

Common challenges for functional green infrastructure in high latitude and altitude forests: *Sweden and the Carpathian Mountains*

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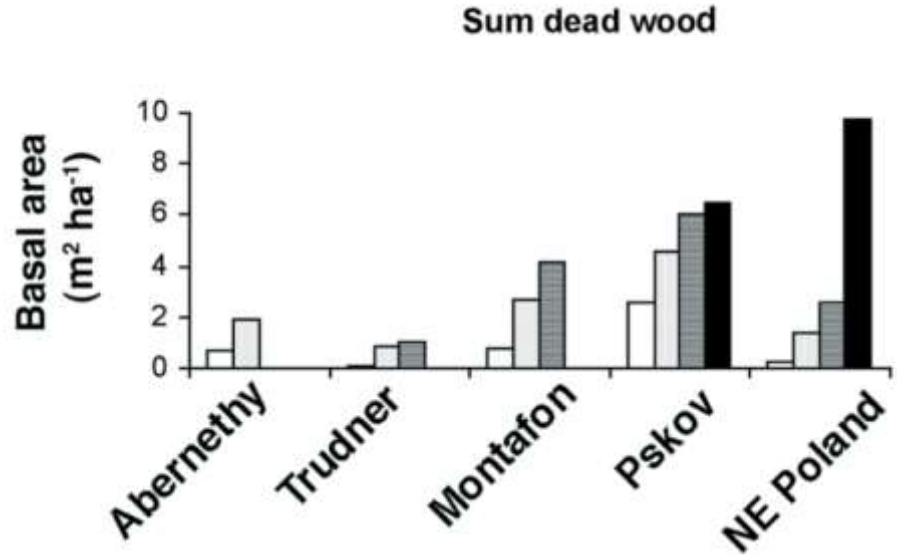
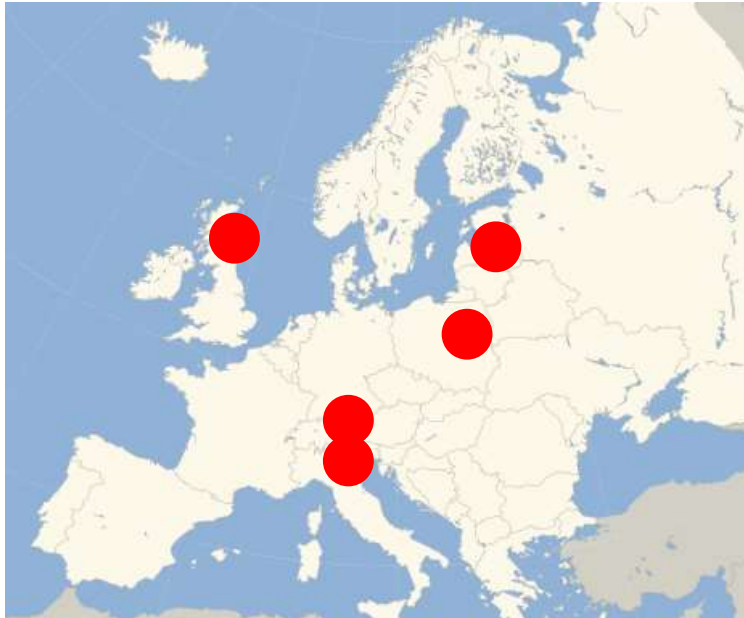
Green Infrastructure (GI)



Outline

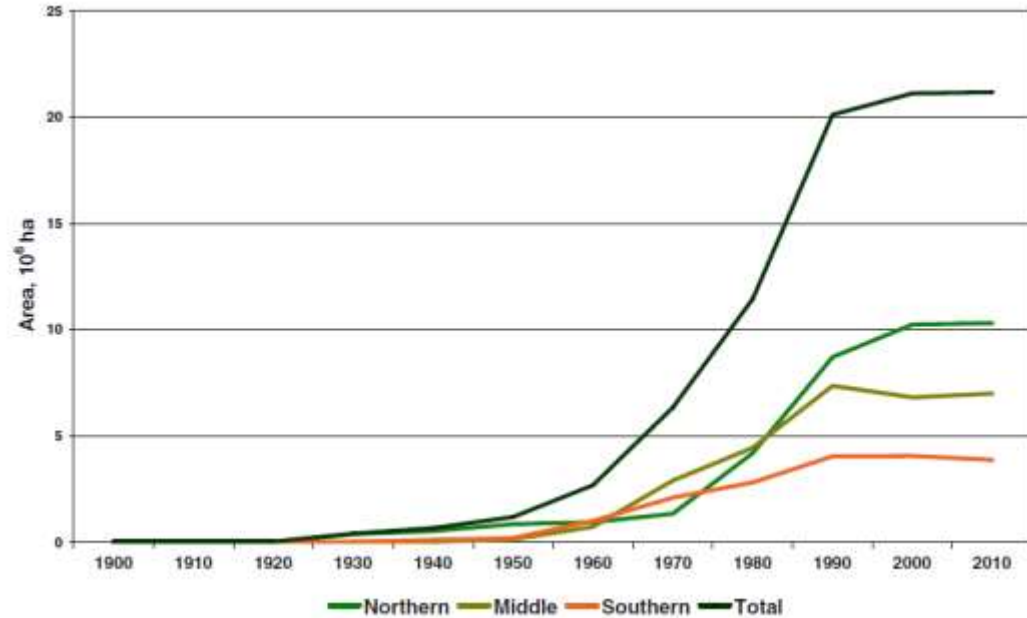
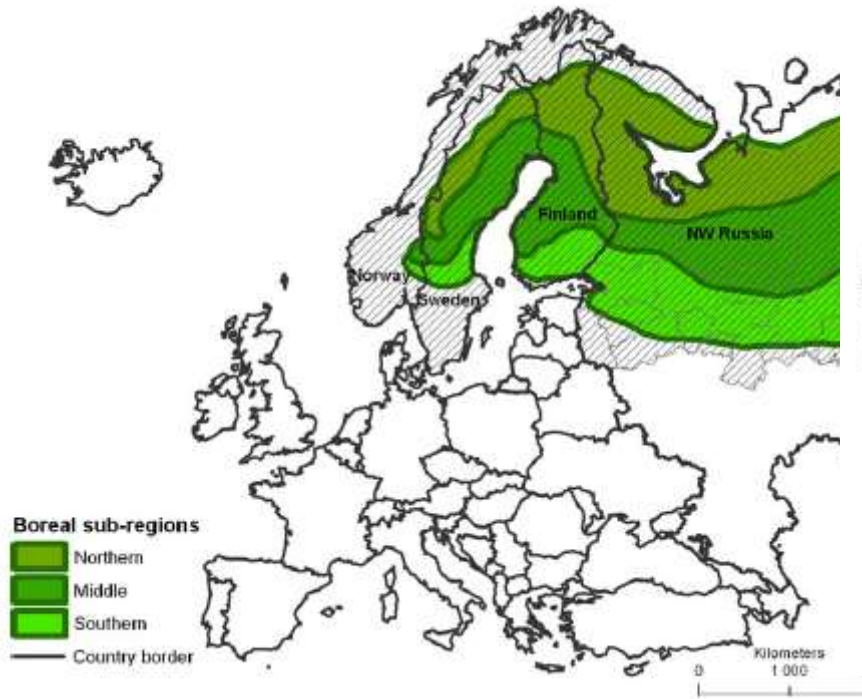
- Encourage knowledge exchange between high altitude and latitude forests...
- ...with Europe as a "time machine"
- What is the net of protected areas and logging on GI functionality?
- Different visions for Green Infrastructure
 - Loss of natural forests...
 - ...gain of cultural landscape

