

Adaptive management of mountain ecosystem services

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Objectives

1. to propose an innovative technological-governance approach to well-being and adaptation for enhancing the resilience of European mountain regions
2. to offer a potential solution for behavioural change to sustainability
3. to scale down global CO₂ objectives from the EU to local policy arenas



Climate change mitigation as a challenge for wellbeing of mountain regions?



- the importance of mountain regions to provide climate regulation (ecosystem service) has been overlooked long time
- unsustainable management of mountains, land use change



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- climate extreme events - global need to decrease the amount of CO₂ in the atmosphere
- action taken separately at global, international, national level to promote SMD with questionable effectiveness
- weak cooperation between individual sectors at different scales



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THE ROLE OF FORESTS IN THE CLIMATE CHANGE MITIGATION

Why mountain regions matter?

Significant providers of carbon sequestration ecosystem service

- European mountains – 35% – forests (41%), meadows, pastures, arable land
- Capturing CO₂ in soil and vegetation, keeping C cycle (other ES: freshwater, pools of cultural and biological diversity, raw materials , flood protection,...)

Figure 1: World carbon stocks in soil organic matter (Schlessinger, 1999)

Total : 1580 Gt C

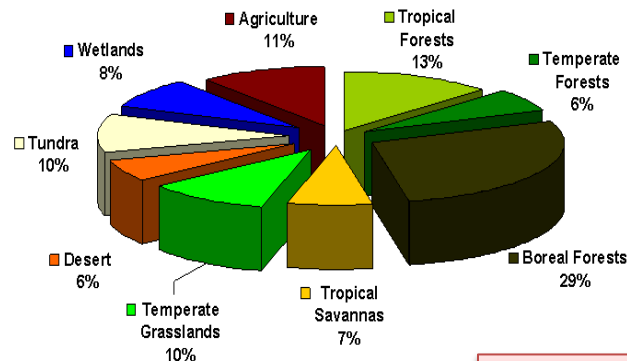
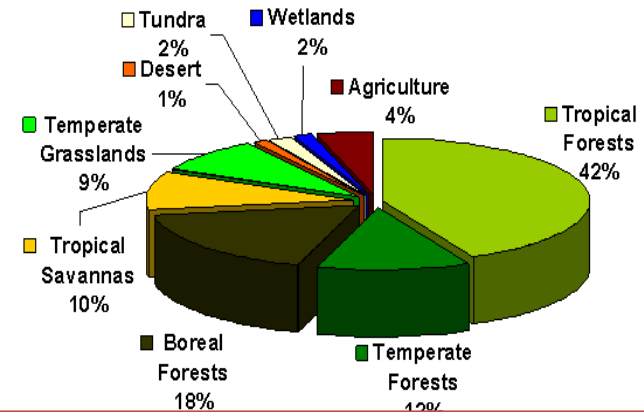


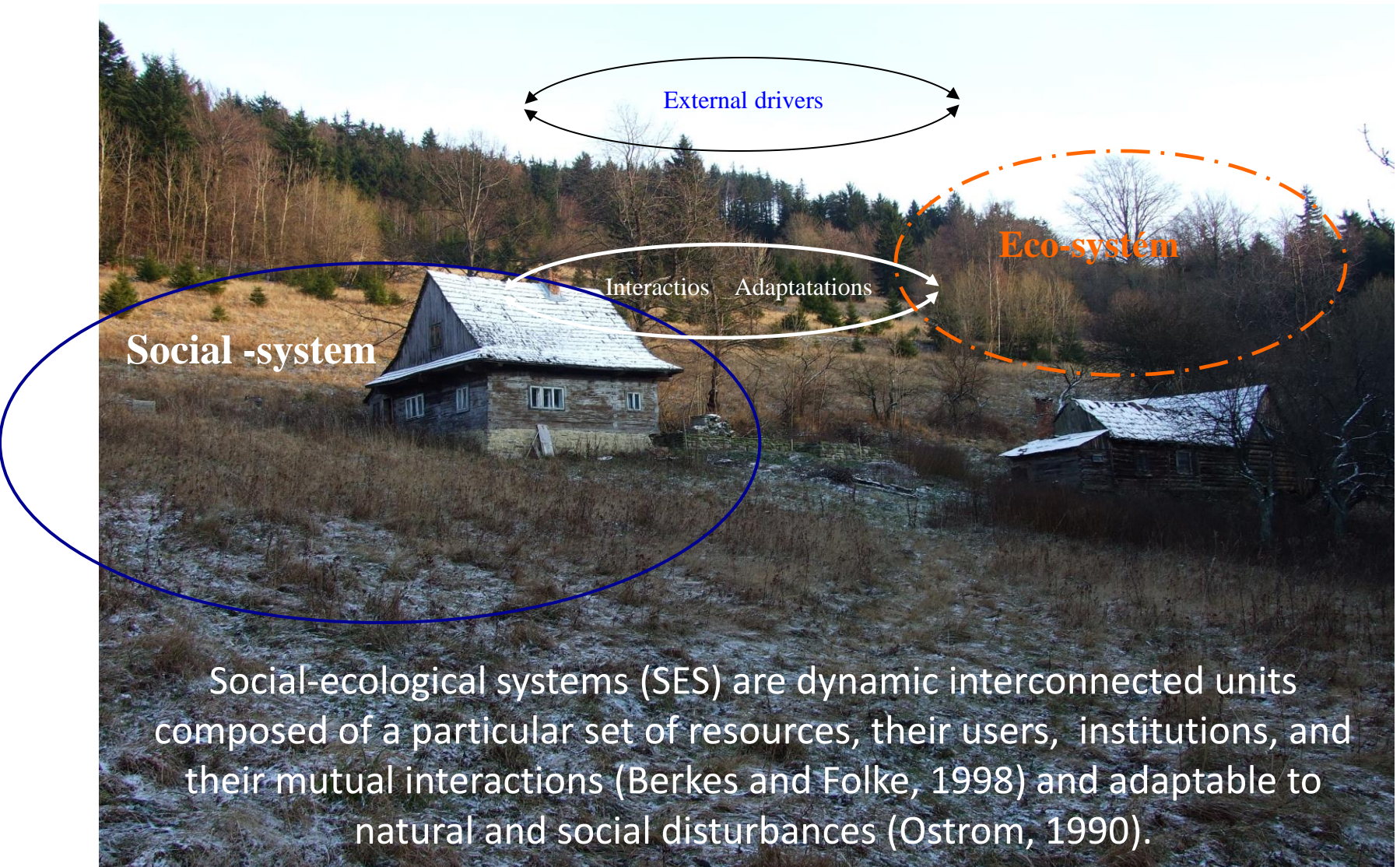
Figure 2: World carbon stocks in terrestrial vegetation (Schlessinger, 1999)

