

The fragmentation of reindeer husbandry landscapes

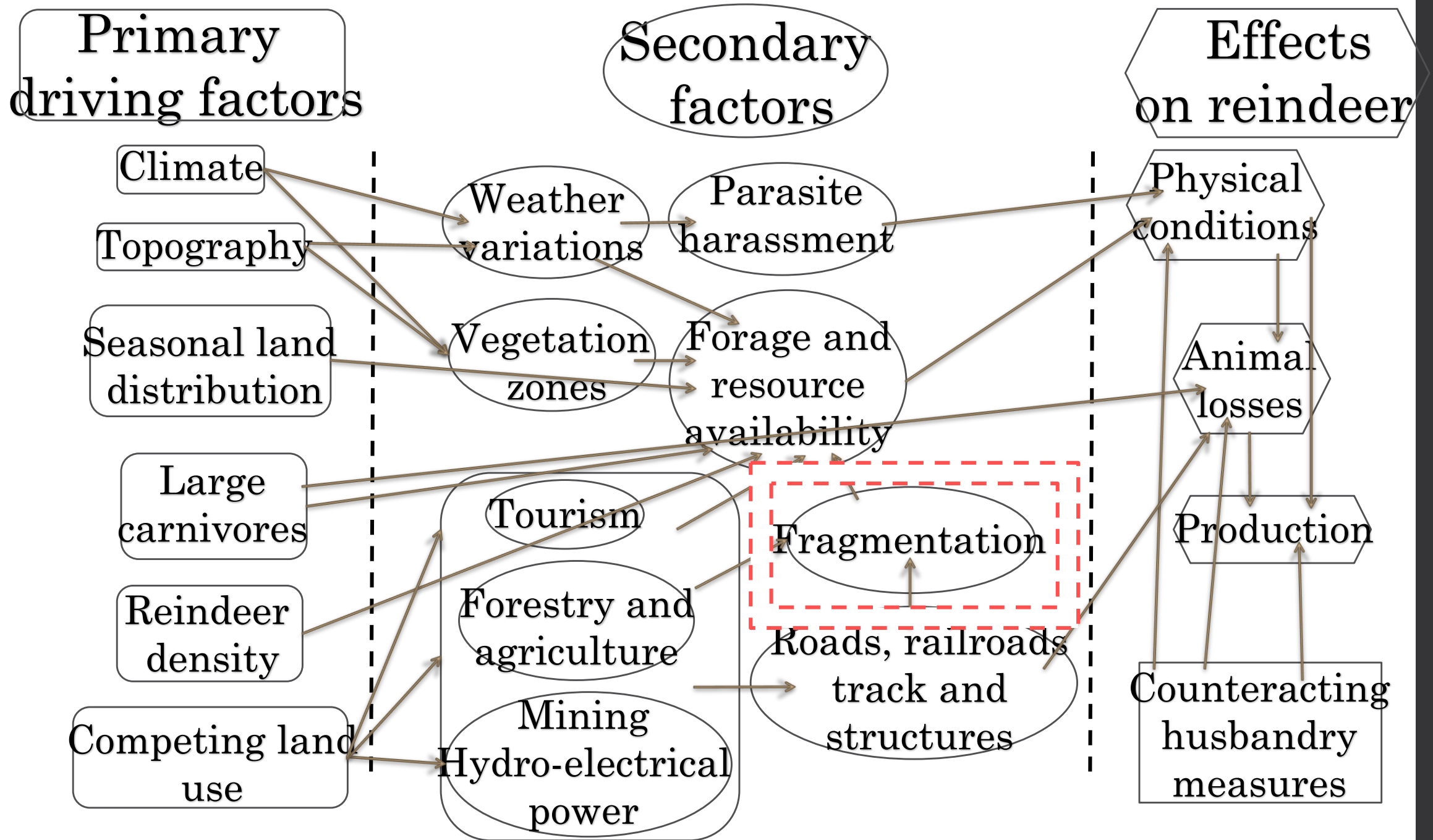
A study case in Swedish Lapland

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The Saami people and reindeer herding

- Last indigenous people of Europe
- 6 500 herders across 4 nations
- 650 000 reindeers
- Lapland/Sapmi: ~ 590 000 km²
- Meat, cheese, jewelry, art



