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COPING WITH NATURAL AND TECHNOLOGICAL HAZARDS IN THE ROMANIAN CARPATHIANS: CHALLENGES AND OPPORTUNITIES

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ISUMADECIP

Research Institute for Sustainability and
Disaster Management based on
High Performance Computing



MADECIP Consortium



8 faculties in Babeş-Bolyai University:



Environmental Science and Engineering



Economics and Business Administration



Mathematics and Informatics



Political, Administrative and
Communication Sciences



Geography



Chemistry and Chemical Engineering



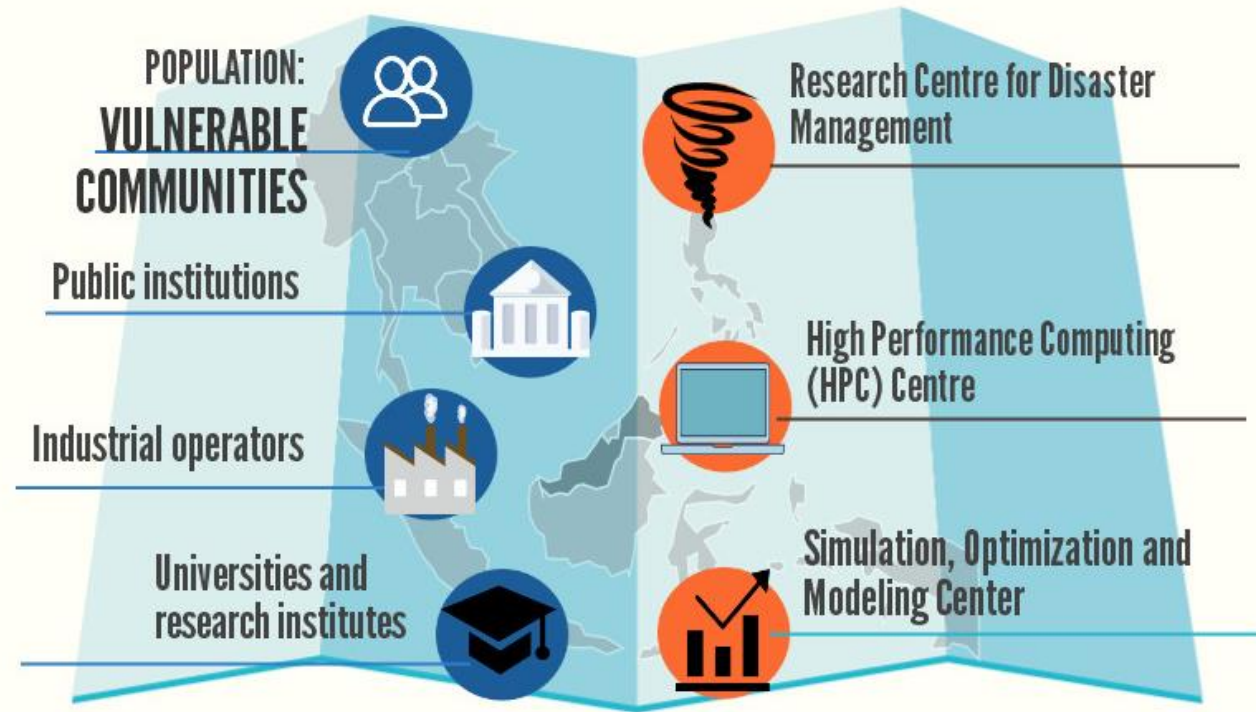
Physics



Biology and Geology

Workflow

MADECIP PROJECT



Post-implementation users & beneficiaries

Project Research Infrastructure

ISUMADECIP Mission

ISUMADECIP provides the framework for interdisciplinary research, setting the basis for addressing the challenges induced by the complex disaster management process.

The Institute operates as a **research unit** dealing with topics like:

- causes of disasters;
- the effects generated by various disasters;
- appropriate management strategies;
- short-, medium- and long-term effects on the population, economy and environment;
- proposed management strategies for various types of disasters.

How does it work ?!