Total : 610 Gt C



Challenge: How effectively manage mountains is still in a question.

FORESTS AS SES



What stands in the way of managing forest SES and the potential of CS under the conditions of global governance?

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Resource regimes matter

- A. Centralized – state regimes***
- B. Private regimes***
- C. Common pool resource regime***

Management approaches

- A. Conventional management***
- B. Carbon forestry management techniques (maximizing C gain)***

Common pool resource regimes

optimal and robust regimes, could ensure a balanced use and protection of the natural resources, as well as the provision of public goods

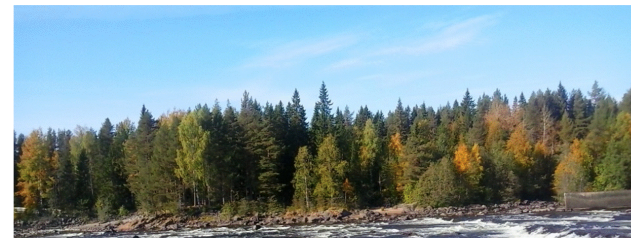
COMMUNITIES



rights + responsibilities

→
protection, sustainable use
←
benefits, well-being

FORESTS




www.earth.org , modified by author

Methods

used to analyze forest SES


FACESMAP project - 3 SSS, Italy, Portugal, United Kingdom

- analyzes of existed traditional and new CPR 
- (Anderies et al, 2004: framework to analyze robustness of SES)

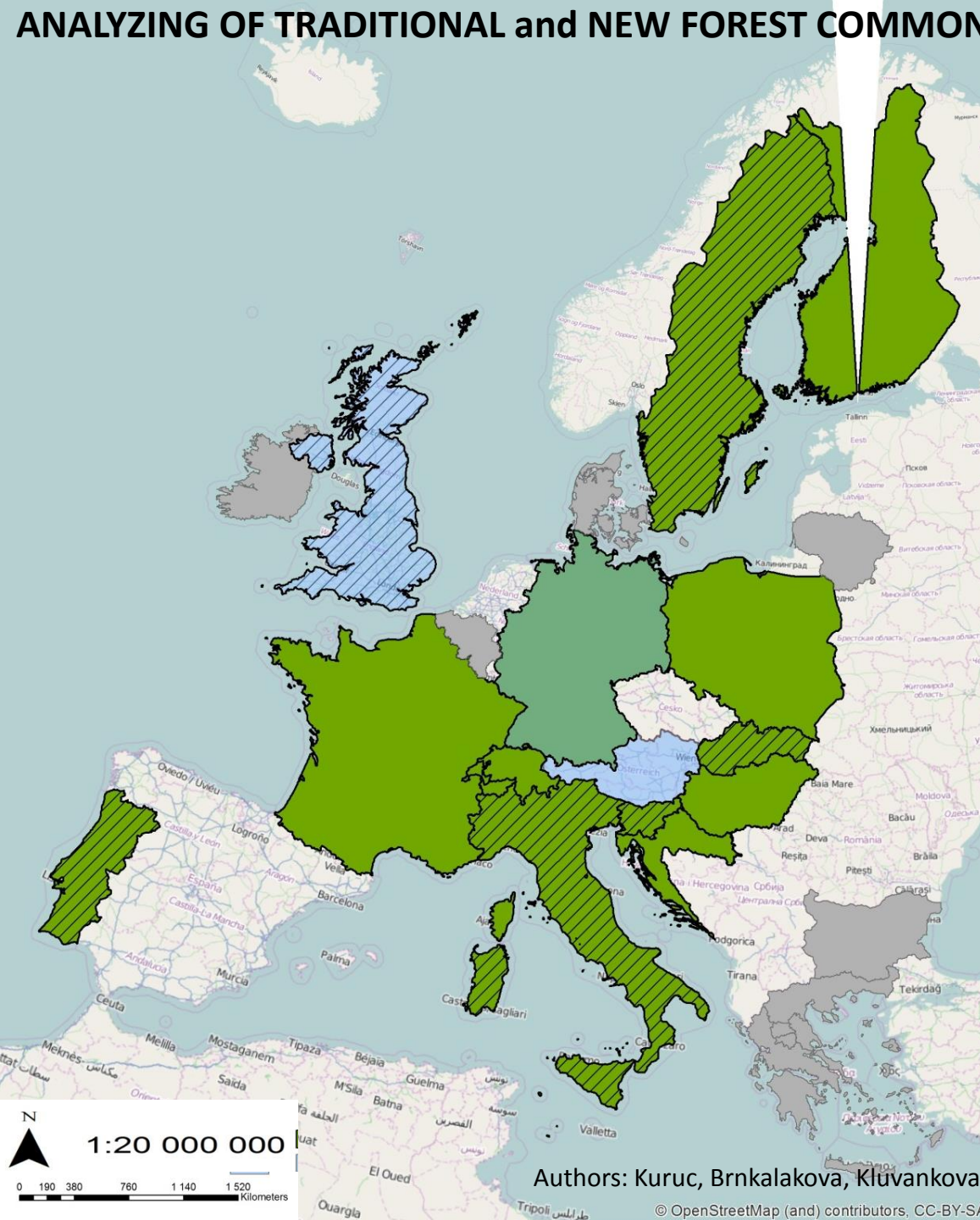
Slovakia, Slovenia, Bulgaria, Scotland: 8 study areas, state, private, CPR regime

