

PRÉSENTATION D'ARTICLE: EVOLUTION SPATIO TEMPORELLE DES SERVICES ÉCOSYSTÉMIQUES EN LAPONIE SUÉDOISE

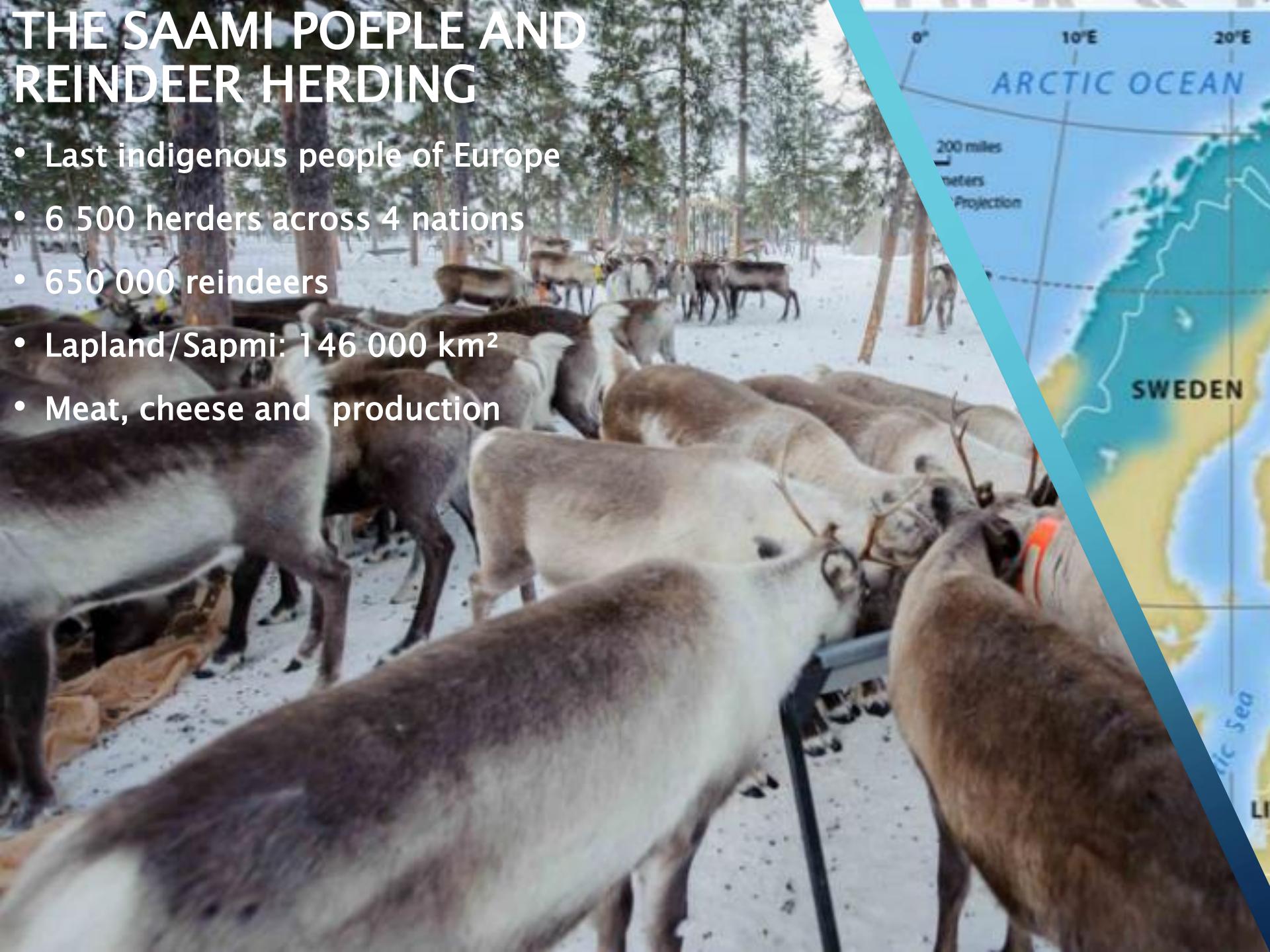
CAFÉ (POST-)DOCS MAISON DE LA TELEDETECTION

