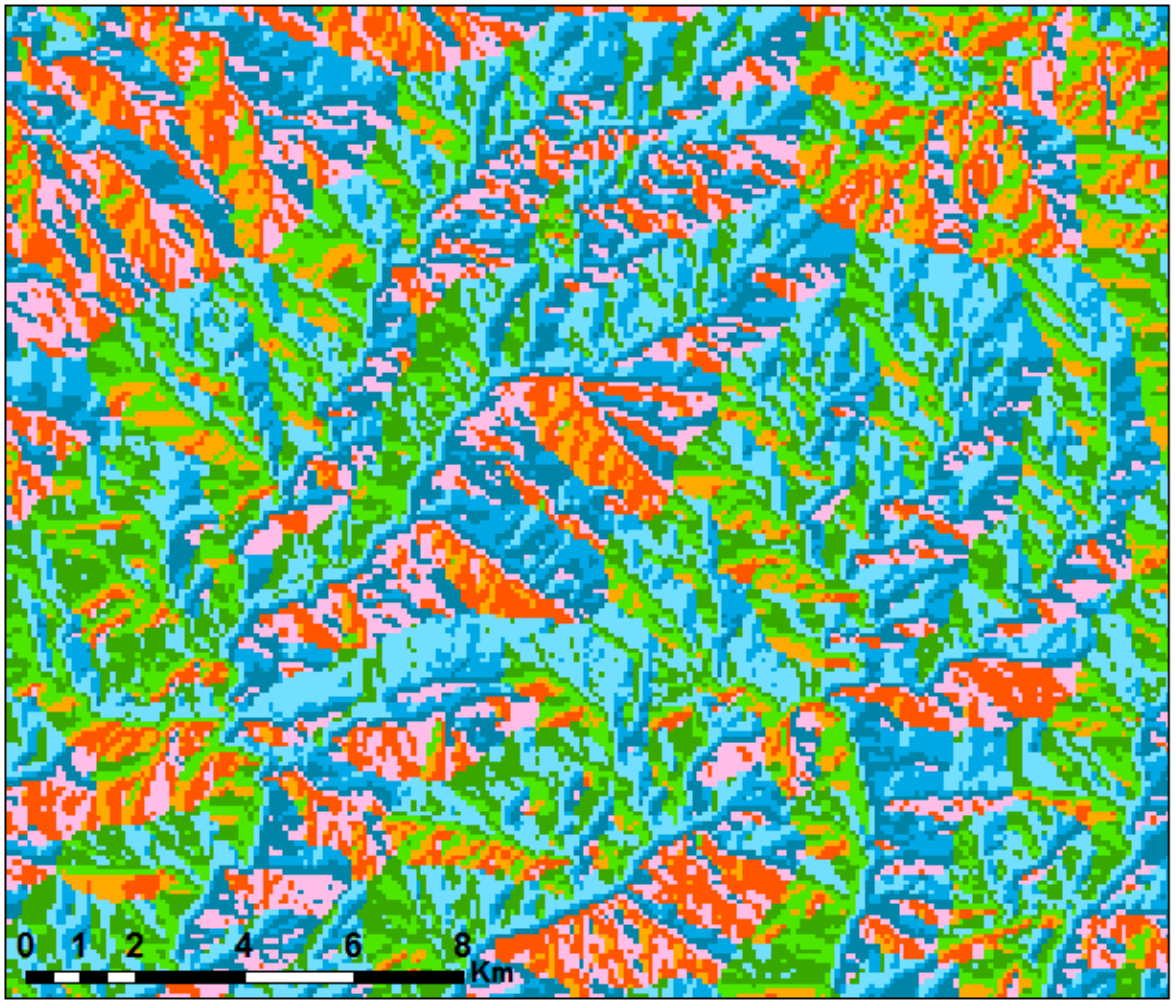
Hydrographic analyses

- Flow direction



Direction Coding

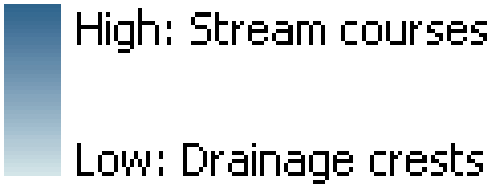
*Any other values indicate errors in the DEM