- intensity of used management practices (expert assessment based on interviews)
- carbon sequestration potential (+carbon social value estimation)

Slovakia: state and 2 CPR regimes

- LANDSAT images (1987 – 2011) – GIS (forests/clearcuts) 
- databases of timber harvesting – 10 years (wood harvested from calamity areas after wind storms and bark beetles infestation)
- behavioural experiments
- interviews with forest experts , leaders from national park

ANALYZING OF TRADITIONAL and NEW FOREST COMMONS



-drawing reports from 27 countries involved in FACESMAP Cost Action

Traditional commons

New commons

Case studies:

3 SSS

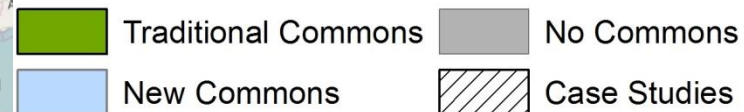
Italy

Portugal

United Kingdom

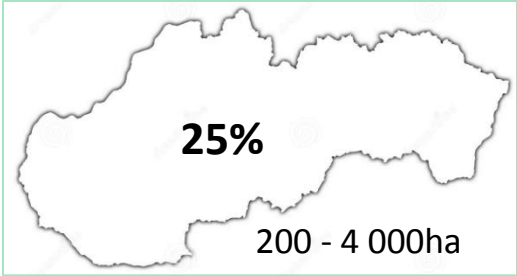
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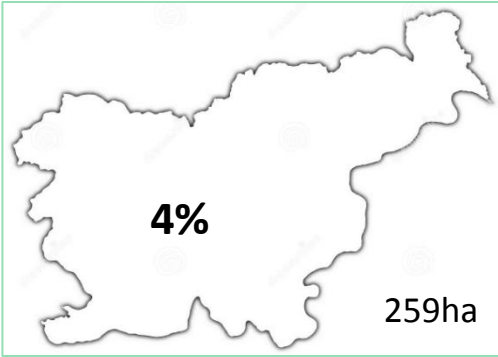