R.COURAULT

5/11/2020

THE SAAMI PEOPLE AND REINDEER HERDING

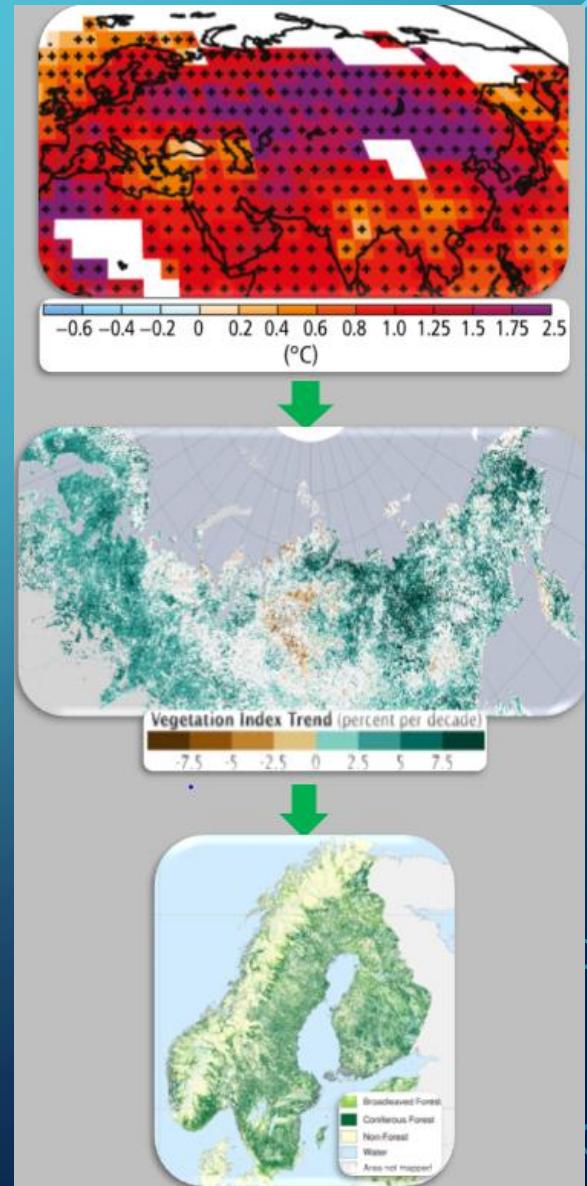
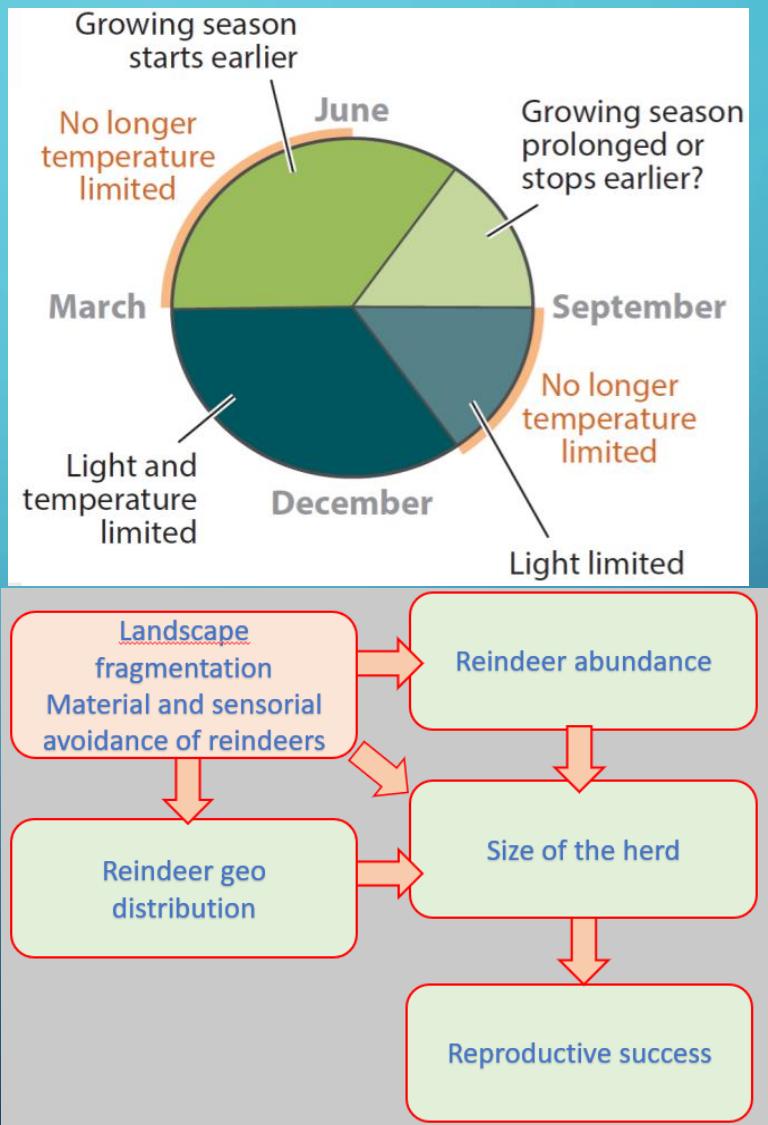
- Last indigenous people of Europe
- 6 500 herders across 4 nations
- 650 000 reindeers
- Lapland/Sapmi: 146 000 km²
- Meat, cheese and production



GLOBAL CHANGE AND ITS EFFECTS ON SUBARCTIC (SOCIO-) ECOSYSTEMS

- Arctic and subarctic socio – ecosystems: sentinels of climate change and its impacts at various geo/temporal scales

- In particular studying reindeer *Rangifer tarandus* and associated pastoralism is meaningful
- Plant distribution modification (e.g. « borealization of ecosystems »; « shrubification ») : loss of pastures?
- Economical activities increasing, landscape fragmentation and reindeer avoiding strategies



