

An aerial photograph of a vast, mountainous landscape in Fennoscandia. In the foreground, a large, irregularly shaped area is enclosed by a yellow fence, where a herd of reindeer is grazing. To the right of the fenced area, several small, conical tents are set up, with smoke rising from them, suggesting a camp. The background shows rolling hills and valleys, with a river or stream winding through the landscape. The overall scene is bathed in a warm, golden light, likely from the setting or rising sun.

The future of reindeer husbandry in Fennoscandia under global change

*Jukka Käyhkö
Division of Geography, University of Turku, Finland*

Grazing in a Changing Nordic Region, Reykjavík 12-15 Sep 2016

Perspectives, Ideas, Needs & Policies

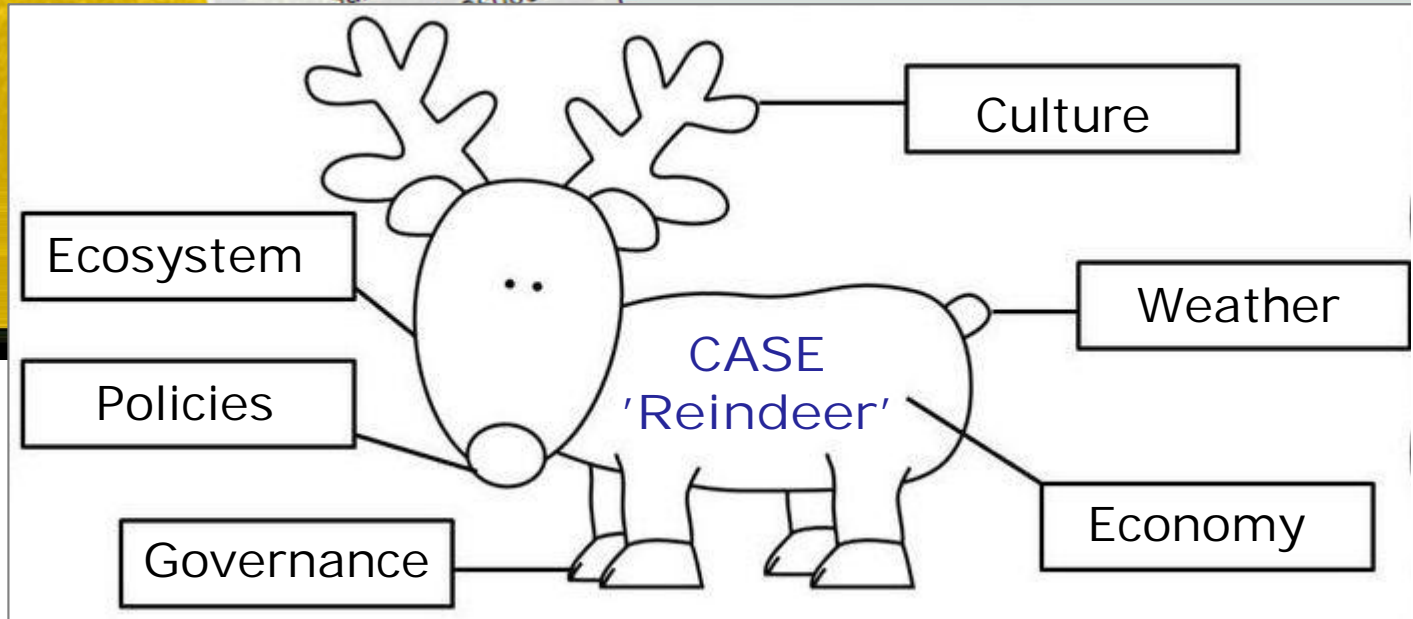
ARE YOU READY FOR
ROUGH DISCUSSIONS?

Taking place
Sept 12-15, 2016

Livestock production and grazing have had a significant effect on ecosystems in the Nordic countries.

These effects range from shaping valuable cultural landscapes to irreversible plant and soil losses.

With a renewed focus on the potential and need for sustainable utilisation of areas suitable for grazing, agricultural management and policies have to take into account aspects other than production volume and efficiency. This includes



Burning issue

How will reindeer husbandry...