% of forest commons in case countries

Slovak republic



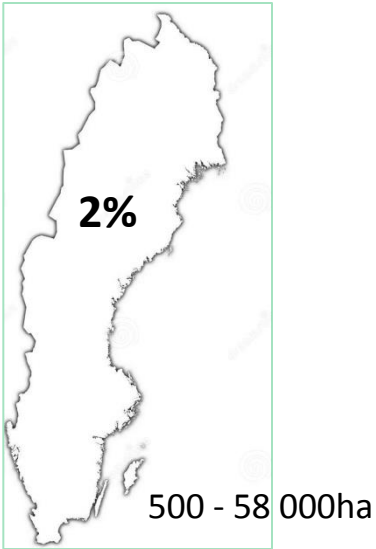
Slovenia



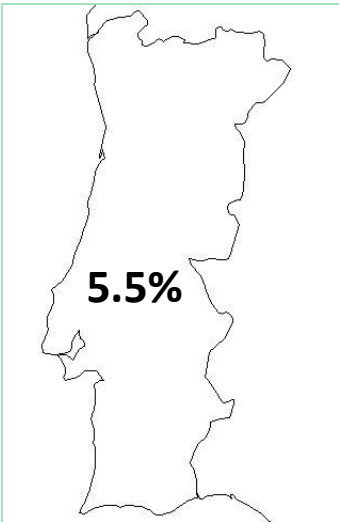
Italy



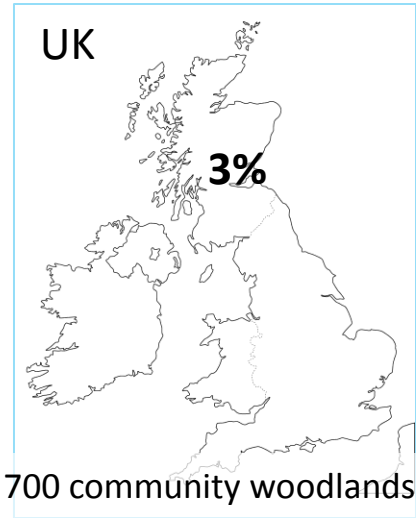
Sweden



Portugal



UK

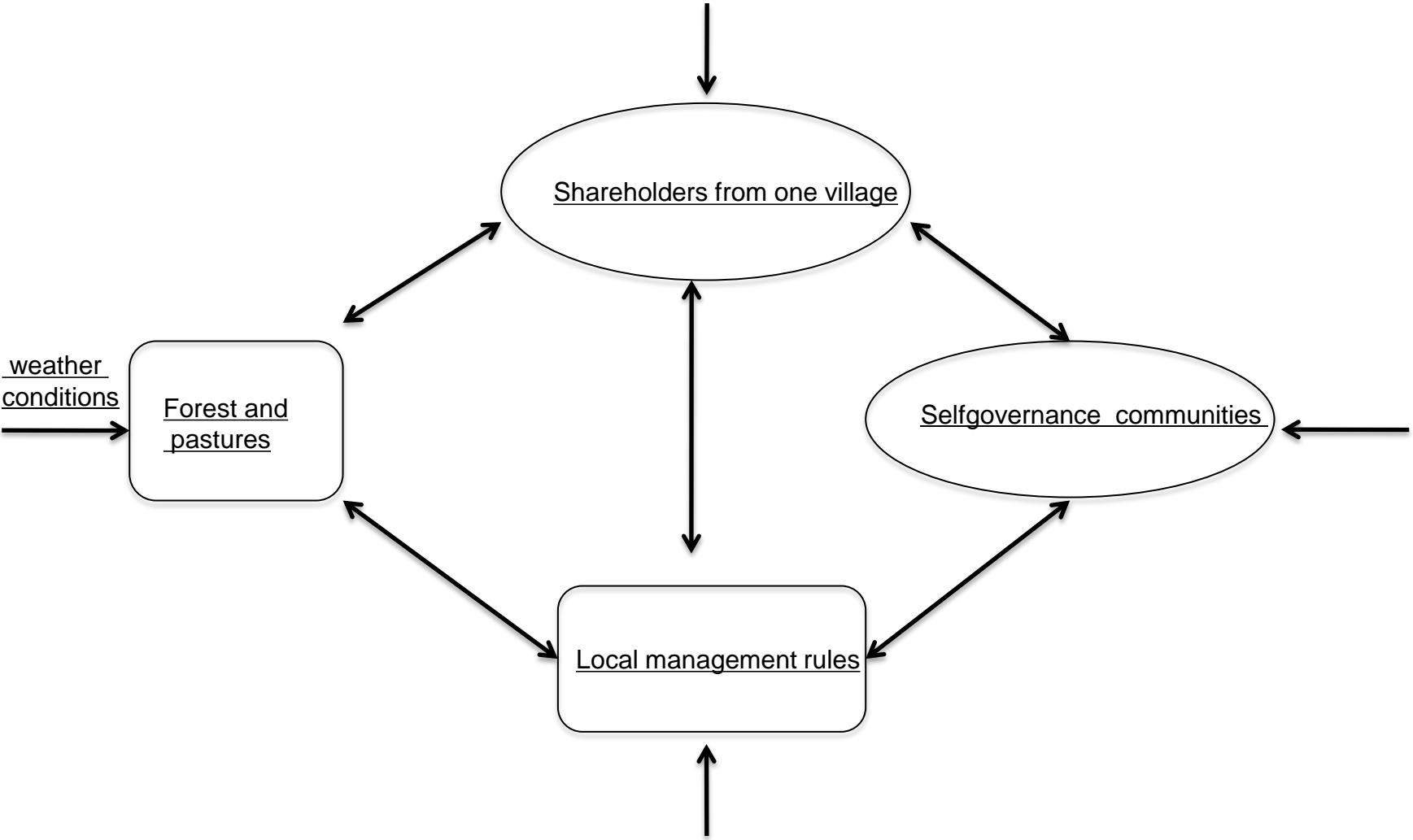


Traditional commons

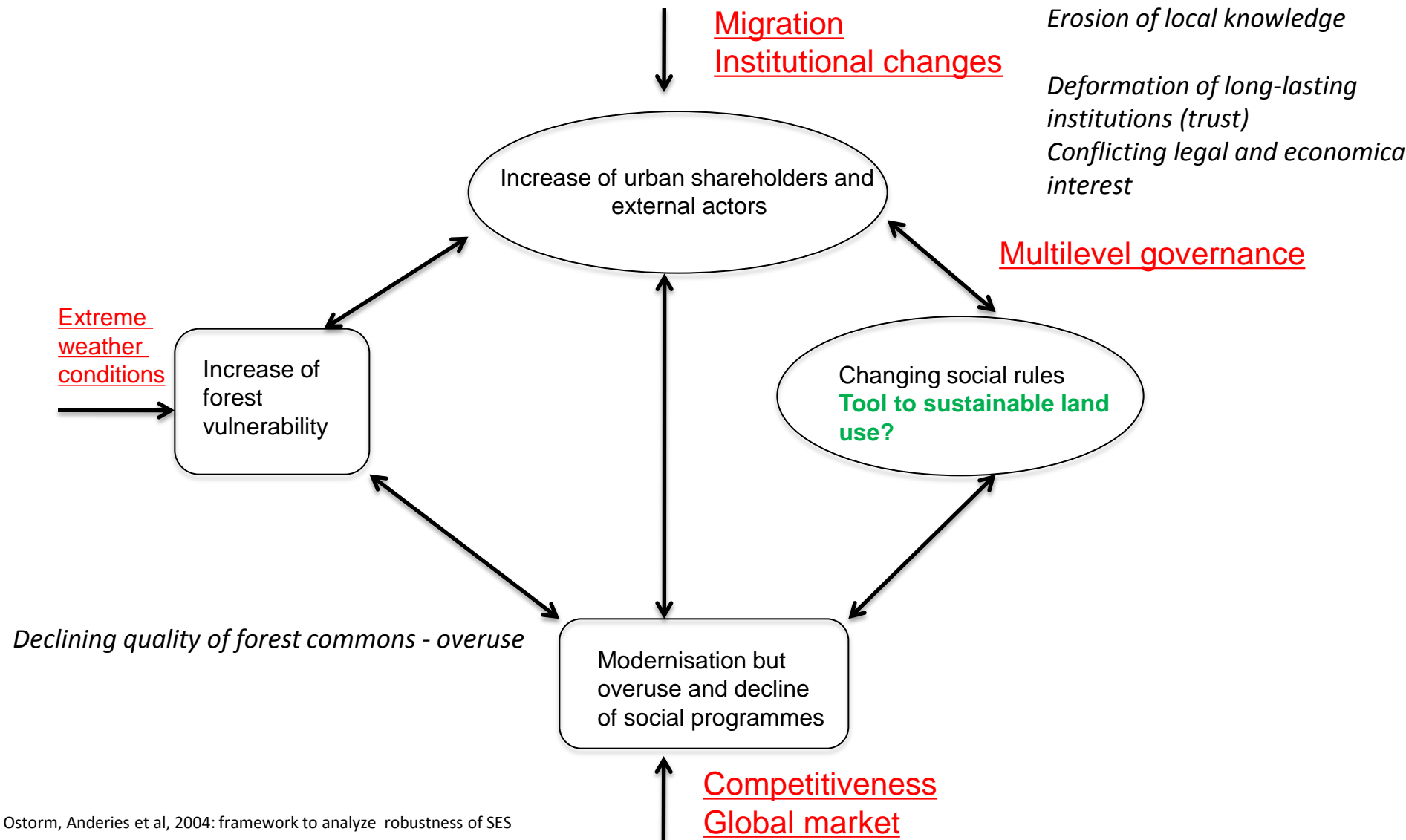
- *Evolved historically during medieval Europe and land use reforms:*
 - Collective ownership based on % shares to reflect equity and construct community identity, self-governance, self-financing
 - Inherited -transfer over generations
 - Ideal property shares stimulate collective action and cooperation
 - Social aspects: solidarity, equality, social programmes