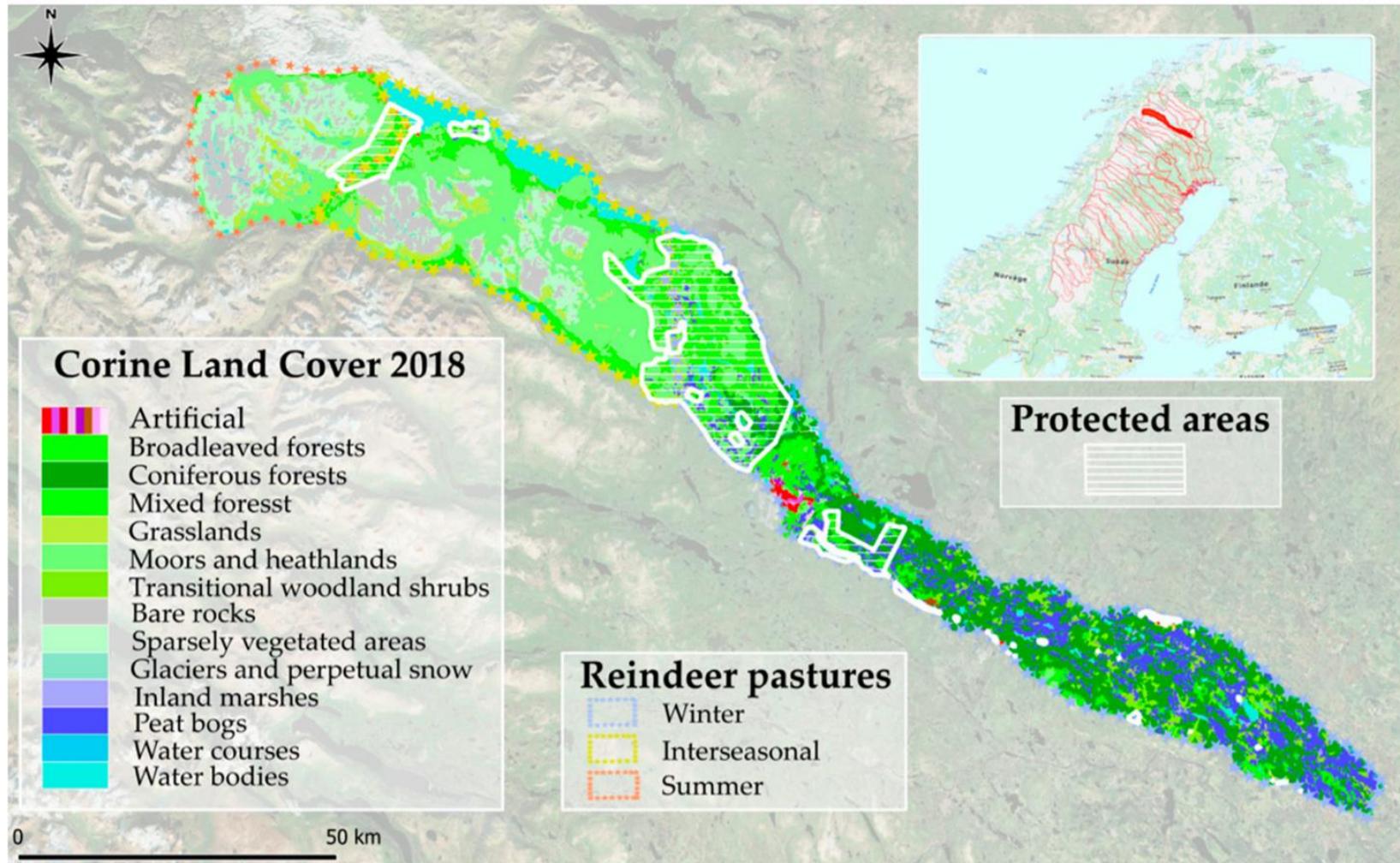
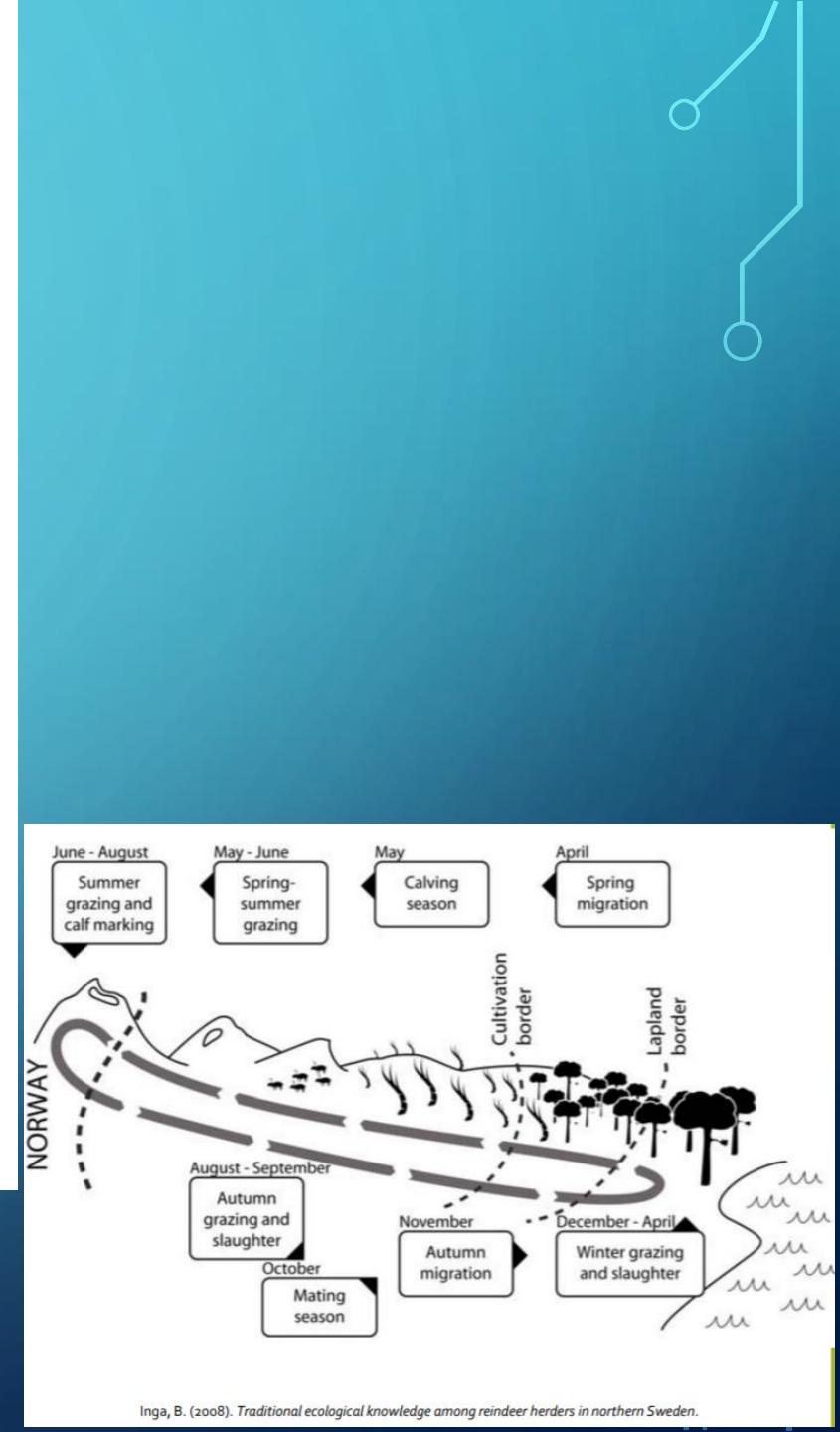
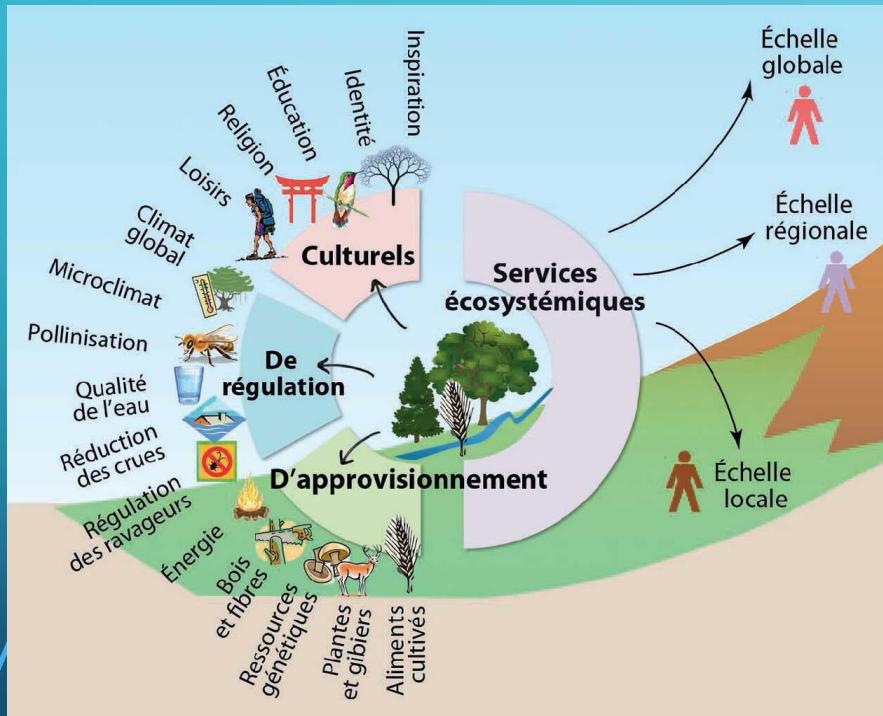