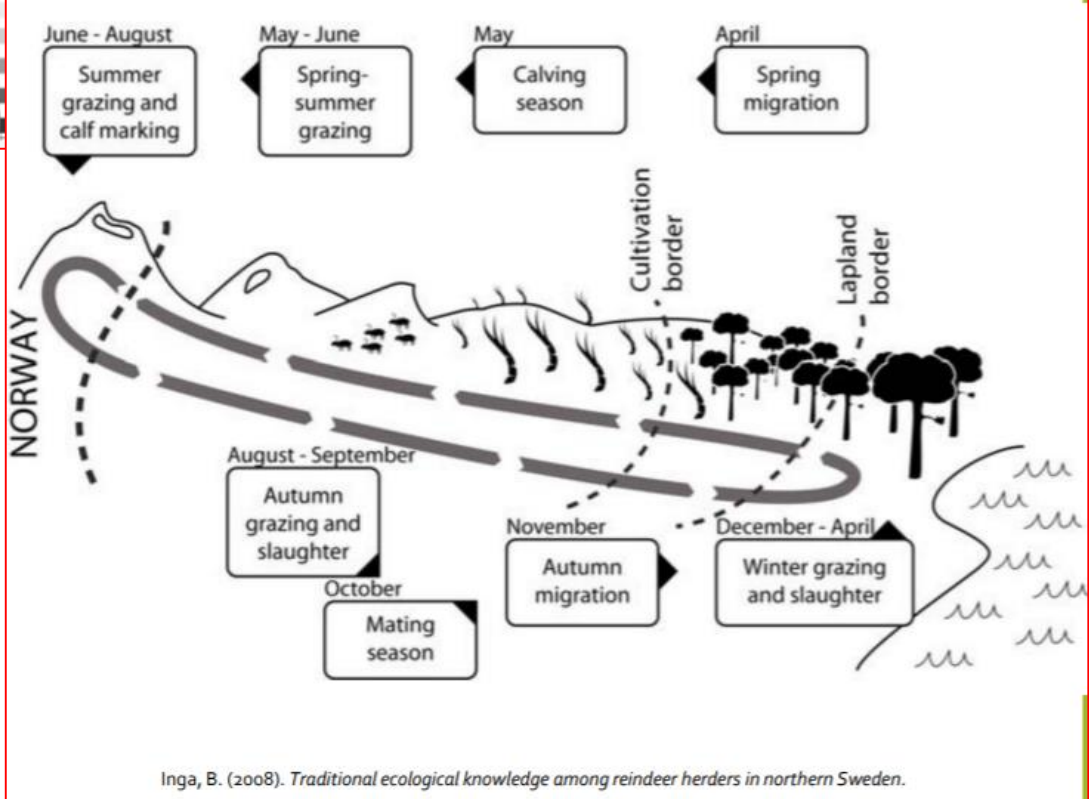
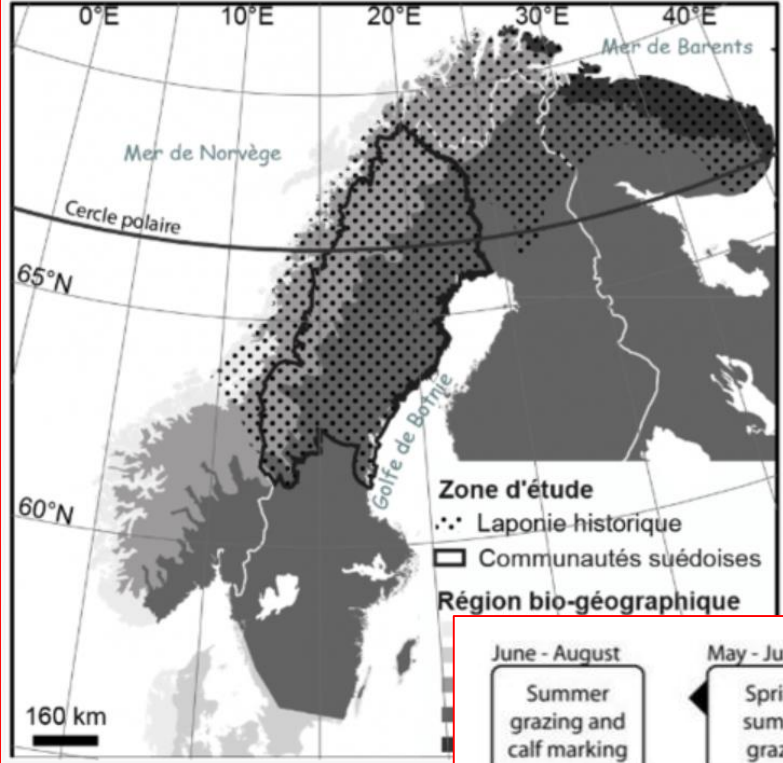


