

## *Field study, BUZĂU COUNTY, ROMANIA:*

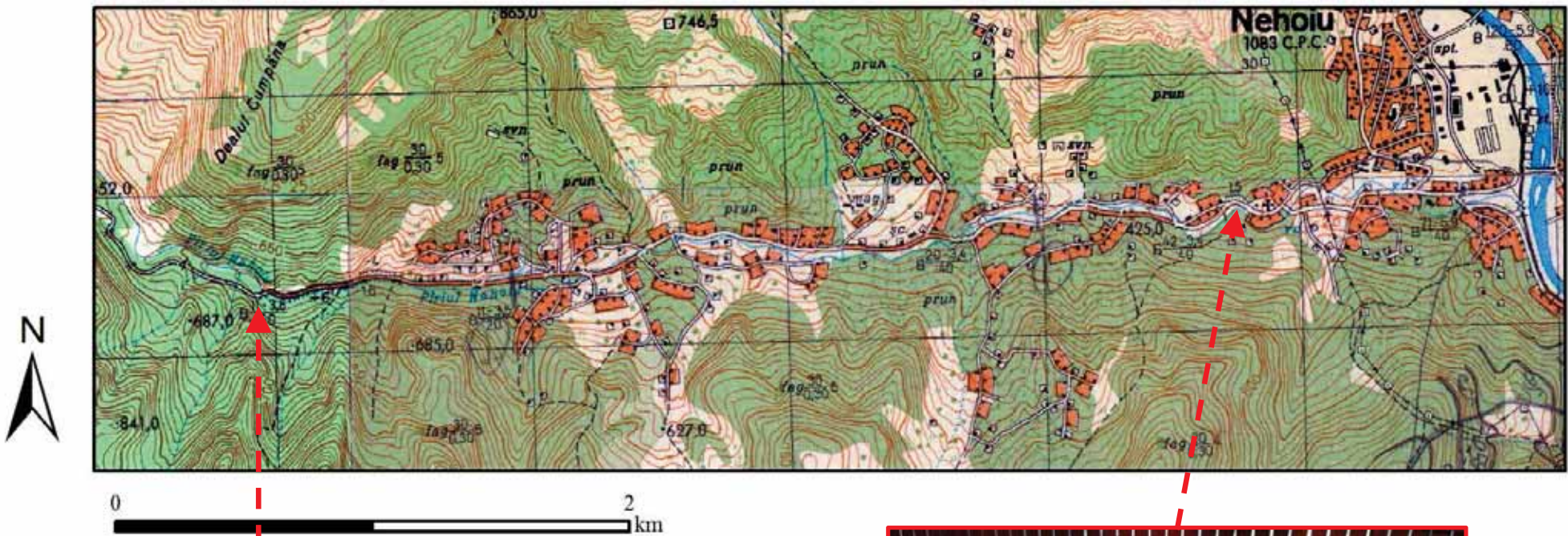
### *Group 2 - Hazard assessment*

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## Objectives

- Identify areas affected by landslides and zones susceptible to future changes and scenarios.
- Detect the areas affected by erosion (possible interaction with river).
- Mapping areas that can be affected by flooding (flash-floods) keeping in mind the 2004 flood as a reference event.

# Nehoiu river study area



## Methodology

Pre-field work:

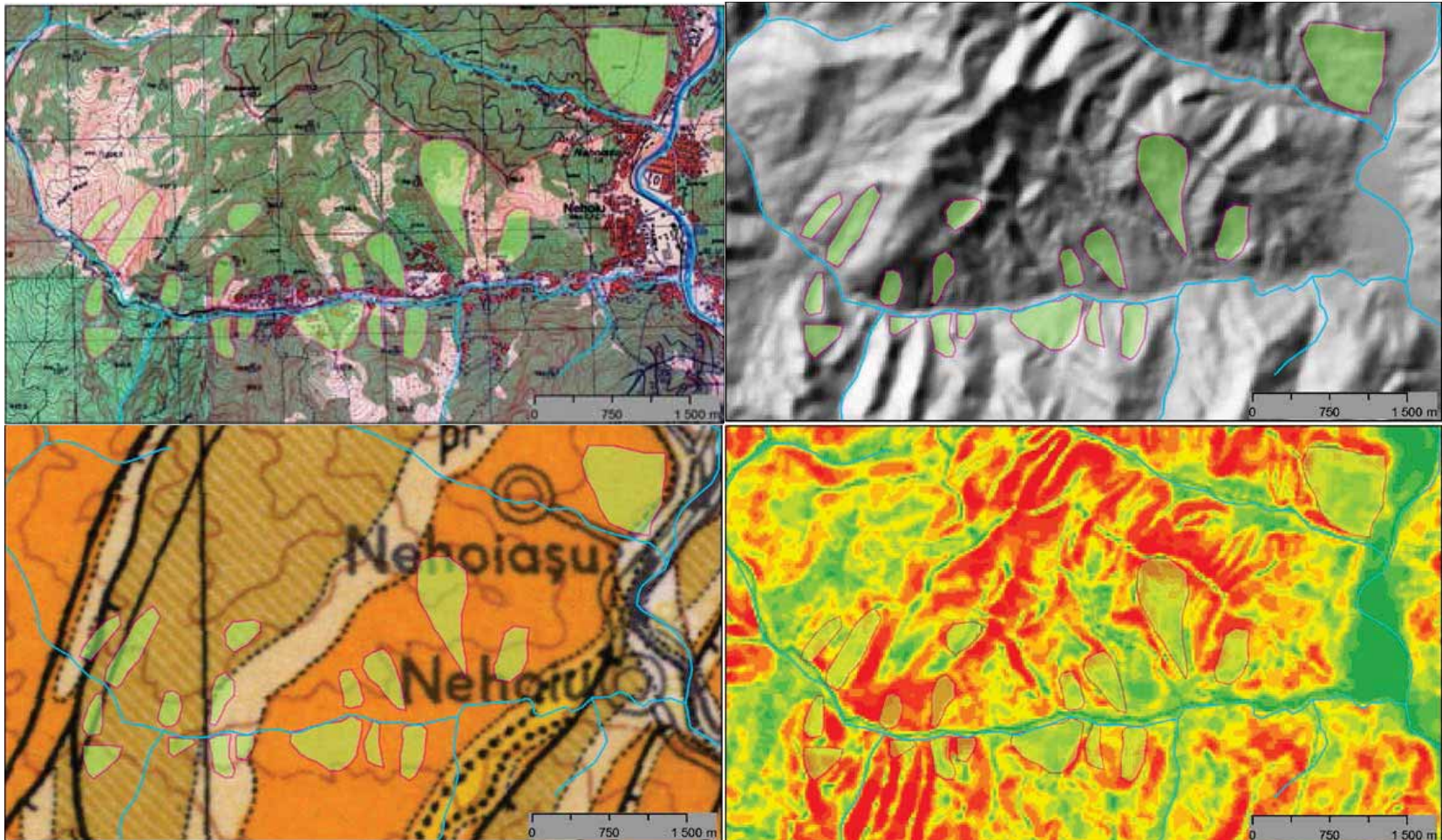
- Analyzed Topographic maps (1:5.000 color, 1:10.000 black-white)
- Route planning
- Photo interpretation (Google Earth)
- Spatial analysis



# Methodology

Pre-field work:

- Spatial analysis



## Methodology (interviews)

### Flood Cemetery lady:

- Rain all night...flood peaked at around 3 am
- Son had time to remove car
- Cascading effect from river flooding causing Landslide at Cemetery

### Man chopping wood:

- Bridge and road collapsed, garden walls damage, needed reconstruction due to flood – landslide interaction
- Road rebuilt

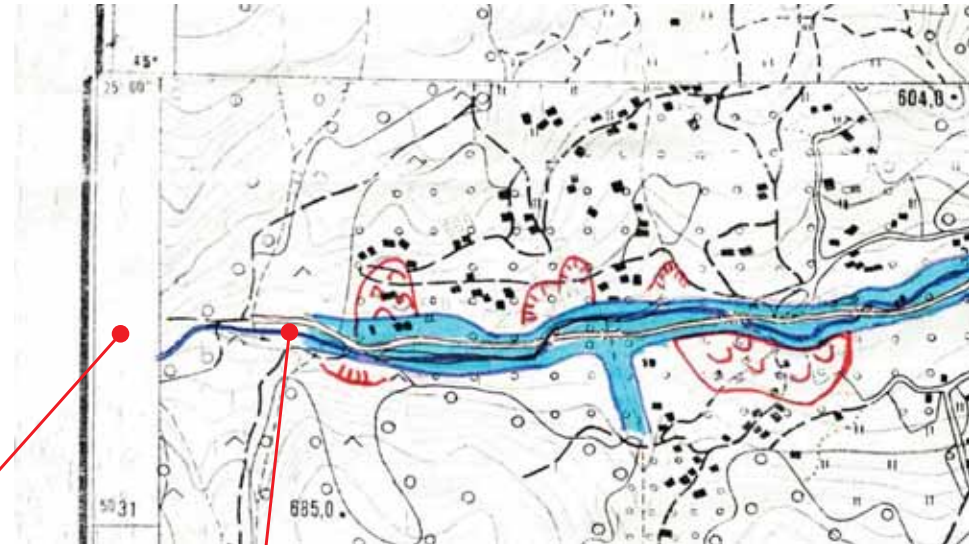
### Young man:

- Continuous rain for 1 week
- High river level
- Torrential rain triggered even higher levels causing flood out-burst
- 2 floods in 6 months, with second flood less severe due to clearing of debris in first flood
- Aware of future flood in case of high rainfall



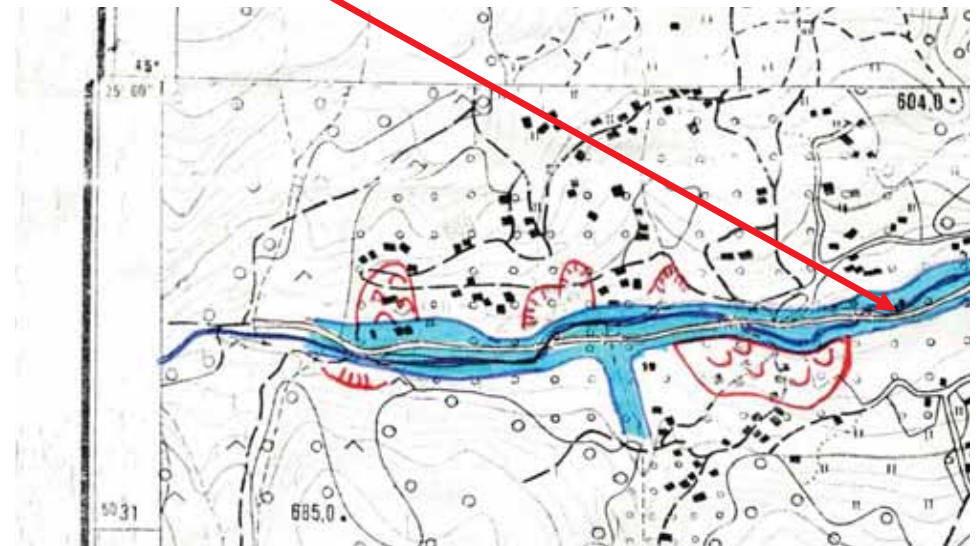
## Upper part Nechoiu river

- Large check dams filled with 0.5 to 2.0 m of debris.
- Disturbed and toppling trees on side of torrent
- Check dams partly destroyed or restored





## Check-dams and deposits

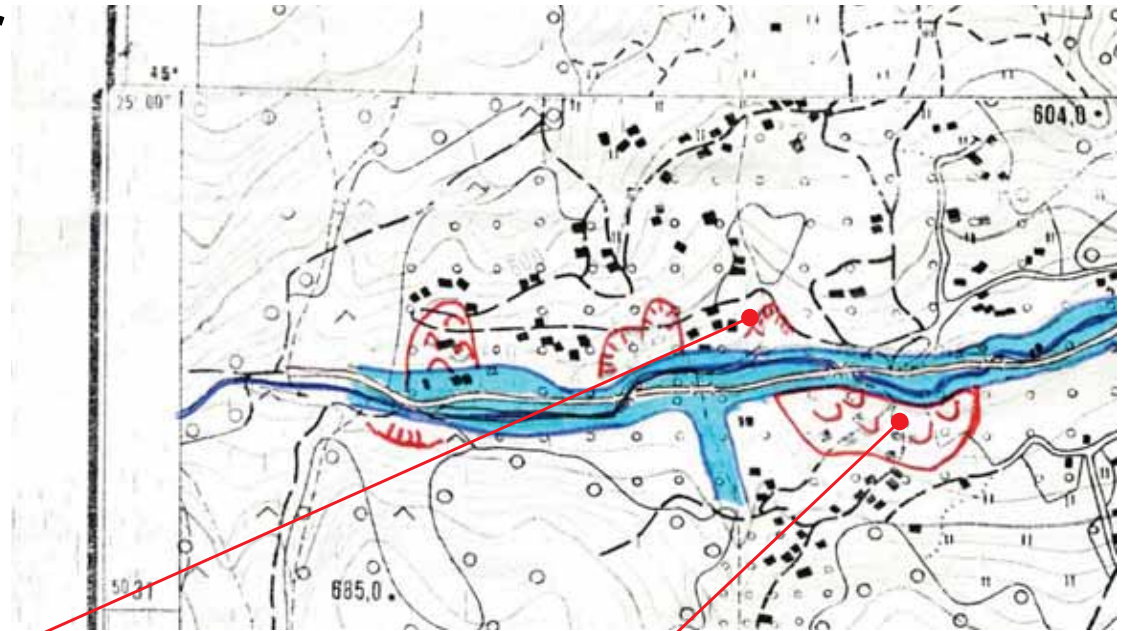




## Upper part Nehoiu river

Landslide and erosional processes:

- Superficial landslides (erosion phenomena along the river bed)
- Deep seated landslides (rotational slides)
- Old inactive landslides (dormant/relic)



**Erosion**



**Rotational**

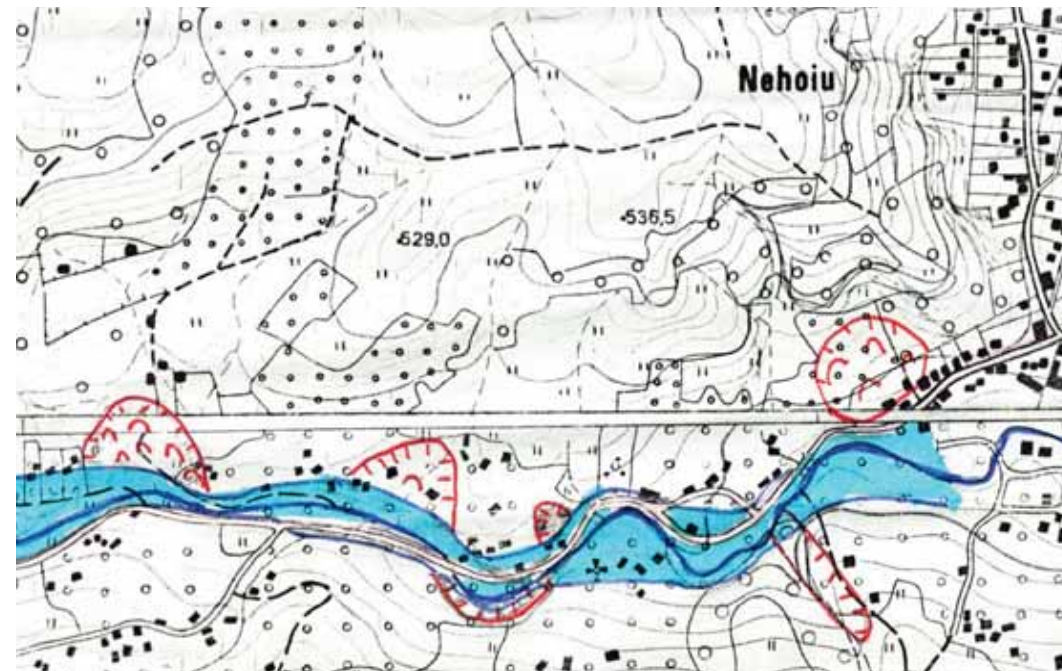
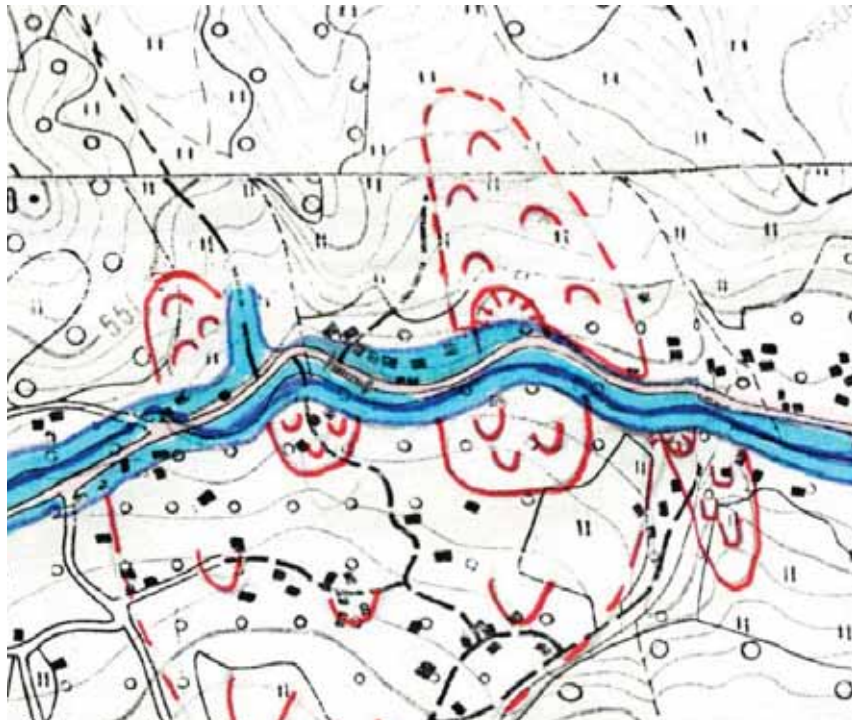


## Flood height - Nehoiu river (2004-2005)



## Landslide – river interaction

“Flip flap” effect (Jaboyedoff, 2012):  
River meanders due to landslides depositing and interacting in river bed.