Quality – dead wood as example



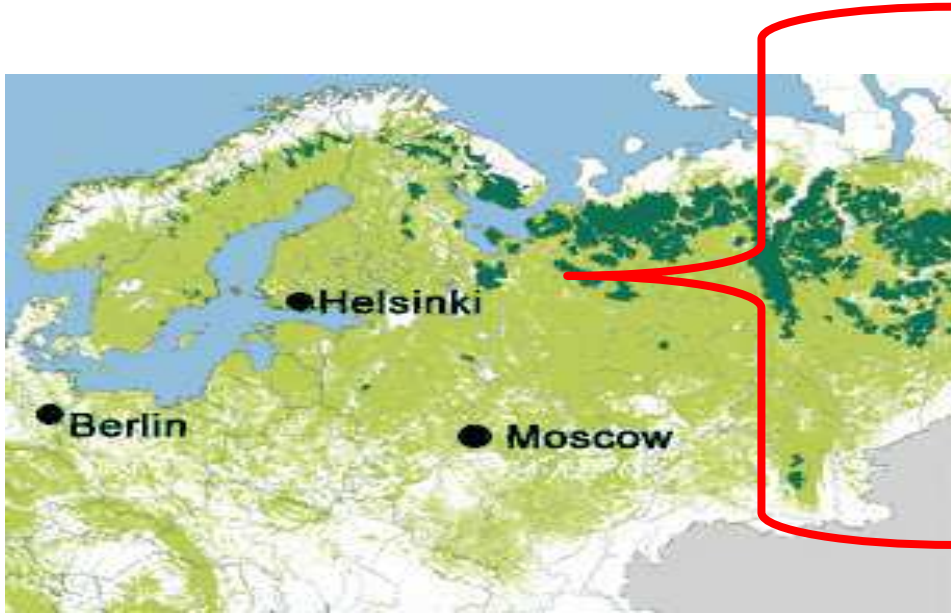
Angelstam, P. and Dönz-Breuss, M. 2004. Measuring forest biodiversity at the stand scale – an evaluation of indicators in European forest history gradients. *Ecological Bulletins* 51: 305-332.

