

# Project 2: Sierra Costera Site Analysis

ENVIRON 761

Geospatial Applications for  
Conservation & Land Management

# Sierra Costera de Oaxaca

## Prioridades de Conservación de la Sierra Costera de Oaxaca

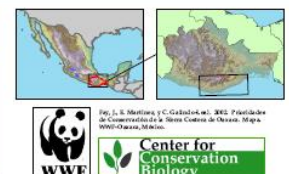
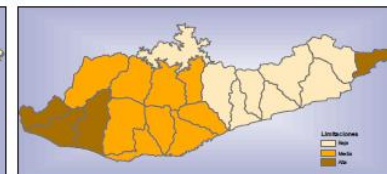
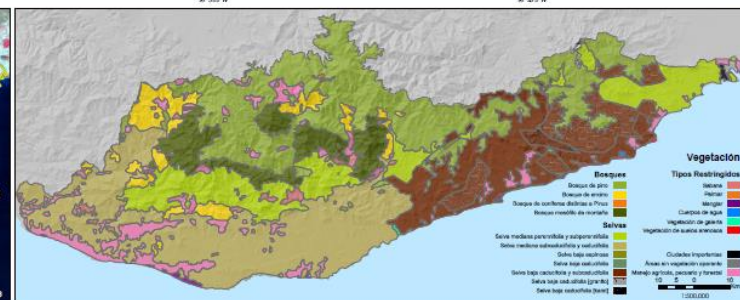
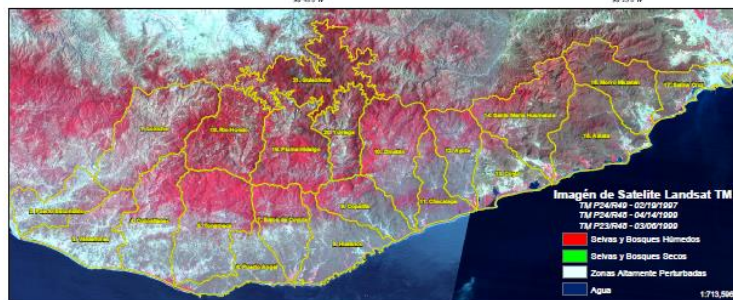
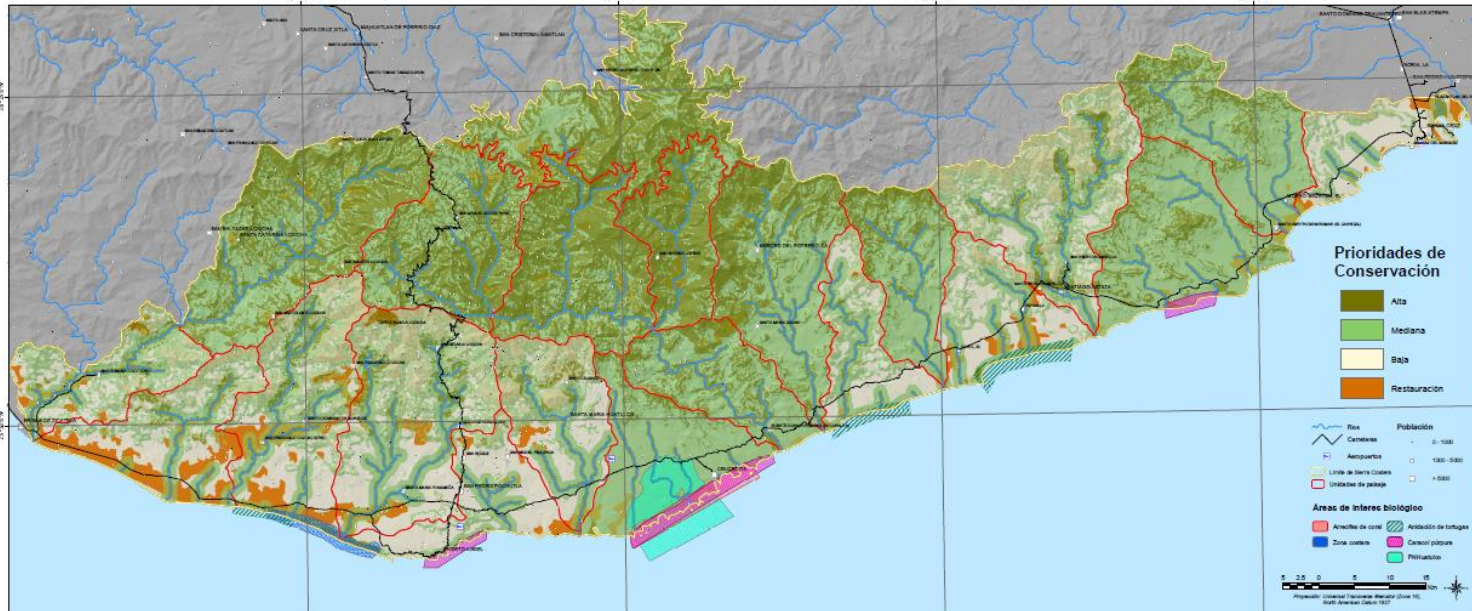


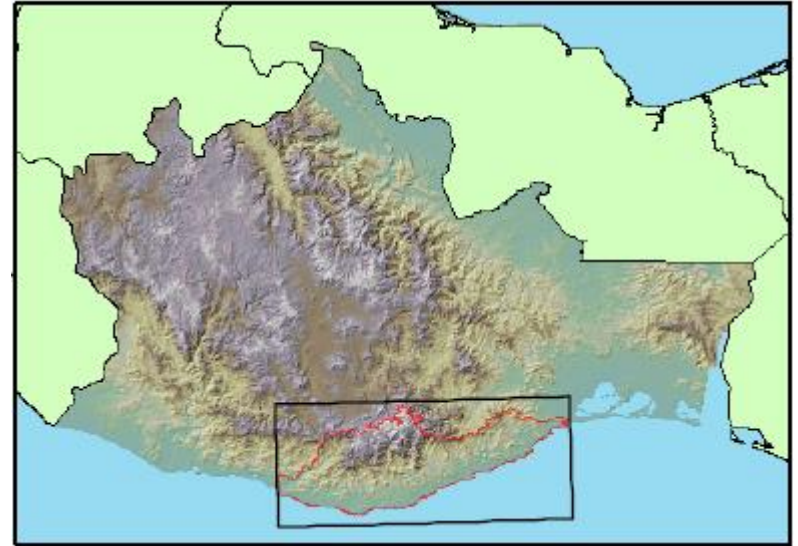
Fig. 1. S. Martínez y C. Galindo et al. 2002. Prioridades de Conservación de la Sierra Costera de Oaxaca. Mapa WWF-Oaxaca, México.

