Golema river case study
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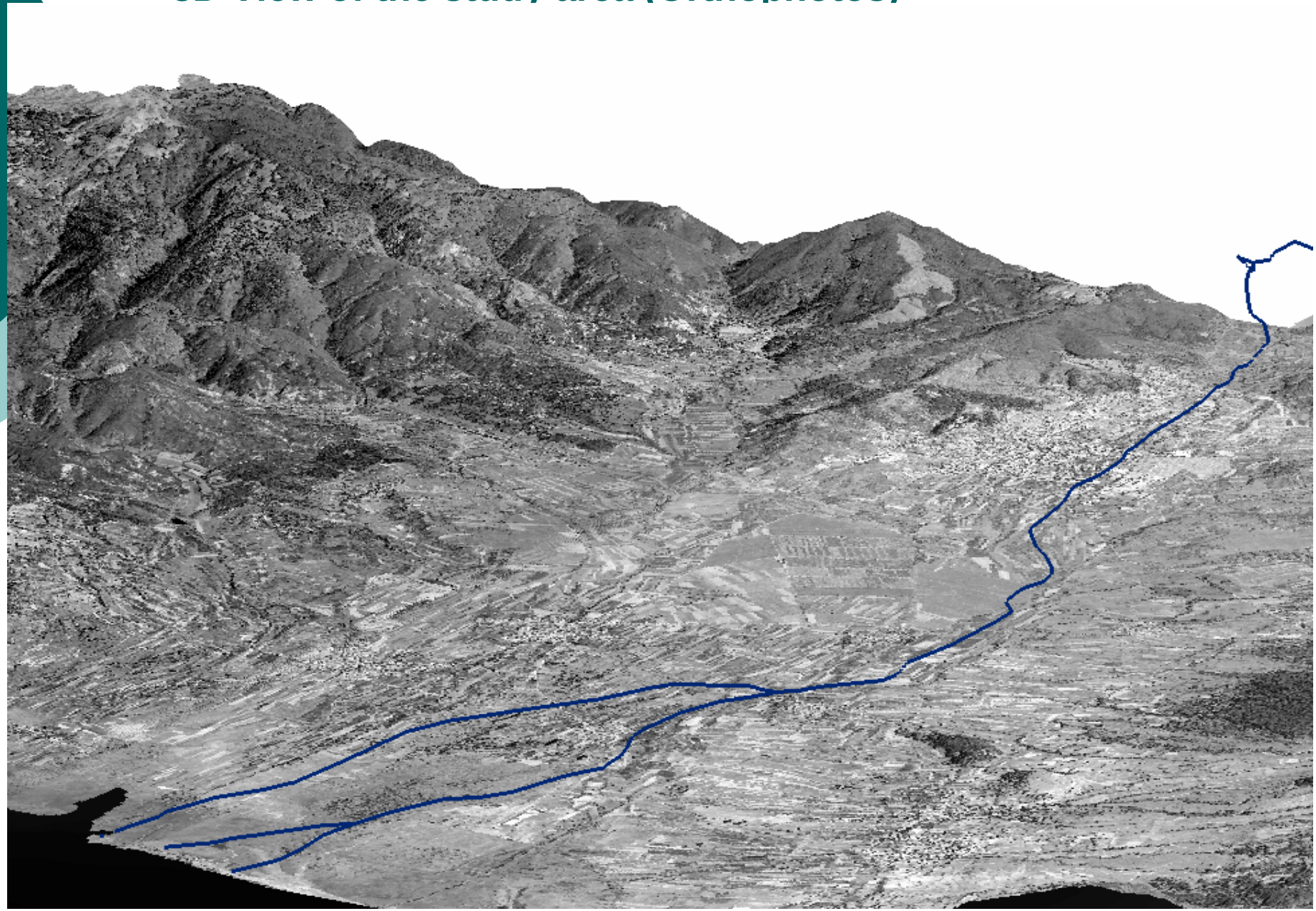
Study area