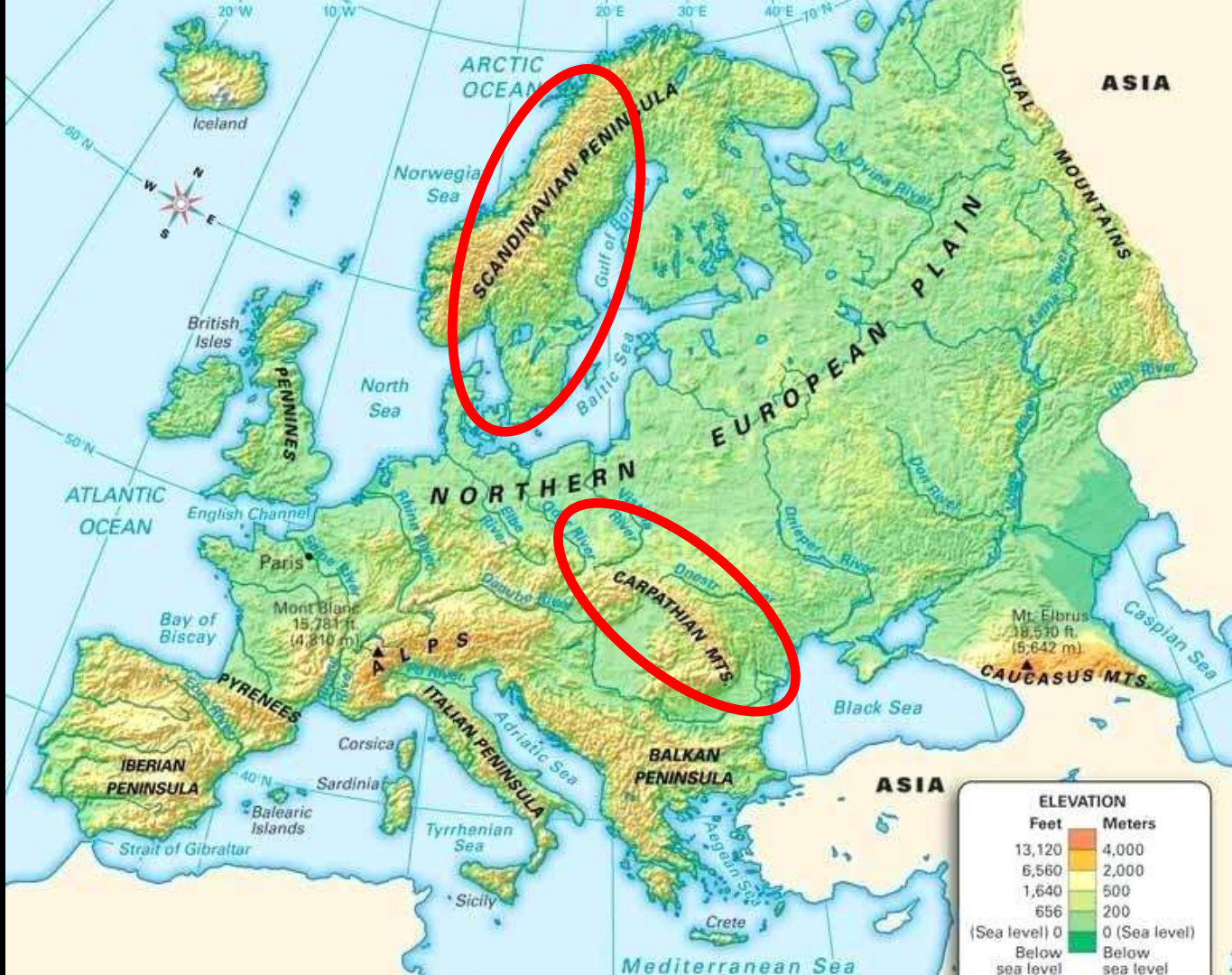
Increase of protected areas



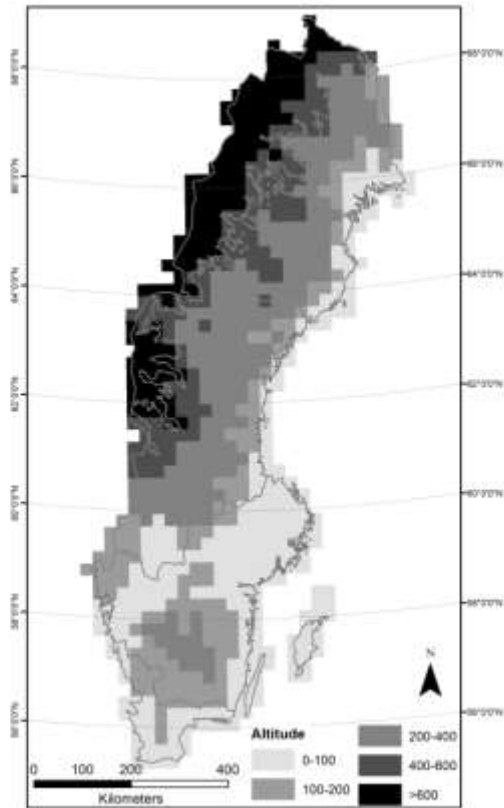
Elbakidze, M., P. Angelstam, N. Sobolev, E. Degerman, K. Andersson, R. Axelsson, O. Höjer, and S. Wennberg. 2013. Protected area as an indicator of ecological sustainability? A century of development in Europe's boreal forest. *AMBIO*. 42(2): 201-214.