# 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

## Datos de Relieve



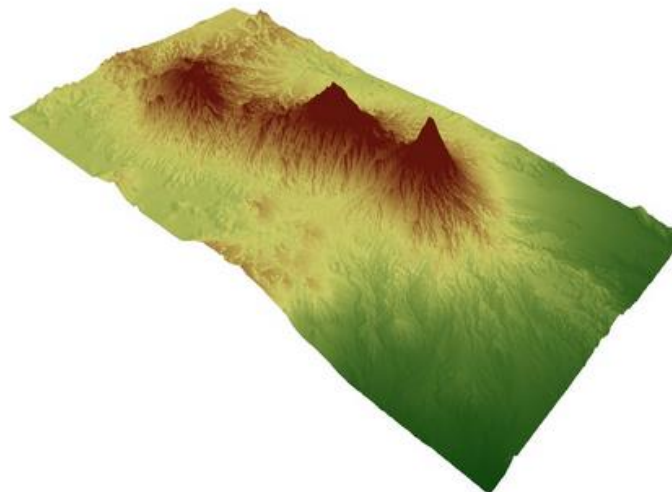
- [Definición](#)
- [Objetivo](#)
- [Antecedentes](#)
- [Ventajas](#)
- [Aplicaciones del CEM en el INEGI](#)
- [Características](#)
- [Descargar](#)

### Continental

Continuo de Elevaciones Mexicano 3.0 (CEM 3.0)

#### Definición

El Continuo de Elevaciones Mexicano 3.0 (CEM 3.0) es un producto que representa las elevaciones del territorio continental mexicano, mediante valores que indican puntos sobre la superficie del terreno, cuya ubicación geográfica se encuentra definida por coordenadas (X, Y) a las que se le integran valores que representan las elevaciones (Z). Los puntos se encuentran espaciados y distribuidos de modo regular.



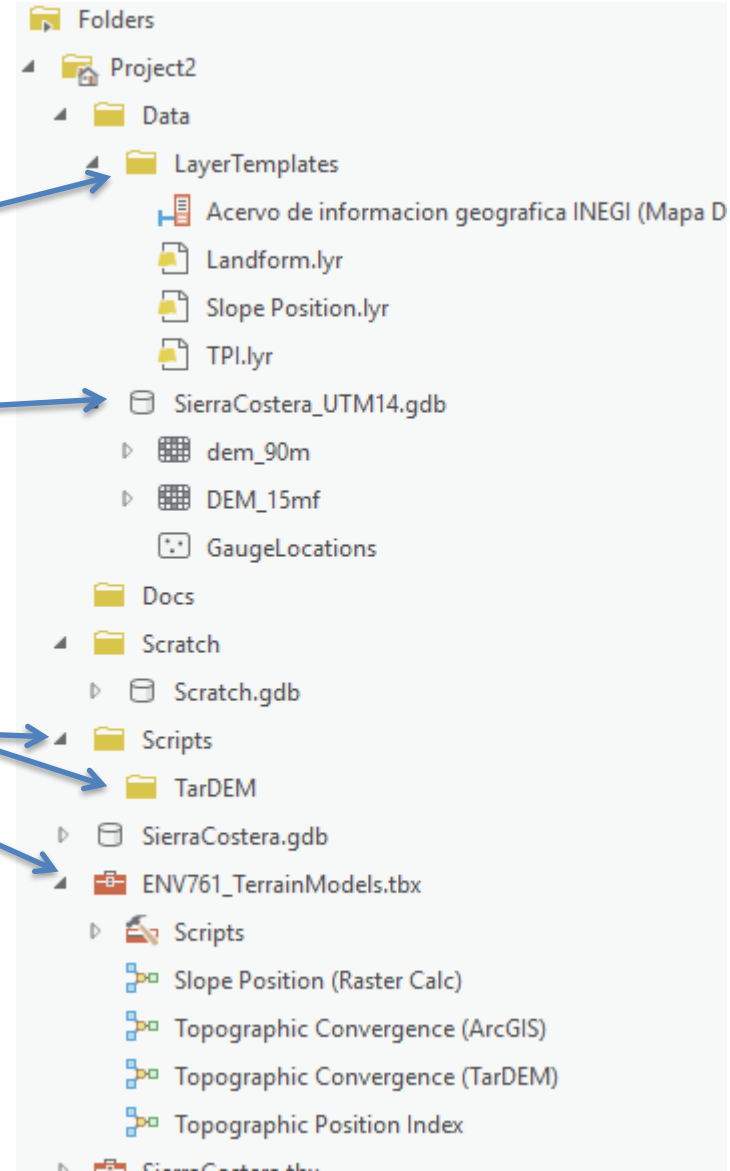
# Overview

- **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

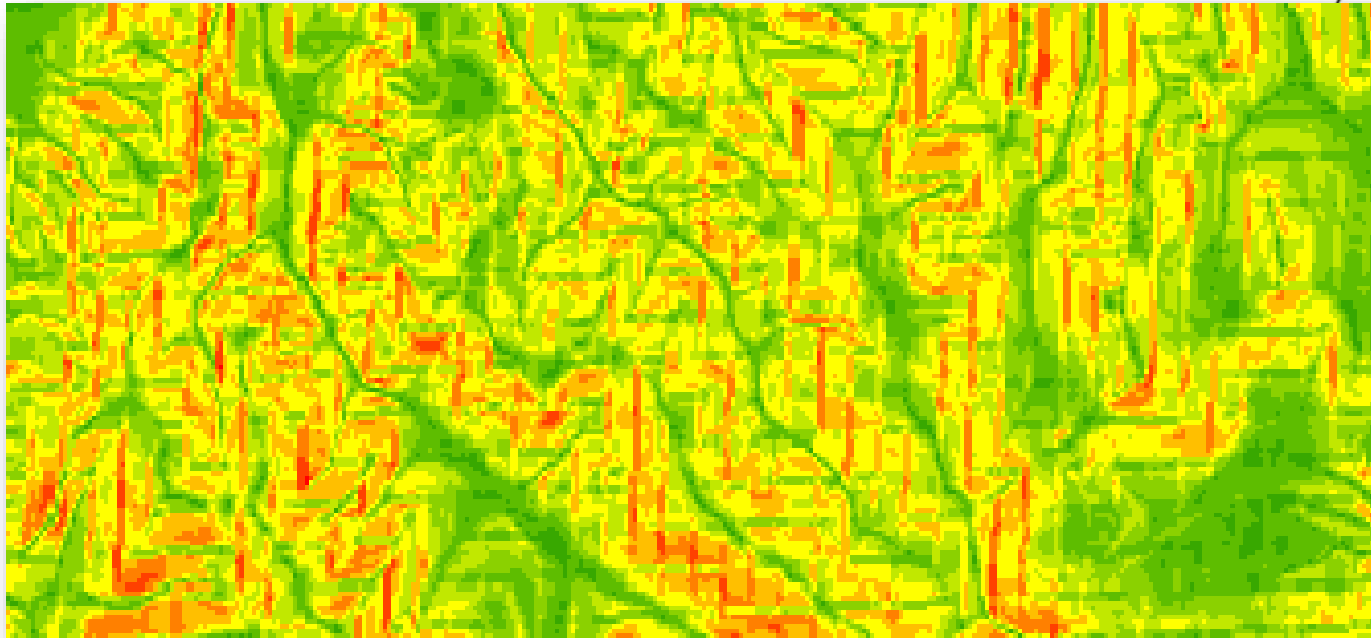
Project2Data.zip

- LayerTemplates
- SierraCostera\_UTM14.gdb
- TarDEM
- ENV761\_TerrainModels.tbx
- CalcLandform.py
- pyTarDem.py
- SlopePosition.py



# Surface analyses

Resampling errors...