Local - traditional forest CPR regime



Vulnerability in forest CPRs under global change



NEW COMMONS

bottom up process, collective action

- **Established in present times**, not necessary by collective ownership but variety of forms that has evolved into the collective action
- Right to access, withdraw, manage and long lasting institutions are essential (not ownership) for **long term sustainability** and resilience
- **Multi-purpose forests** (not necessarily managed for wood production, perhaps more often for conservation, recreation and education)
- **Community learning** - through networking and training groups - increasing community resilience and sustainability
- **Policy support** – seen as a way to deliver a wide **spectrum of** social, economic and environmental **benefits** (also improve health, increase woodland biodiversity, community cohesion)



LOCAL IS THE
GLOBAL

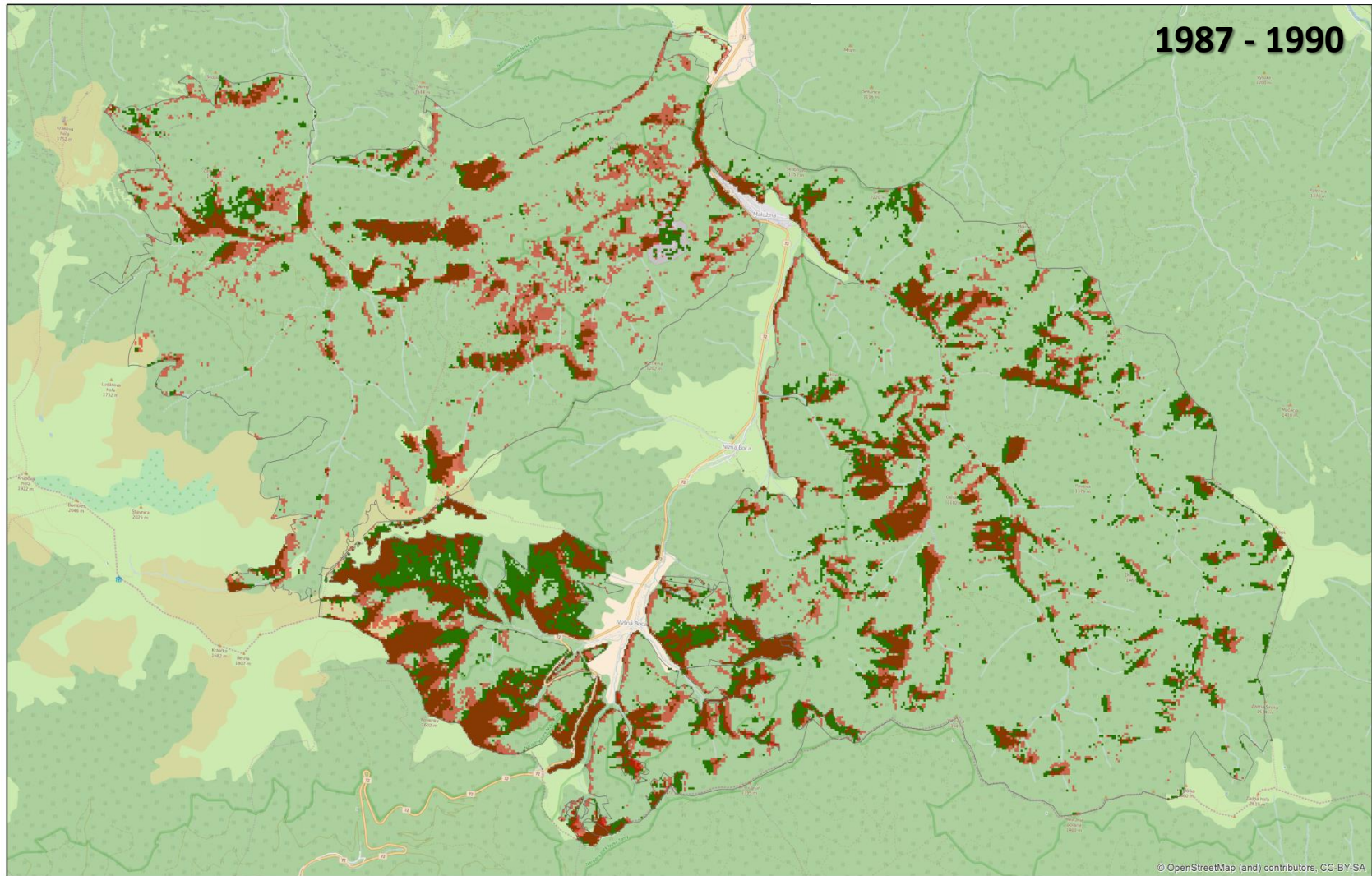
www.idyllicsoftware.com

Robustness of forest commons and adaptation

- Multi-level governance: **opportunity to coordinate territorial landscape protection at EU level** (multi-purpose forest commons)
- Social programmes in new commons – **tool for maintenance of identity and poverty reduction and well-being in mountain regions**
- **Social innovation:** tool for CO₂ mitigation – scaling down global CO₂ objectives

CPR regimes – robust and adaptive?

