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BIODIVERSITY OR GEODIVERSITY IN PASTORAL SYSTEMS OF ARCTIC? CONCEPTUAL FRAMEWORKS AND PRACTICAL IMPLICATIONS

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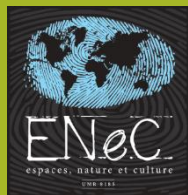
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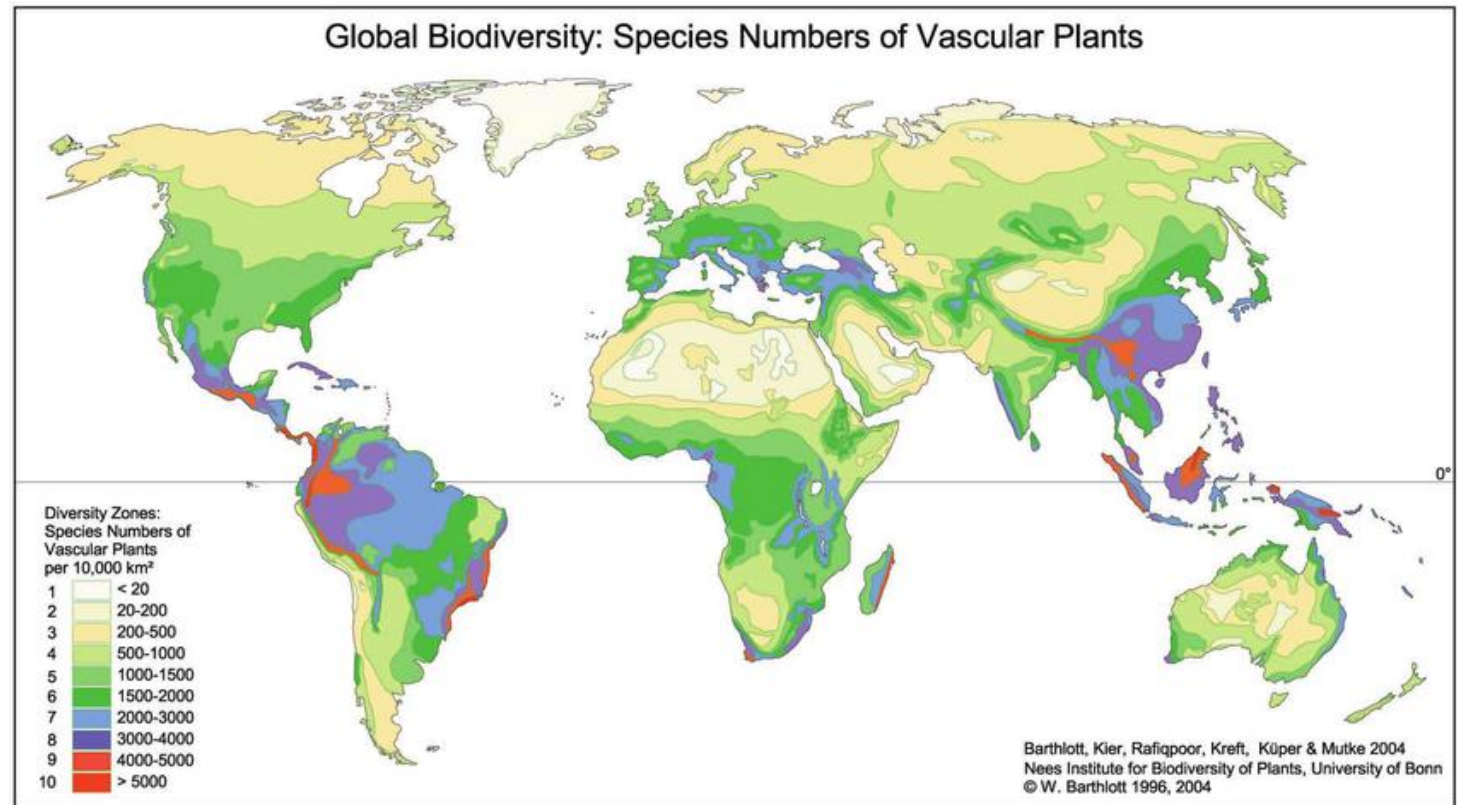
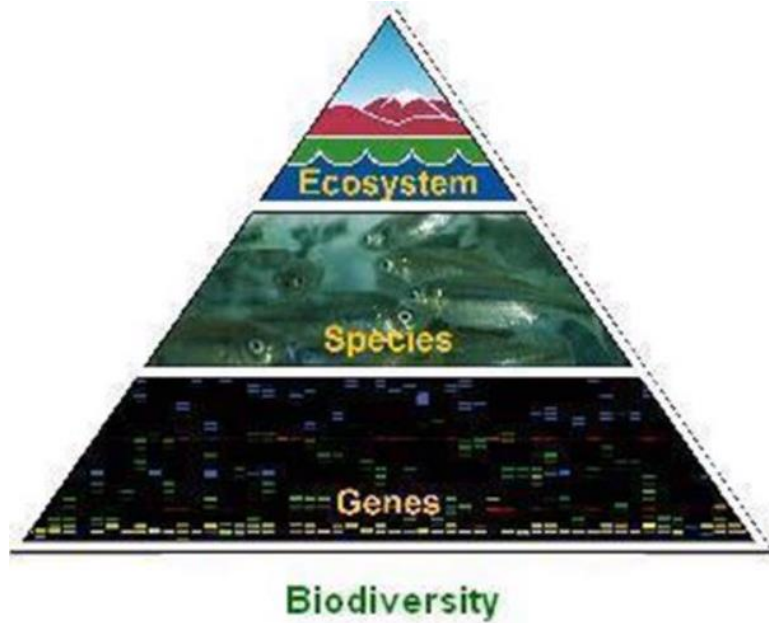
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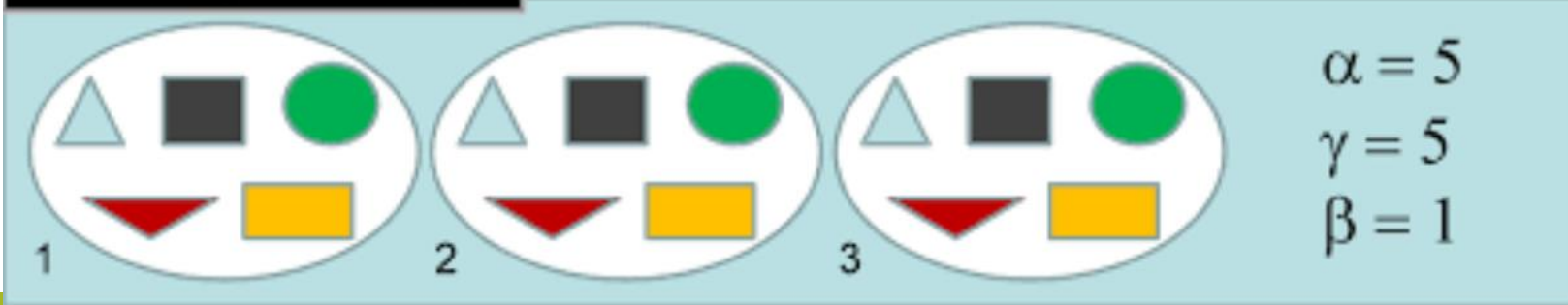
Romain Courault, PhD, Biogeography and Climatology, Sorbonne-
University