- Golema river catchment, located in the south-western part, with total area of 182.9 km2 and length of 26.1 km, forms the largest and most important sub-catchment of Prespa Lake.
- According to the CORINE land cover classification the dominating land cover class is Forest and semi natural areas followed by Heterogeneous agricultural areas
- The dominate soil types are brown forest soils, alluvial and dilluvial soil types.
- The largest part of the Prespa Lake region receives 600 mm of precipitation/rainfall. For the lowest parts of the area the value reaches 600 to 700 mm; at the upper parts it amounts 800 to 900 mm, and up to 1,000 mm in the national parks of Galicica and Pelister.
- The average annual air temperature in the region for the period 1961 to 1999 is 9.5°C

3D View of the study area (Orthophotos)



3D View of the study area (Landsat)

Methodology (Part 1, erosion)

USLE model:

A = R*K*LS*C,

where:

A = annual soil loss from sheet and rill erosion in tons/ha/yr

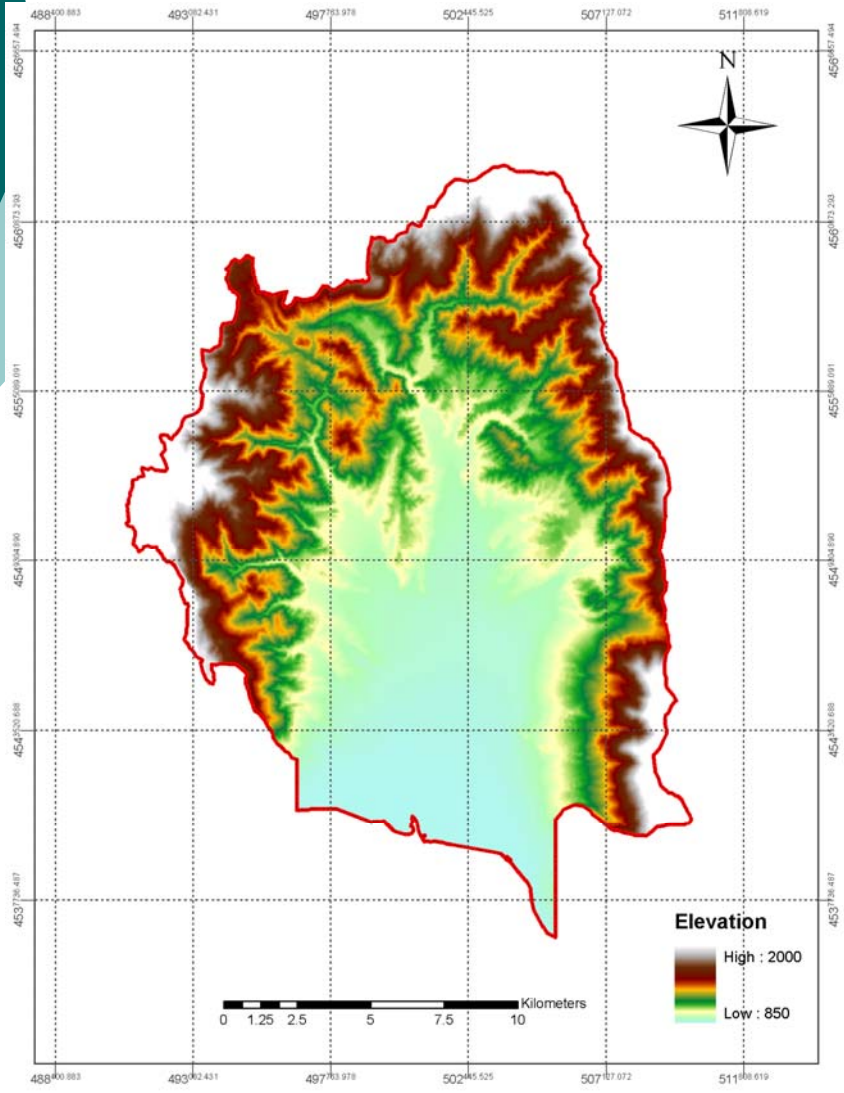
R = rainfall erosivity factor

K = soil erodibility factor

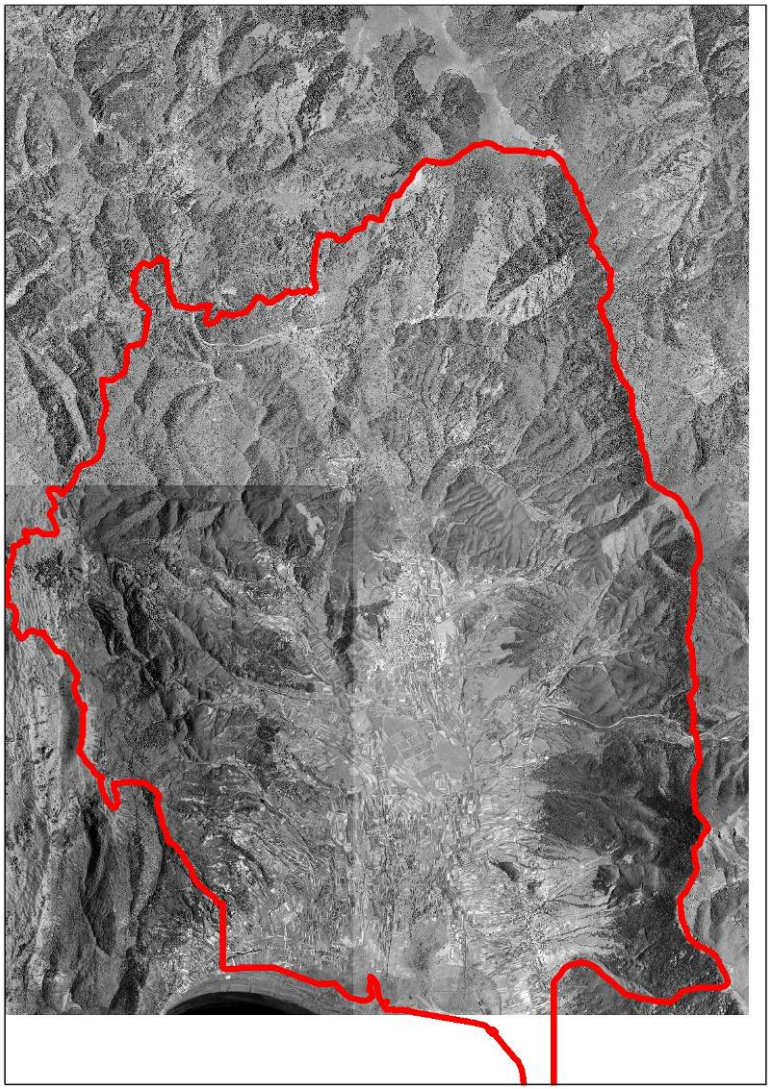
LS = slope length and steepness factor

C = cover and management factor

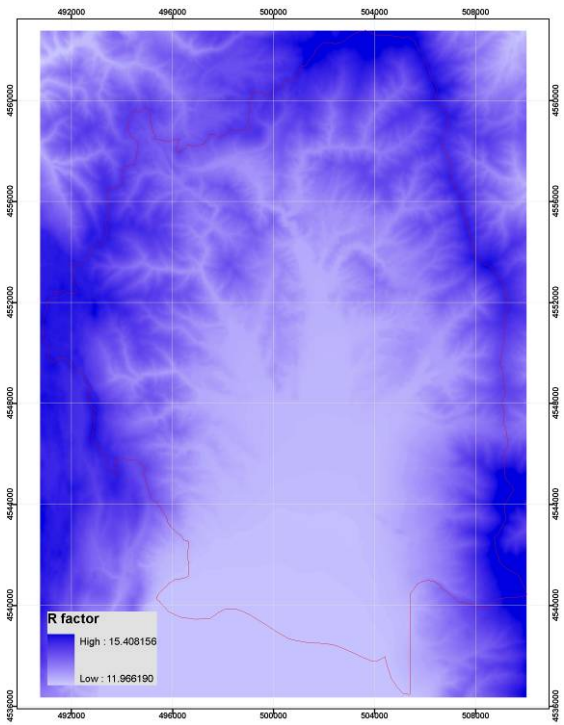
DEM (Spatial resolution 40m)