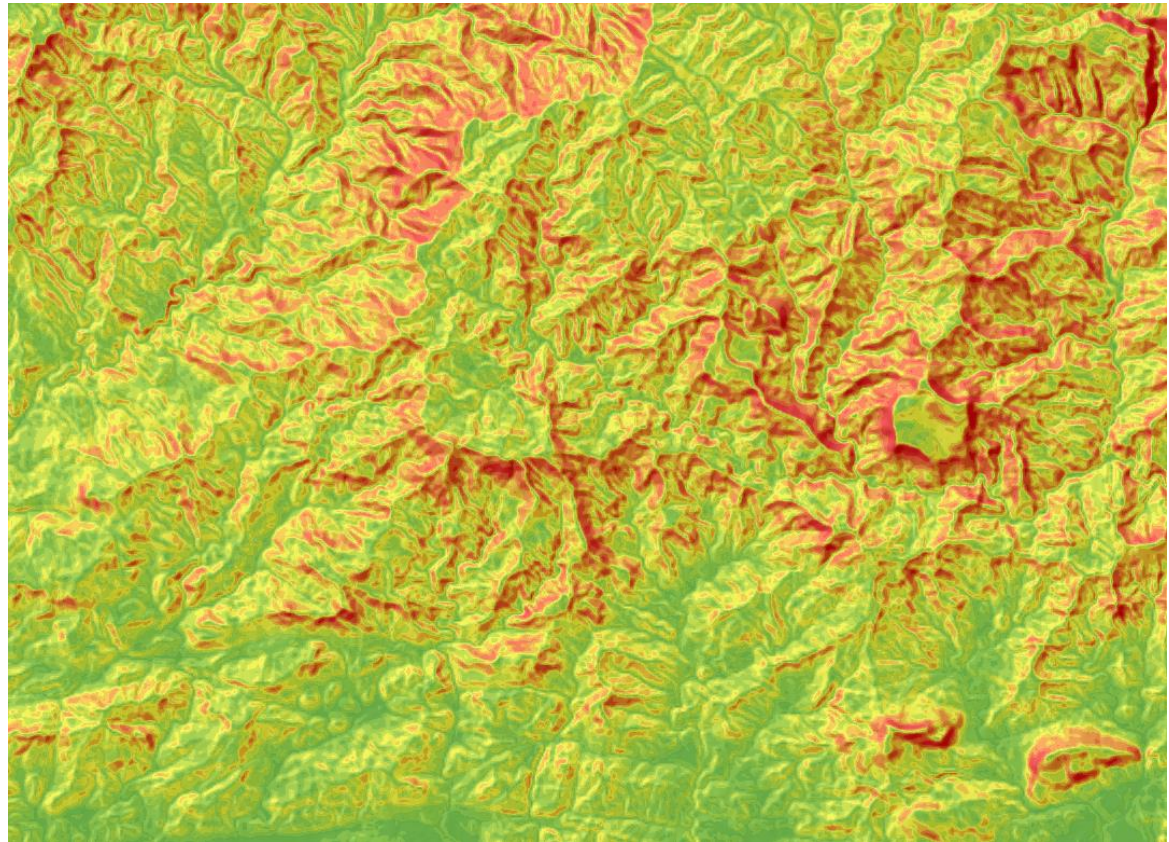
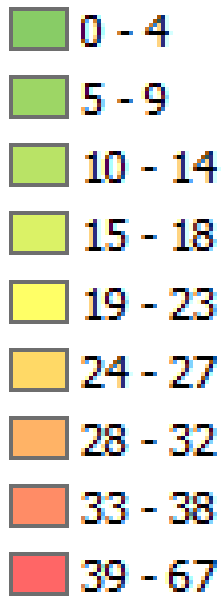
...an artifact of resampling elevation using nearest neighbor instead of bilinear interpolation!