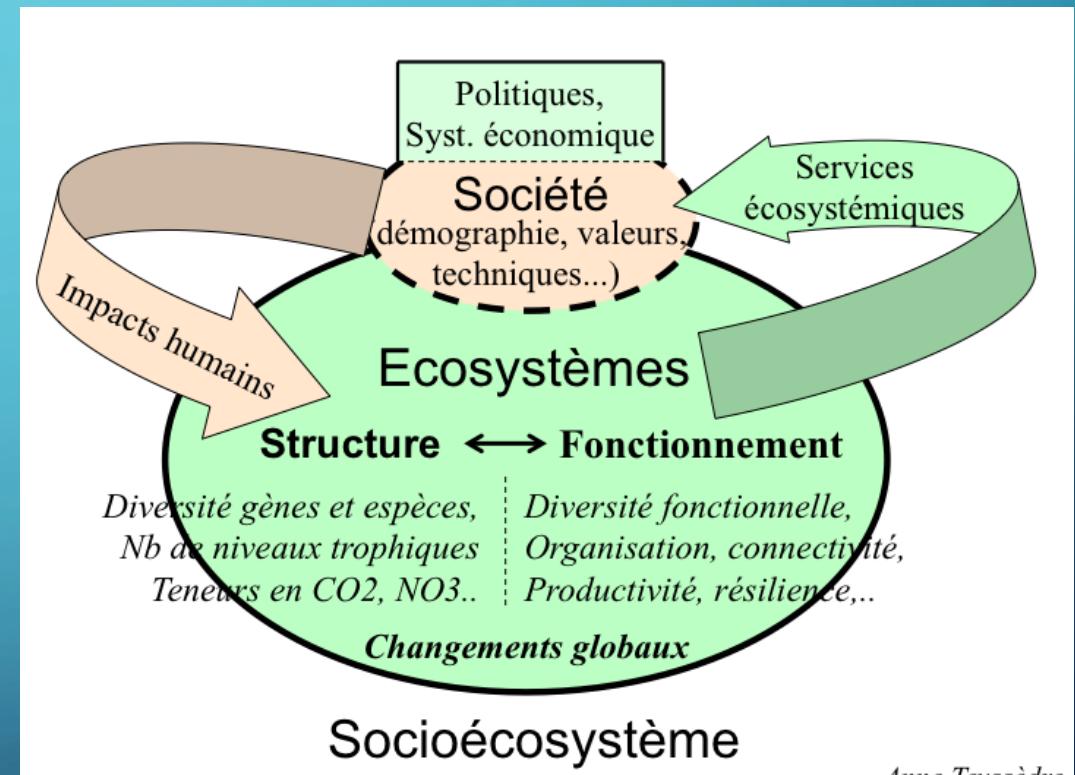
Figure 1. Location map and geographical features of the *Gabna* reindeer herders' *sameby* (source: CORINE Land Cover 2018, RenGIS 2.0 Swedish Saami Parliament, European Environmental Agency, 2019; realization: R. Courault, 2019).