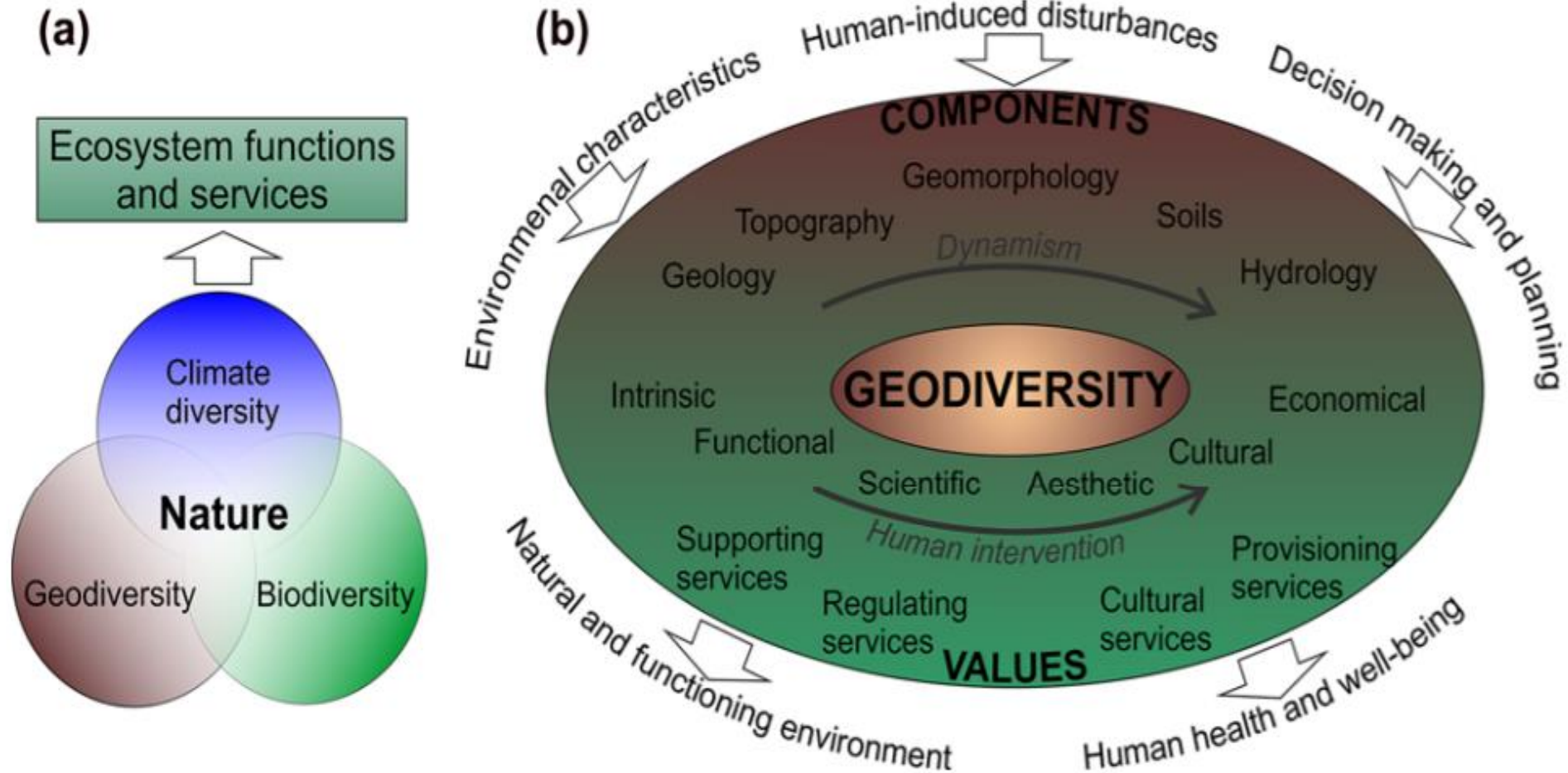
Biodiversity



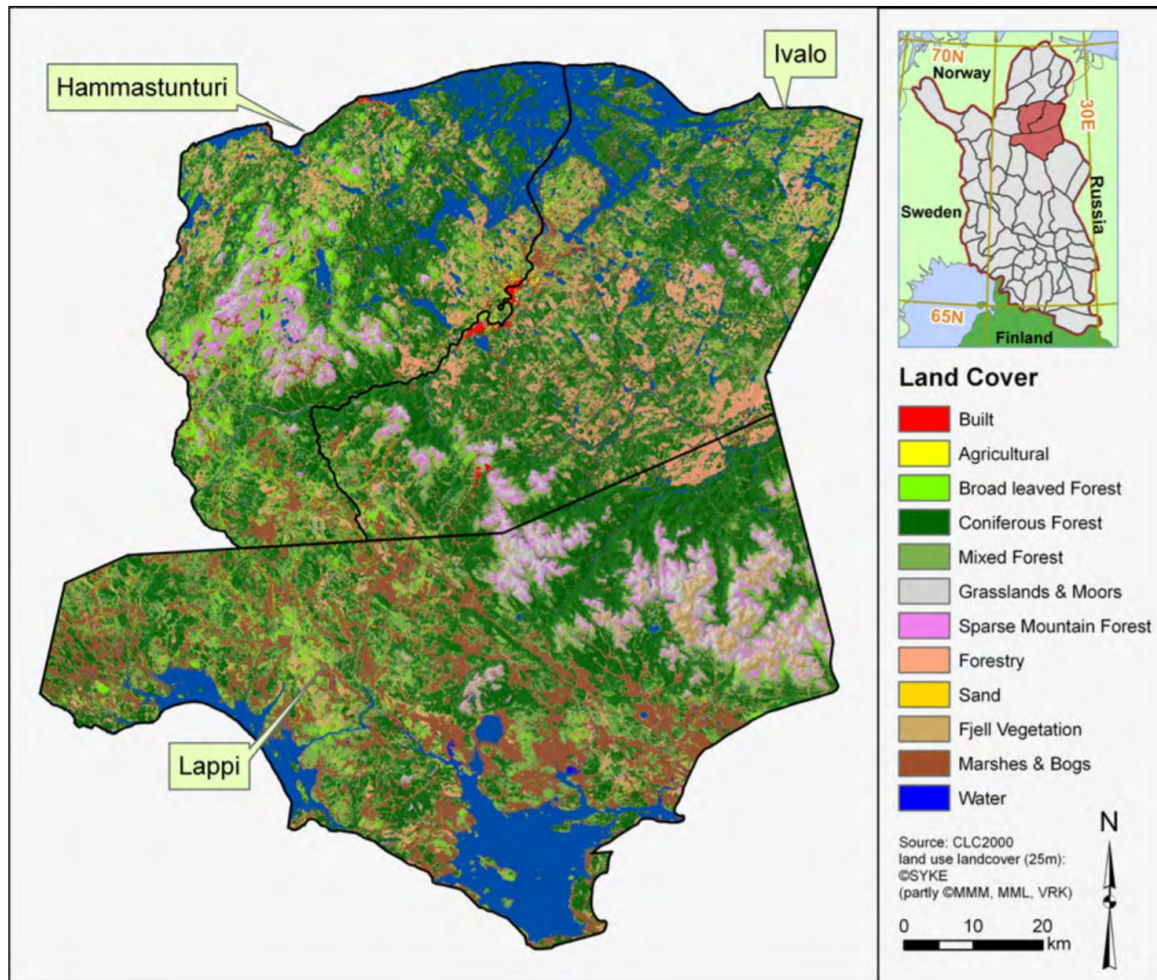
Minimum differentiation



Geodiversity



(Pastoral) landscapes and ecosystemic services



	Artificial surfaces	Agricultural areas	Broad-leaved forest	Coniferous forest	Mixed forest	Grasslands and moors	Sparse mountain forests
Provisioning							
Reindeer	0	1	2	2	2	2	1
Game	0	1	2	2	2	1	1
Fish	0	0	0	0	0	0	0
Berries, mushrooms	0	0	1	2	2	1	1
Fodder	0	2	1	1	1	1	1
Medicines	0	0	0	2	1	0	0
Wood	0	0	1	2	2	0	0
Water	0	0	1	1	1	1	1
Energy	0	0	1	2	2	0	1
Genetic resources	0	2	2	2	2	2	2
Habitat value	0.0	0.6	1.1	1.6	1.5	0.8	0.8
Regulating							
Local and regional climate	0	0	2	2	2	1	1
Carbon sequestration	0	1	2	2	2	1	1
Pollination	1	2	1	1	1	2	0
Flood prevention	2	0	1	1	1	0	0
Erosion prevention	1	0	2	2	2	2	2
Nutrient sequestration	2	2	1	1	1	1	0
Habitat value	1.0	0.8	1.5	1.5	1.5	1.2	0.7
Cultural							
Local and Sami cultures	1	2	2	2	2	1	1
Esthetic landscape	0	1	2	2	2	2	2
Intrinsic value of nature and BD	0	0	2	2	2	2	2
Recreation	0	0	2	2	2	2	2
Habitat value	0.3	0.8	2.0	2.0	2.0	1.8	1.8
Supporting							
Photosynthesis	0	2	2	2	2	2	1
Nutrient cycling	0	2	2	2	2	2	1
Soil formation	0	2	2	2	2	2	1
Habitat value	0.0	2.0	2.0	2.0	2.0	2.0	1.0

Vihervaara, P., Kumpula, T., Tanskanen, A., & Burkhard, B. (2010). Ecosystem services—A tool for sustainable management of human–environment systems. Case study Finnish Forest Lapland. *Ecological Complexity*, 7(3), 410–420.

