



CHANGES
Risk=HVA

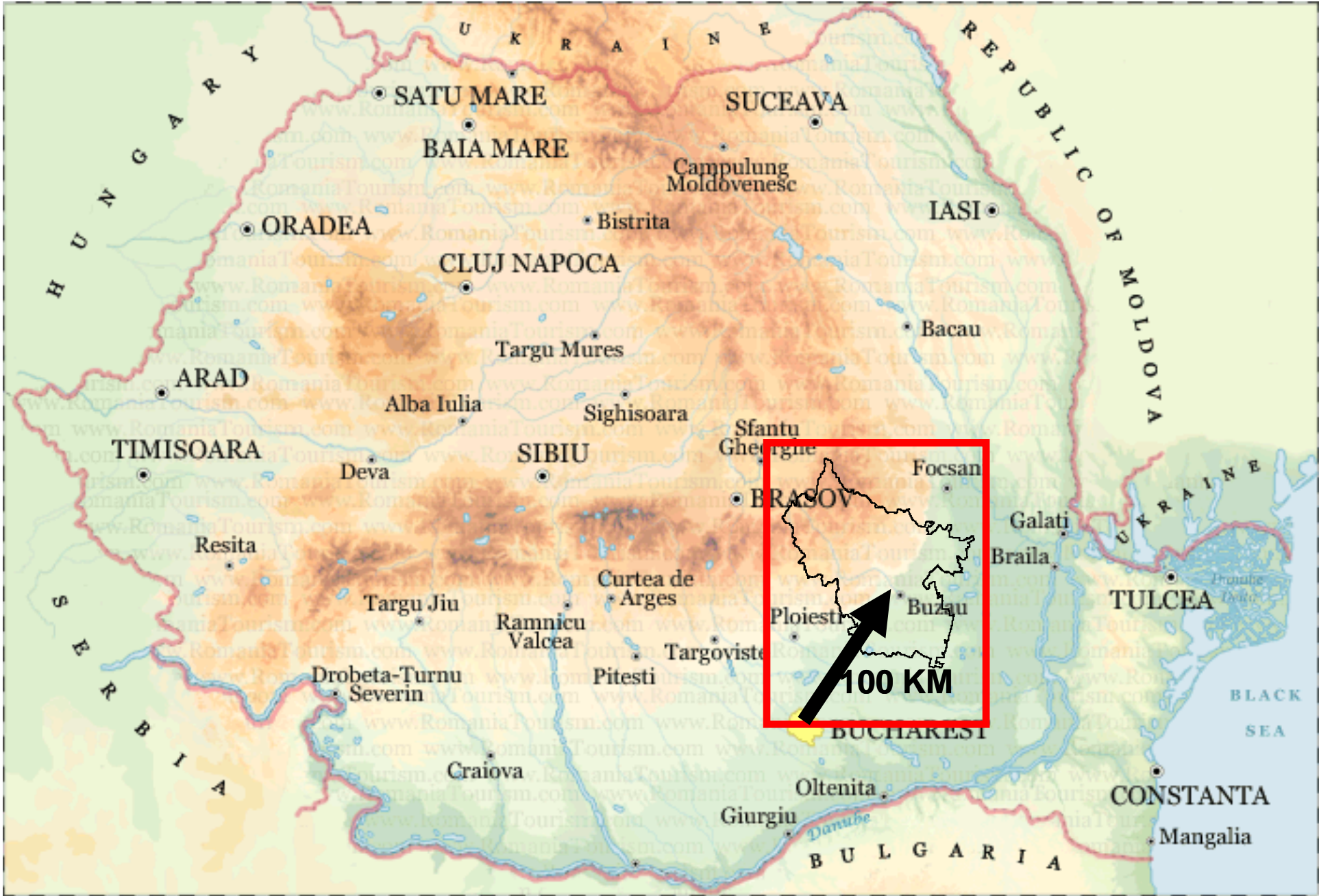


17-23 September, Stryszawa/Krakow, Poland

Case study, ROMANIA:

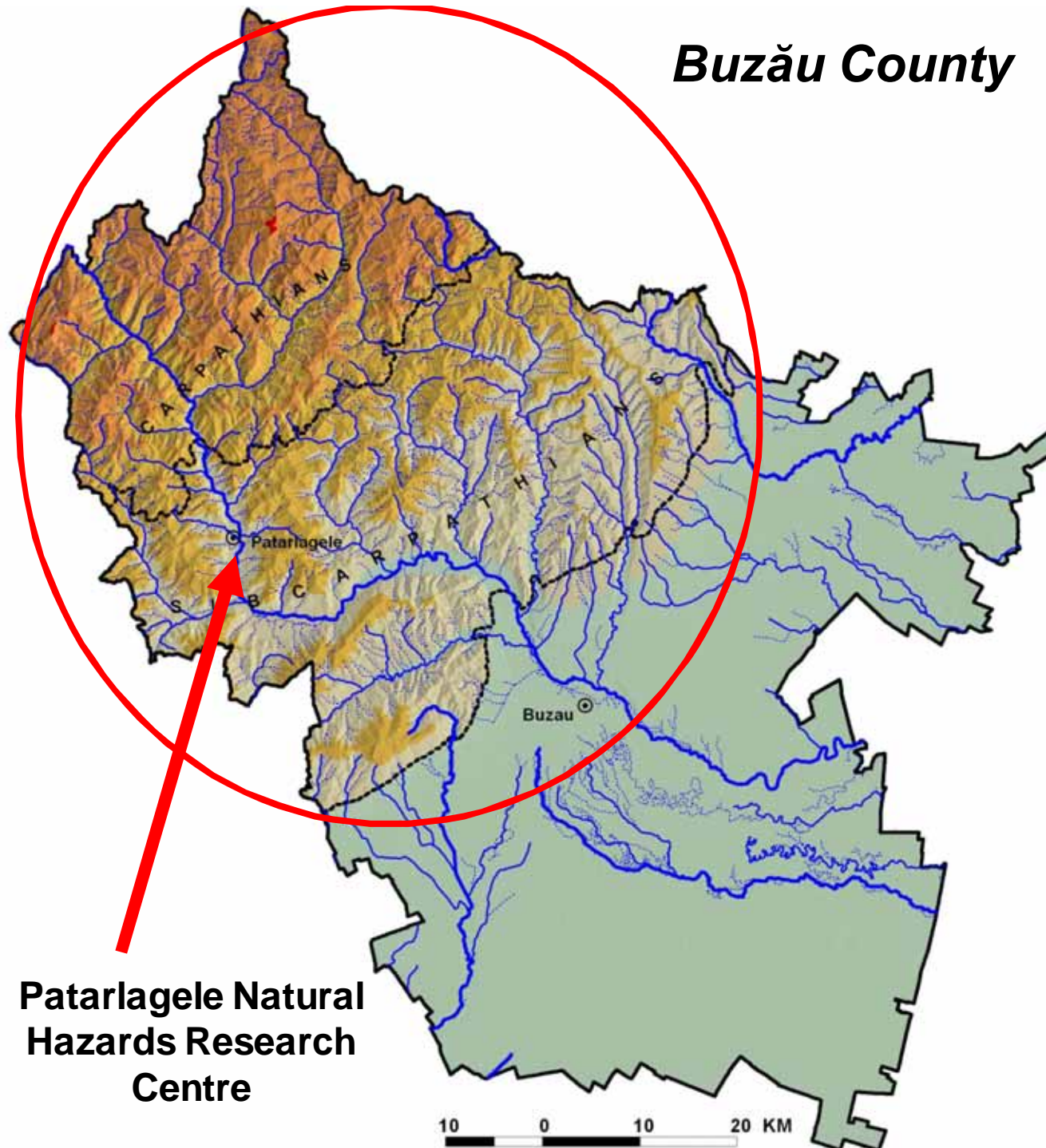
BUZĂU COUNTY





Buzău County

- almost 6100 km² of which half is represented by mountains and hills
- situated in the heart of Vrancea Seismic Region (Curvature sector of the Southeast Romanian Carpathians)
- the most active seismic region in Romania.
- the most active sub-crustal earthquake province of Europe (continental collision area, weak crustal but intense sub-crustal seismicity (80-160 km in depth), a domain in which three-to-four major events ($M_w > 7$) occur per century.