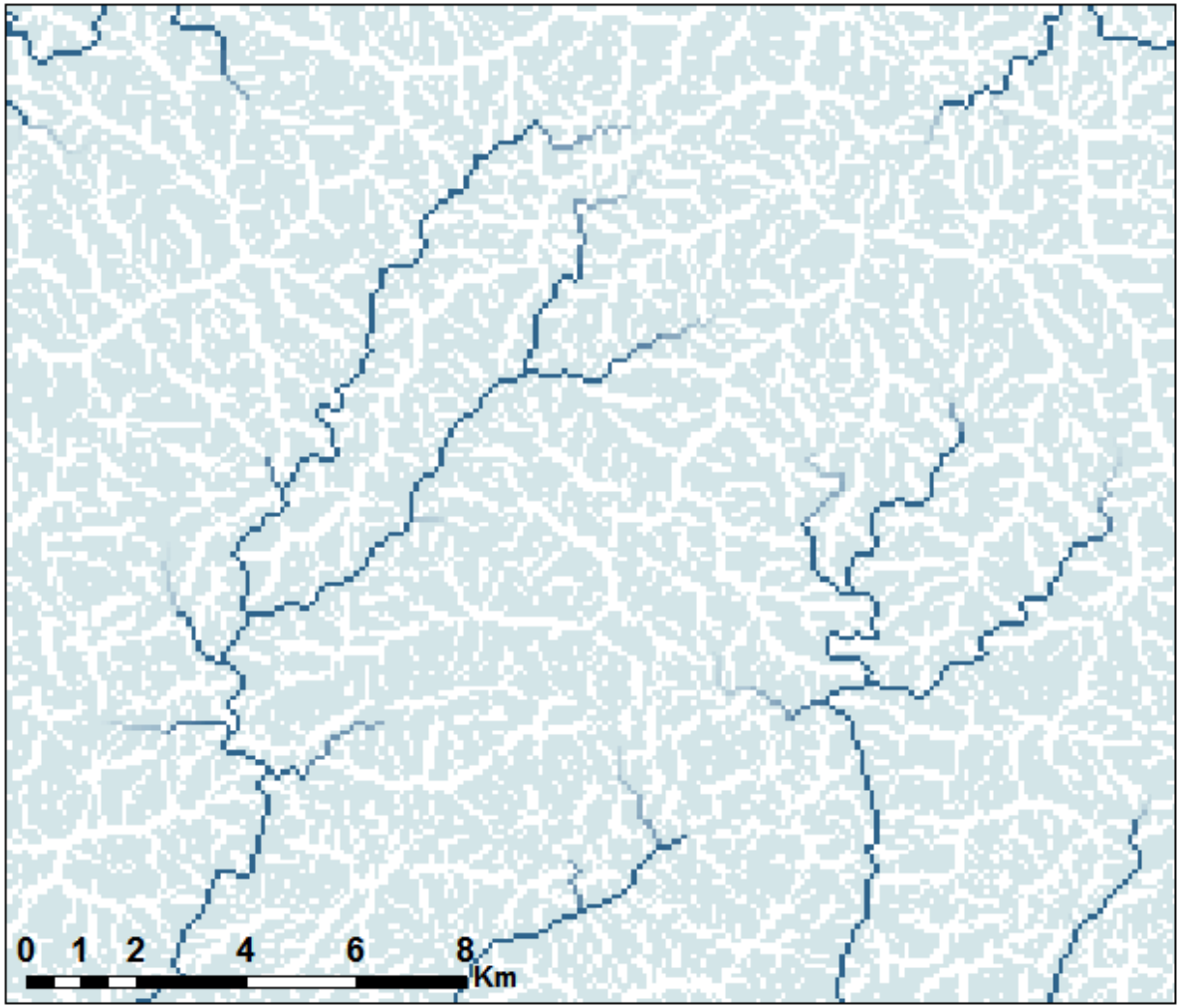


Hydrographic analyses

- Flow accumulation

How many cells flow into a given cell?