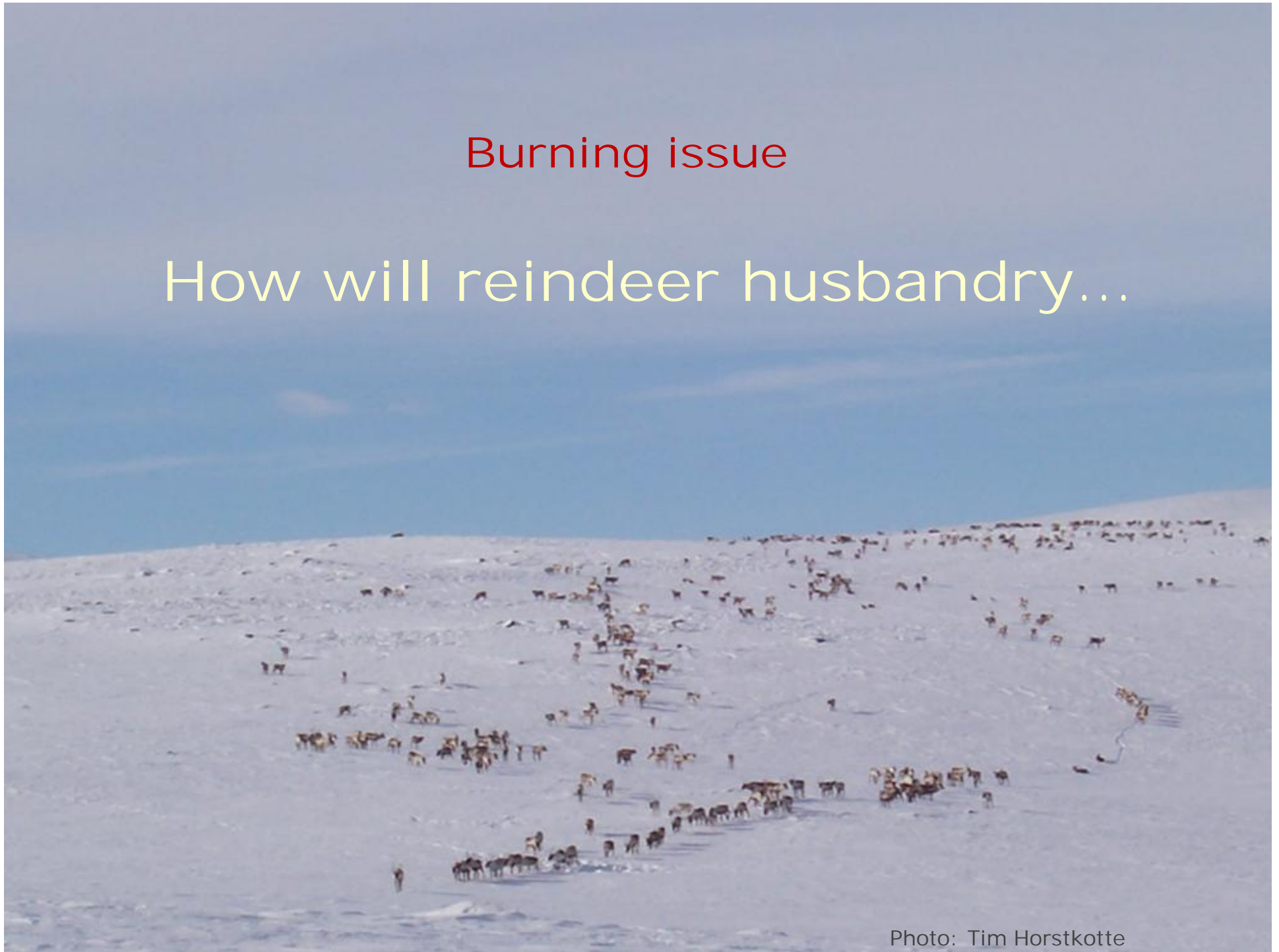


Photo: Tim Horstkotte



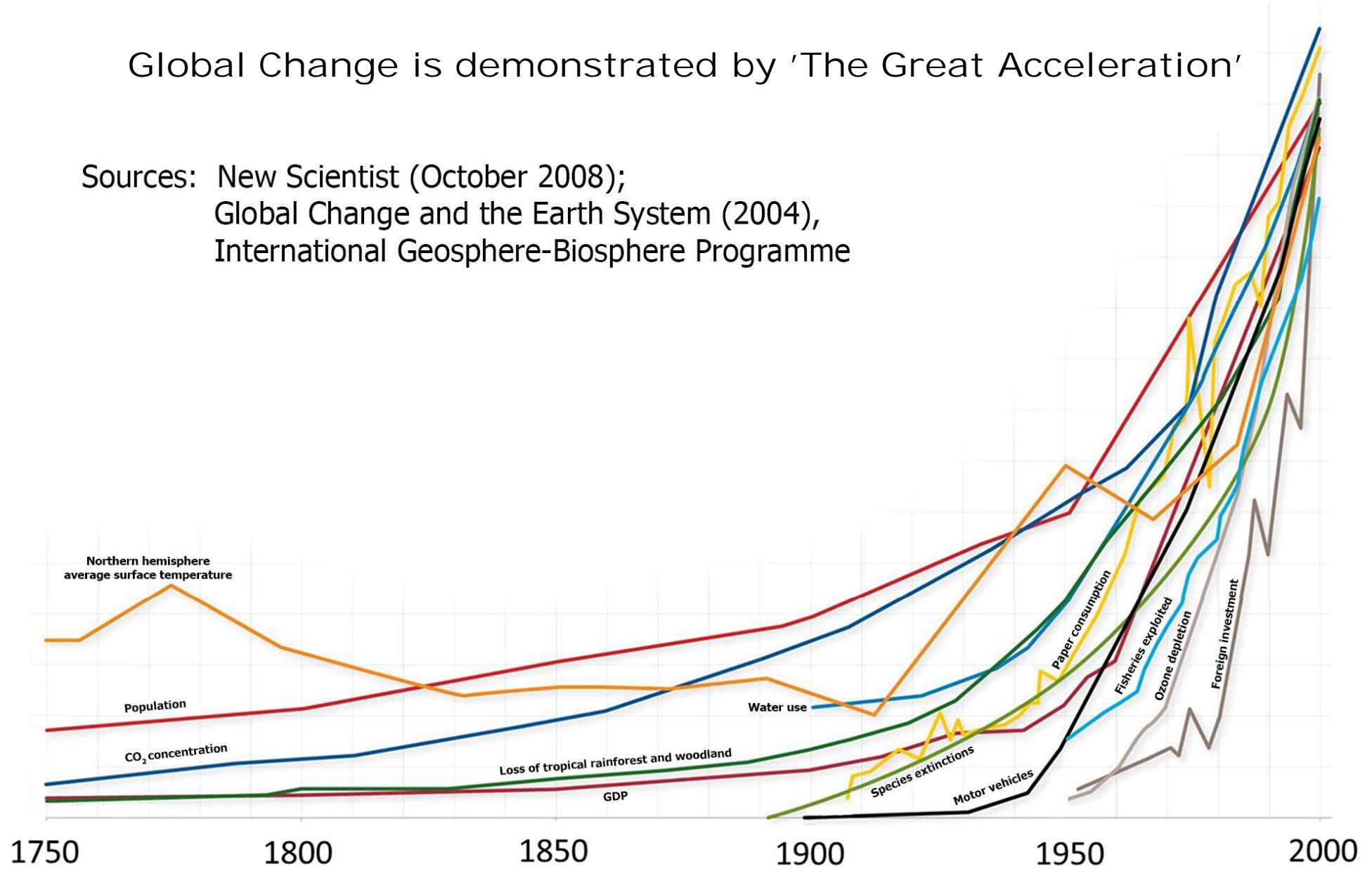
Burning issue

...cope with Global Change?

flightradar24.com 14 Sep 11:40

Global Change is demonstrated by 'The Great Acceleration'

Sources: New Scientist (October 2008);
Global Change and the Earth System (2004),
International Geosphere-Biosphere Programme