**Patarlagele Natural
Hazards Research
Centre**

GEOGRAPHICAL SETTINGS

- **Relief:** great structural and petrographical complexity, a young and very dynamic relief of mountains (1400-1500, up to 1700), hills (400-800 m) and depressions;
- **Geology:** folded and faulted flysch – molasse – quaternary deposits (great lithological heterogeneity; *clays, marls, sands*);
- **Precipitation regime:** 500-1000 mm yearly amount, torrential heavy summer rainfalls, spring showers overlapping snow melt;
- **Human activity and land use/land cover:** long history of intensely populated (90-150 pers./sq.km.) and used areas; large deforestations;
- **Natural hazards:** in the Subcarpathians, 30-40 % of the agricultural lands are affected by landslides, mudflows and erosion. The presence of numerous elements at risk (villages, isolated households and a dense road network) requires appropriate hazard assessment and mapping for risk management and governance.
- The local signals of **climate change** are sustained by several aspects: a slight increasing trend in annual mean temperatures, a decrease in precipitation but a tendency of rainfall concentration over short time intervals along with increased torrential character.

Potential:

Regional

CARPATHIANS

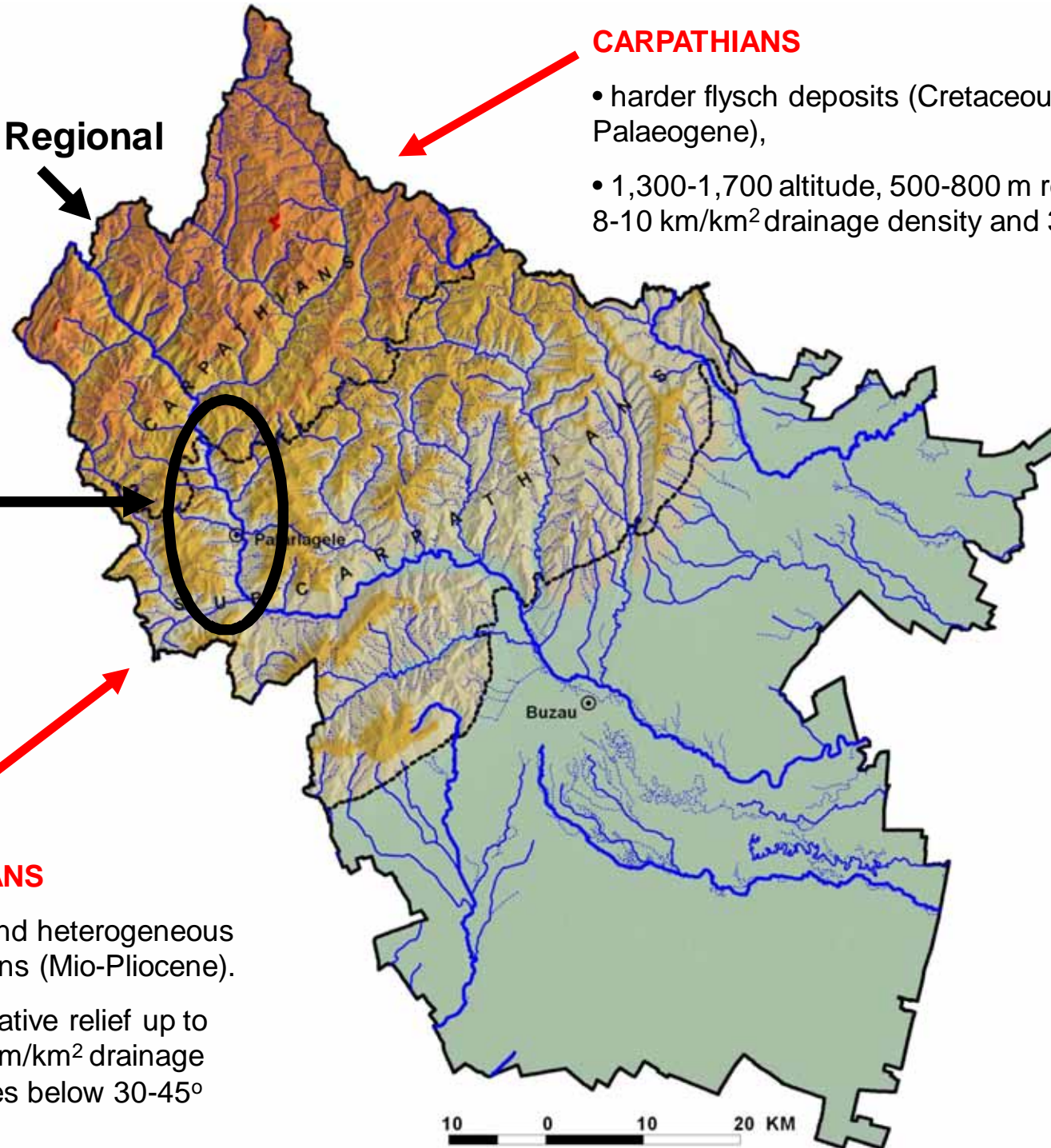
- harder flysch deposits (Cretaceous and Palaeogene),
- 1,300-1,700 altitude, 500-800 m relative relief, 8-10 km/km² drainage density and 30-45° slopes