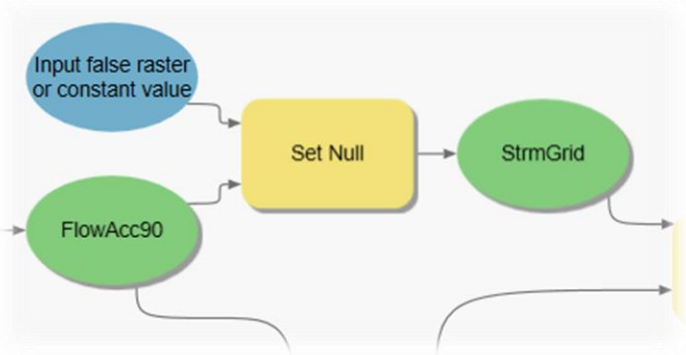


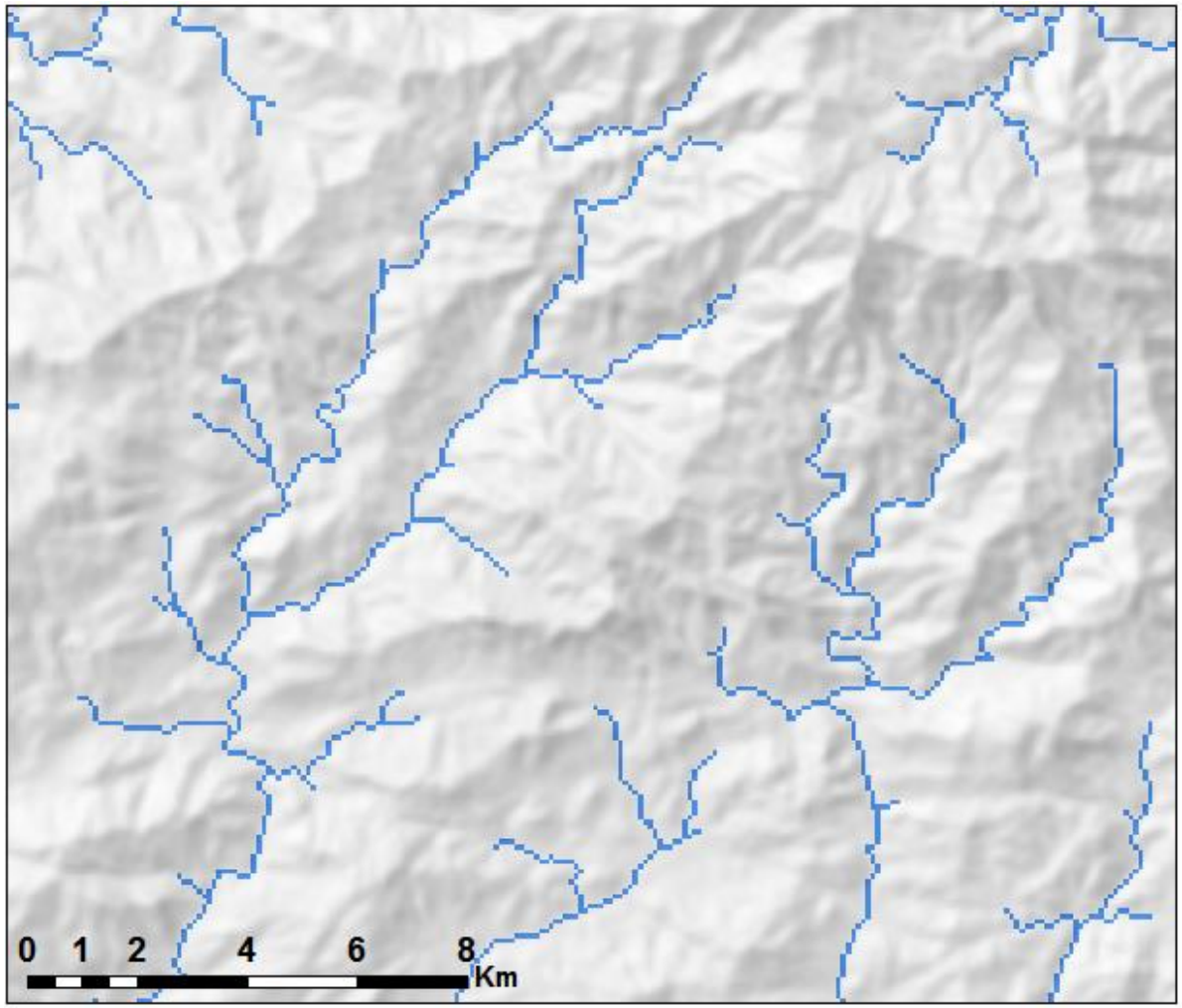


