

Exposure to human activity in Slovakia in the year 2001

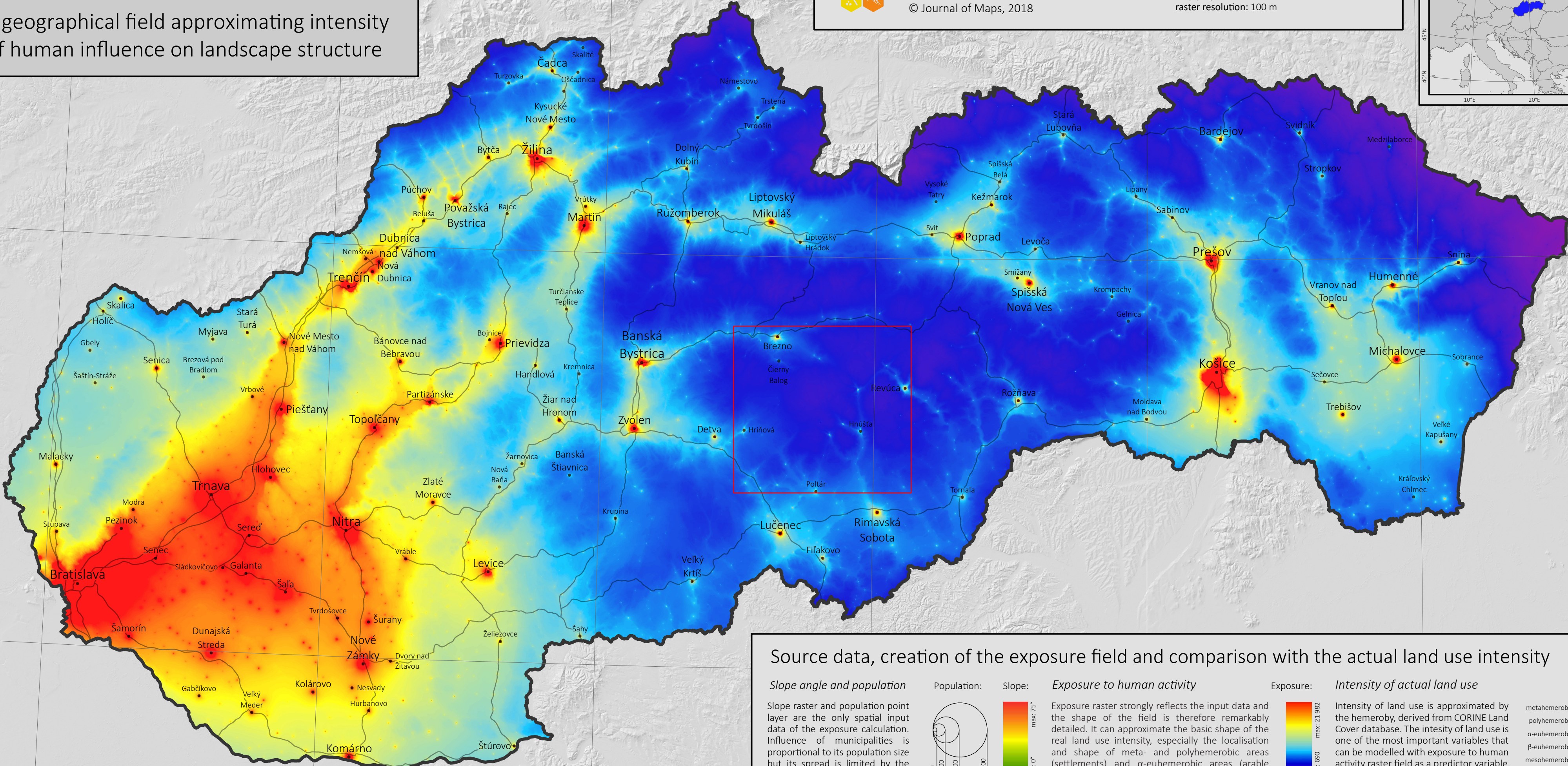
a geographical field approximating intensity
of human influence on landscape structure



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coordinate system: ETRS 1989 UTM Zone 34N
datum: European Terrestrial Reference System 1989
spheroid: GRS 1980
map projection: Transverse Mercator
raster resolution: 100 m



Source data, creation of the exposure field and comparison with the actual land use intensity

Slope angle and population

Slope raster and population point layer are the only spatial input data of the exposure calculation. Influence of municipalities is proportional to its population size but its spread is limited by the barrier effect of terrain slope.

Population: 100 1 000 5 000 20 000

Slope: min: 0° max: 75°

Exposure to human activity

Exposure raster strongly reflects the input data and the shape of the field is therefore remarkably detailed. It can approximate the basic shape of the real land use intensity, especially the localisation and shape of meta- and polyhomerobic areas (settlements) and α-euhemerobic areas (arable land) as well as oligohemerobic areas (forests).

Exposure: min: 685 max: 21 982

Intensity of actual land use

Intensity of land use is approximated by the hemeroby, derived from CORINE Land Cover database. The intensity of land use is one of the most important variables that can be modelled with exposure to human activity raster field as a predictor variable.

Hemeroby:

- metahemerobic areas
- polyhomerobic areas
- α-euhemerobic areas
- β-euhemerobic areas
- mesohemerobic areas
- oligohemerobic areas

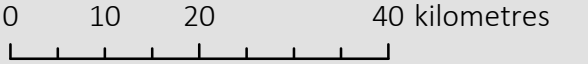
Exposure to human activity

min: 685 max: 123 128



Towns:	Population:
• Nitra	> 70 000
• Levice	25 000 - 70 000
• Detva	10 000 - 25 000
• Krupina	5 000 - 10 000

state border main roads



The exposure computation

EXPOSURE to settlement is directly proportional to its population size and inversely proportional to the cost distance from this settlement. Overall exposure to human activity sums all exposures to individual settlements in a region.

COST DISTANCE is calculated as the least-cost path over a cost surface. Sine of the slope is used as the cost surface.

SOURCE DATA:

POPULATION: Tomášiková V., (2010). Demo(geo)grafický a metadátový informačný systém so zreteľom na dynamiku obyvateľstva Slovenska. Dissertation thesis source data. Comenius University in Bratislava.
DEM: European environment agency (2013). Digital Elevation Model over Europe (EU-DEM).
LAND COVER: European environment agency (2016). Corine Land Cover 2012 seamless vector data.

$$Ex = \sum_{i=1}^n \frac{population_i}{1 + \frac{cost\ distance_i}{d1}}$$

i = individual settlement from the total set of n settlements
 $d1$ = "distance one" - calibration coefficient used for setting, how intensively the exposure disappears with rising cost distance.