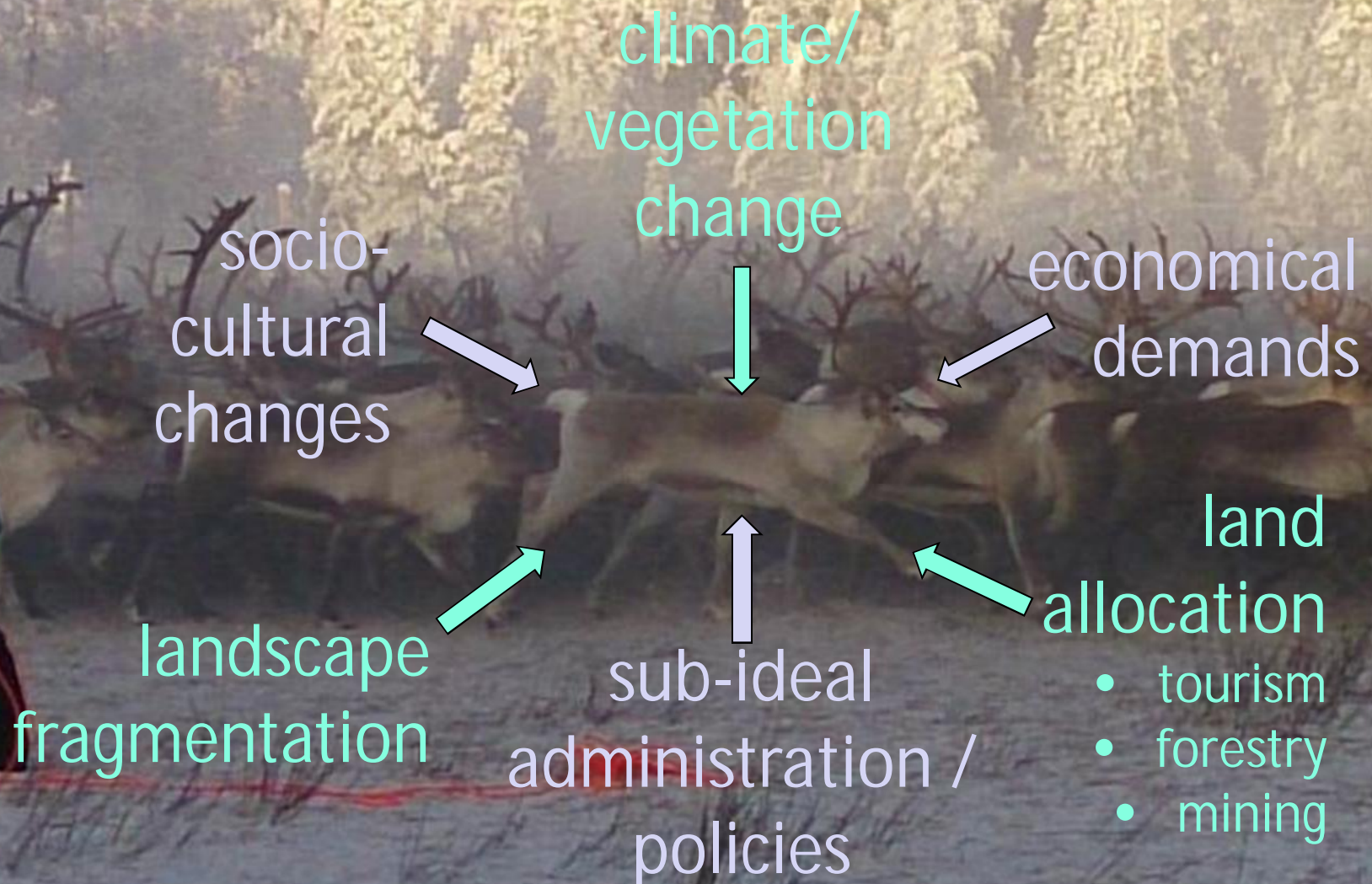


Before: weather and snow conditions were an issue



Photo: Tim Horstkotte

Today, reindeer husbandry is facing a multitude of new challenges



Reindeer husbandry
may also suffer from
'a small PR problem'

- overgrazing
- 'land grabbing'
(from more important
land uses)
- subsidies,
compensations
- internal conflicts

So, are reindeer
for bad or for good?





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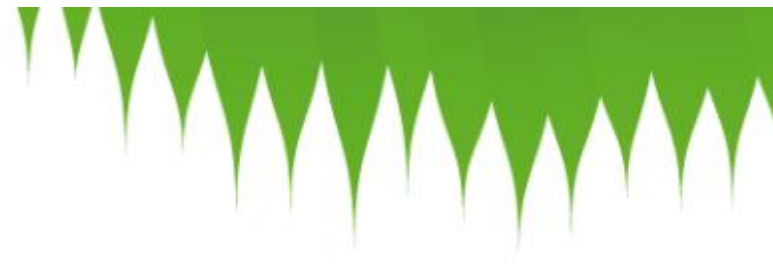
Someone might actually ask, *is there room*
for reindeer husbandry in today's world