Hydrographic analyses

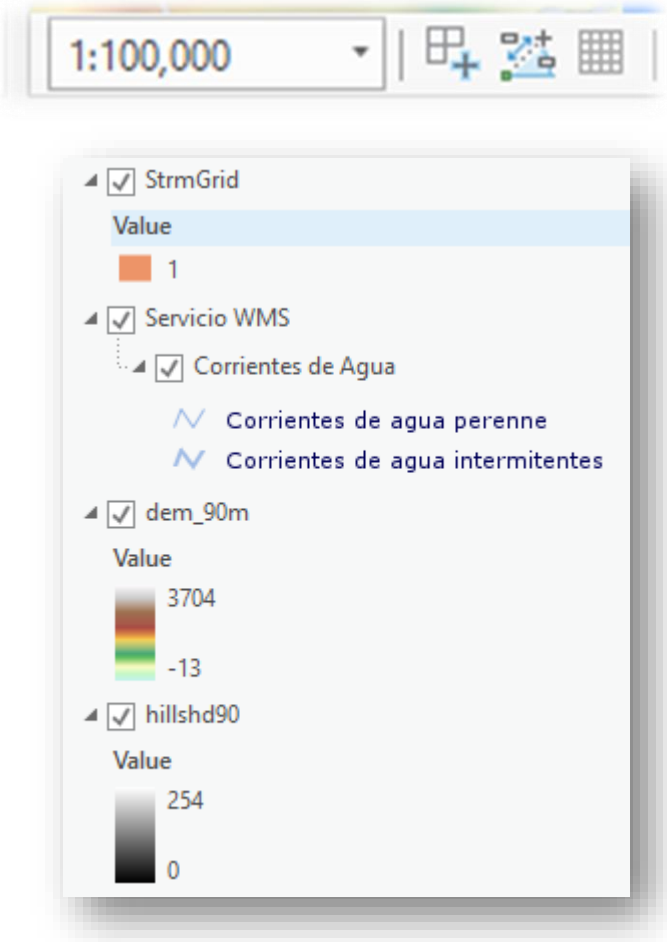
- Streams (raster)