SERVICES ÉCOSYSTÉMIQUES ?!



<https://www.cairn.info/des-territoires-vivants-pour-transformer-le-monde--9782759226542-page-108.htm#>



Anne Teyssèdre

<https://www.sfecologie.org/regard/regards-4-teyssedre/>

ECOSYSTEM SERVICES APPLIED TO REINDEER PASTORALISM

Ecosystem services :

« the benefits human populations derive, directly or indirectly, from ecosystem functions » (Constanza et al. 1997 in Fisher et al., 2007)

⇒ How apply it in the Saami context?

⇒ What is their recent evolution over time?

Millenium Ecosystem Assessment (2005) + Vihervaara, Kumpula et al. (2010):

- a. Supporting
- b. Provisionning
- c. Regulating
- d. Cultural services

	Industries/cities	Coniferous forests
Provisioning values	Reindeer	0
	Game	0
	Fish	0
	Berries, mushroom	0
	Fodder	0
	Medecine	0
	Wood	0
	Water	0
	Energy	0
	Genetic resources	0
Regulating values	Local and regional climate	0
	Carbon sequestration	0
	Pollination	10
	Flood prevention	20
	Erosion prevention	10
	Nutrient sequestration	20
Cultural values	Local and Sami culture	10
	Esthetic landscapes	0
	Intrinsic value of nature	0
	Recreation	0
Supporting values	Photosynthesis	0
	Nutrient cycling	0
	Soil formation	0