Local



SUBCARPATHIANS

- less cohesive and heterogeneous molasse formations (Mio-Pliocene).
- up to 900 m, relative relief up to 300-500 m, 3-8 km/km² drainage density and slopes below 30-45°



Landslide data/information

Rotational and translational slides, flows, complex;

Debris, earth;

Reactivations, first time;

Rainfall, snowmelt, seismic acceleration;

Velocity, geometry, run-out: very variable according to the type of process.

AVAILABLE:

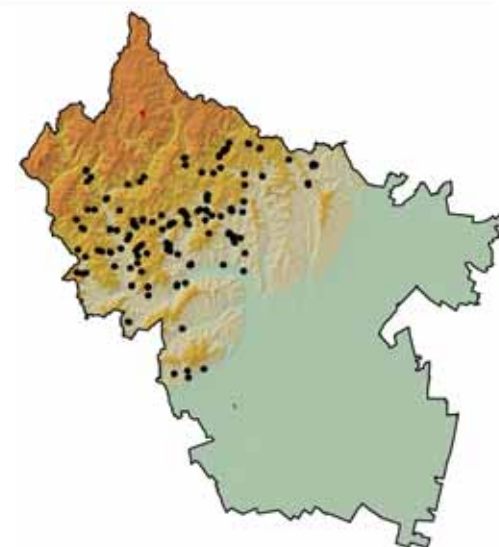
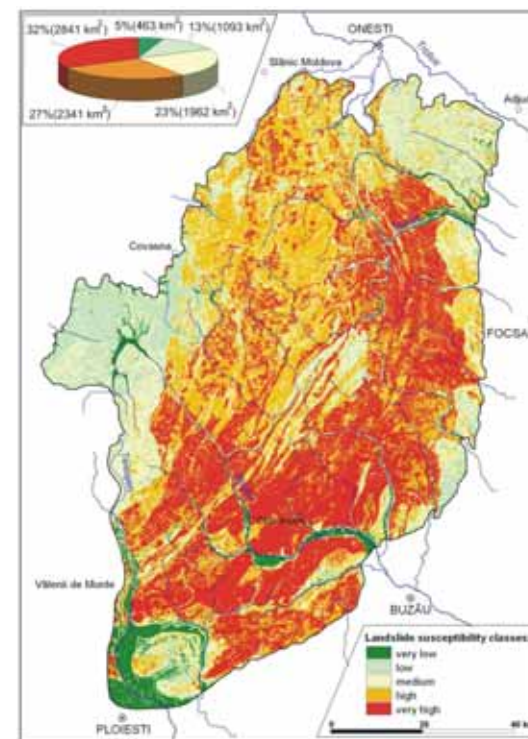
susceptibility (expert knowledge);

NOT AVAILABLE:

multi-temporal inventories (regional);

IN PROGRESS:

landslide inventory, susceptibility (statistic), hazard.



Flood data/information

Flash floods;

Monitoring: velocity and discharge (4 river gauging stations, *INHGA*);

Triggering: rainfall, snowmelt.