Regional and local logging frontiers





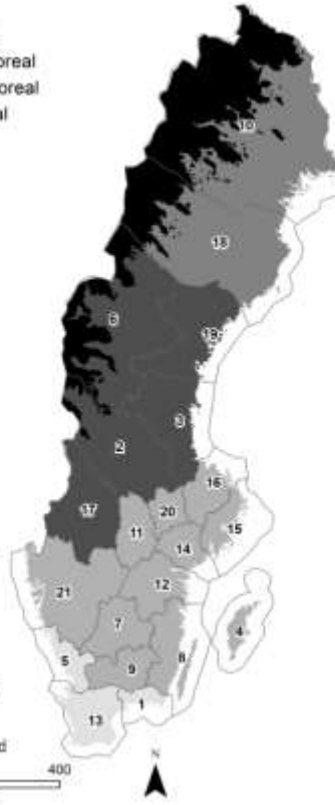
Sweden as a case study



Ecoregions

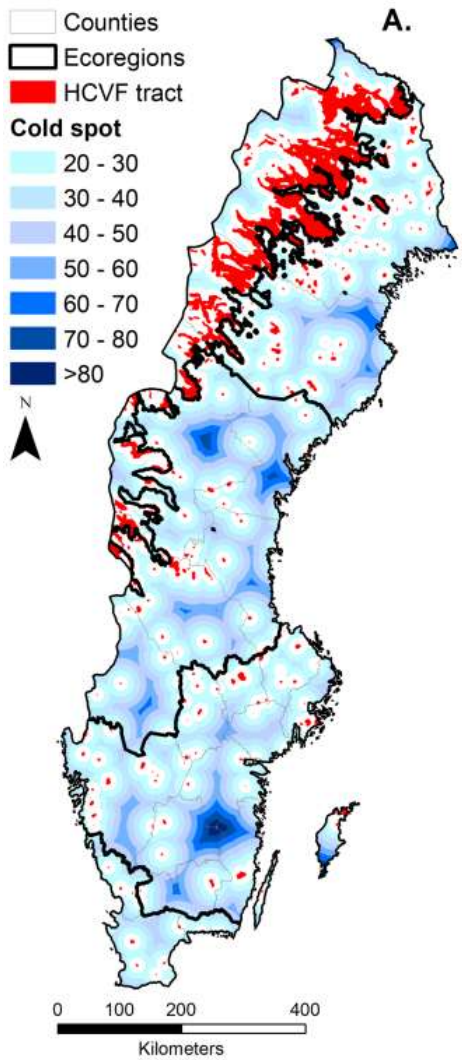
- Sub-alpine
- Northern Boreal
- Southern Boreal
- Hemi-Boreal
- Nemoral
- Counties

- Blekinge
- Dalarna
- Gävleborg
- Gotland
- Halland
- Jämtland
- Jönköping
- Kalmar
- Kronoberg
- Norrbottn
- Örebro
- Östergötland
- Skåne
- Södermanland
- Stockholm
- Uppsala
- Värmland
- Västerbotten
- Västernorrland
- Västmanland
- Västra Götaland

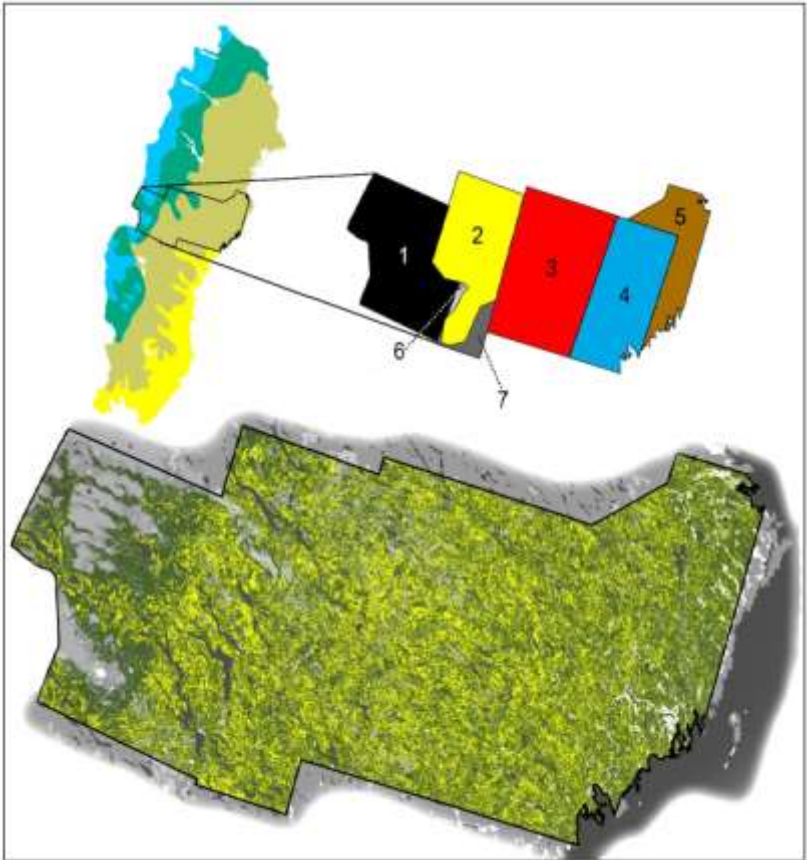


- Ecoregions
- Counties
- Forest commons
- Municipality
- State
- Sveaskog
- Industry