Adapted from Lundqvist, 2003

Swedish Lapland and the fragmentation of its migratory landscapes

- UNEP, 2001: 1/3 of saami ranges affected due to infrastructure development
- Loss of grazing due to : (1) Destruction (2) Obstruction (3) Disturbances
- Juridical consequences: increasing of court cases between herders and industrial

- ⇒ How much reindeer pastures available in 2012?
- ⇒ Which habitats the most impacted ?
- ⇒ What distribution of fragmenting elements?
- ⇒ Vulnerability/resiliency factors? (e.g. social organization; distance to roads; protected areas)



Inga, B. (2008). Traditional ecological knowledge among reindeer herders in northern Sweden.

Material and methods

1) Dataset integration

- Reindeer herders maps : RenGIS 2.0 (Swedish Saami Parliament)
- Land cover map: Corine Land Cover 2012 (European Environmental Agency)
- Roads and rails map (Diva-GIS portal)
- Protected natural areas and World Heritage site maps (EEA, UNESCO)

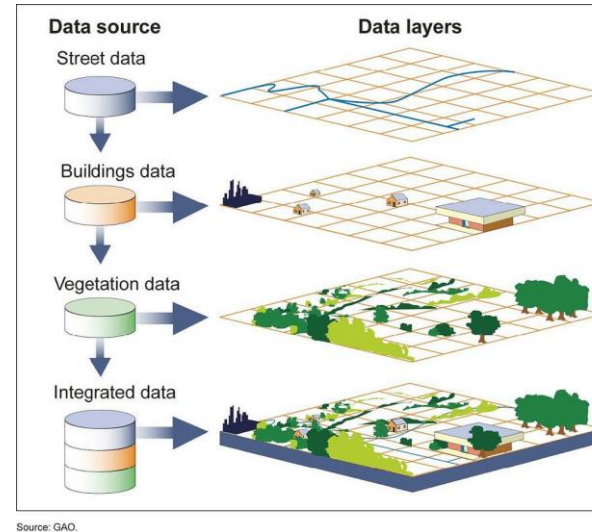
2) Spatial analysis

- Applying thresholds of reindeer' avoidances according to studies and various land covers (distances, buffer zones)
- Crossing land cover maps and fragmented elements
- Crossing reindeer herders maps and fragmented elements

3) Statistical analysis

- Fragmentation and type of land cover: χ^2
- Coefficient correlation + non-parametrical tests