ISUMADECIP Interdisciplinary Research Network

Causes of various types of disasters

Effects on the population,
economy and environment

Proposed global management
strategies

Effective response strategies

The resources of the Carpathians

The Romanian Carpathians are one of the **Europe's greatest wilderness area**, hosting outstanding ecosystems for biodiversity, including **extended areas with old-growth and virgin forest and the biggest populations of large carnivores**, but also natural grass-land and valuable semi-natural pastures that are **genuine hot-spots of cultural and traditional identity**.



Defining the problem

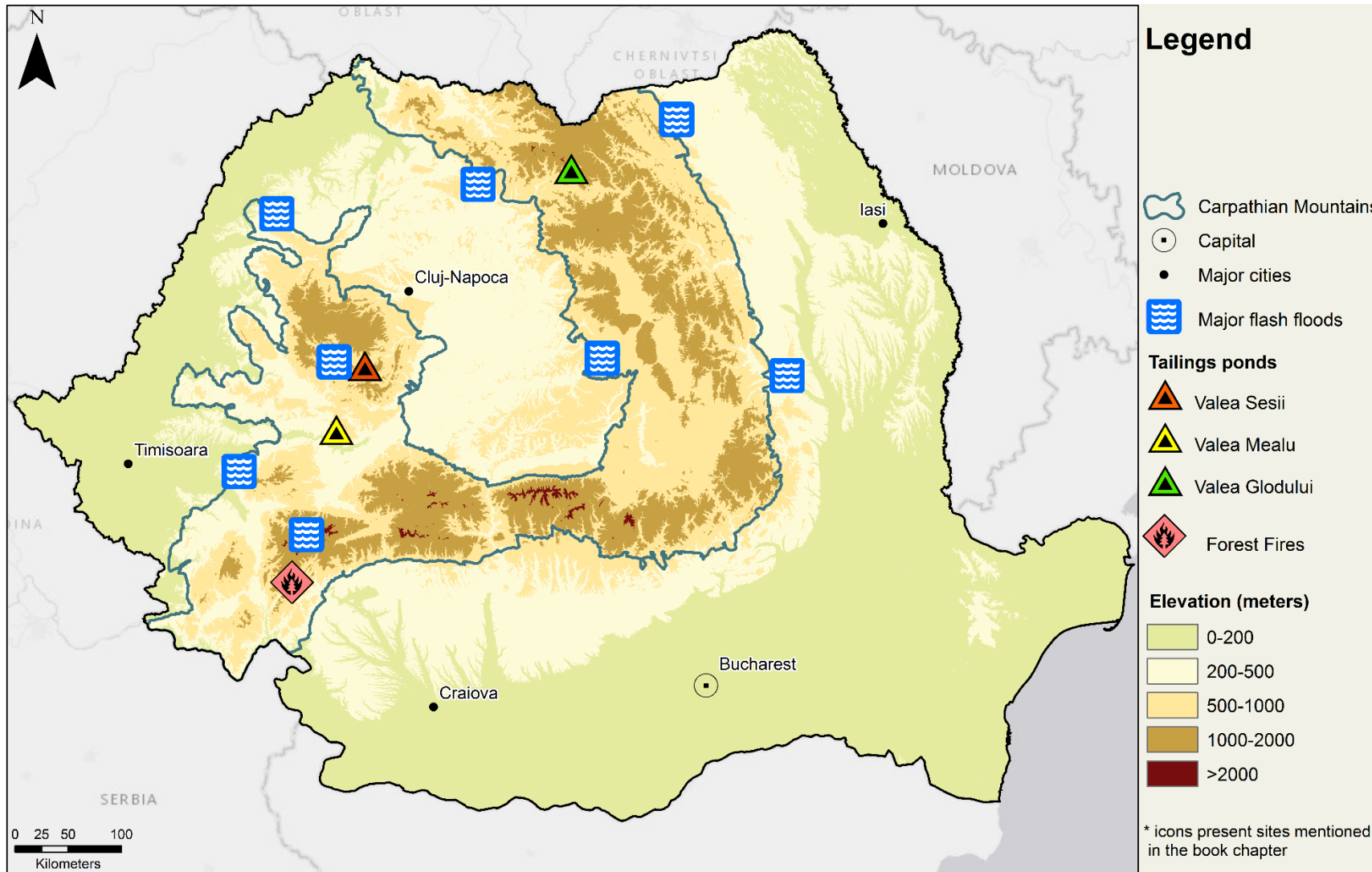
■ HIGH SOCIAL VULNARIBILITY:

Romanian Carpathians there were **mainly mono-economical settlements** (mainly industrial and touristic), which suffered profoundly due to economic challenges brought by the economy market, following the fall of the communist regime. In this context, **local communities are characterized by a high vulnerability level**, which hinders their future development (*Ozunu, Gagiu, Costan, & Nour, 2011*).

■ CLIMATE CHANGE:

Increasing changes in **global climate pattern and derived natural hazards coupled with unsustainable land-use management practices** could destroy the Carpathians and its resources are very sensitive to any large-scale changes in the environment.

Hazards faced by the local communities



- Flash-floods and related debris flows
- Forest degradation and related forest fires
- Technological hazards originating mostly from tailings management facilities

These phenomena have exacerbated in the recent years **by the effects of climate change and varying land use management practices.**

Flash-floods

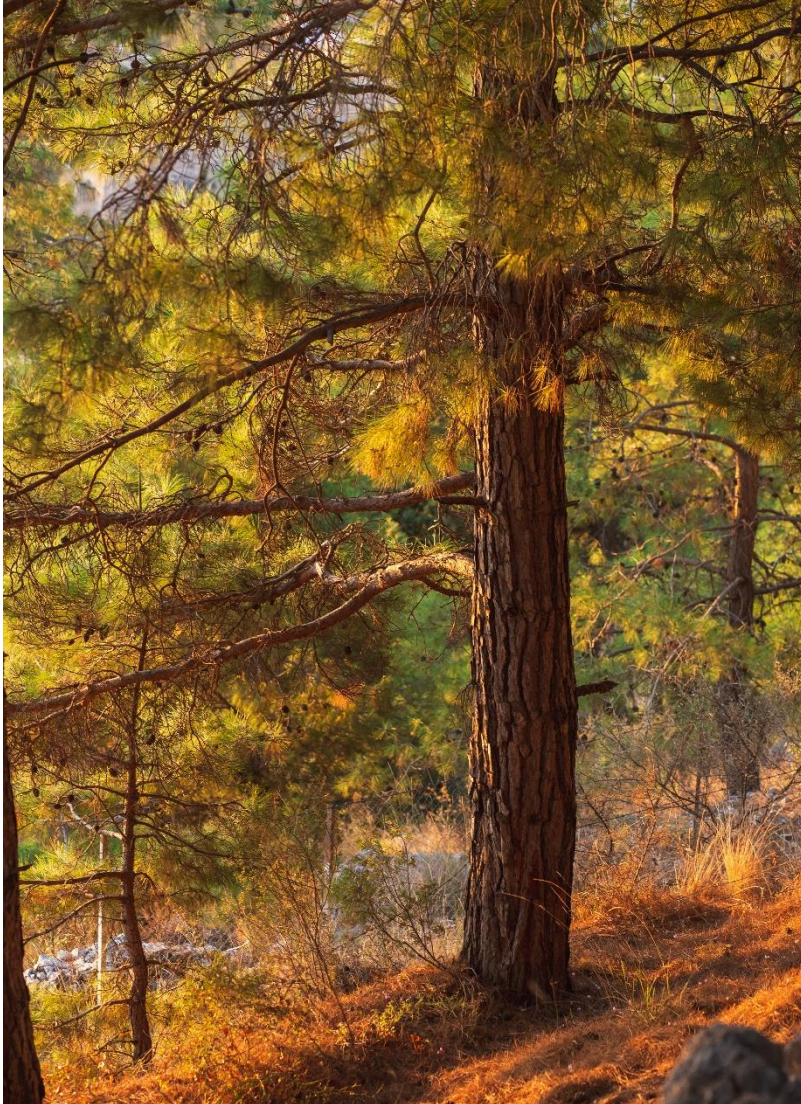
- Research now indicates that the greatest increases are likely to occur in short-duration storms lasting less than a day, **potentially leading to an increase in the magnitude and frequency of flash floods** (*Westra et al, 2014*).
- The Romanian Carpathians being characterized by steep slopes and high drainage density and subject to continuous actions of forest alteration or deforestation, **the Romanian Carpathians and surrounding Sub-Carpathians are most prone areas to major flash-flood events.**
- **In last decades there have been several flash-flood disasters**, accompanied by dozens of casualties.
- Since the frequency of flash-floods events covering small basins are expected to increase in the future and these phenomena are quite different compared to ordinary floods, **there is a need to develop a distinct Flood Directive.**