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...while someone else reminds, that reindeer husbandry is one of the corner stones of indigenous Sámi culture



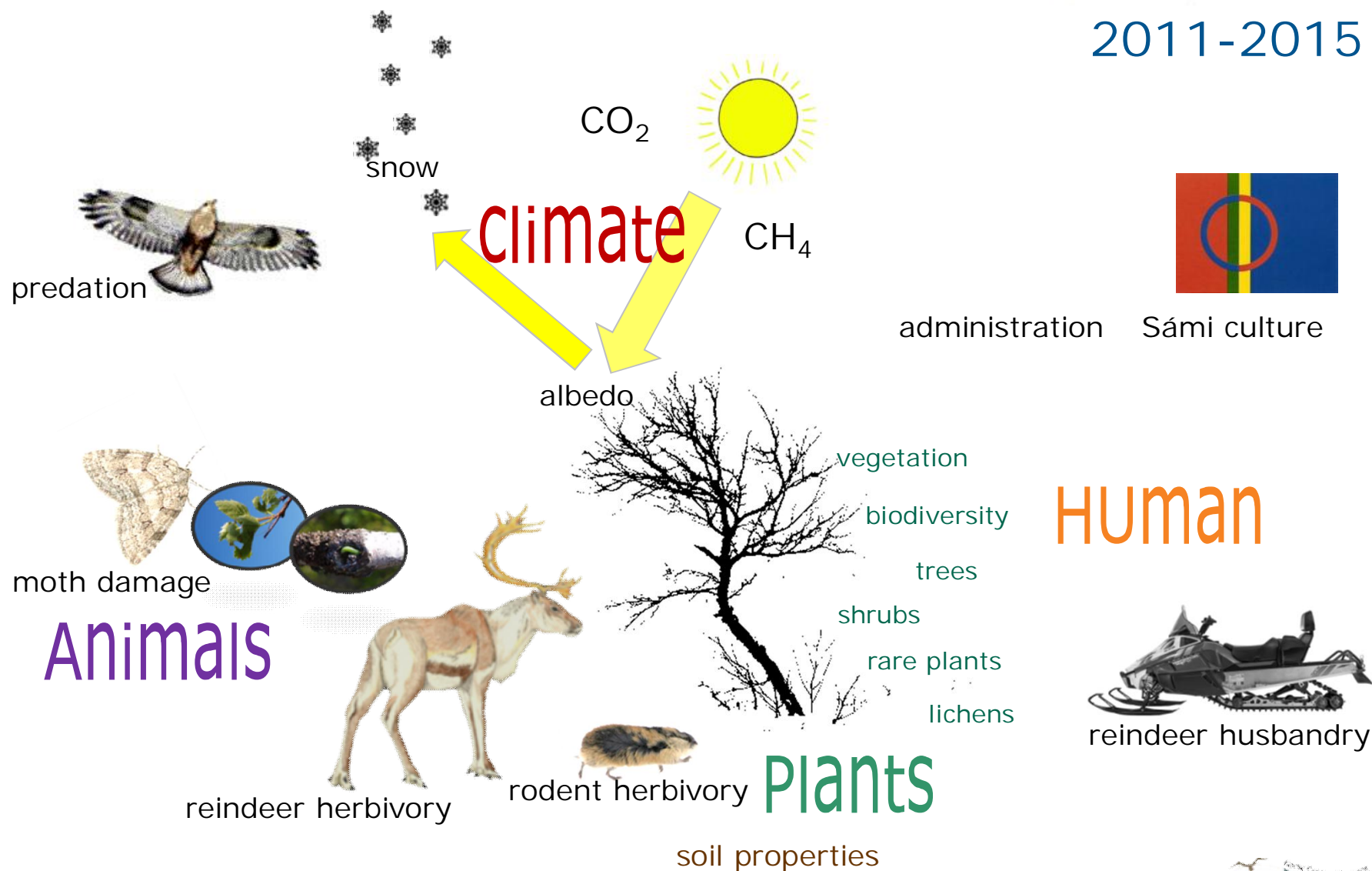


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Nordic Centre of Excellence 'Tundra'