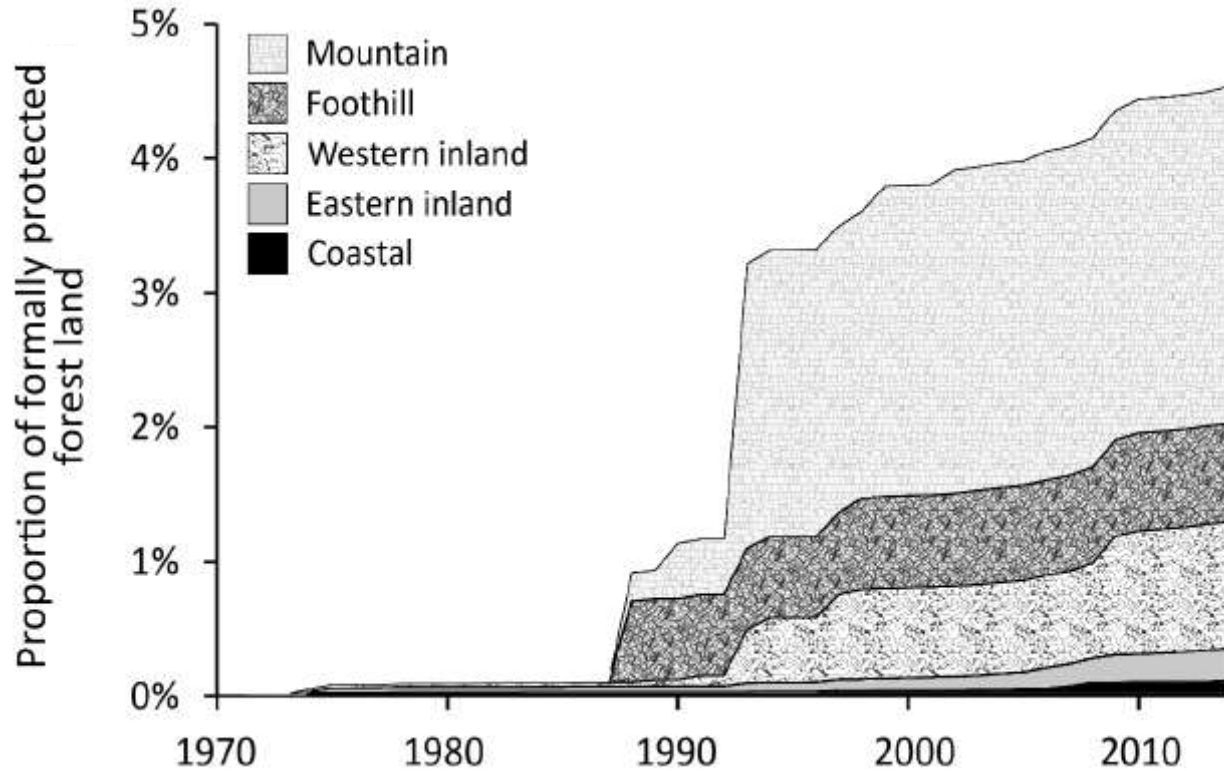




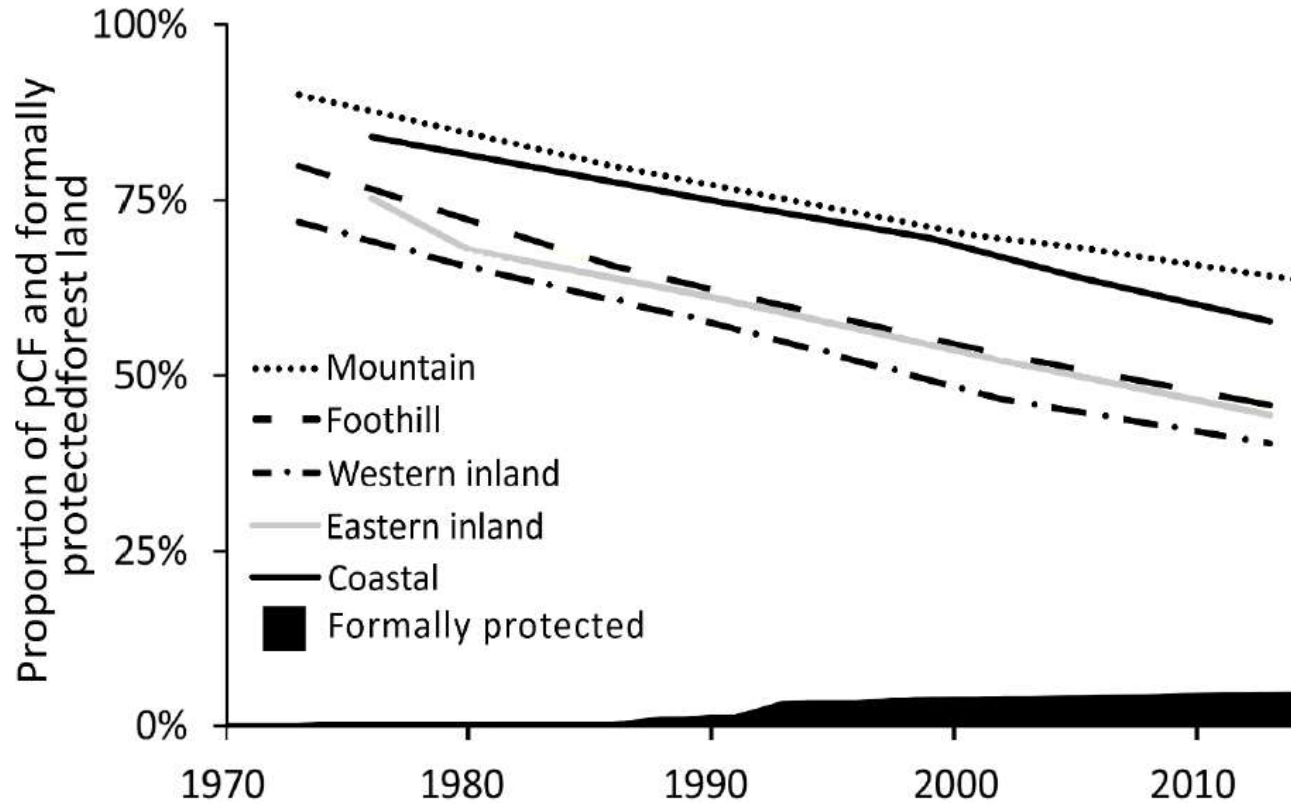
A forest gradient in Sweden



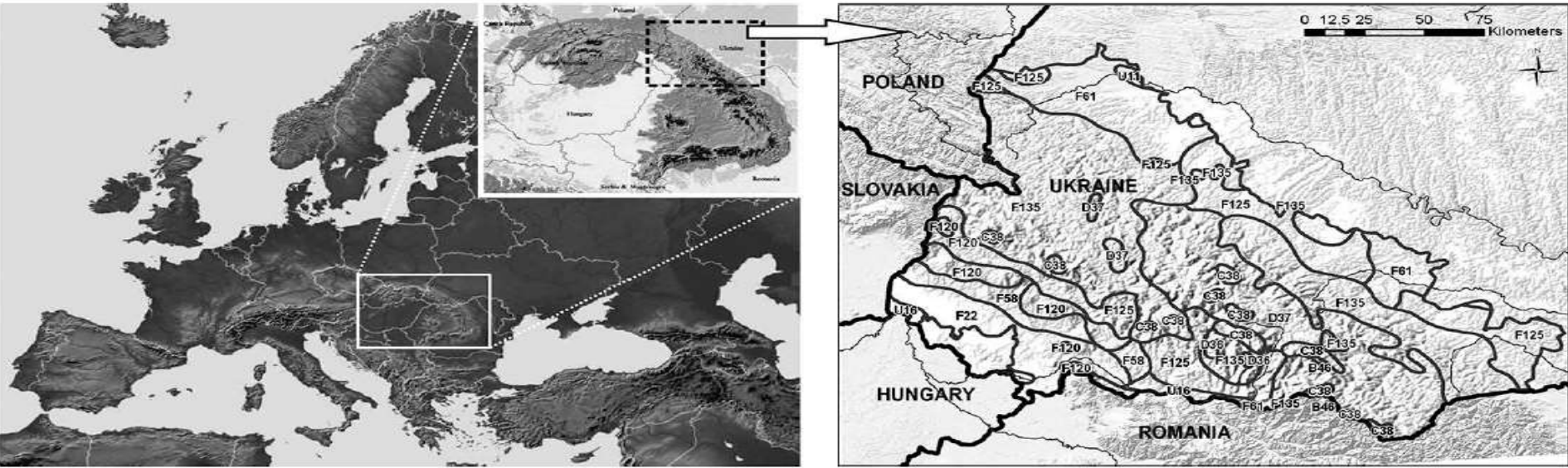
More protected areas



Protected areas vs. forest loss



Carpathian Mountains in Ukraine