- Indigenous/local communities : « *populations at disproportionately higher risk of adverse consequences with global warming of +1,5°C* »; In particular those dependant on agricultural or coastal livelihoods (high confidence). (IPCC, SR15 SPM, 2018)

- « *Indigenous, local and traditional knowledge systems and practices, including indigenous peoples' holistic view of community and environment, are a major resource for adapting to climate change, but these have not been used consistently in existing adaptation efforts* » (IPCC, AR 5, 2014)

⇒ Inclusion of local / indigenous knowledges in global change issues (loss of biodiversity and climate change)

⇒ Not only « important » but **ESSENTIAL**

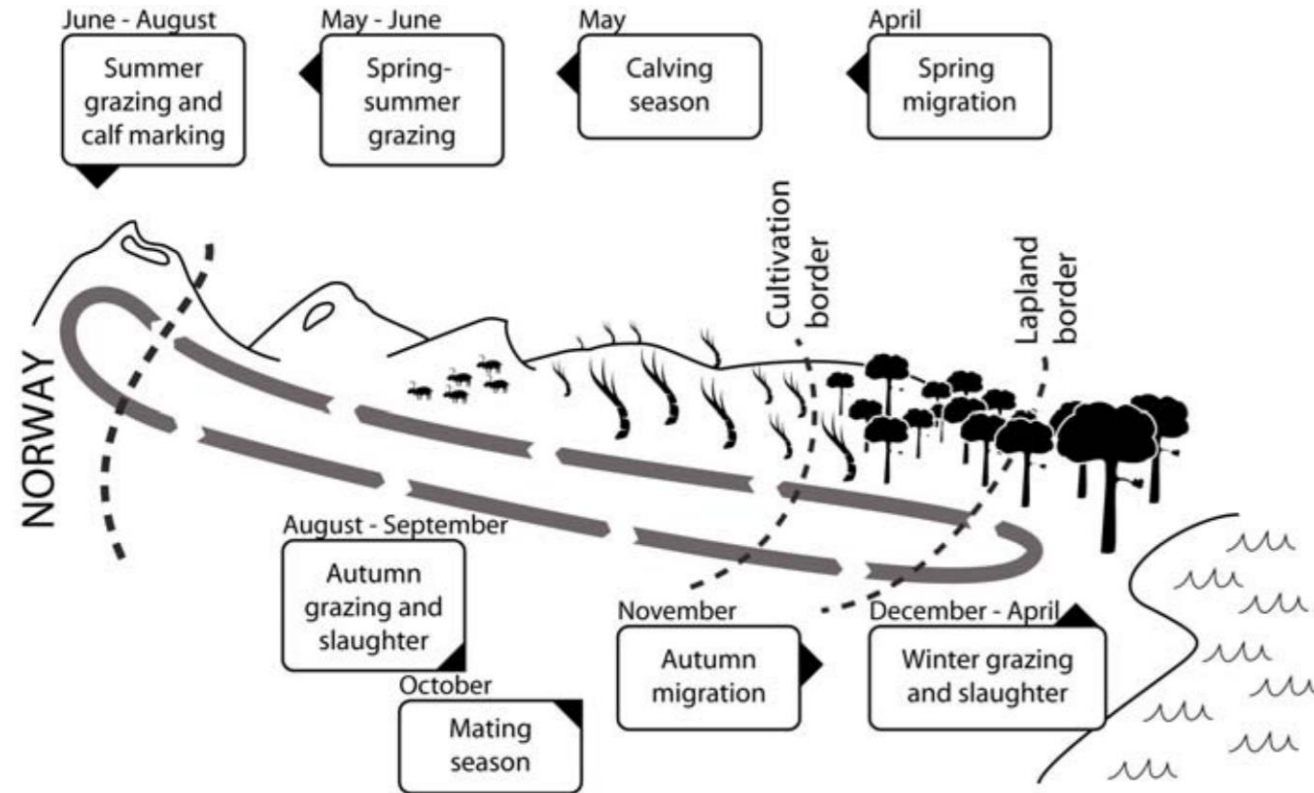
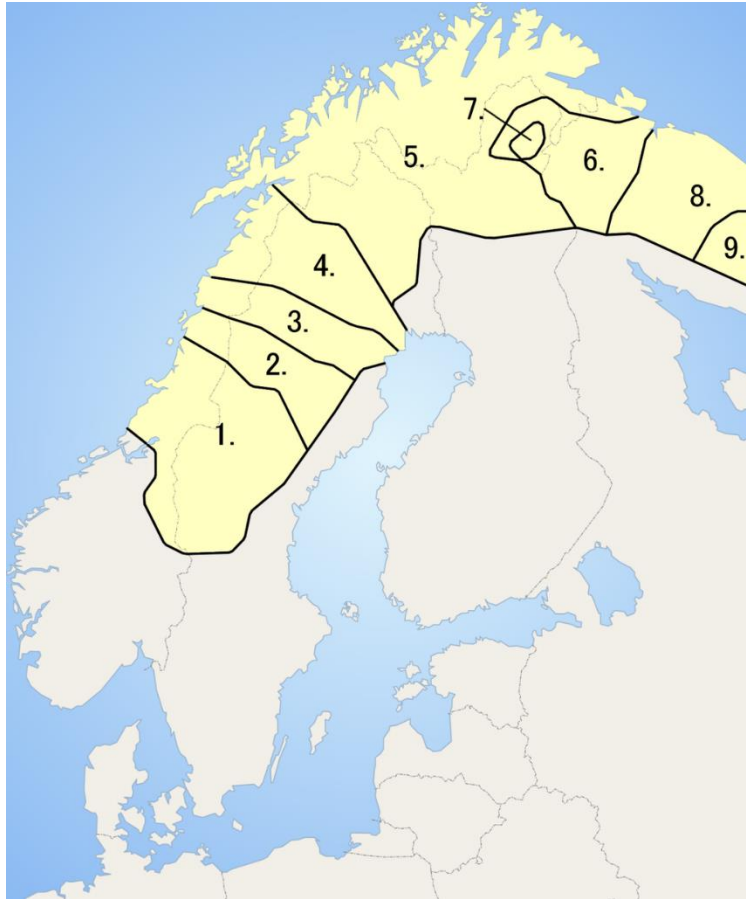
IPCC