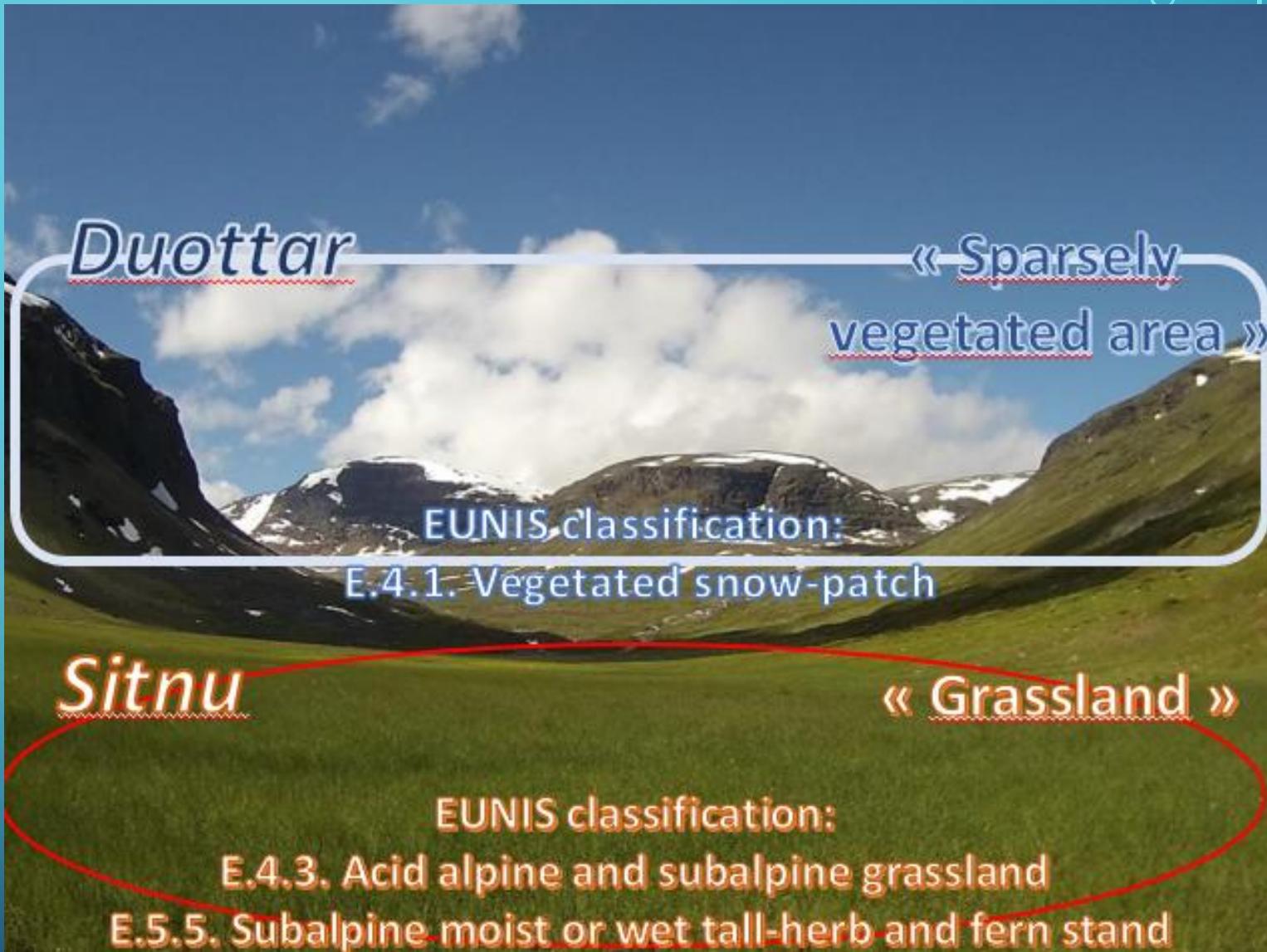
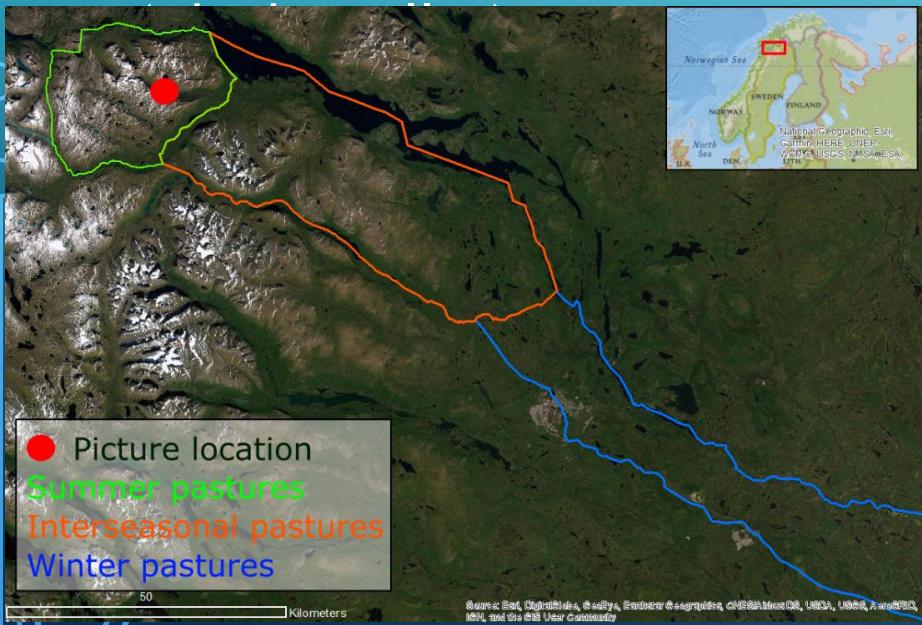
Source: Vihervaara, Kumpula et al. (2010). Ecosystem services: – A tool for sustainable management of human environment systems. Case study Finnish Forest Lapland, *Ecological Complexity* 7 (2010) 410–420

LINGUISTIC CATEGORIES ≠ ECOLOGICAL CATEGORIES!