# Surface analyses

## Slope

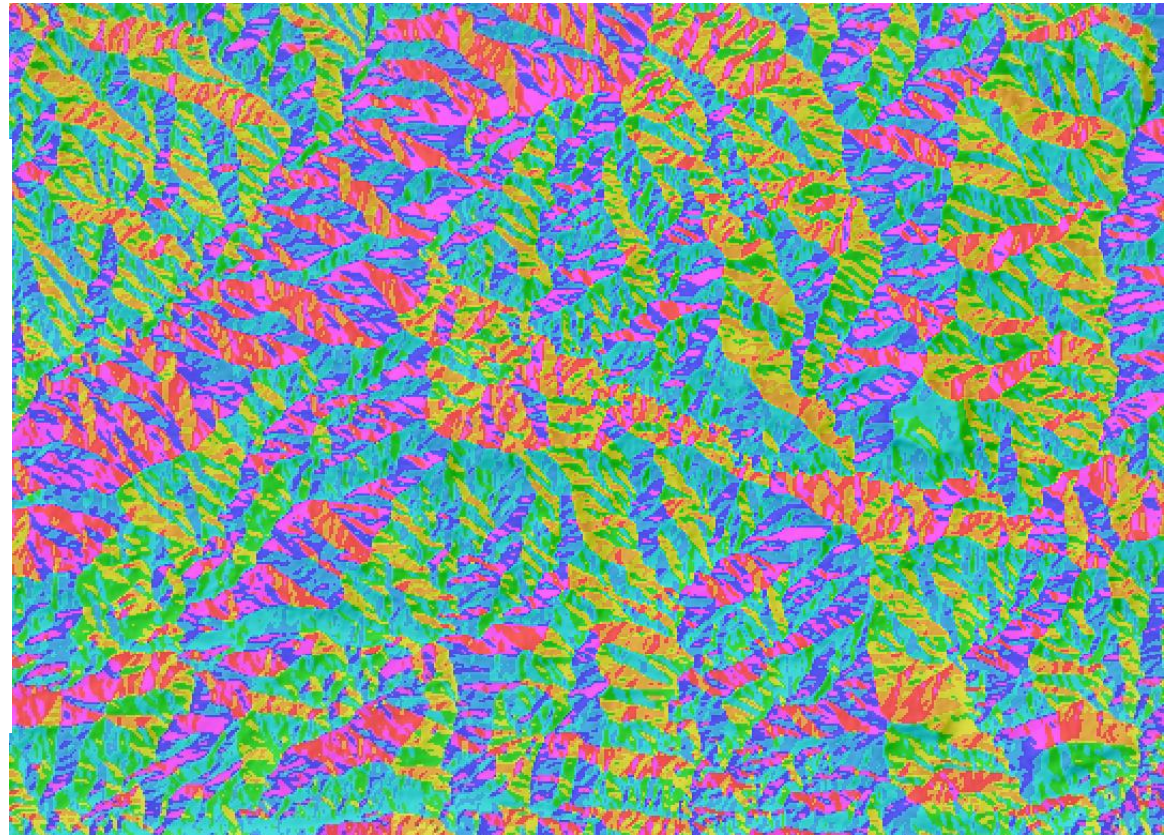
Degrees



# 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

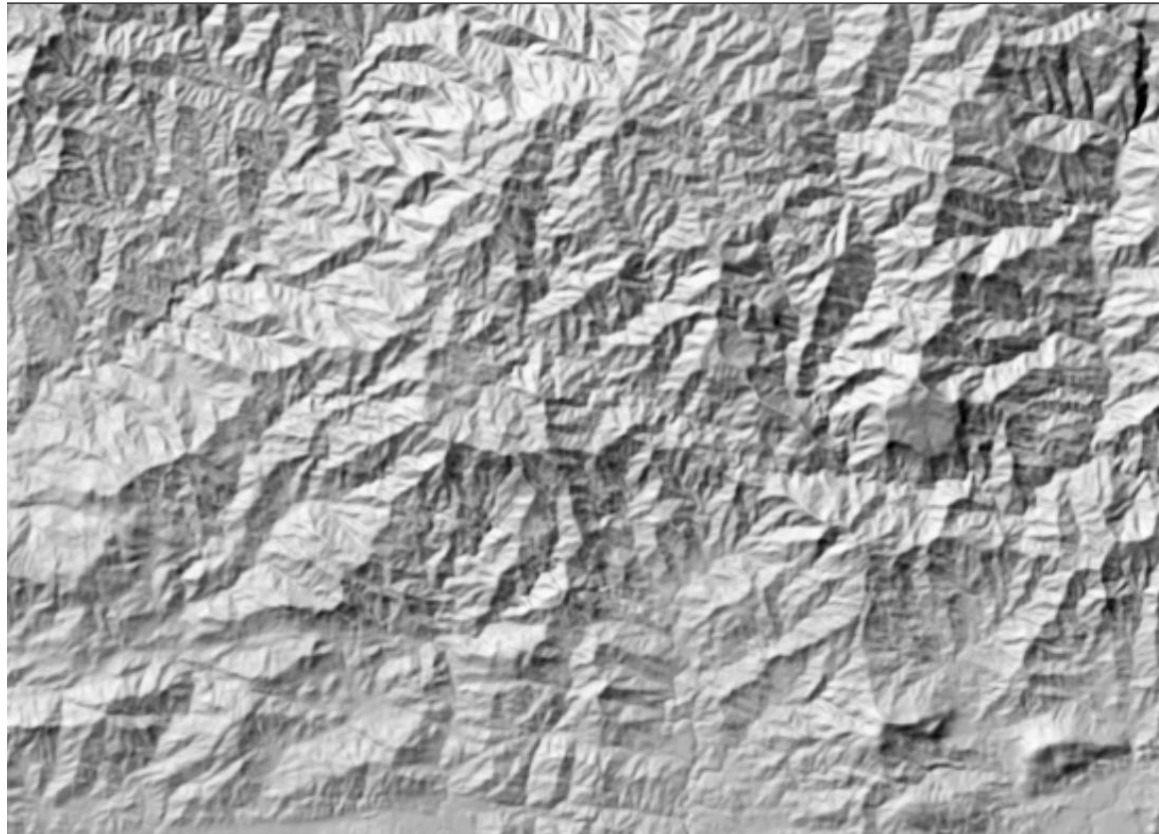
## Hillshade



Illumination

High : 254

Low : 0



# Surface analyses

## *Analytical* Hillshade

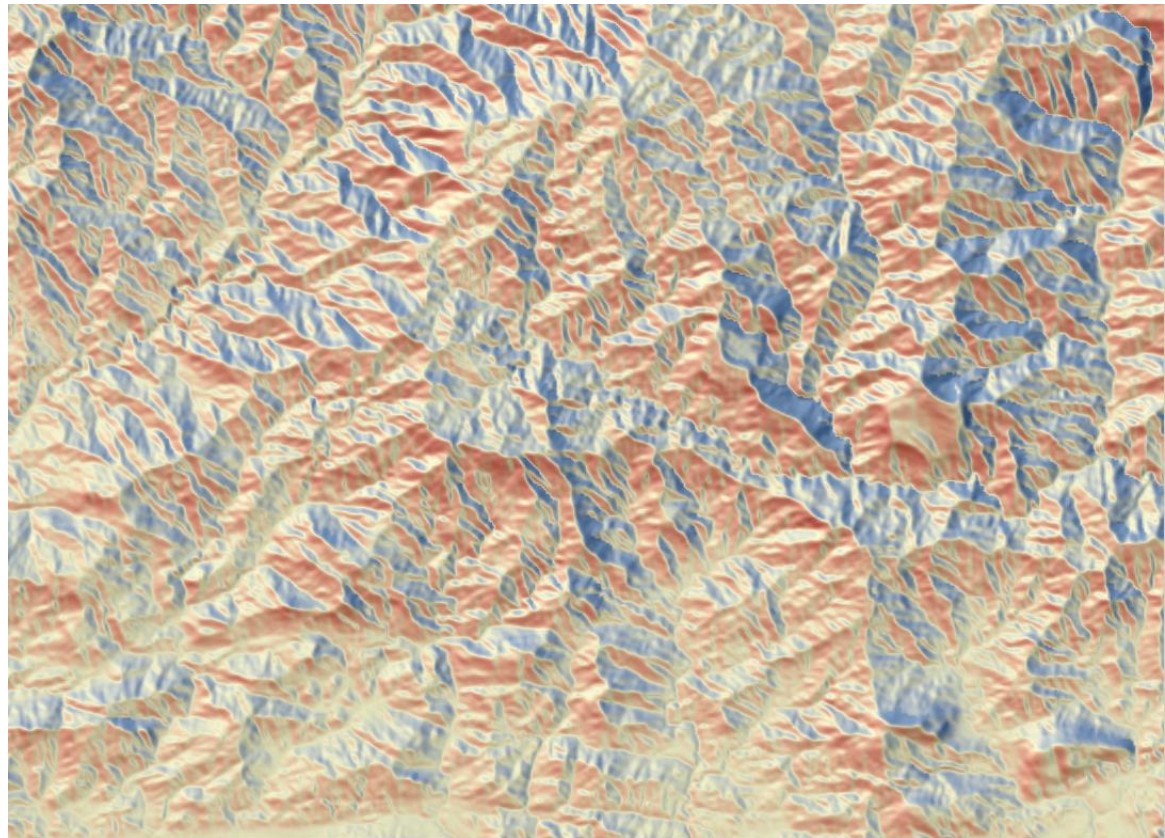
Azimuth = 225°

Altitude = 30°

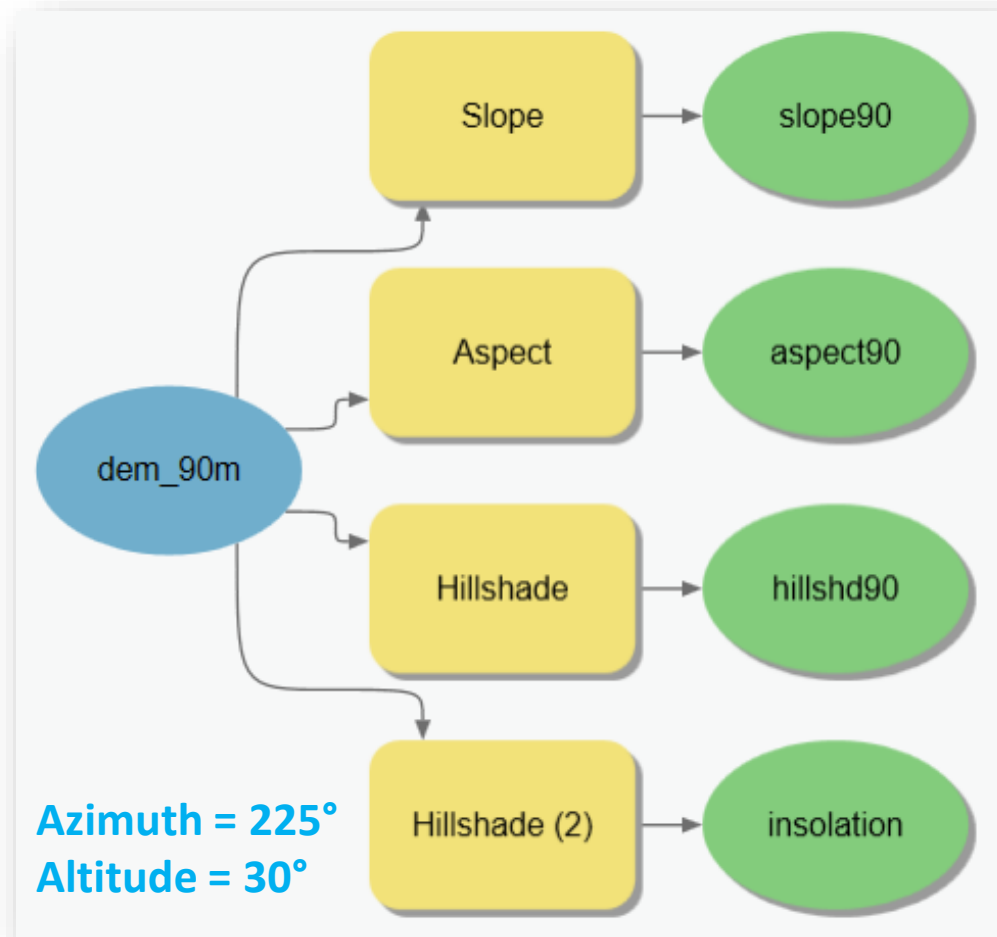
Solar radiation

High : 253

Low : 0