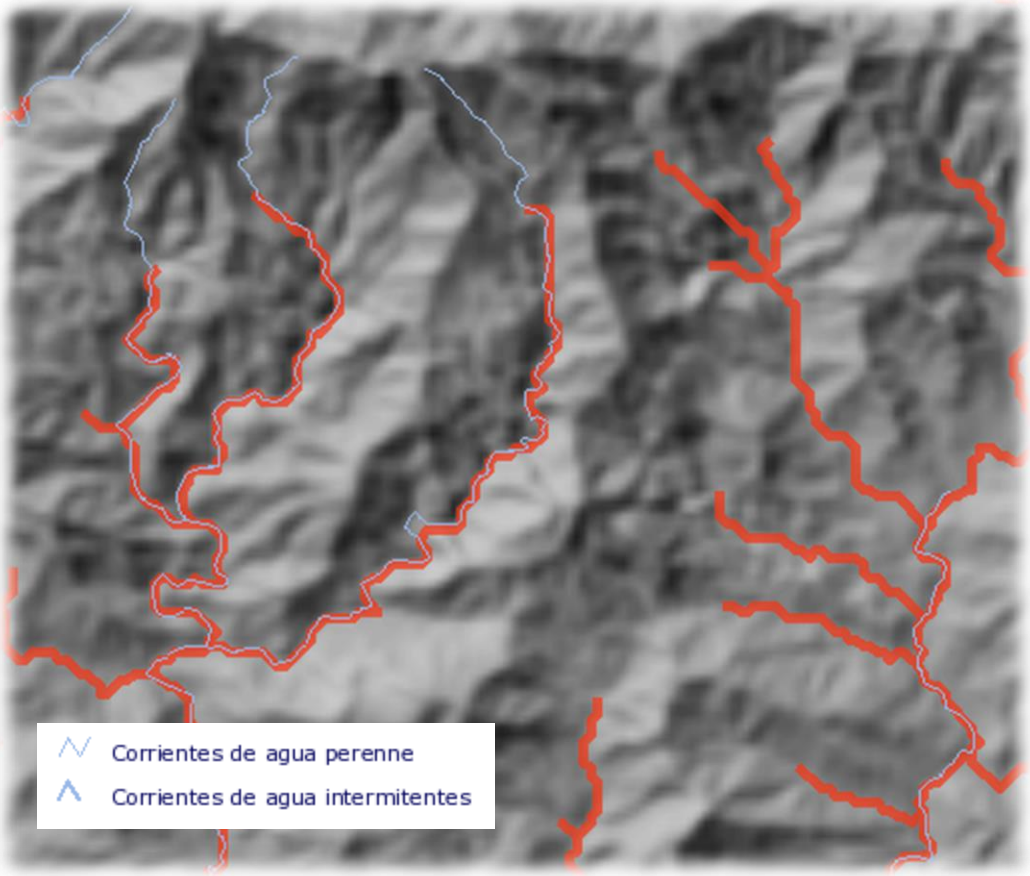
Isolate cells above a threshold accumulation