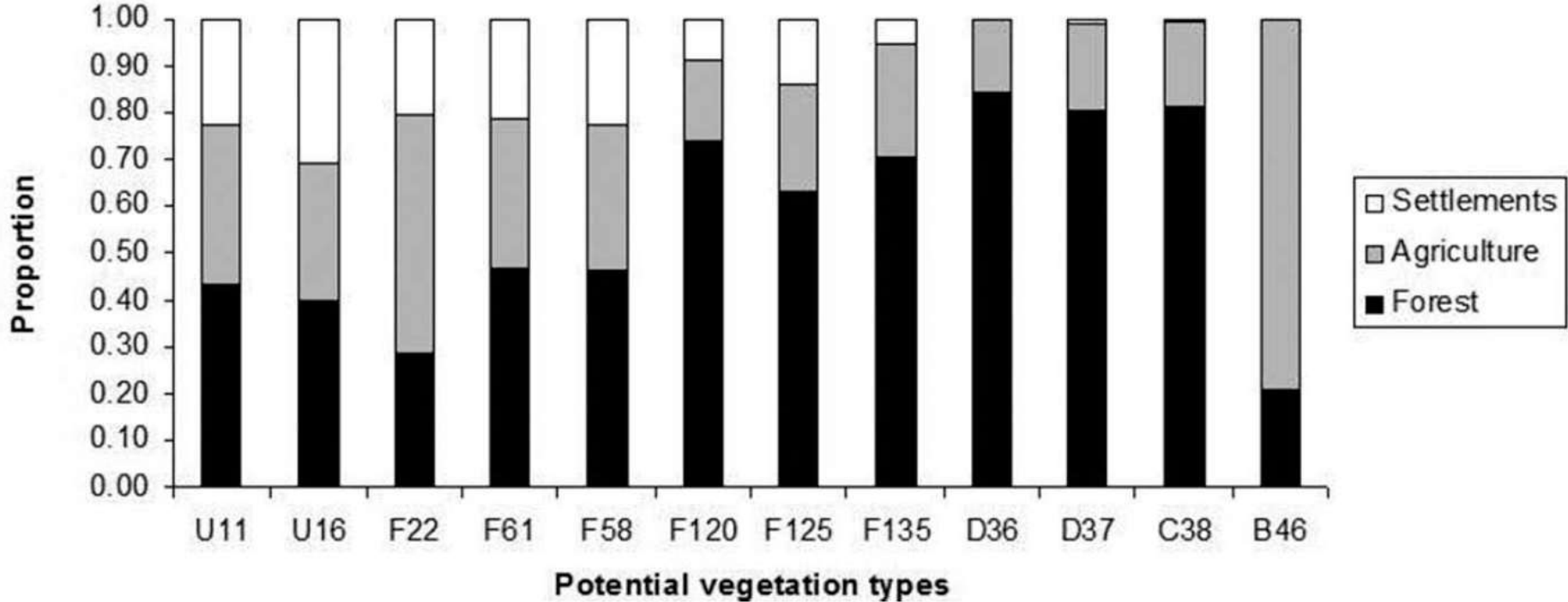
Angelstam, P., Yamelynets, T, Elbakidze, M., Prots, B., Manton, M. 2017. Gap analysis as a basis for strategic spatial planning of green infrastructure: a case study in the Ukrainian Carpathians. *Écoscience* 24 (1-2): 41-58.