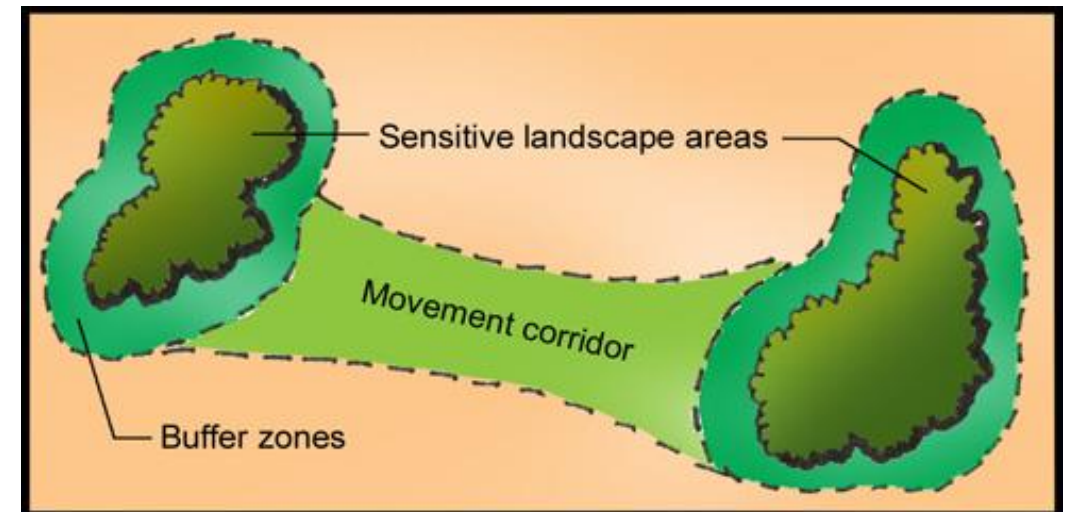
(1) Dataset integration



(3) Statistical summaries

$$\chi^2 = \sum_{i,j} \frac{(n_{ij} - n_{ij}^*)^2}{n_{ij}^*}$$

(2) Spatial analysis



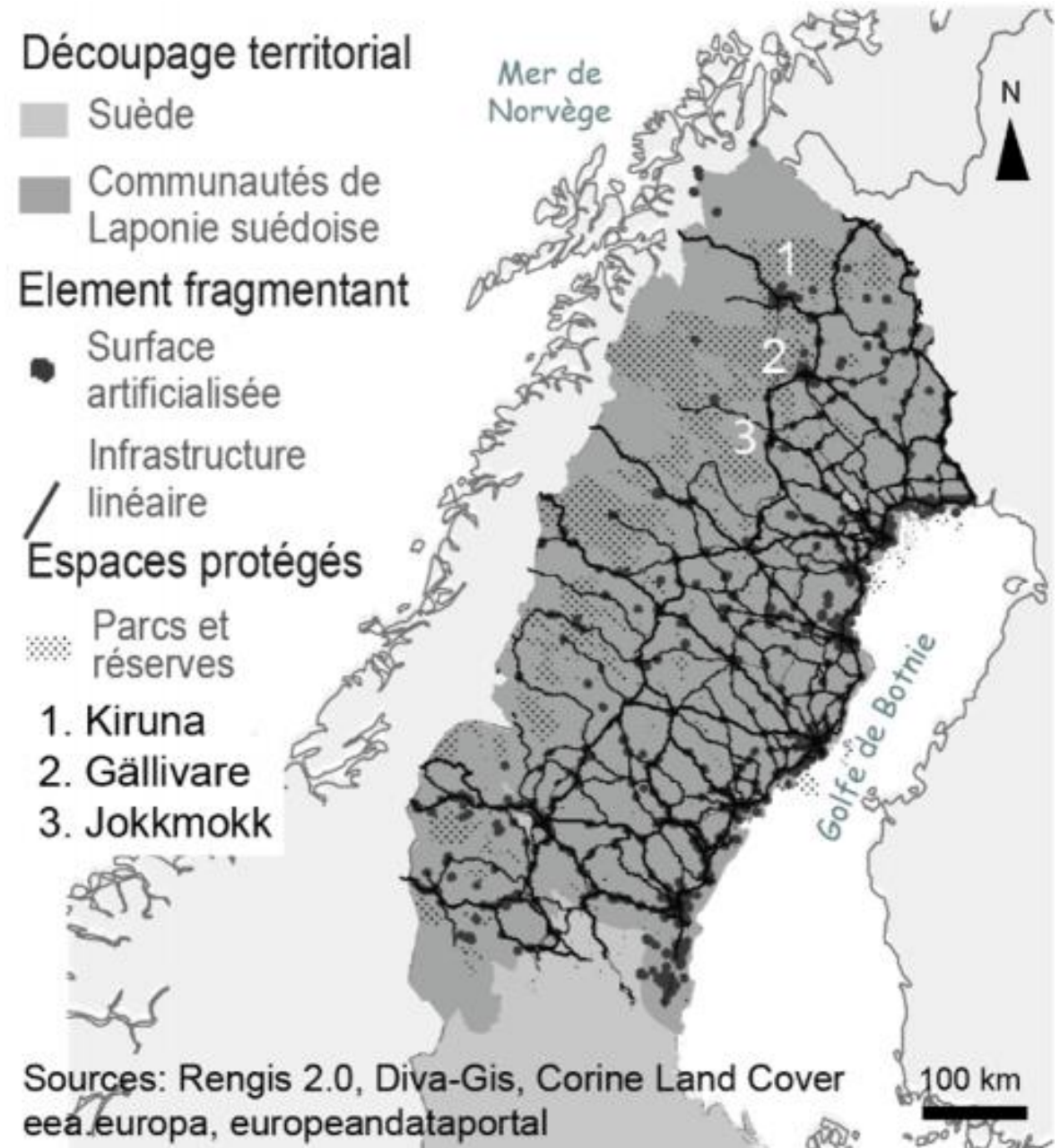
(1) Results : fragmenting elements within Swedish Lapland

⇒ How much reindeer pastures available in 2012?

- 22% of Swedish Lapland is fragmented (e.g. 71 338/330 754 km²)

⇒ Which habitats are the most/less impacted ?