# Surface analysis



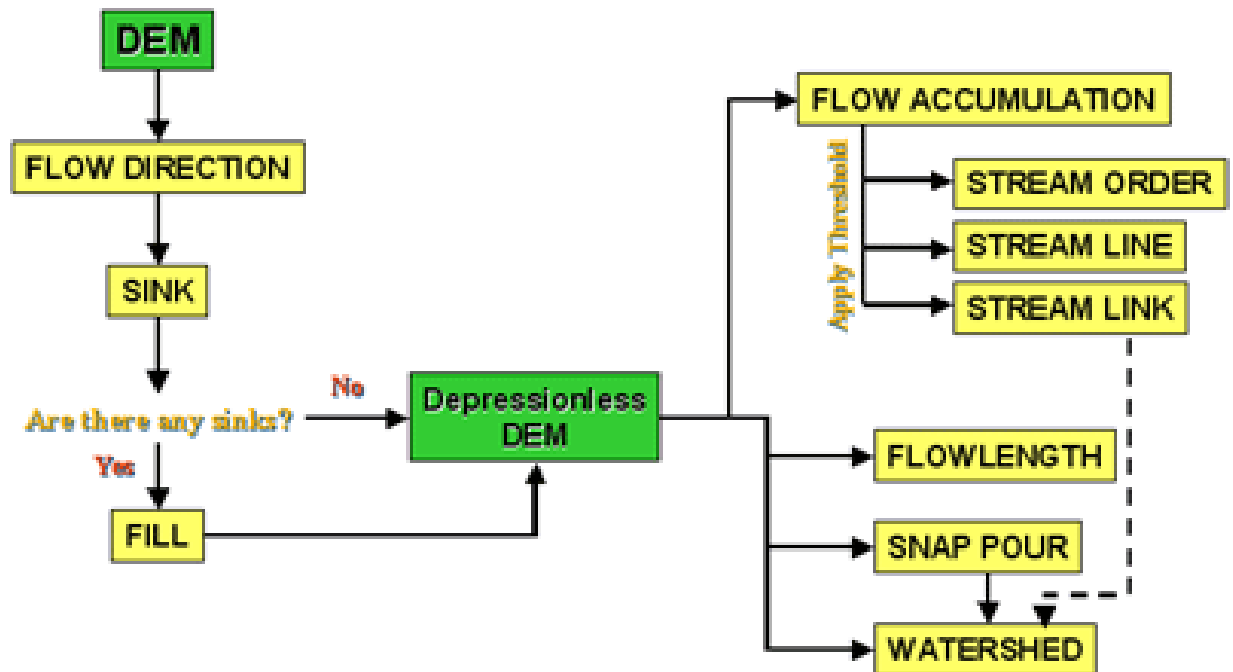
## *Geodesic or planar?*

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

- Spatial Analyst Tools
  - Conditional
  - Density
  - Distance
  - Extraction
  - Generalization
  - Groundwater
  - Hydrology
    - Basin
    - Fill
    - Flow Accumulation
    - Flow Direction
    - Flow Distance
    - Flow Length
    - Sink
    - Snap Pour Point
    - Stream Link
    - Stream Order
    - Stream to Feature
    - Watershed