Regional Gap Analysis

Variable	Description
A	The past amount of a particular potential natural vegetation ^a
B	Today's amount of a particular potential natural vegetation
$A - B$	Representativeness of potential natural vegetation
C	Empirical knowledge of the proportion of a particular land cover required for retaining a viable population of a given species
$A * C$	Long-term target for the amount of a particular land cover
$B - (A * C)$	Gap (if the value is negative) or surplus (if the value is positive)

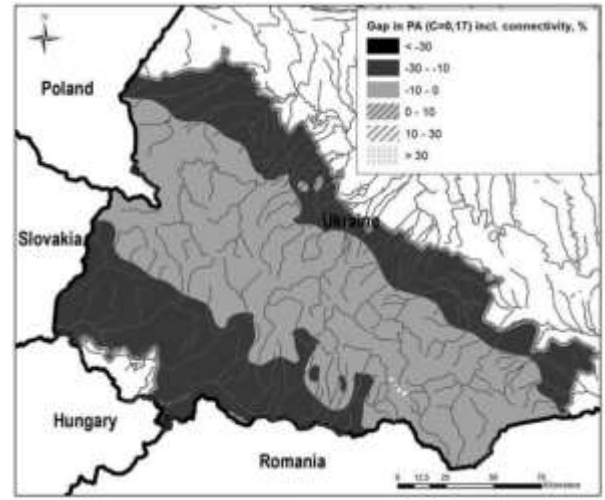
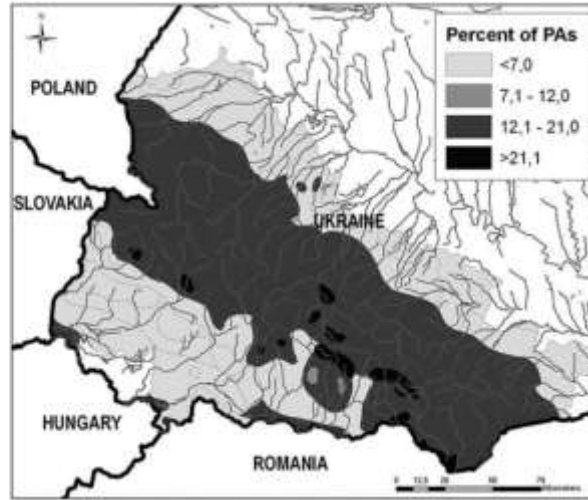
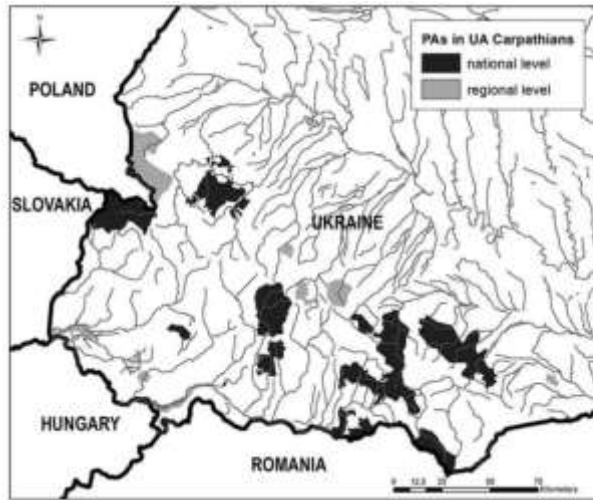
^a natural range of variability (NRV; Cyr et al. 2009) in naturally dynamic forest landscapes (e.g., Winter 2012), or historical range of variability (HRV; Keane et al. 2009), such as in traditional cultural landscape (e.g., Erixon 1960).

Loss of forest landscape



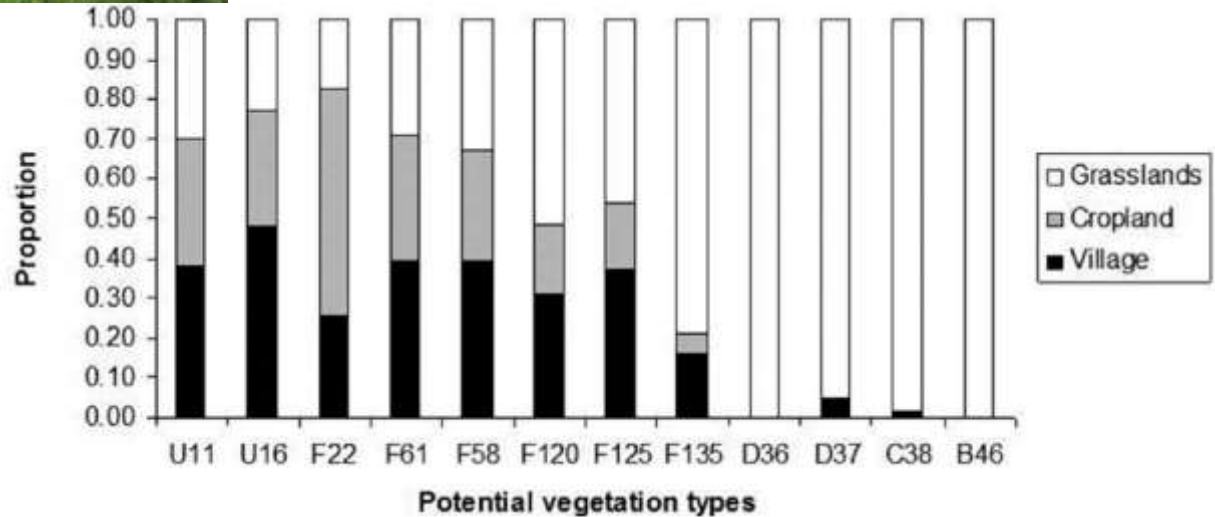
Gradient from floodplain forest via oak and beech to Norway spruce

Aichi target 11 (17% and functional)