Saami terminology	English translation	Biogeographical scale	Interpretation (CLC and SW maps)
<i>Beahcevuovdi</i>	Pine forest	Landscape + specie	Coniferous forest
<i>Duottar</i>	Tundra, hill, treeless mountain	Landscape	Sparsely vegetated areas; bare rocks
<i>Lageš</i>	Montane birch	Specie	Broadleaved forest
<i>Hàika</i>	Old pine	Specie + dynamics	Cold and humid conifer forests
<i>Meahcci</i>	Open country, pasture land, wilderness	Landscape	Moors and heathlands
<i>Sitnu</i>	Grasses	Familia / genera	Grasslands

INTERPRETATION OF LANDSCAPE USING HERDERS' ECOLOGICAL CATEGORIES

- Mountainous area: summer pastures
- Glacial valley of Gorsajohka



Credits: R. Courault (2016, 2019)

MATERIAL AND METHODS

1) Corine Land Cover 2000; 2006; 2012; 2018

2) Spatial units of pastoral gestation (community, seaonnal)

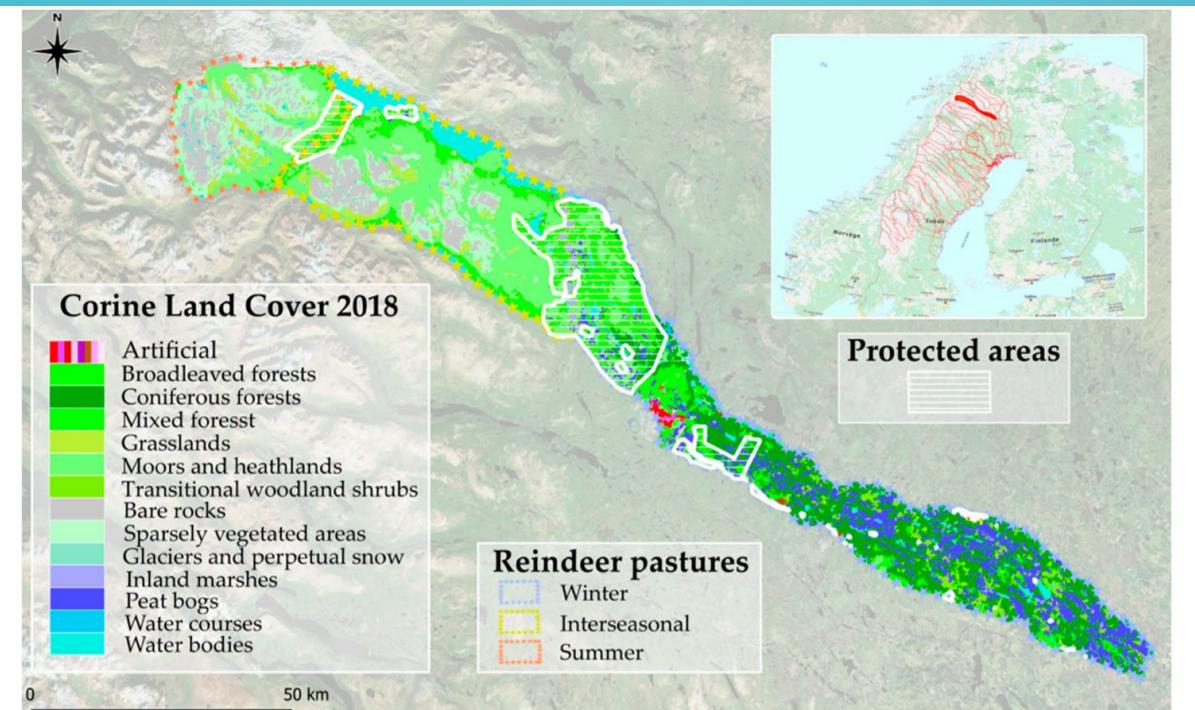


Figure 1. Location map and geographical features of the *Gabna* reindeer herders' *sameby* (source: CORINE Land Cover 2018, RenGIS 2.0 Swedish Saami Parliament, European Environmental Agency, 2019; realization: R. Courault, 2019).

- 1) Reclassing land cover maps to adapted ecosystem services
- 2) Areas calculation for the two scales of analysis (*Gabna*' community and seasonal pastures)
- 3) Simple calculation of areas' changes (land cover and SES) over the period
- 4) Average of the SES by type (Support, Regulation, Providing, Cultural)

Table 4. Areal ecosystem service capacity indices (AESC) in 2018 for seasonal pastures and the entire *Gabna sameby*.