**INCREASE IN AREA OF CLEARCUTS
BEFORE DENATIONALISATION
(State property regime)**



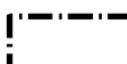
Persistent clearcuts



New clearcuts



Reforested clearcuts



Common forest Vysna Boca



Common forest Hybe



State forest Maluzina

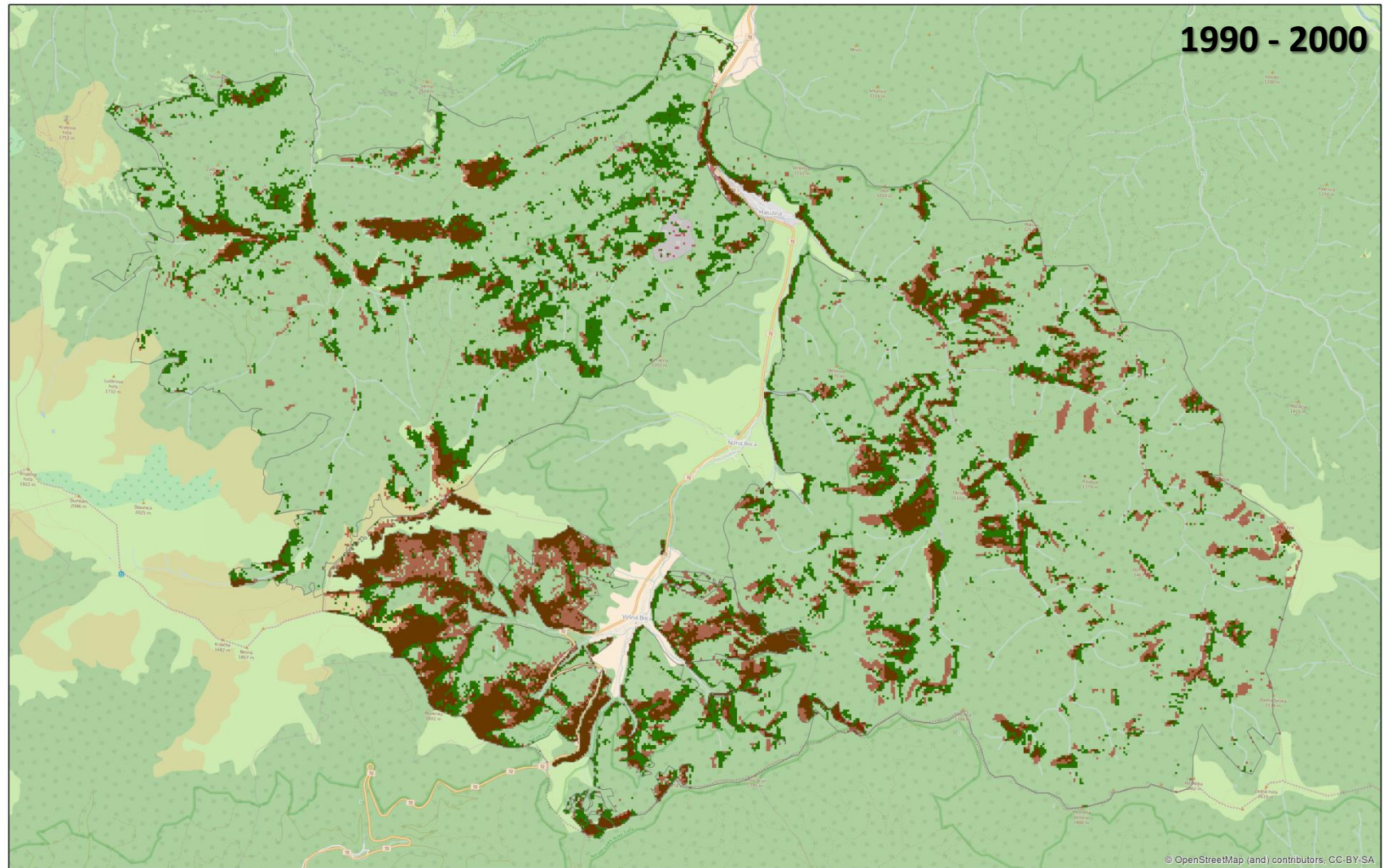


0 1 2 4 Kilometers

1:50 000

CPR regimes – robust and adaptive?

DECREASE IN AREA OF CLEARCUTS
DENATIONALISATION in 90's
(CPR regime)