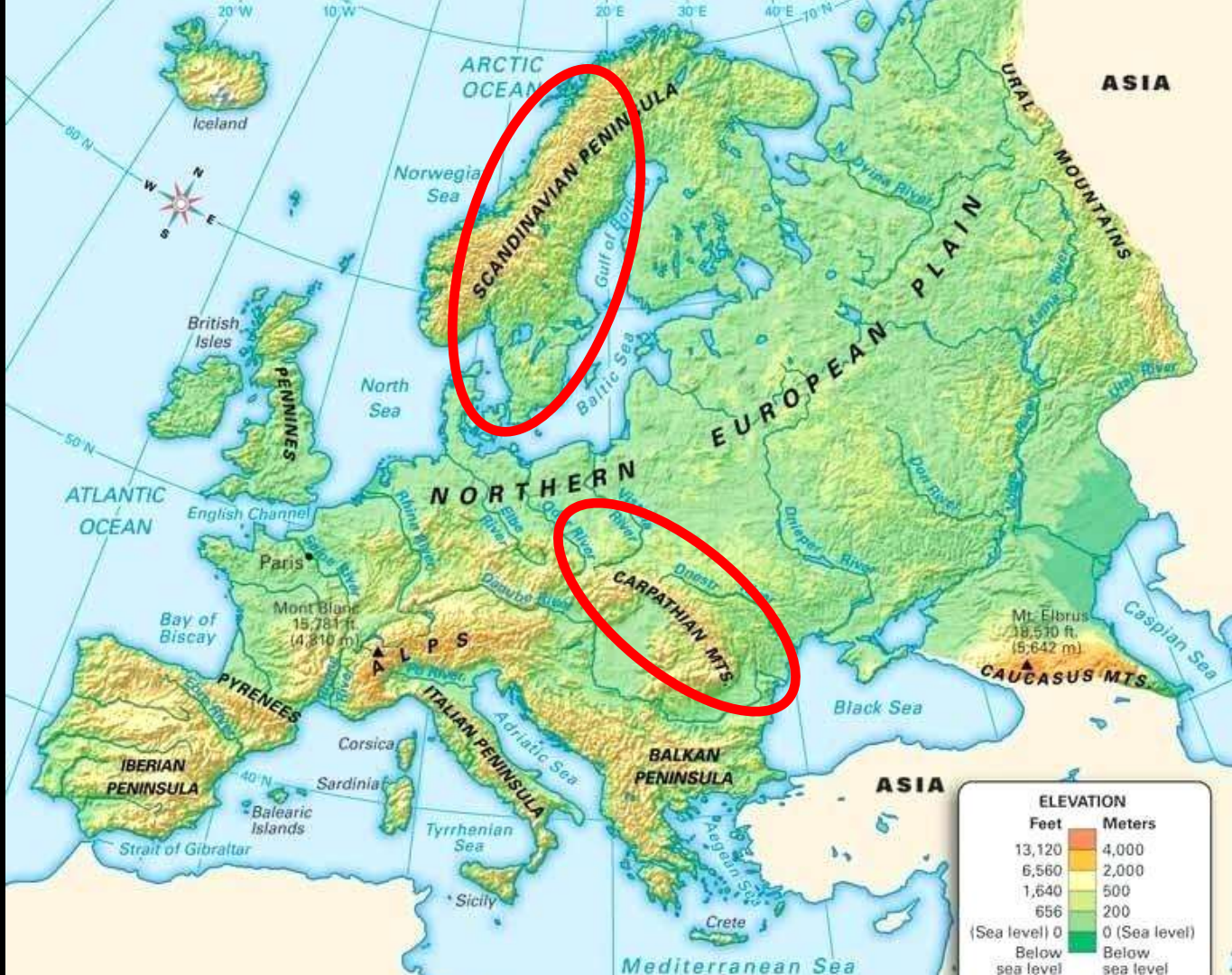




Creation of a cultural landscape



Gradient from floodplain forest via oak and beech to Norway spruce



Conclusions

- Landscape transformation continues
- The net effect of protected areas and logging frontier expansion is negative
- Mutual learning is needed!
 - evidence-based knowledge and analytic tools
 - traditional village systems with social capital

Read more

- Angelstam, P., Elbakidze, M., Axelsson, R., Čupa, P., Halada, L., Molnar, Z., Patru-Stupariu, I., Perzanowski, K., Rozyłowicz, L., Standovar, T., Svoboda, M., Törnblom, J. 2013. Maintaining cultural and natural biodiversity in the Carpathian Mountain ecoregion: need for an integrated landscape approach. In: Kozak J., Ostapowicz K., Bytnerowicz A., Wyzga B. (eds.) Integrating nature and society towards sustainability, Springer. pp. 393-424.
- Angelstam, P., Khauliyak, O., Yamelynets, T., Mozgeris, G., Naumov, V., Prots, B., Elbakidze, M., Manton, M., Valasiuk, S., Chmielewski, T.J. 2017. Green infrastructure at the EU's eastern border: effects of road infrastructure development and forest habitat loss. *Journal of Environmental Management* 193:300-311.
- Angelstam, P., Yamelynets, T, Elbakidze, M., Prots, B., Manton, M. 2017. Gap analysis as a basis for strategic spatial planning of green infrastructure: a case study in the Ukrainian Carpathians. *Écoscience* 24 (1-2): 41-58.
- Svensson, J., Andersson, J., Sandström, P., Mikusiński, G., & Jonsson, B. G. 2018. Landscape trajectory of natural boreal forest loss as an impediment to green infrastructure. *Conservation Biology*.