Ecosystem Services for wellbeing of mountain regions ?

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Challenges of EU mountain regions



Socio-ecological systems (SES): dynamic interconnected units composed of a particular set of resources, their users, institutions, and their mutual interactions (Berkes and Folke, 1998) and adaptable to natural and social disturbances (Ostrom, 1990).

Traditional (sectoral) approaches and fragmentation of responsibilities resulted in the loose of resilience and increased vulnerability of mountair regions(Maestre Andreas et.al, 2012).

Climate change mitigation as challenge for wellbeing of mountain SES?



1) The importance of mountains to provide climate regulation (ecosystem service) has been overlooked long time.

2) Un-sustainable land use management resulting in marginalisation of mountain areas

3) Sectoral approach and lack of coordination between global, international, national level.

The need for integrative approaches, innovations and adaptative management of mountains to maintain ecosystem quality and improve well being.





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From Sectoral to Ecosystem Services Governance

- Failure of sectoral and market approaches to address ES promotion
- ES Governance to addresses global policy targets integrate policies across decision making level by:
- (i) connecting ES providers and users across the scale
- (ii) consider value of ES (PES)
- Considered for revised Common Agriculture Policy (CAP) as a Tool for evidence based decision making Together





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Opportunities of EU mountain regions?

Carbon forestry as technological innovation
Common pool resource regime as social innovation

to address climate policy objectives and well being of mountain regions









Carbon Forestry PHILOSOPHY

Manage to conserve carbon, as well as to provide other services

Minimize carbon losses

- ✓ modify <u>site preparation</u> ploughing, mounding, burning etc.
- ✓ Prefer less invasive harversting means
- ✓ preserve <u>thinnings</u> and harvest residues, or use for energy substitution

Maximize carbon gain

- ✓ develop a carbon based silvicultural system
- ✓ fertilize (but be wary for N_2O emissions)
- ✓ preserve wind throw, encourage natural regeneration

Commons

 Shared resources in which users subtract from same pool and exclusion from use is costly (Hardin 1968, 1998, Ostrom 1994, 2009).



Facing social dilemma: individual-group interests













Common pool resource regime





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 CPR – collective self-organised regimes are capable of crafting own rules that allow for the sustainable and equitable management of SES. Moreover, due to their self-organisation and self-management, such regimes are able to solve the resource management problems without external authorities (Ostrom, 1990, 1998, 2005, 2006, 2010)







Design conditions of commons robust regime (Ostrom 1990, 2008)

- 1. Group boundaries are clearly defined.
- 2. Rules governing the use of collective goods are well matched to local needs and conditions.
- 3. The rights of community members to devise their own rules is respected by external authorities.
- 4. Most individuals affected by these rules can participate in modifying the rules.
- 5. A system for monitoring member's behavior exists; the community members themselves undertake this monitoring.
- 6. A graduated system of sanctions is used.
- 7. Community members have access to low-cost conflict resolution mechanisms.
- 8. CPRs are parts of larger systems: appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.











Traditional Commons

New Commons

FOREST COMMONS AND COMMUNITY FORESTRY IN EVOLUTION IN EUROPE





- Group of rights: access, withdrawal, management shared among owners/users.
- Evolved historically during medieval Europe and land use reforms or are formed as community forest (Scotland)
- Ecosystem dynamics (forest renewal) is considered in harvesting and management strategies.
- Management rules are derived and operated on self-management and collective actions - aiming to improve the group's conditions (Ostrom conditions of robust regime).

SPECTRA

No Commons

Case Studies





Carbon Forestry for Well-being of Mountain Regions

Potential of carbon sequestration to enhance sustainable forest management for well being of mountain regions and scale down global CO_2 objectives from the EU to local policy arenas



8 SES in 4 countries: BULGARIA - private/state regime SLOVAKIA - state/traditional forest CPR regime SCOTLAND - private/new forest CPR regime SLOVENIA - traditional/state regime

KluvankovaT, Brnkalakova S, Marek M.V, Valatin G, Hopkins ^{J,} Kovac U, Nijnik M, Udovc A, Ambrose-Oji ^{B,} Zhiyanski M, Glushova M.: CARBON SEQUESTRATION FOR THE WELL-BEING OF EUROPEAN MOUNTAIN REGIONS, In Climate Research in review.