INTERGOVERNMENTAL
PANEL ON
CLIMATE CHANGE



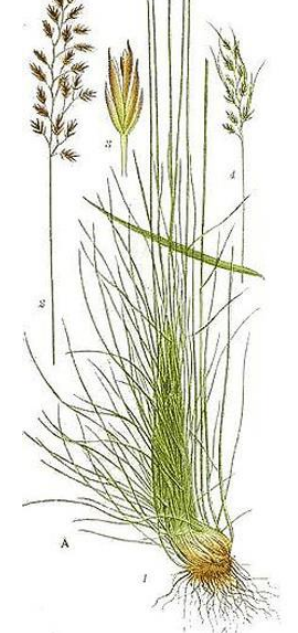
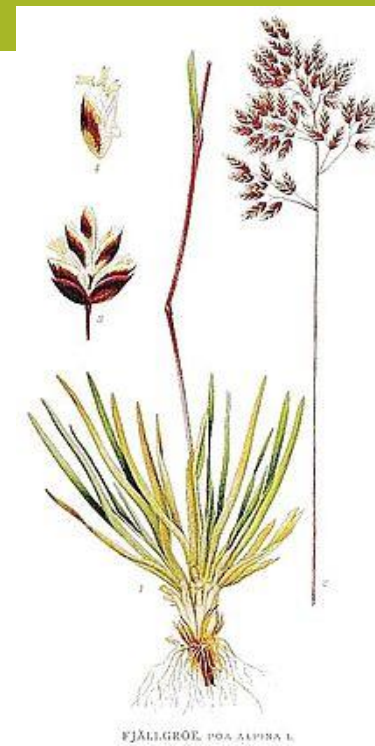
Northern saami

- Sitnu
- Ràssi
- Jeagil
- Lahppu
- Gatna



Sitnu :

- Litteraly « short grass »
- *Poa alpina*; *Equisetum fluviatile*; *Festuca ovina*; *Deschampsia alpina*
- Mainly summer plants, describing alluvial flood plains in Fennoscandia mountains (from wet plain to dry sides/slopes)
- Dominates grasslands but perennial plants stay eatable for reindeer in winter



Inga, B. (2008). *Traditional ecological knowledge among reindeer herders in northern Sweden*.
<http://kaino.kotus.fi/algui/index.php?kikieli=en&t=etusivu>



Rássi :

- Litteraly « Tundra flowers »

“The name used for grass and sedges, and also for forbs’

- Graminoids plants, dicotyledons; mainly Apiaceae family?
- Mainly hygrophilous plants, describing ground cover plants in :
- Wooded tundras (*Betula pubescens* sp forests)
- Hydric altitudinal grasslands



Angelica archangelica L.