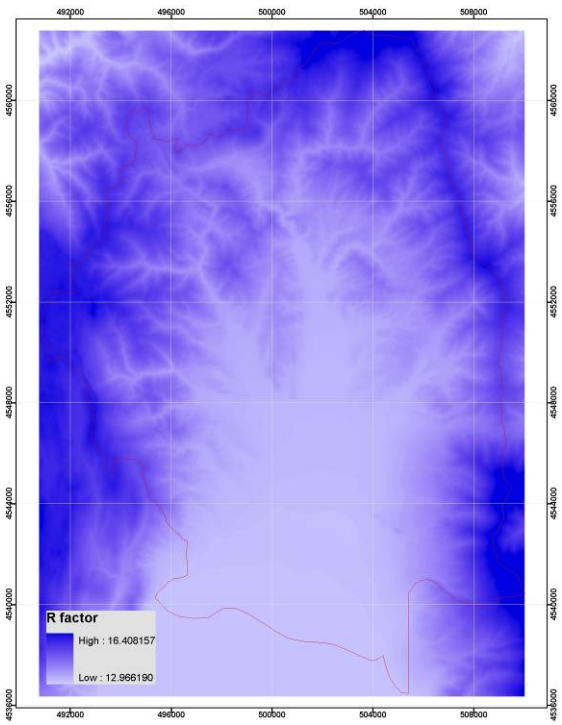
Orthophotos (Spatial resolution 0.5m)



Rainfall Erosivity Factor (R)



August; R = 1.0246H - 0.1468



November; R = 0.9786H + 39.444

- For derivation of R factor the following equation was used

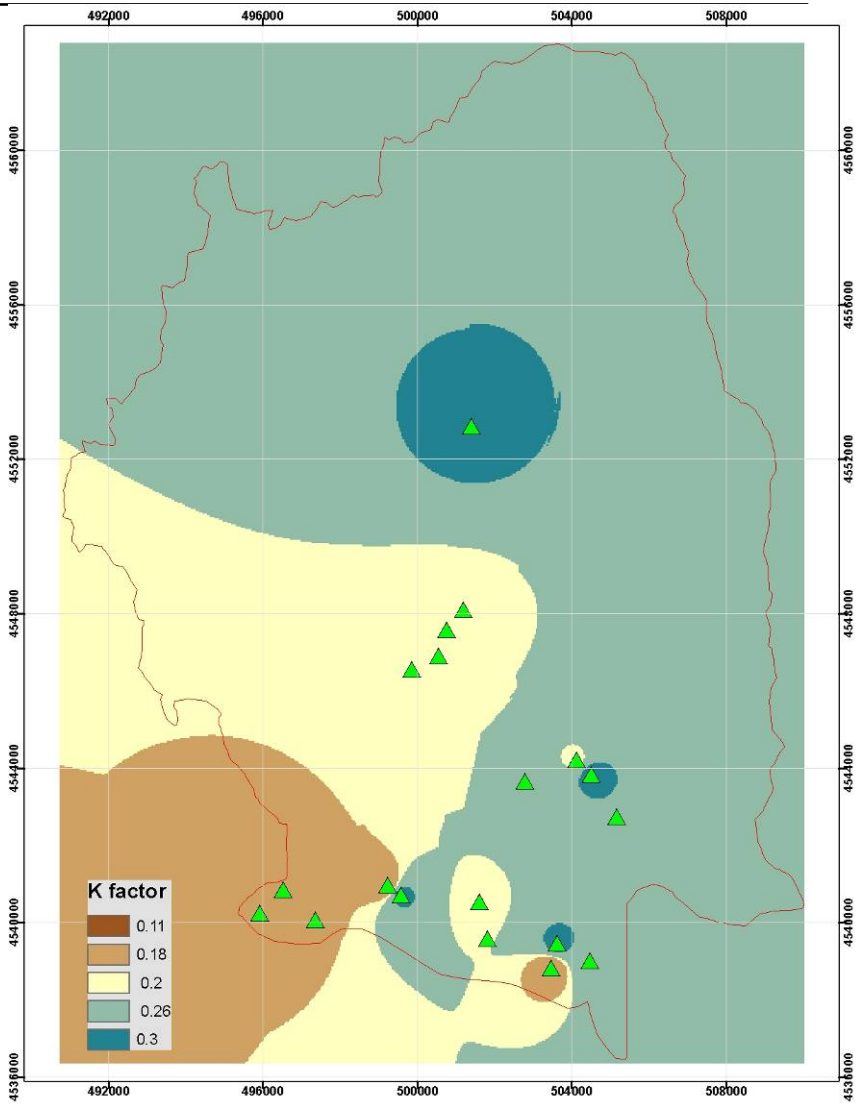
  $LogR = 1.93 \log \sum (ri^2/R) - 1.52$