Methodology



1: Carbon sequestration potential Baldocchi at al. 1988, CzechGlobe – ICOS-CzeCOS network: eddycovariance technique

2. Expert assessment of intensity of carbon forestry management practices

3. Social valuation



Carbon capture capacity of different ecosystem types

	CARBON CAPTURE [tC ha-1
ECOSYSTEM TYPE	year-1]
montane spruce stand	up to 8
montane beech stand	up to 7.4
highland monoculture spruce stand	up to 5
agro-foresty system –poplar	up to 4.7
agro-system (added energy not included)	up to 4
wetland	up to 3
montane non-managed grassland	up to 2.5
e: CzechGlobe – ICOS-CzeCOS (un published) measured in 2	005-2010







Carbon sequestration potential in selected SES (tC/ha/year)

	Bulgaria		Scotland		Slovakia		Slovenia	
Case areas	state regime	private regime	private regime	new forest commons	state regime	traditional forest commons	state regime	traditional forest commons
Total area (ha)	741.8	103,989	138,106.56	675	5,410	3,831.7	4,835	2,508
Carbon capture	F 74	7.40	0.04	4.70	7.00	7.00	E 44	7.00
(tCha/year)	5.74	/.42	3.31	4.78	7.00	/.88	5.11	7.69







Social value of Carbon

- <u>Average market price EUR 85/t CO2 (ETS)</u>
- production costs (in process)
- <u>Social value</u> EUR 323/tC (Valatin 2014)
- Social value of C per 1000 ha of forest comparable with economic profit from 7500m3 of timber



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Some concluding remars?



- Growing vulnerability of mountain SES challenge and opportunity for social innovations (Simra H2020 N: 677622)
- Collective action to cope with social dilemmas (individual short-term interest vs. social long-term interest) also under the global governance?
- Ecosystem Service Governance adresses Mitigation of CO₂ by carbon forestry management practices and social dillema by common pool regimes - crucial for sustainable forestry









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Land use: from sectoral to integrative ap







biodiversity and climate regulation + flood protection and recreation



to minimise sectoral conflicts and interests











Global Environmental Governance





Climate Regulation in European Mountain SES

- European mountains 35% of surface
- Carbon stocks:

1999 adopted by Marek, 2014)

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

Figure 2: World carbon stocks in terrestrial vegetation (Schlessinger, 1999 adopted by Marek, 2014)



Total : 1580 Gt C

CPR regimes – robust and adaptive?

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



CPR regimes – robust and adaptive?

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



CPR regimes – robust and adaptive? 2000 - 2007

INCREASE IN AREA OF CLEARCUTS NATURAL DISTURBANCIES



CPR regimes – robust and adaptive?

INCREASE IN AREA OF CLEARCUTS RECOVERING AFTER NATURAL DISTURBANCIES



CPR forest regime in Slovakia

- Historical regime established by Teresian statut from 1767 to improve economic situation and reduce poverty.
- Land reforms:
- Colaps of Austro-hungarian empire 1919
- Nationalisation 1948
- Re-nationalisation -1993
- Today -25% of Slovak Kluvankova, Gezik, Journal of Forest Economics, forthcoming





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1: Boundaries

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 Collective ownership based on % share inherited from parents (ideal share) – determine rights and duties, promote cooperative management strategy and maintain intergenerational continuity.







2. Congruence with local conditions

Historically share in urbar regulated maxim. fee to be requested by landowner.

Later social security programmes and complementary collective activities.

Today cost and benefits upon the size of individual shares.













3. Rules in use are respected in formal authorities

 Present management approaches (Act 181/1995) derived upon historical management rules and periodic plans (teresian statut, 1767):











4: Collective choice rules

- Division of competences:
- Assembly
- Management board
- Control board











5-7: Monitoring and control

- Internal conflict resolution mechanism and monitoring in
- Social exclusion
- Self-governance reduces administrative costs













8. Nested in formal legal framework

- XXXI article of old hungary law from 1879
- Act 181/1995 Z. on land associations amended by č. 97/2013)













2. MANAGING STATE AND COMMON FORESTS – quantative RM

- LANDSAT images (1987 2011)
- databases of timber harvesting 10 years
- State forest
- 2 Common forests











Survival of forest commons?

- Multi-level governance: opportunity for behavioral change to sustainable land-use management (to coordinate territorial landscape protection at EU level - multi-purpose forest commons, to embede local regimes to larger systems)
- Scaling down global issues to local (e.g. CO2 mitigation)
- Climate change: sufficient reason for cooperation?
- Migration: minimasing/eliminating individual property rights
- Market Solidarity economy maintainance of identity and poverty reduction in marginalized regions - well-being in mountain regions



2. MANAGING STATE AND COMMON FORESTS – qualitative RM

A. Qualitative research method - experiments