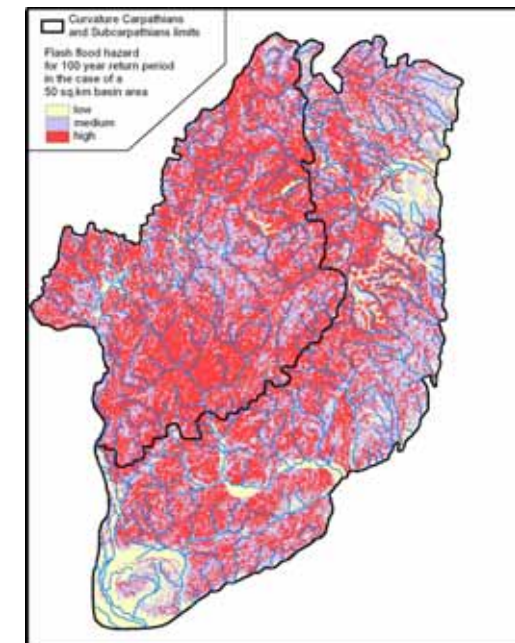
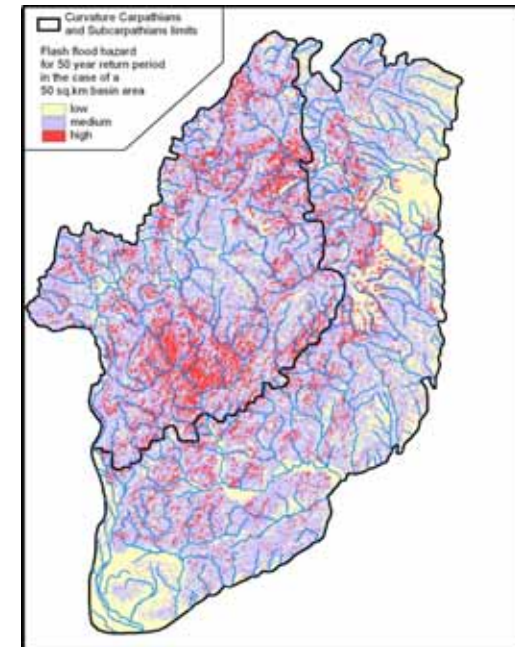
AVAILABLE:

maximum discharge, return periods: 10, 50, 100 years (regional);

NOT AVAILABLE:

Hazard;

IN PROGRESS: -



Data on conditioning factors

AVAILABLE:

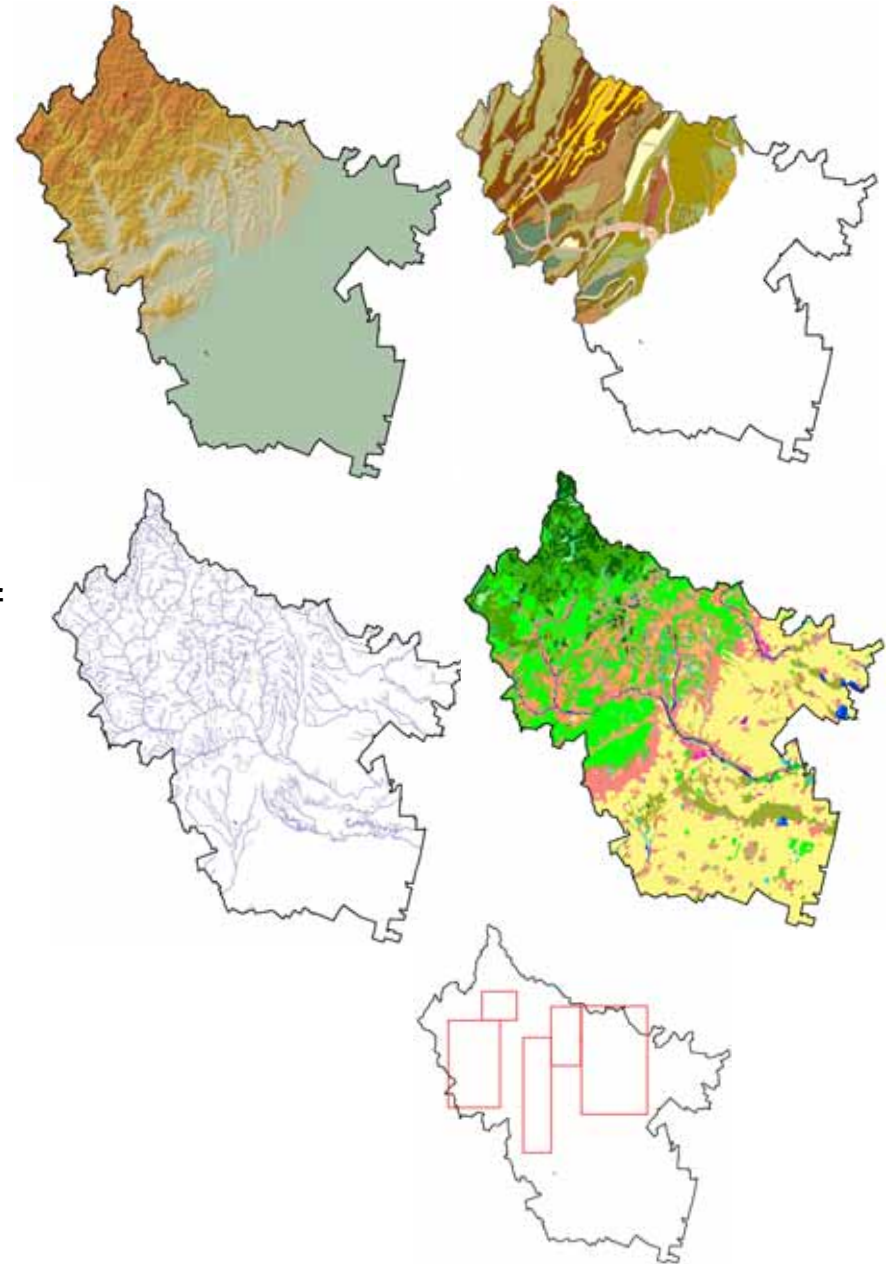
DEM (30 m/pixel); topomaps (1/25,000: 1940, 1970, 1980, 1989; 1/10,000: 1970, 1980) (*still considered state secret*); geological map (1/100,000, 1/200,000); general geomorphological map (1/100,000); land-cover map (1990, 2000, 2006; CORINE); tectonic map (1/100,000); forest map (1/100,000) aerial photos (some 40% of the entire area);

NOT AVAILABLE:

accurate DEM, radar images, groundwater distribution, geophysical assessment;

IN PROGRESS:

soil map (1/100,000);



Data on triggering factors

AVAILABLE:

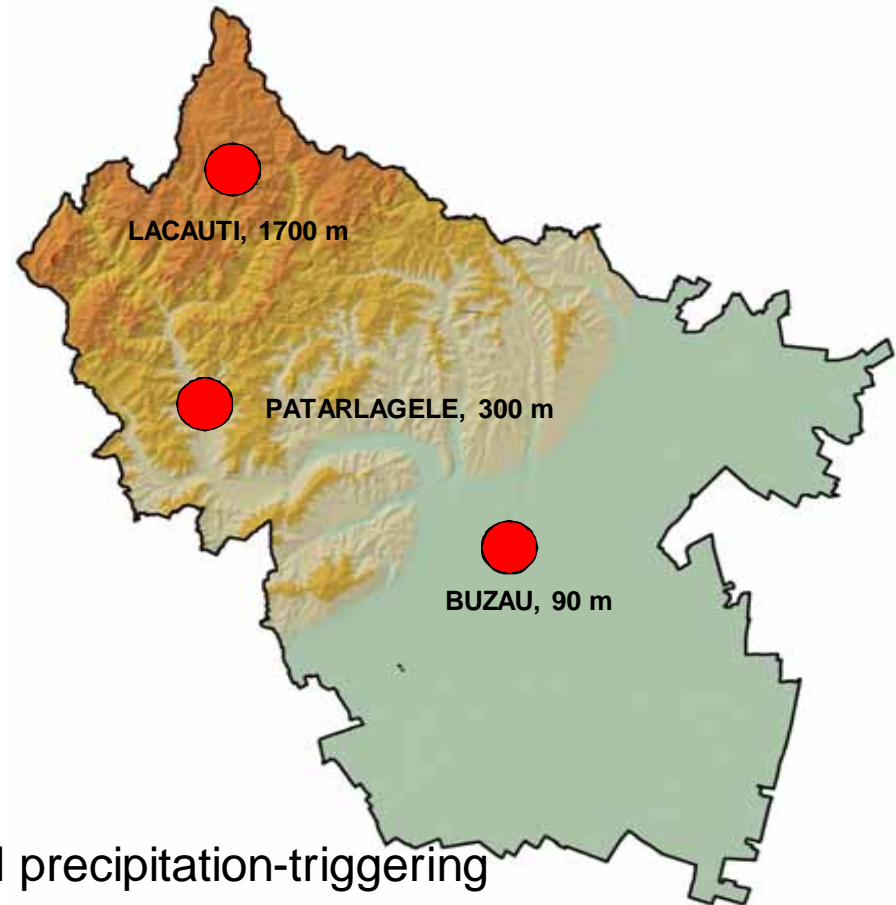
3 weather stations;
Daily: temperature and precipitation;
Earthquake catalogue;