## Changes in future flood scenarios

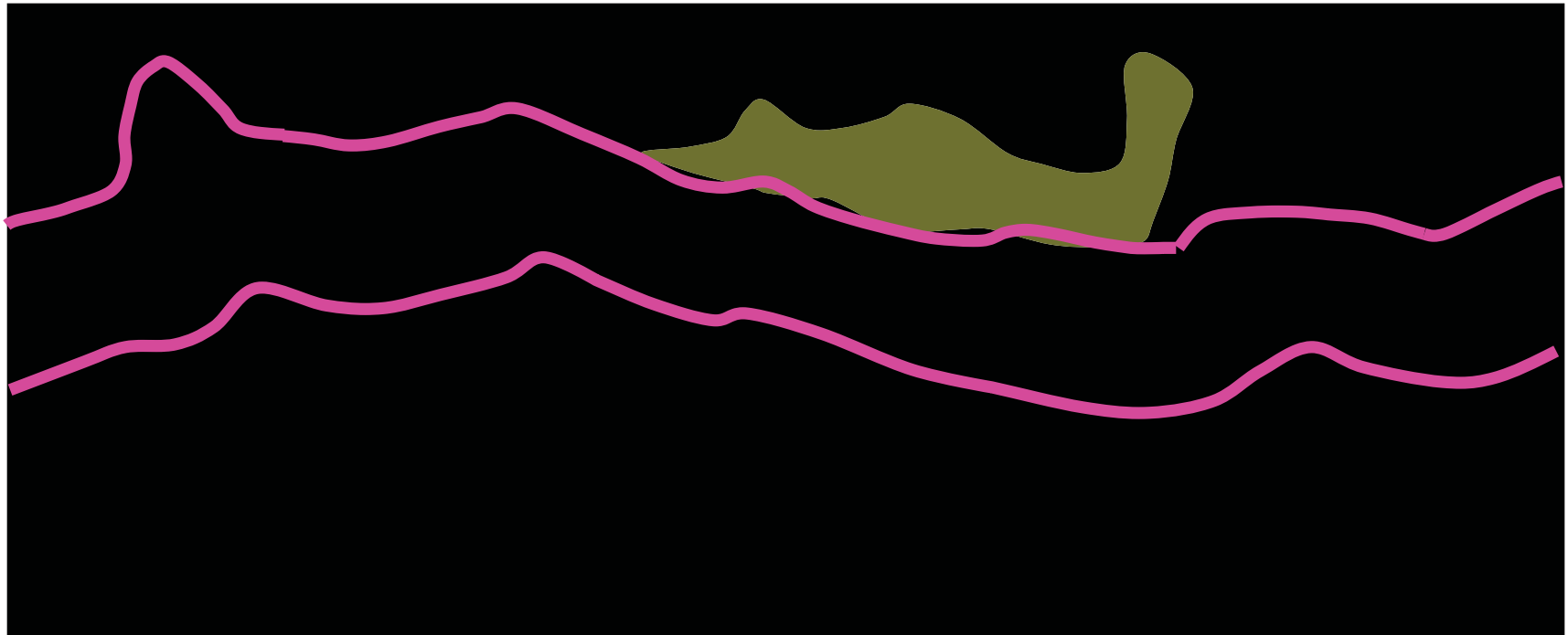
- Deforestation
- Dumping gravel and other building material (man made heaps)
- Lack of maintenance (clearing check dams, removal trees/bushes)
- Climate change and extreme events

Pink = extreme event

Yellow = low hazard zone

**Mapping needs to show priority zone that needs to be avoided**

**Possible relocation needs to occur in low hazard zones**



## Conclusions and Recommendations

- The Nehoiu river valley is highly susceptible to multi-hazards
- Frequent cascading between flooding and landslides
- Mitigation, monitoring and early warning has been setup
- Detailed hazard and risk assessment needs to be carried out in order to assess the usefulness of measures
  
- More detailed data is required for reliable hazard/risk assessment
- Involvement of residents should be incorporated into the assessment

# Thank you