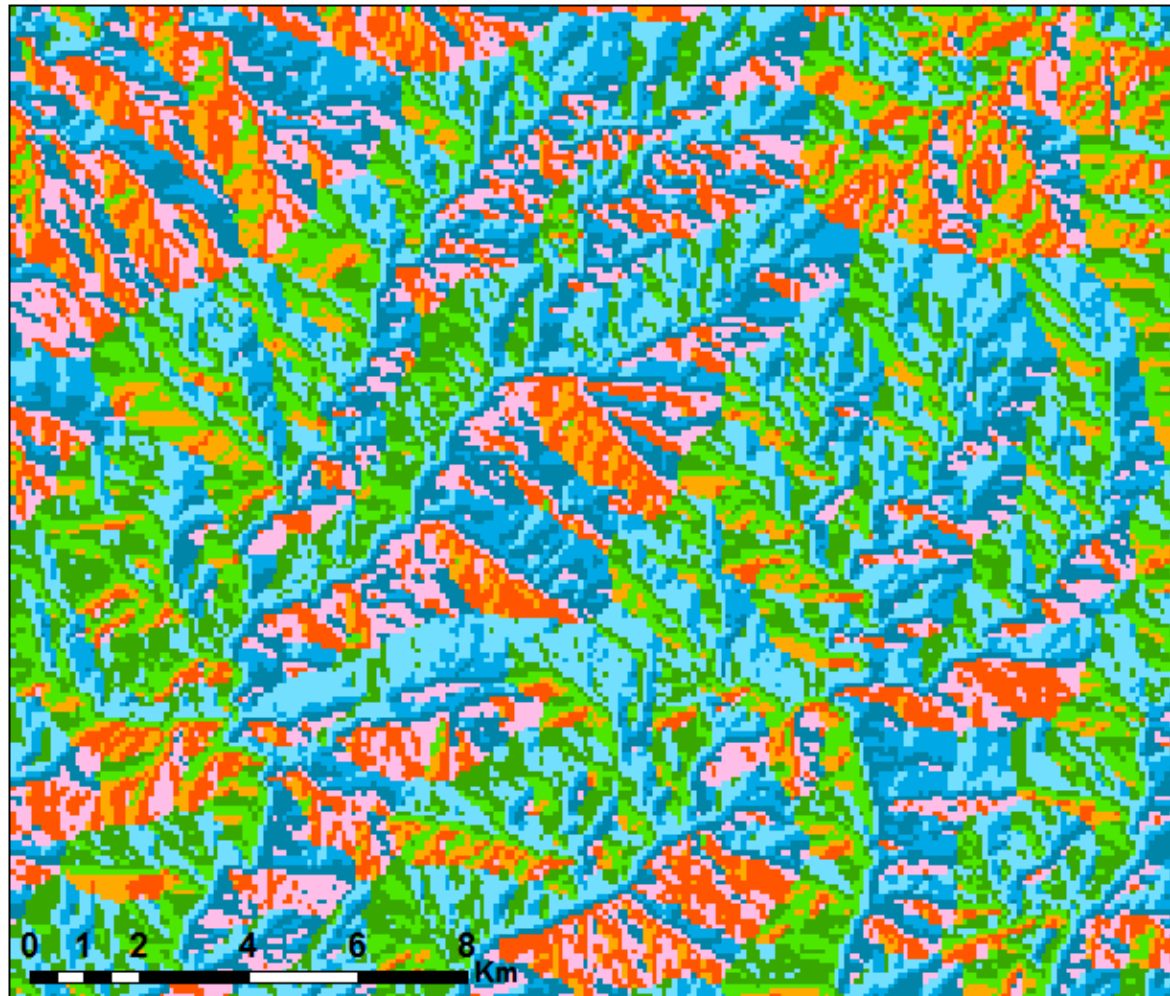
# Hydrographic analyses

- Flow direction

32	64	128
16	↑	↓
8	4	2

Direction Coding

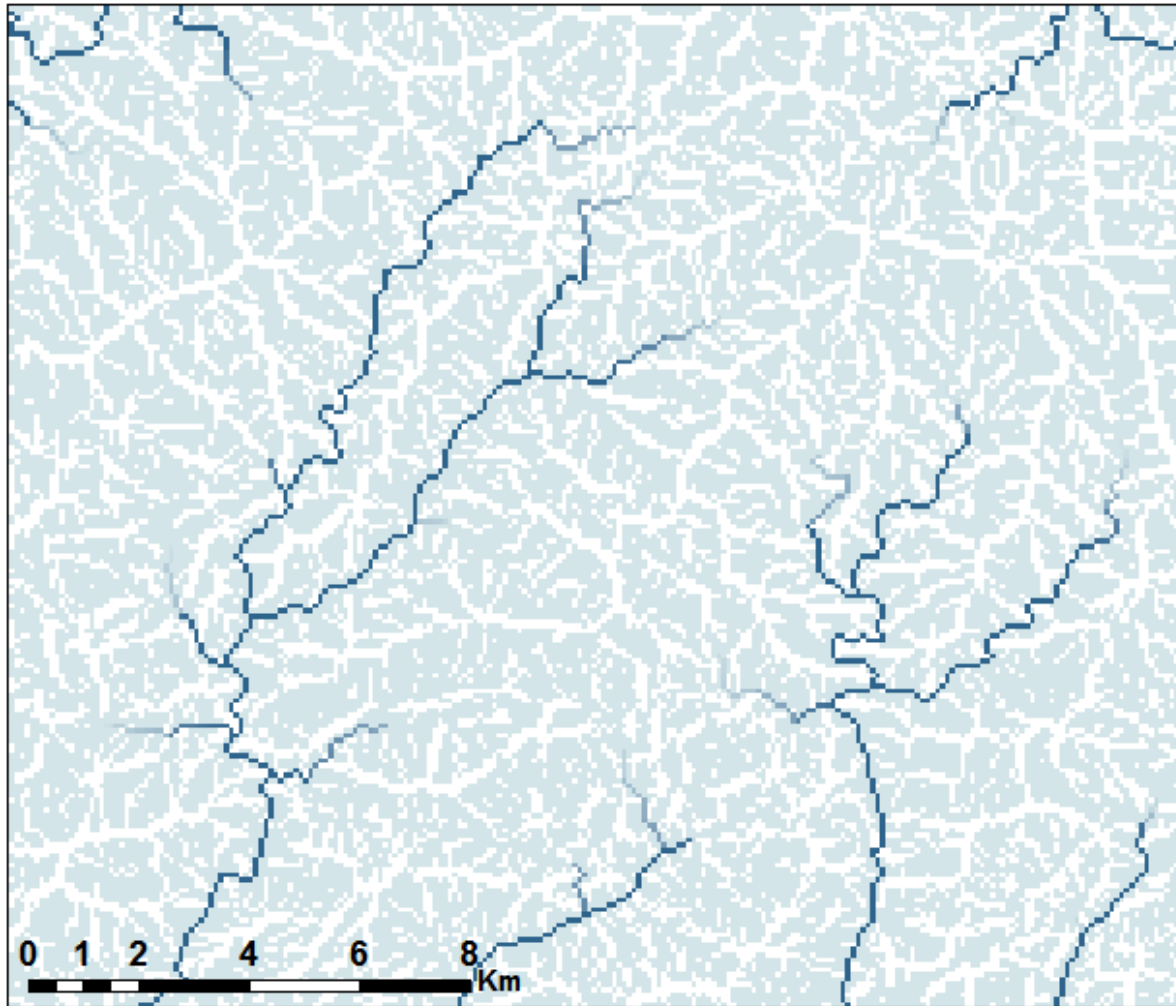
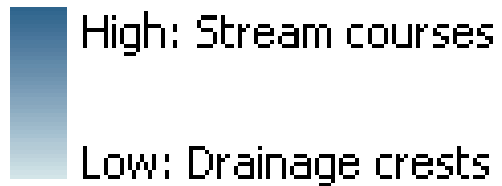
\*Any other values indicate errors in the DEM



# Hydrographic analyses

- Flow accumulation

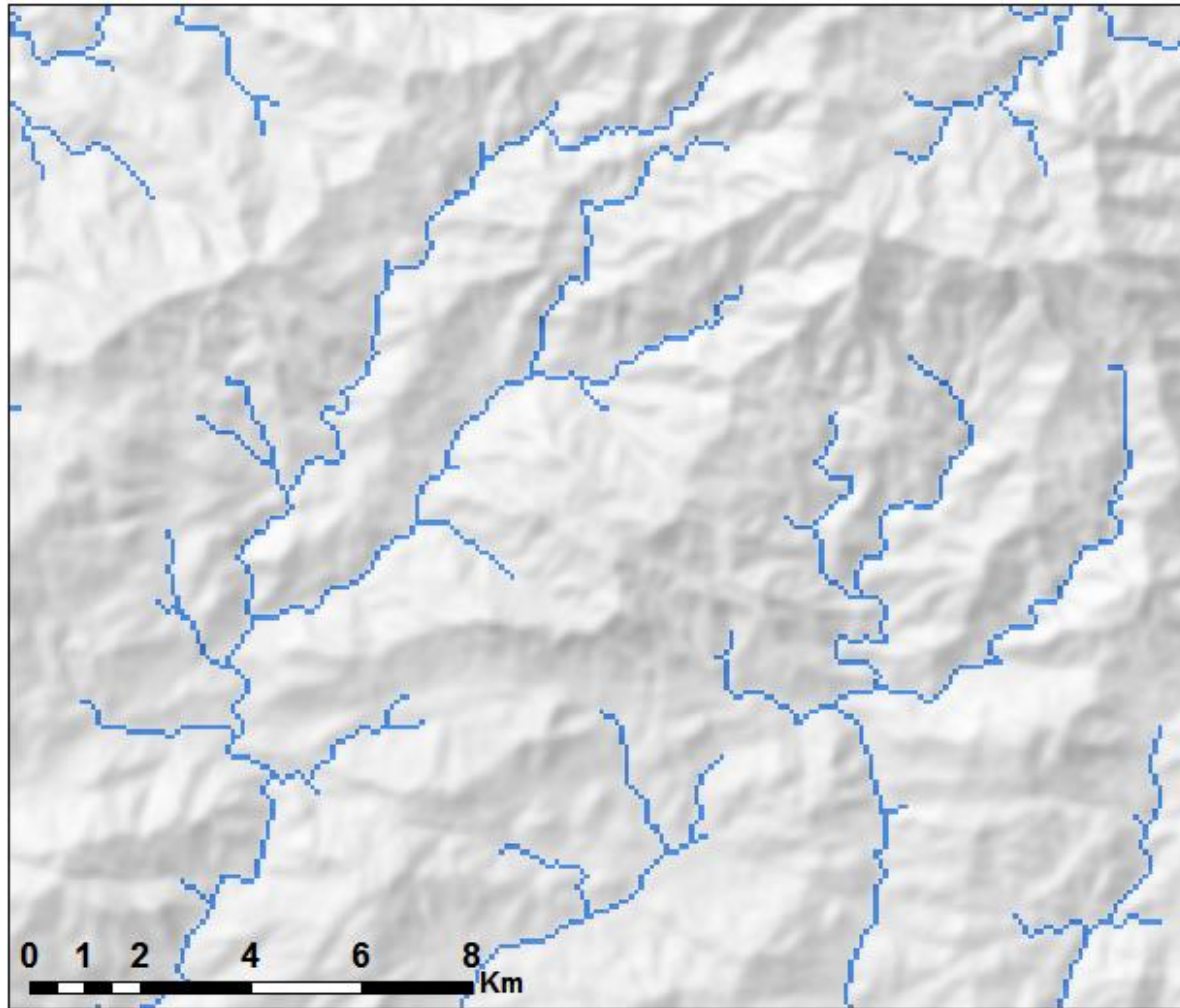
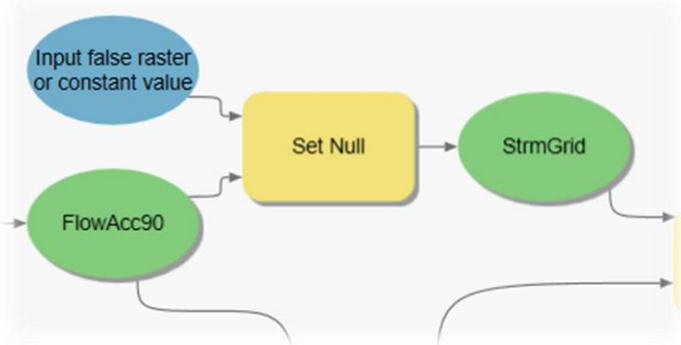
*How many cells flow into a given cell?*