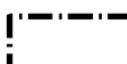
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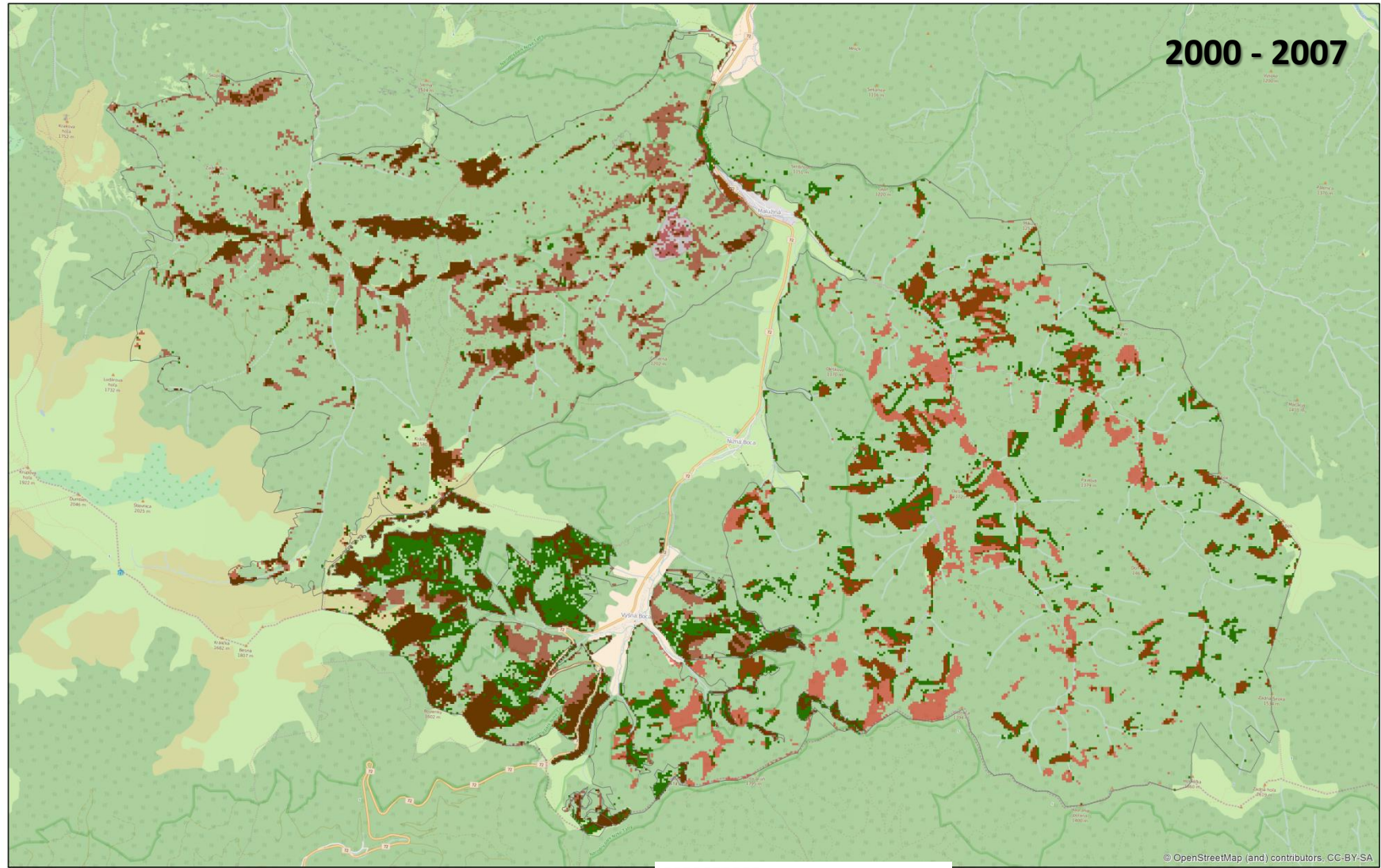


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CPR regimes – robust and adaptive?

INCREASE IN AREA OF CLEARCUTS
NATURAL DISTURBANCIES



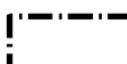
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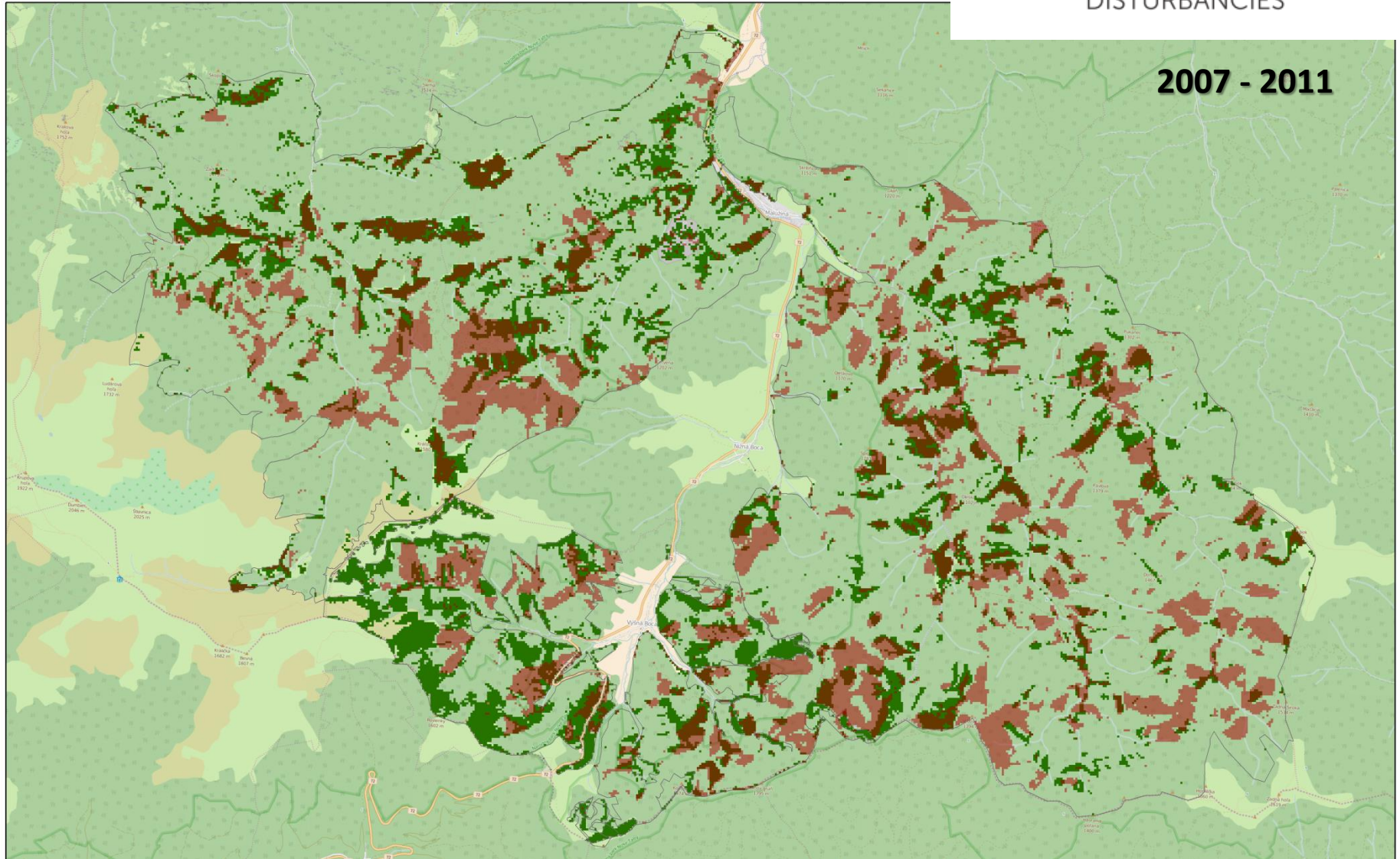
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CPR regimes – robust and adaptive?