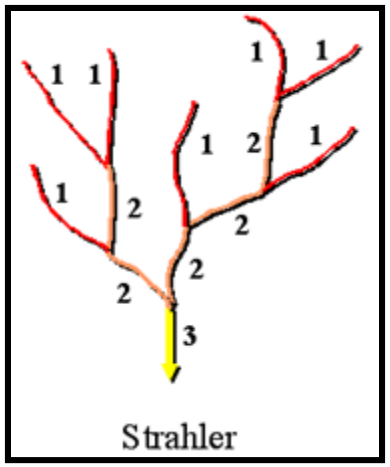
Hydrographic analysis

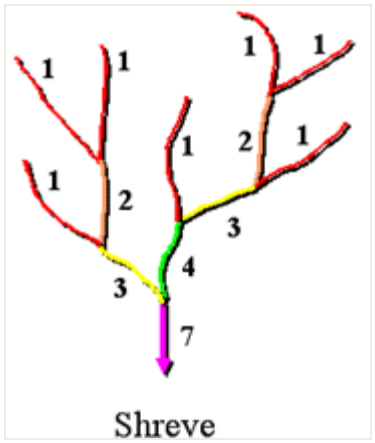


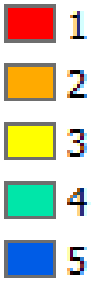


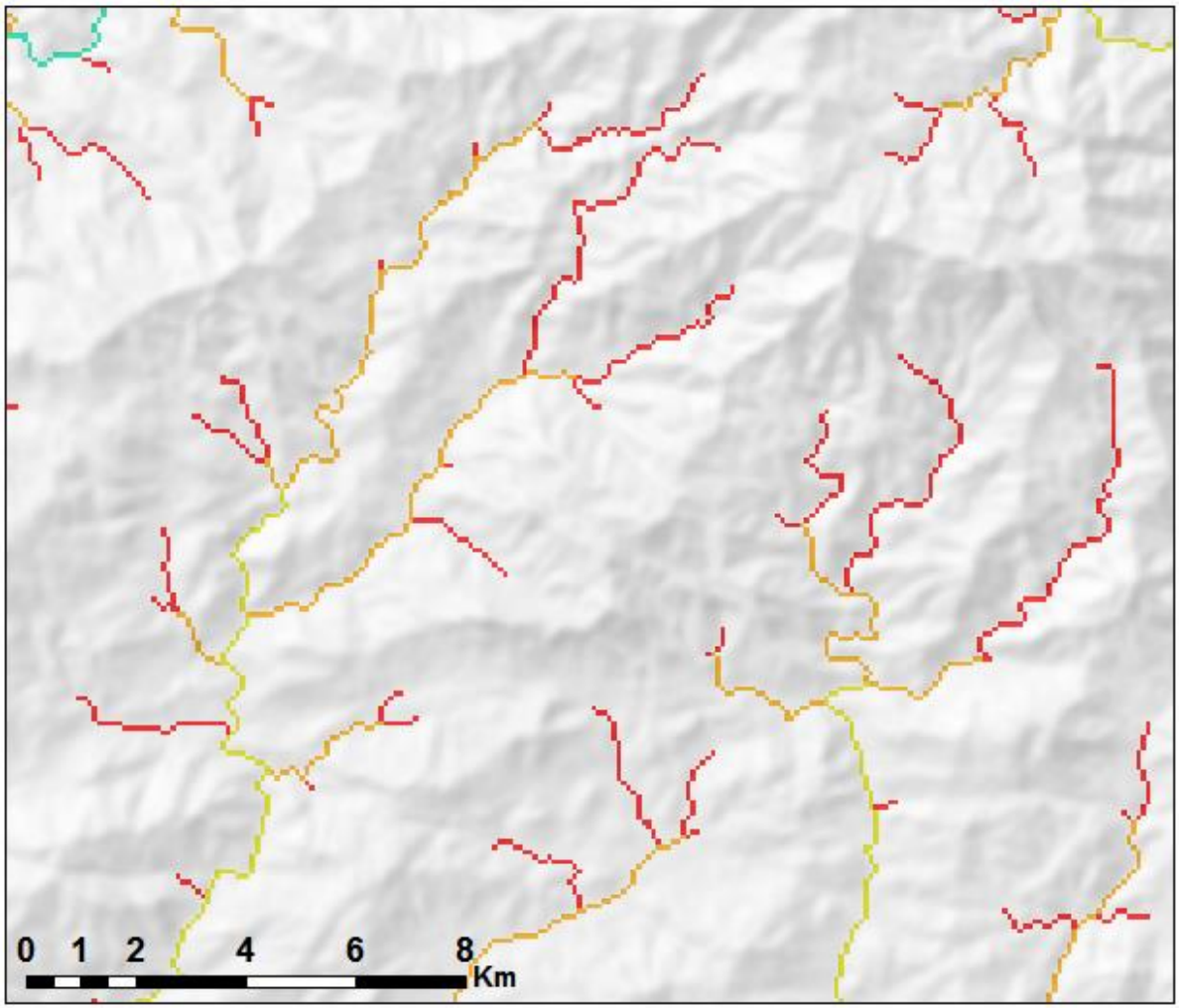
Hydrographic analyses

- Stream order