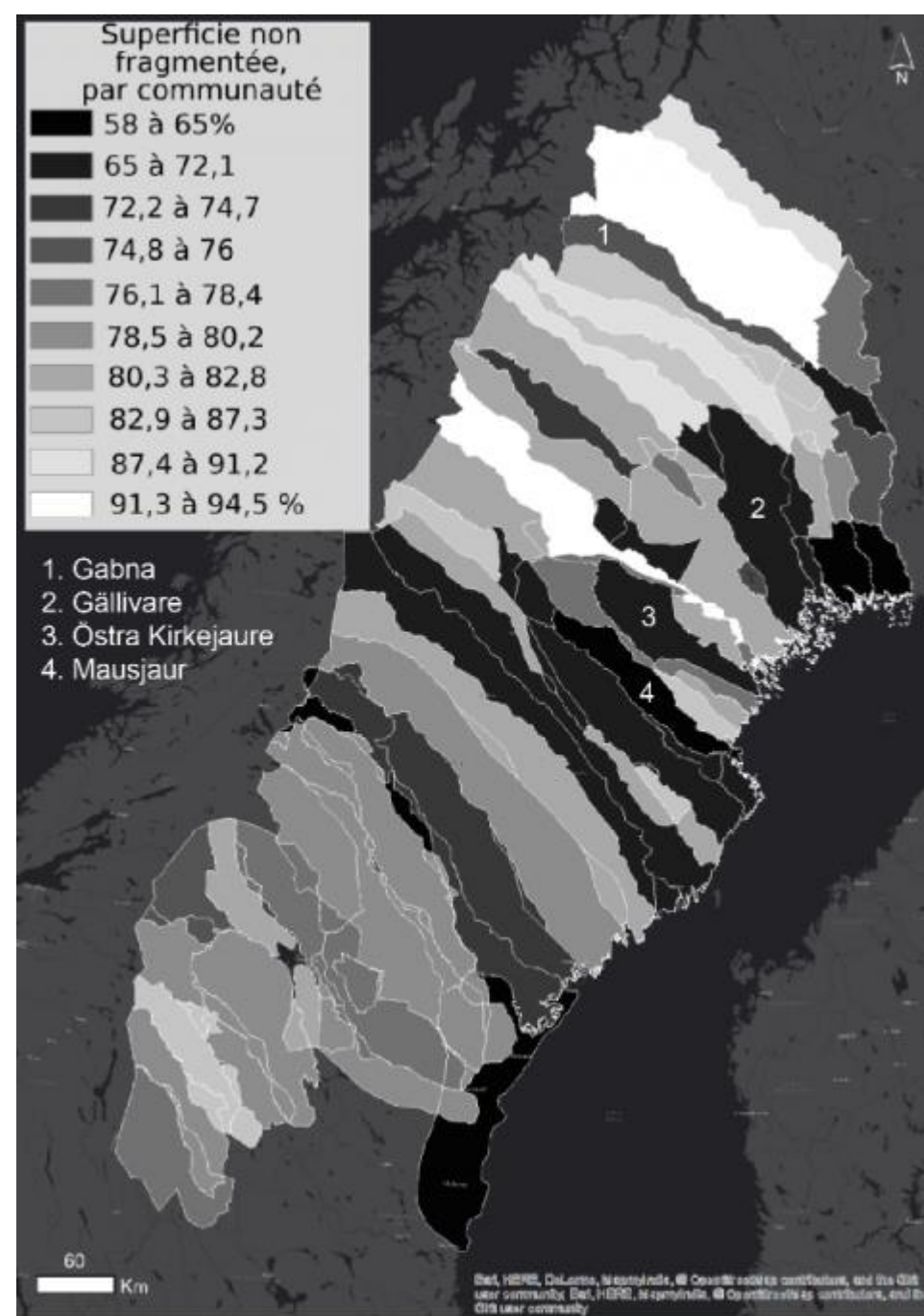
- Coniferous forests (70% of the most fragmented elements)
- Heathlands and natural grasslands (<2% of the most fragmented elements)



(2) Results : geographical factorization

⇒ Vulnerability/resiliency factors? (e.g. latitude/longitude; social organization; distance to roads; distance to protected areas; distance to coastline; herders' social organization)

- Non fragmented landscapes : 58 to 94 % according to the considered herders' community
- Concordance between %protected areas and non fragmented areas
- Concordance between %intensity forests and non fragmented areas
- Statistical opposition between intensely exploited forests (littoral, hinterland) and alpine landscapes



Credits: R. Courault (2017)

5. Conclusion and perspectives

Snapshot of landscape fragmentation in 2012 at the scale of Swedish Lapland

Overall results close to UNEP assessment (33% vs 22% here)

Spatial heterogeneity according to human density, landscapes distribution, resources location

Reproducibility of the method for others indigenous people/regions?



Thank you
for your attention!