# Hydrographic analyses

- Streams (raster)

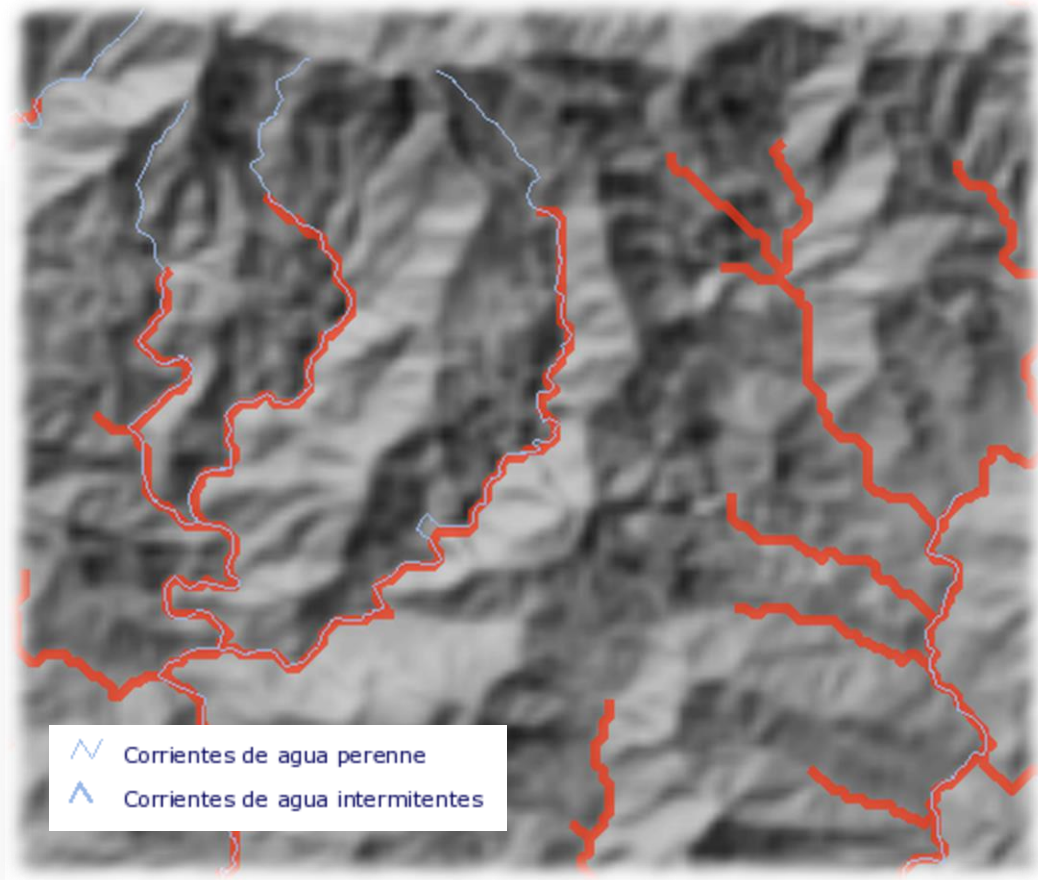
*Isolate cells above  
a threshold  
accumulation*



# Hydrographic analysis

1:100,000

- StrmGrid
  - Value
    - 1
- Servicio WMS
  - Corrientes de Agua
    - Corrientes de agua perenne
    - Corrientes de agua intermitentes
- dem\_90m
  - Value
    - 3704
    - 13
- hillshd90
  - Value
    - 254
    - 0