  Extrapolation of the two station data was done by regression, which takes into account ancillary information from the DEM
- An r-squared indicates almost a perfect fit

Soil erodibility factor (K)

The output value for a cell using IDW is limited to the range of the values used to interpolate. Because IDW is a weighted distance average, the average cannot be greater than the highest or less than the lowest input.

Soil texture	K -factor
CL, L	0,3
SiC	0,26
FSL	0,18
LFS	0,11
LC	0,3
Sandy CL	0,2



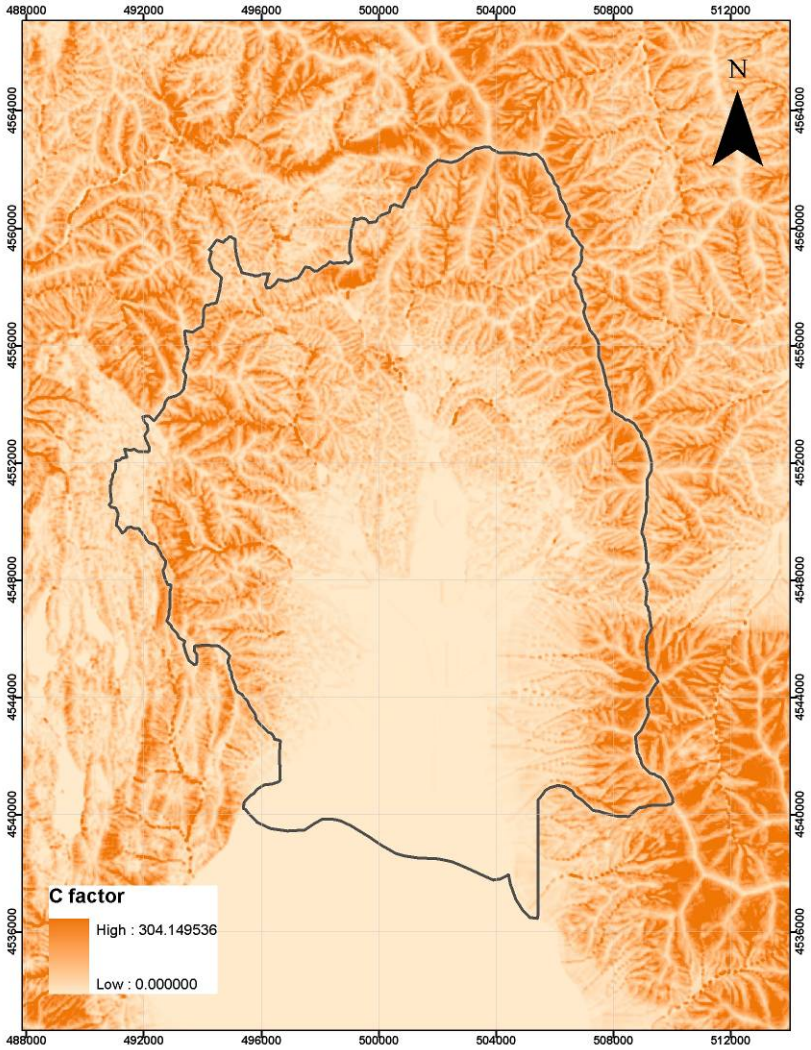
LS Factor

The LS factor map was derived from the DEM using the equation which was developed by Schmidt in 2002, based on the work of Moore et al. for calculation of the S (slope steepness) and L (slope length) factors as follows:

$$L = 1.4\left(\frac{A_S}{22.13}\right)^{0.4}$$

$$S = \left(\frac{\sin\beta}{0.0896}\right)^{1.3}$$

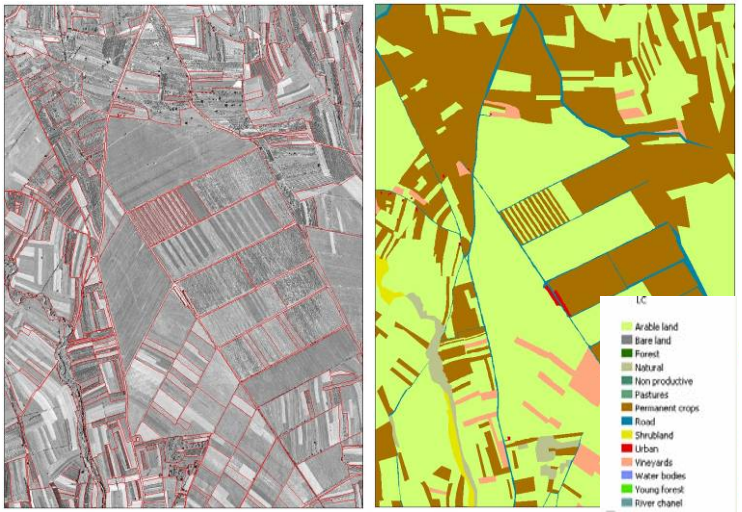
β- Slope angle in degree
As- Specific catchments area or drainage area per unit width orthogonal to a flow line (m2/m)



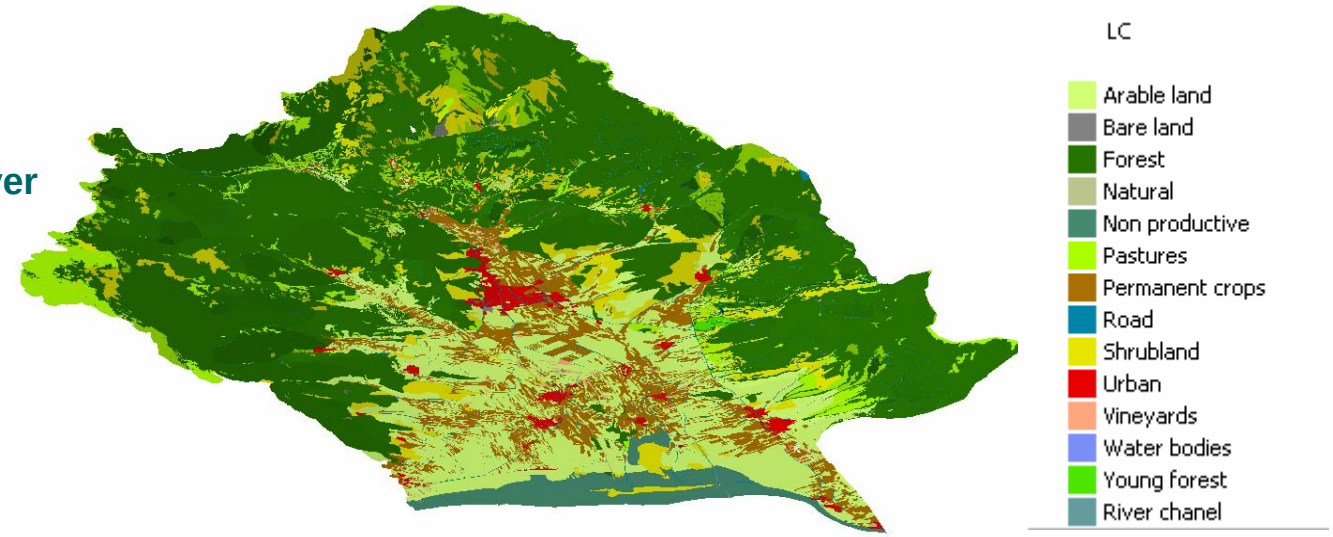
Land cover classification

For land cover classification the following methods were used:

- **Visual interpretation;**
- **Manual digitalization** of the different land cover types (in total 13 classes were identified)