Jeagil :

- Literaly « lichen »
- Terricolous lichens communities (dozen of species/subspecies)
- Mainly consumed during winter
- Wide distribution along taiga – tundra ecosystems

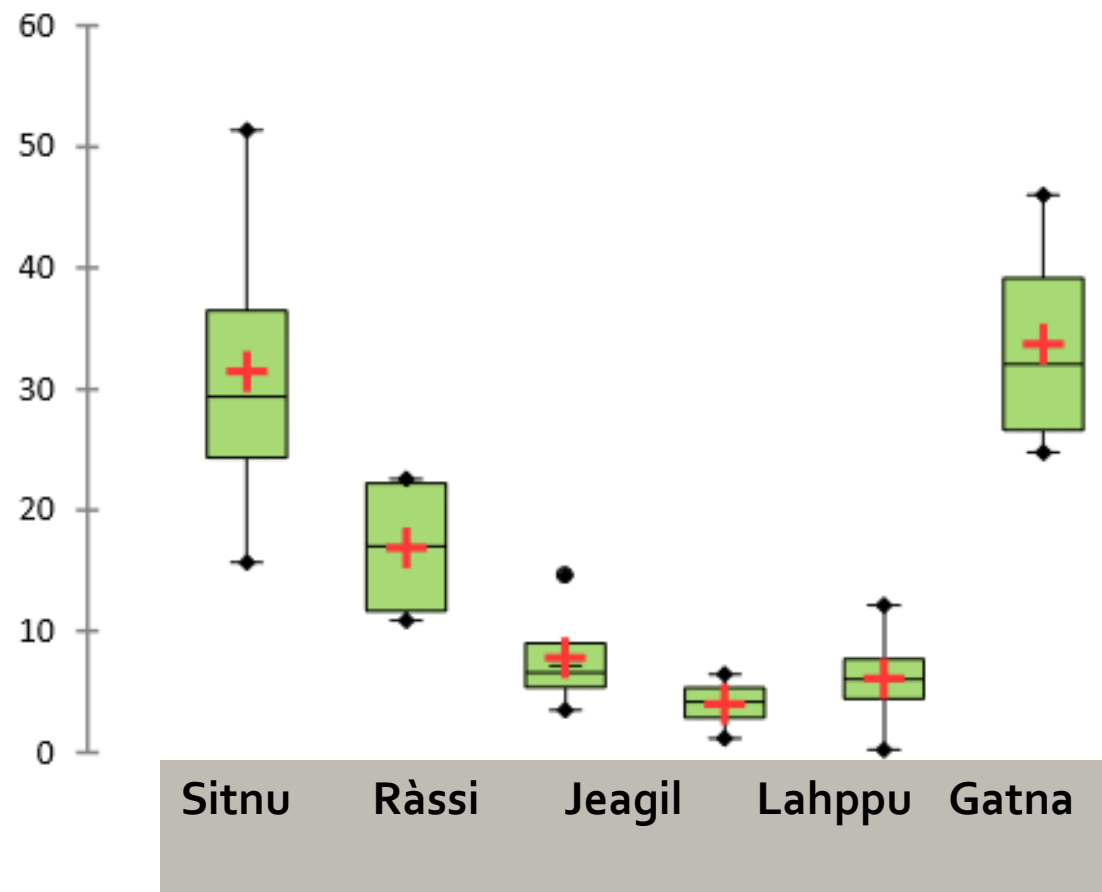
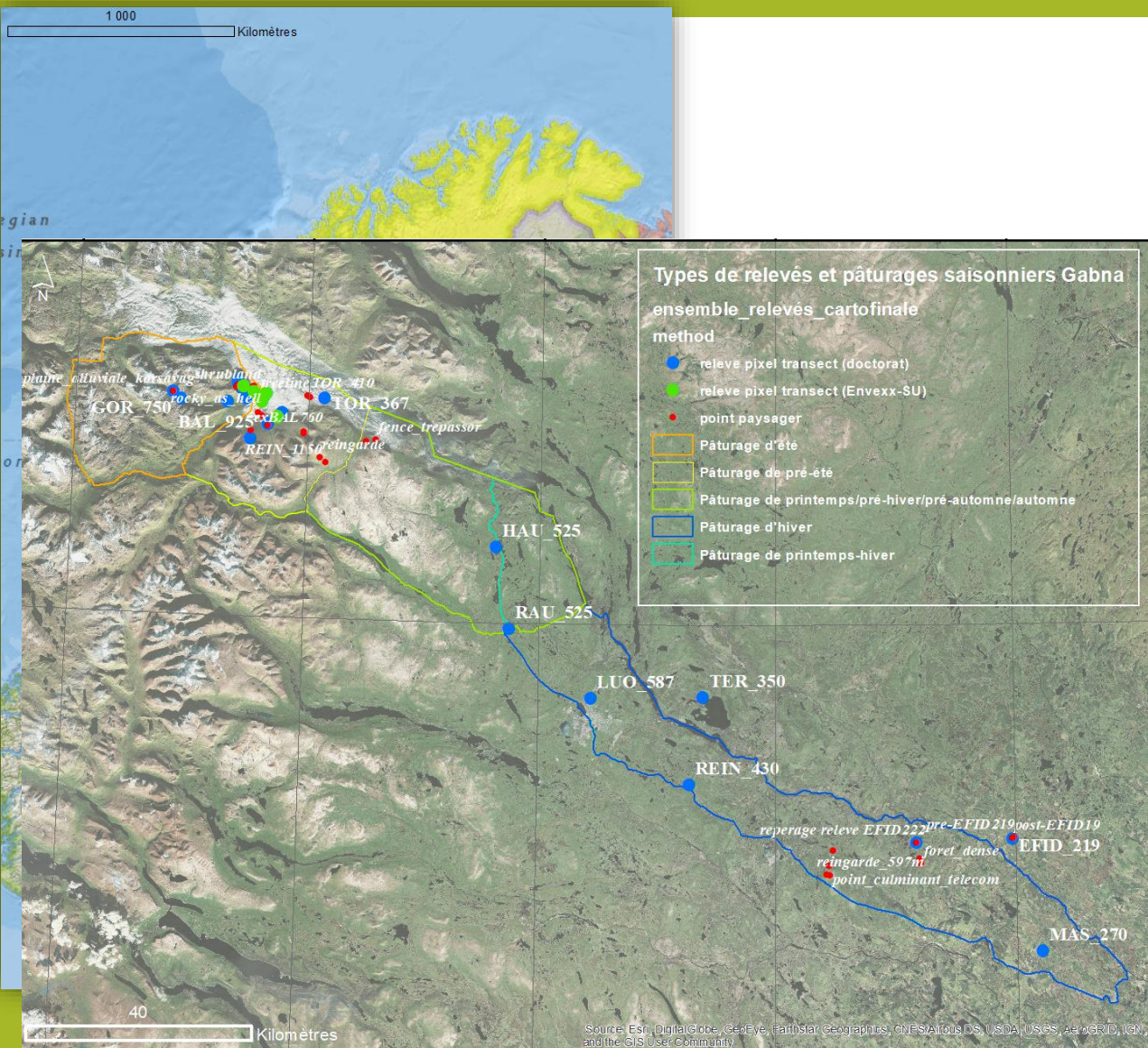


Lahppu :

- Litteraly : « thick thread »
- Epiphytic/arboreal lichens (Usni, Bryoria...)
- Mainly found on spruce and pine trees => Boreal distribution
- Highly sensible to pollution and loss of habitats (intensive forestry)



- Example: pine forest composition



- Diversity of life = diversity of way to describe life
- Linguistic categories
 - scientific categories (empirical)
 - ⇒ Taxonomy of vegetal formations...
 - ⇒ applied to a space (specie coverage; community; vegetal formation; vegetal landscape; biome...)
- Plants important for semi-domesticated reindeer : not species, but functional groups
- Ecosystem services might be adapted according to linguistic contexts