	Provisioning	Regulating	Cultural	Supporting	Total Index (Mean)
Summer pasture	0.64	0.76	1.86	0.83	1.02
Inter-seasonal pasture	0.77	0.96	1.8	1.14	1.16
Winter pasture	1.07	1.33	1.38	1.48	1.31
<i>Gabna sameby</i>	0.92	1.14	1.57	1.29	1.23

Table 5. Main CLC land cover changes over 2000, 2006, 2012, and 2018 within the *Gabna* reindeer herding *sameby* (changes >1 km² over the whole period are indicated; % calculated from the overall *Gabna* extent ~3786 km²). “-” represents negligible changes in cover extent.

CLC Category	Evolution 2000–2006	Evolution 2006–2012	Evolution 2012–2018	Evolution 2000–2018
Dump sites (132)	-	-	+2.2 (+0.06)	+2.9 (+0.08)
Coniferous forests (312)	-6.9 km ² (-0.18%)	+36 (+0.95)	+1.9 (+0.05)	+30.9 (+0.82)
Mixed forests (313)	-	+4.8 (+0.13)	-	+6.3 (+0.16)
Forestry/Transitional woodland-scrubs (324)	+6.5 (+0.17)	-39.1 (-1.03)	-5.3 (-0.14)	-37.9 (-1)
Sparingly vegetated areas (333)	+1.1 (+0.03)	-	-	-
Peat bogs (412)	-	-	-	+1.6 (+0.04)

Table 6. Main traditional land cover changes over 2000, 2006, 2012, and 2018 within the *Gabna* reindeer herding *sameby* (% calculated from the overall *Gabna* extent). “-” represents negligible changes in cover extent (excepting *Lageš*/Broadleaved forest, being stable along the period).

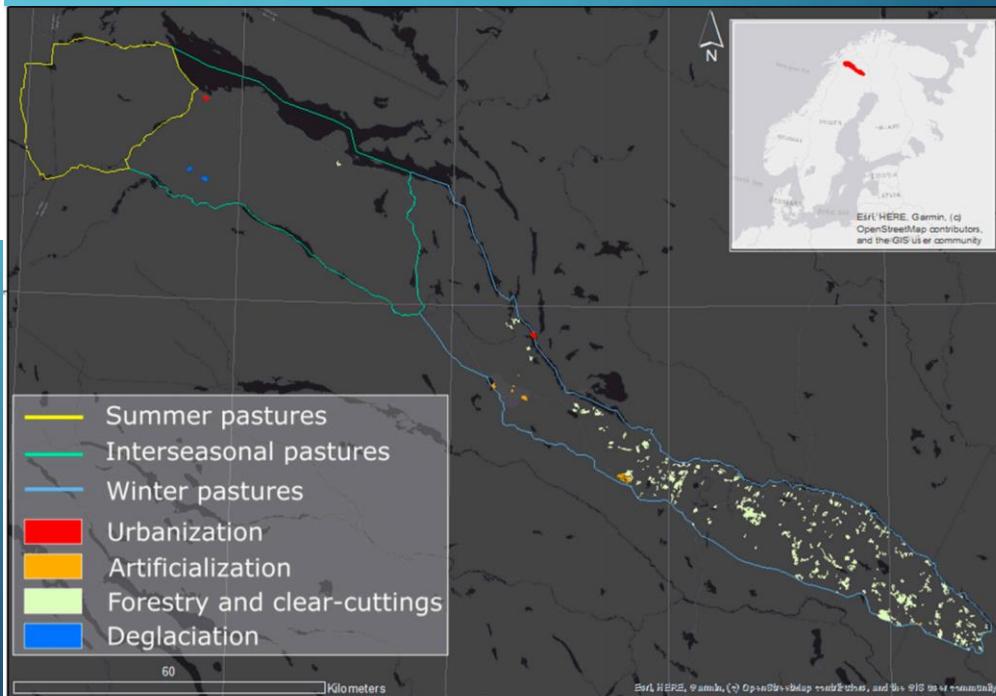


Figure 2. Map of land cover changes for seasonal pastures of the *Gabna sameby*. All land cover changes occurring during 2000–2018 have been reduced into four categories (Section 2.3). Urbanization outlines have been magnified, and thus do not represent projected area surfaces (source: CORINE Land Cover changes database (2019), RenGIS 2.0 Swedish Saami Parliament (2019); realization: R.Courault, 2019).

CONCLUSIONS

- Inclure les connaissances locales: riche de sens pour co-construction de diagnostics écologiques => mise en discussions entre parties-prenantes
- Méthodologiquement: transformation superficies de catégories d'occupation de sols en services écosystémiques « facile »... mais nécessité d'une expertise de terrain => éviter l'attribution arbitraire de « points »
- Régionalement et localement: effets de la sylviculture ++ (coupe, reboisement) => pertes en SES de support, SES culturels, SES d'approvisionnement, SES de régulation