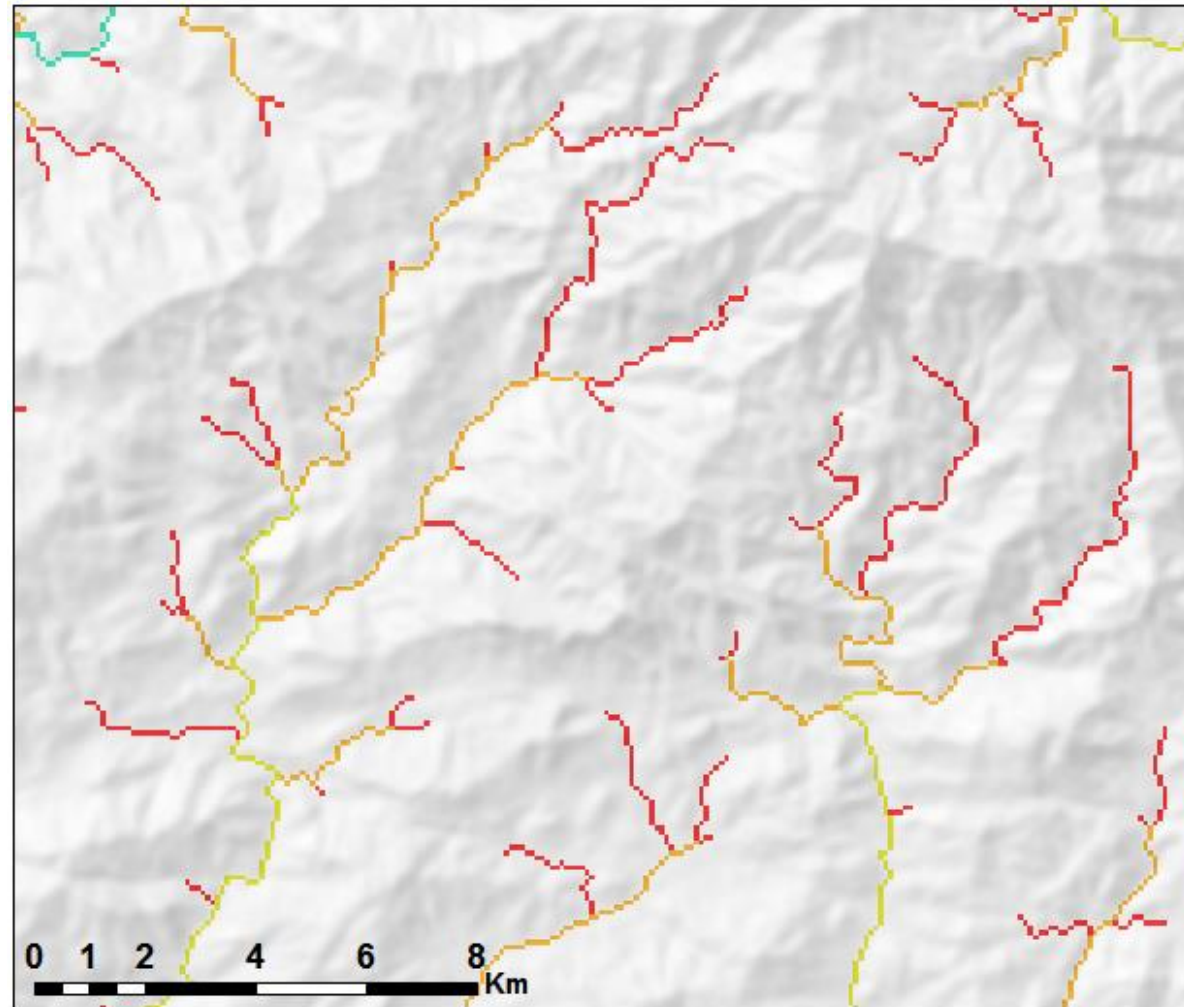
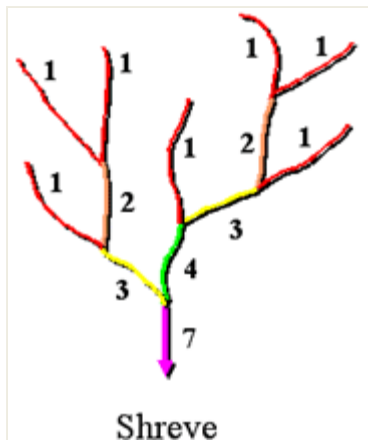
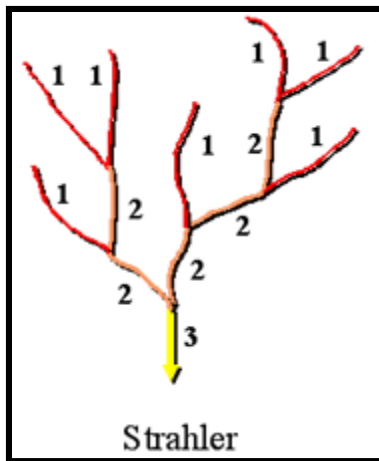


Corrientes de agua perenne  
Corrientes de agua intermitentes



# Hydrographic analyses

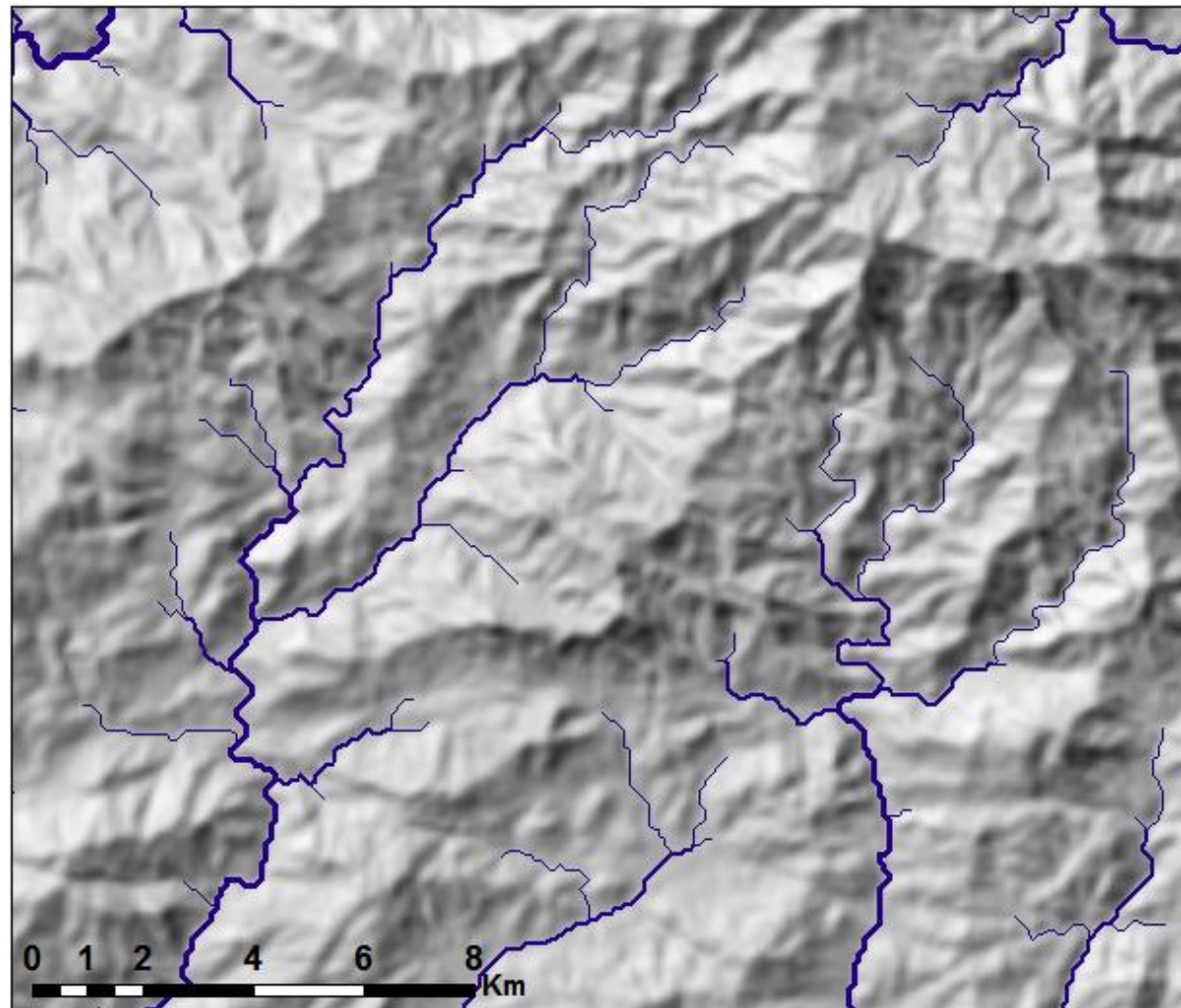
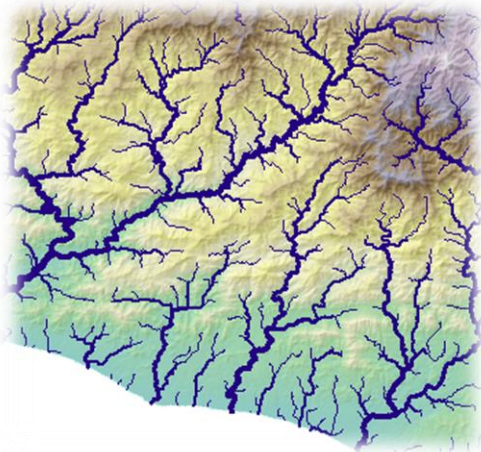
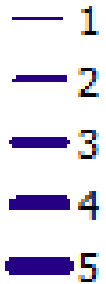
- Stream order



# Hydrographic analyses

- Stream to feature

GRID\_CODE





# Hydrographic analyses

End first part...