The Forest fire of the Carpathians

- In Romania the main cause of forest fires was the **fire propagation from farming land and pastures during episodes of dry, warm and windy weather** (*Joint Research Centre, 2019, 2020*)
- Nevertheless, this is not valid for **The Domogled - Valea Cernei National Park**
- Here the main causes of forest fires are usually unknown, **but the fires are boosted by the dry and windy conditions.**



Forest fire in The Domogled - Valea Cernei National Park



- The Domogled - Valea Cernei National Park located in the Retezat-Godeanu Mountains group, in the Cerna river basin, Southern Carpathians, **is a category II IUCN protected area**
- The area of 61211 ha shelters a variety of flora and fauna, **with some very rare or endemic species such as *Pinus nigra ssp. banatica* (Marangoci, 2019).**
- Given the difficult terrain **firefighting interventions are hard.**
- **approx. 2540 ha are considered to be high risk and 27440 medium risk**, which represents almost half of the entire National Park surface area (*Banu, Banu, & Banu, 2014*)

Romanian Carpathians tailings management facilities (TMF)



- Given the richness of ore in the Carpathian area, some regions have a vast history of mining, leading to:
 - **Historical pollution** (especially in the case of gold mining)
 - **High risk of accidental pollution**, because of the many tailing management facilities (TMF) have been left behind following the decline of the mining sector, **being prone to damage or failure with unpredictable environmental effects.**

From a total of 152 TMFs in Romania, 27 are still active and **8 from these are located in the Carpathian Mountains region**, such as Valea Şesii (*photo*)

To prevent further damages and dam failure, **safe operation of these TMFs should be ensured by complying at least with the minimum safety standards**, including rethinking of the design parameters in line with expected increase in heavy rainfall and maximum discharges.

DRR in the Carpathians: Challenges

- The **difficult access to quality services** (ex.: healthcare, education) and the lack of an adequate infrastructure put additional pressure on community resilience in mountain regions.
- Also, the **limited employment opportunities** in the mountain region forces many to apply for jobs elsewhere, therefore aged population is often representative for mountain communities, who are more vulnerable (*Botezan et al., 2020*).
- **All these aspects pose unique challenges for every community from the Carpathian region.**

DRR in the Carpathians: Opportunities

- To cope with the above-mentioned hazards, **ambitious policies at EU-level are set in place, promoting the implementation of climate change adaptation and mitigation measures in future projects in the area** (*Directorate-General for Climate Action, 2016*). Also, are also important initiatives on regional-level, such as the Carpathian Convention aimed to guarantee the protection and sustainable development of the Carpathians (*Carpathian Convention, 2014*).
- In recent years the **Romanian early warning system on extreme weather events and flash-floods was improved**. Also, in 2017, the Romanian Government introduced RO-Alert, an emergency alert system based on cell broadcast technology.
- **People from the Carpathian region seem to have learned how to cope with disasters from past experiences and lessons learned**. However, while people from mountain regions report having the knowledge on how to act in order to cope with disasters, **what to act with poses a problem for many, especially when it comes to financial capital** (*Botezan, Meltzer, Ozunu, & Rademacher, 2015*)

Conclusion

In order to achieve DRR in mountain regions, **it is important to adapt strategies to local characteristics that should give specific solutions for the local communities** that will protect the population in face of natural and technological emergencies, thus leading to a sustainable development of the area.

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Thank you for your attention!

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