**INCREASE IN AREA OF CLEARCUTS
RECOVERING AFTER NATURAL
DISTURBANCES**

2007 - 2011



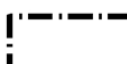
Persistent clearcuts



New clearcuts



Reforested clearcuts



Common forest Vysna Boca



Common forest Hybe



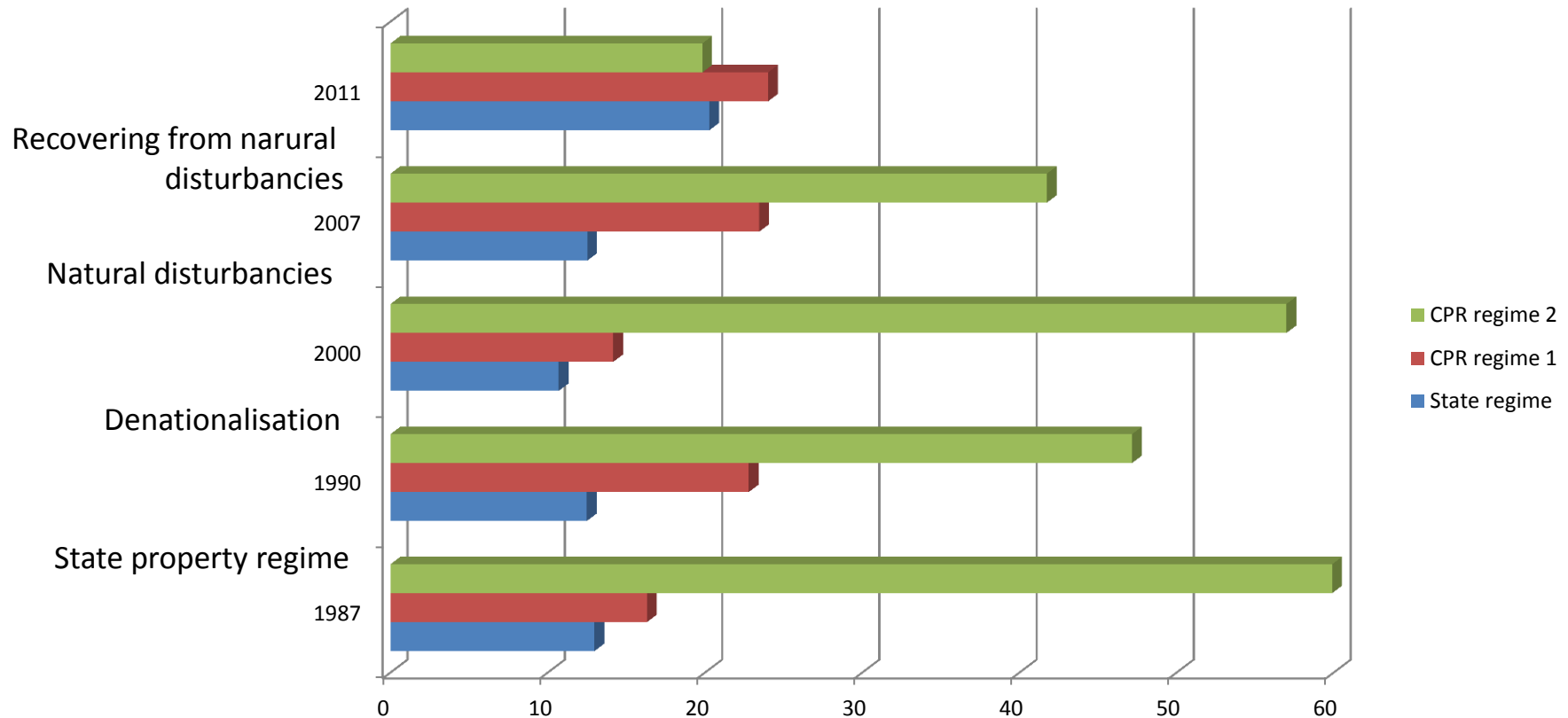
State forest Maluzina



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CPR regimes – robust and adaptive?



Total % of clearcuts from 1990 to 2011

- state regime **8%** increase
- CPR regime 2 **20%** decrease
- CPR regime **2 %** increase
- CPR regime is self-govern, self-financing, natural forest regeneration cheaper in CPR

CONCLUSION

- CPR regimes have proven their *robustness and adaptation capacity to natural and social changes*
- CPR regimes in mountain regions create a potential *ecosystem services governance mode* that could ensure a balanced use and protection of the natural resources
- The emphasis on *carbon forestry* in local forest CPR regimes could not only provide climate regulation ecosystem service as *public good* but also could enrich the *economic growth of marginal mountain regions and well-being of local communities /win-win/*
- CPR regime has a potential to contribute to robustness and adaptation capacity of forest SES



Thank you for your attention!



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