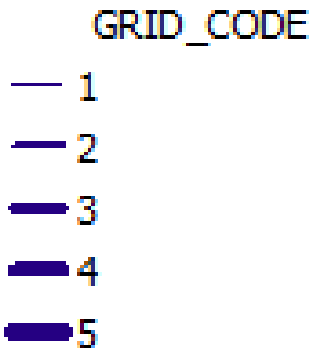


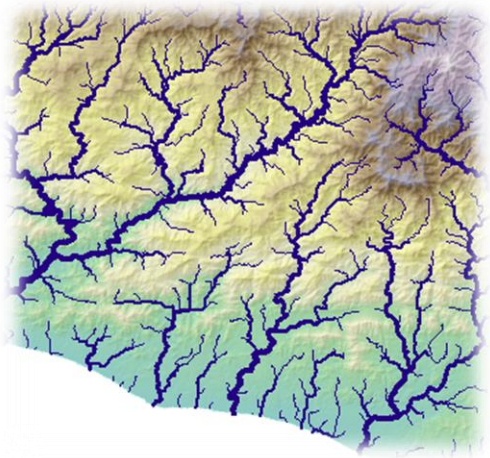


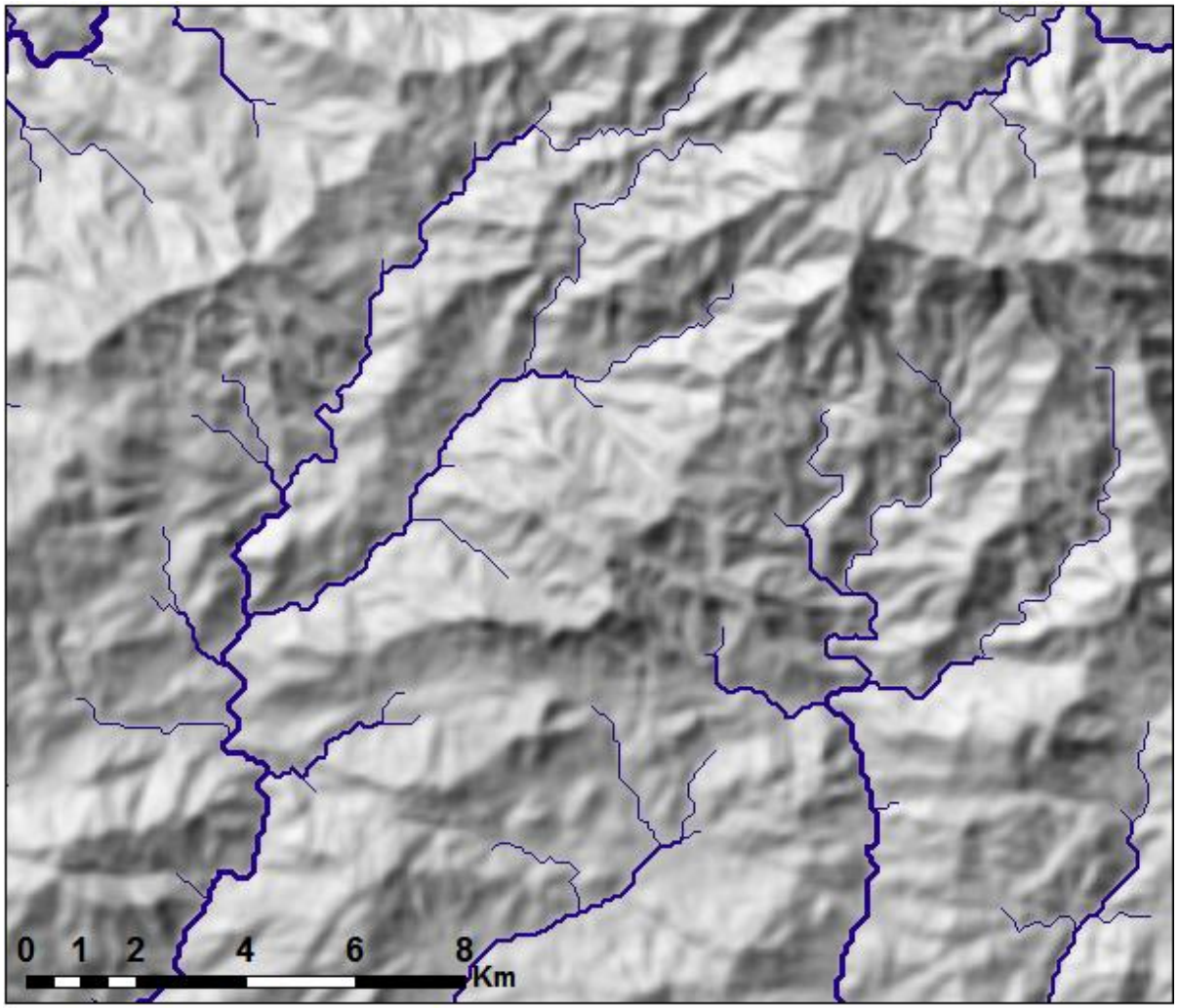


Hydrographic analyses

- Stream to feature







Hydrographic analyses

End first part…