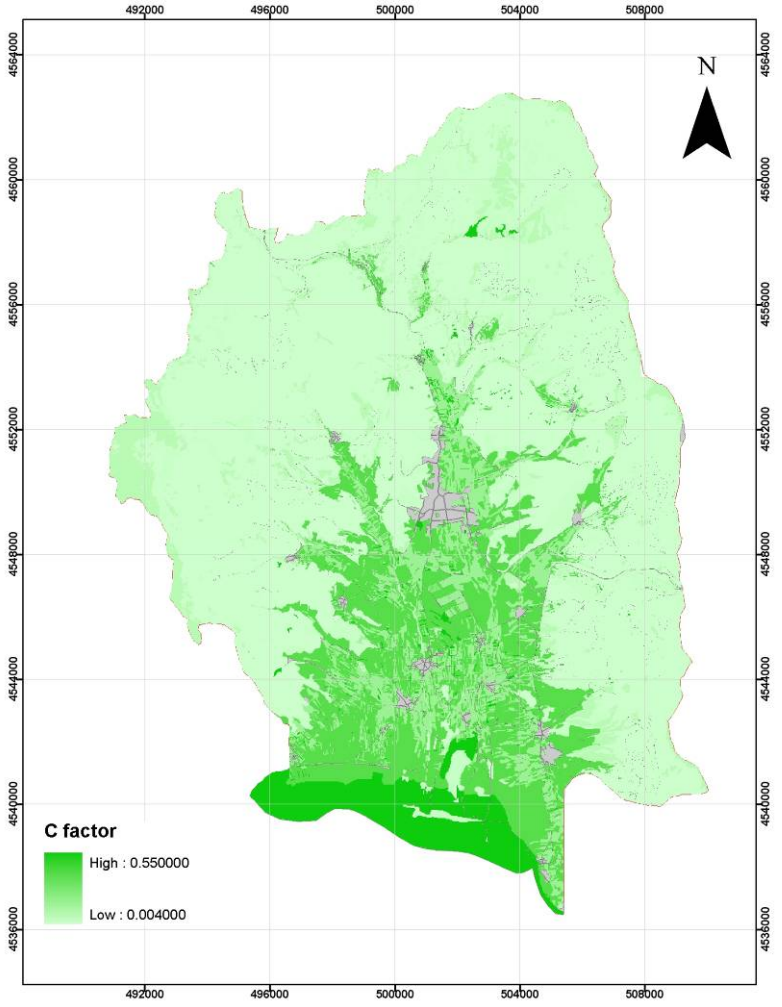


3D View of the land cover classification

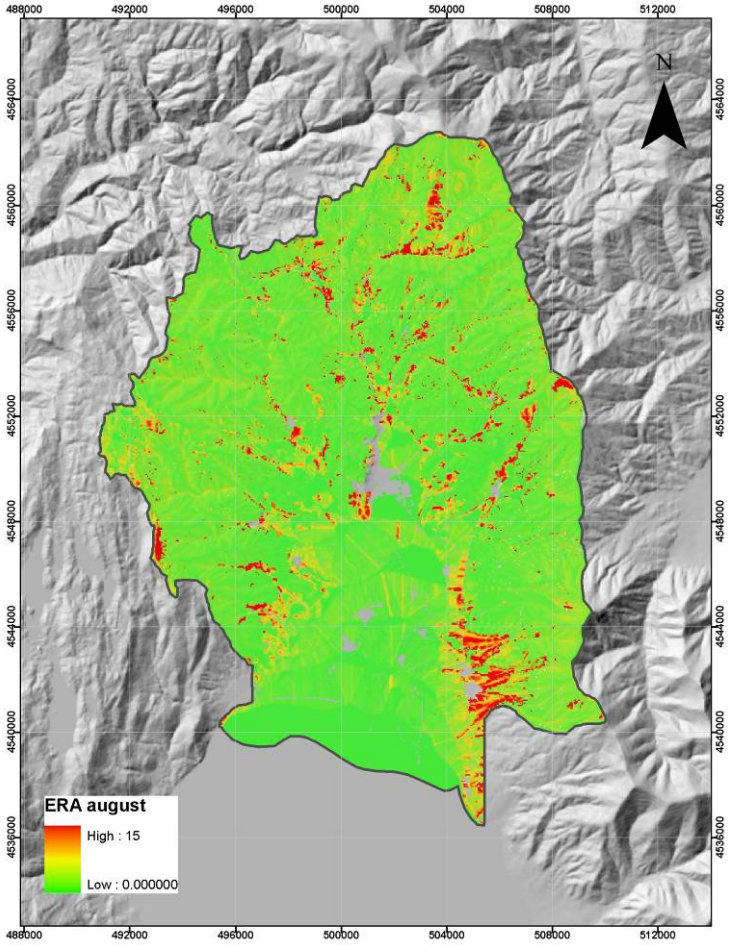


Cover management factor (C)

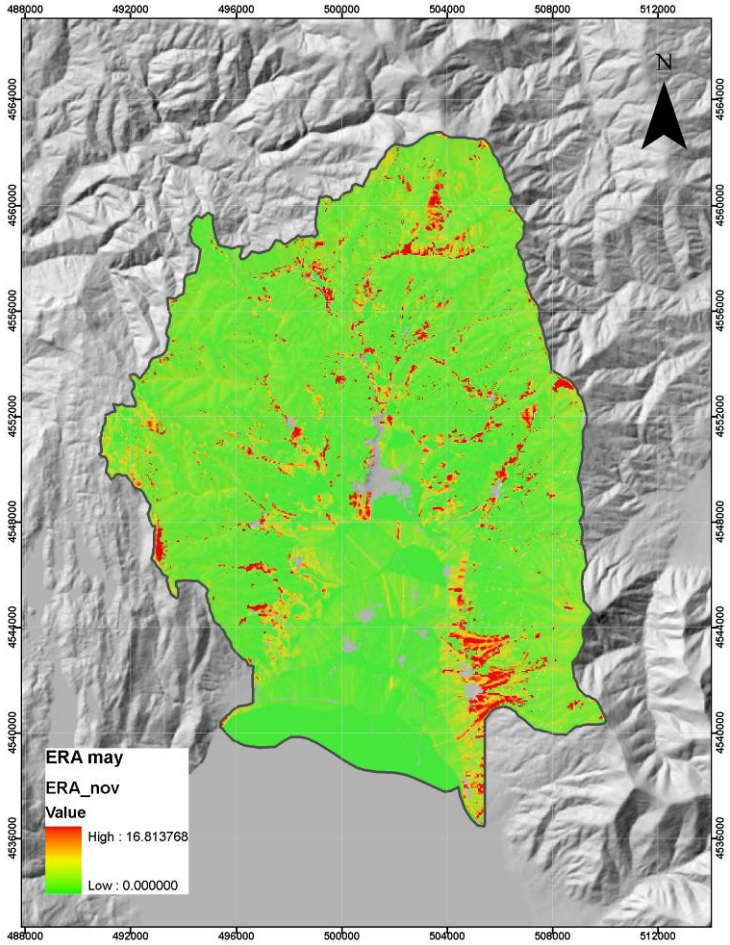
LC	*C_factor*
Arable land	0.250
Bare land	0.550
Forest	0.004
Non productive	0.550
Pastures	0.050
Permanent crops	0.110
Shrubland	0.014
Vineyards	0.400
Young forest	0.006



Erosion risk assessment result



MAY



NOVEMBER

Methodology (Part 2, SEDD)

- The proposed methodology for modeling the variability of the sediment delivery process within a catchment is estimation of the Sediment Delivery ratio (*SDR) (which accounts for the amount of sediment that is actually transported from the eroding sources to a catchment outlet compared to the total amount of soil that is detached over the same area above that point)* per cell (*SDRi)* incorporated in the sediment delivery distributed model (SEDD).
- As a final step the spatial gross catchment erosion estimates obtained from the erosion model will be used as input and coupled to the spatial SDR predictions in order to calculate sediment yield contribution of a cell to the catchment outlet.

$$Sy = \sum_{i=1}^{N} SDR_i \, xS_{Ei}$$

THANK YOU FOR YOUR ATTENTION