NOT AVAILABLE:

Humidity data; no early warning systems;

IN PROGRESS:

Spatial correlations between landslides and precipitation-triggering thresholds.



Data on elements at risk and land planning

Roads, bridges, buildings, located on/or near active landslides, on active torrential cones and in the floodplain.

AVAILABLE:

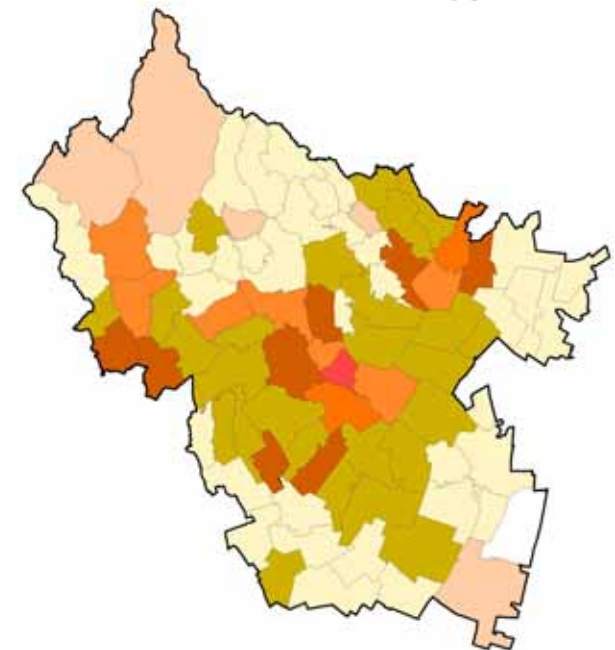
Settlements map; population density (*NUTS 4*)

NOT AVAILABLE:

Numerical modelling, risk analyses.

IN PROGRESS:

Element at risk map (including attributes of the elements at risk) – 1/100,000; Data on damages of elements at risk; value of some category of buildings; human losses due to previous events; economic loss due to previous events; land planning/management.





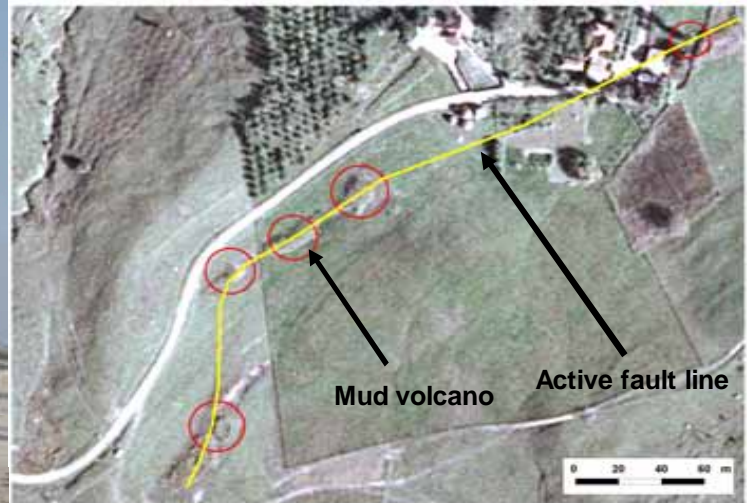
Siriu reservoir and National Road 10



Chirlesti mud-flow



Small catchments affected by flash-floods



Seismicity, neotectonic uplift