2011-2015



Data



Information



Knowledge

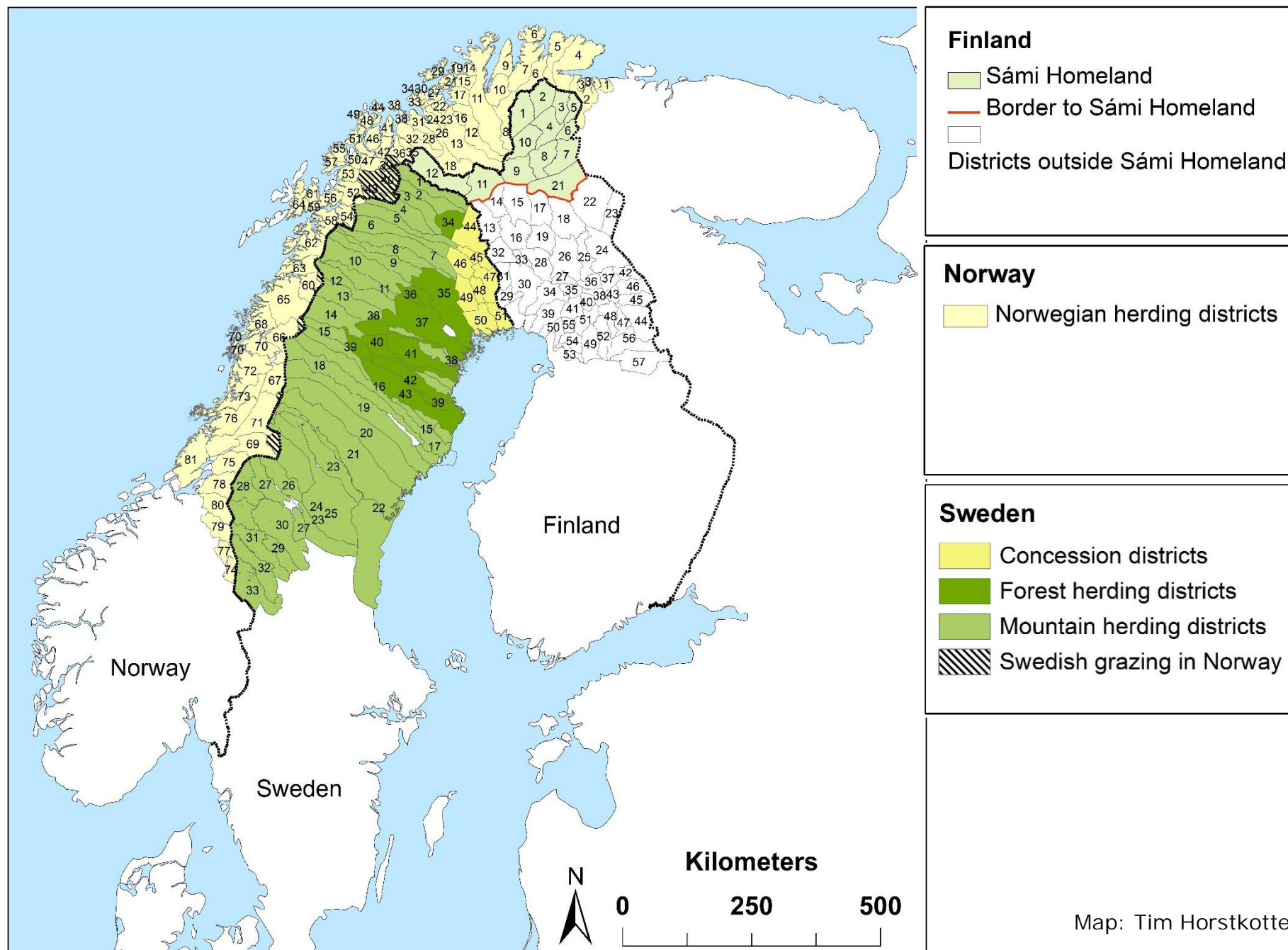


Understanding



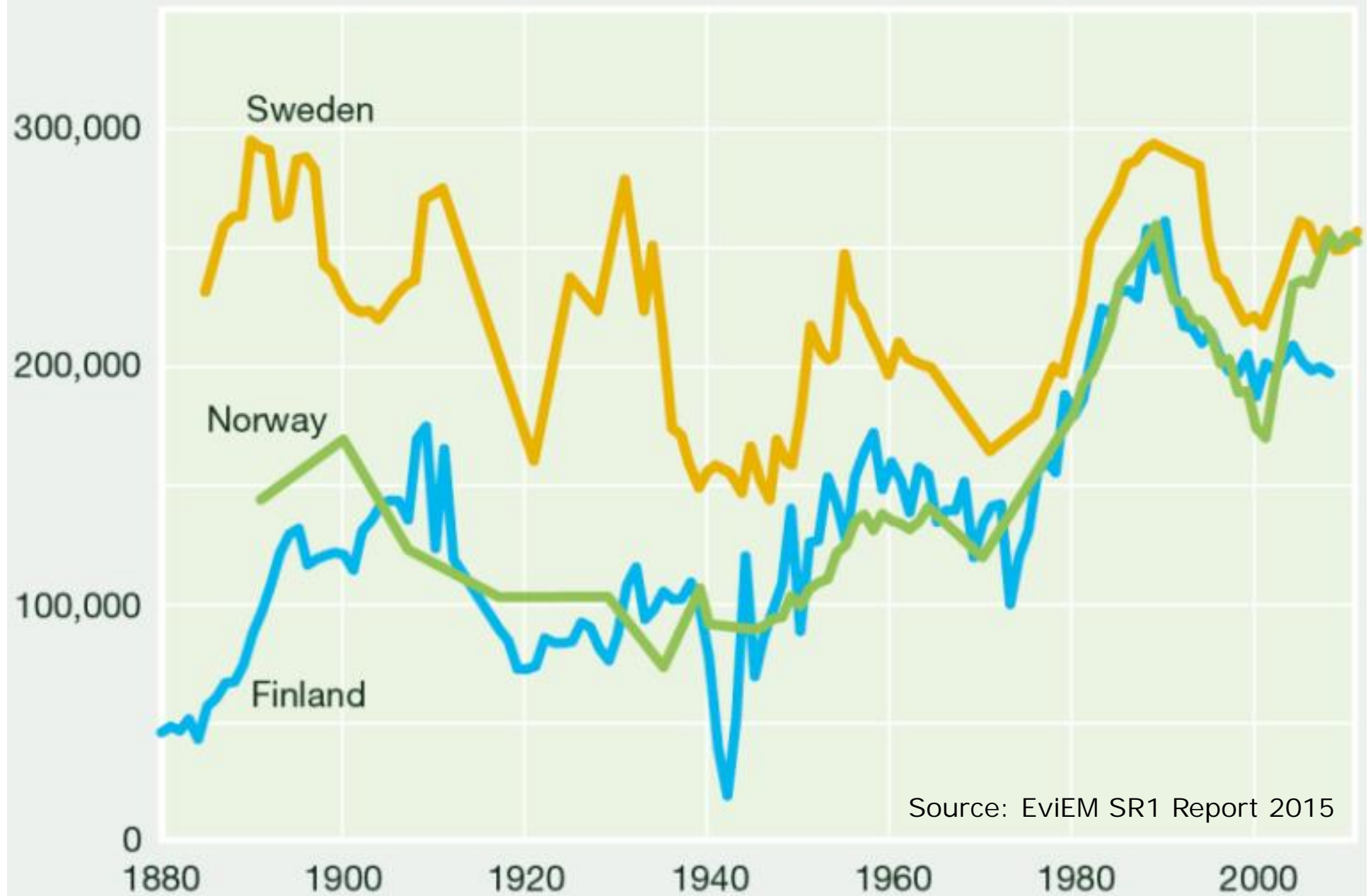


Reindeer Herding Districts in Northern Fennoscandia



Map: Tim Horstkotte

Reindeer numbers in Fennoscandia

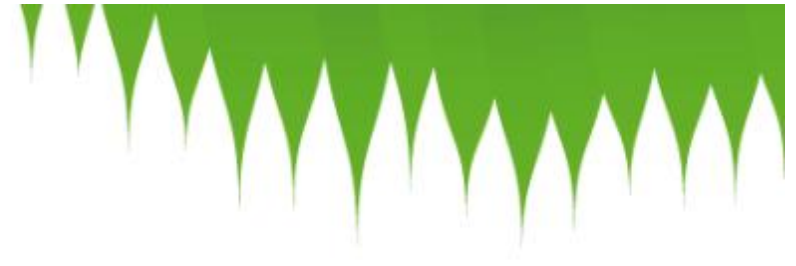


Source: EviEM SR1 Report 2015



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Looking for bonuses:

Spatio-temporality of grazing

optimization of herding practices may
potentially offer a tool for 'bioengineering'

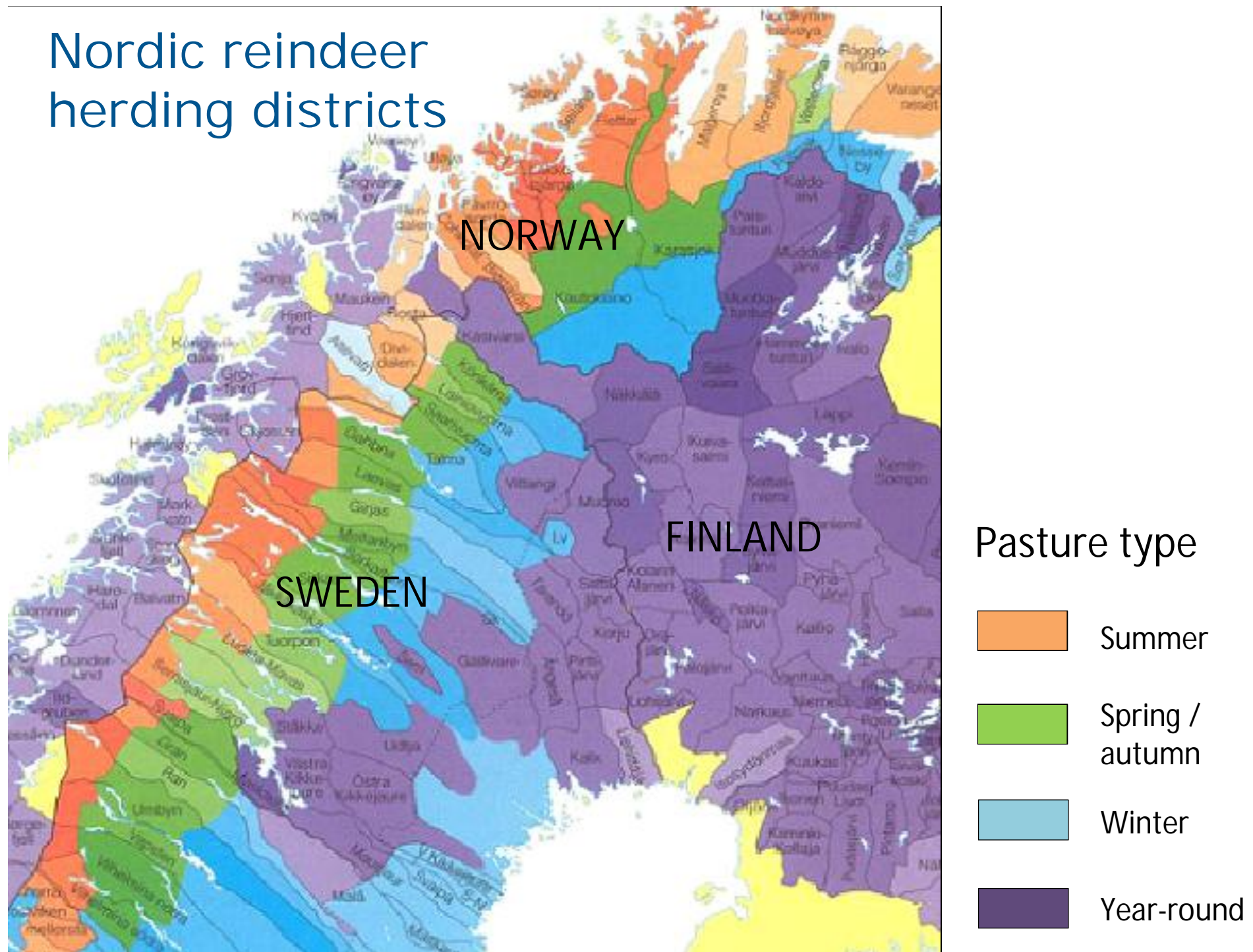
...as spatial timing of grazing has a strong
impact on vegetation



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Nordic reindeer herding districts





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Norway has higher annual average
reindeer densities,
but pasture rotation
-> land is a winter pasture only

Finland: year-round pasture
few *Betula* trees

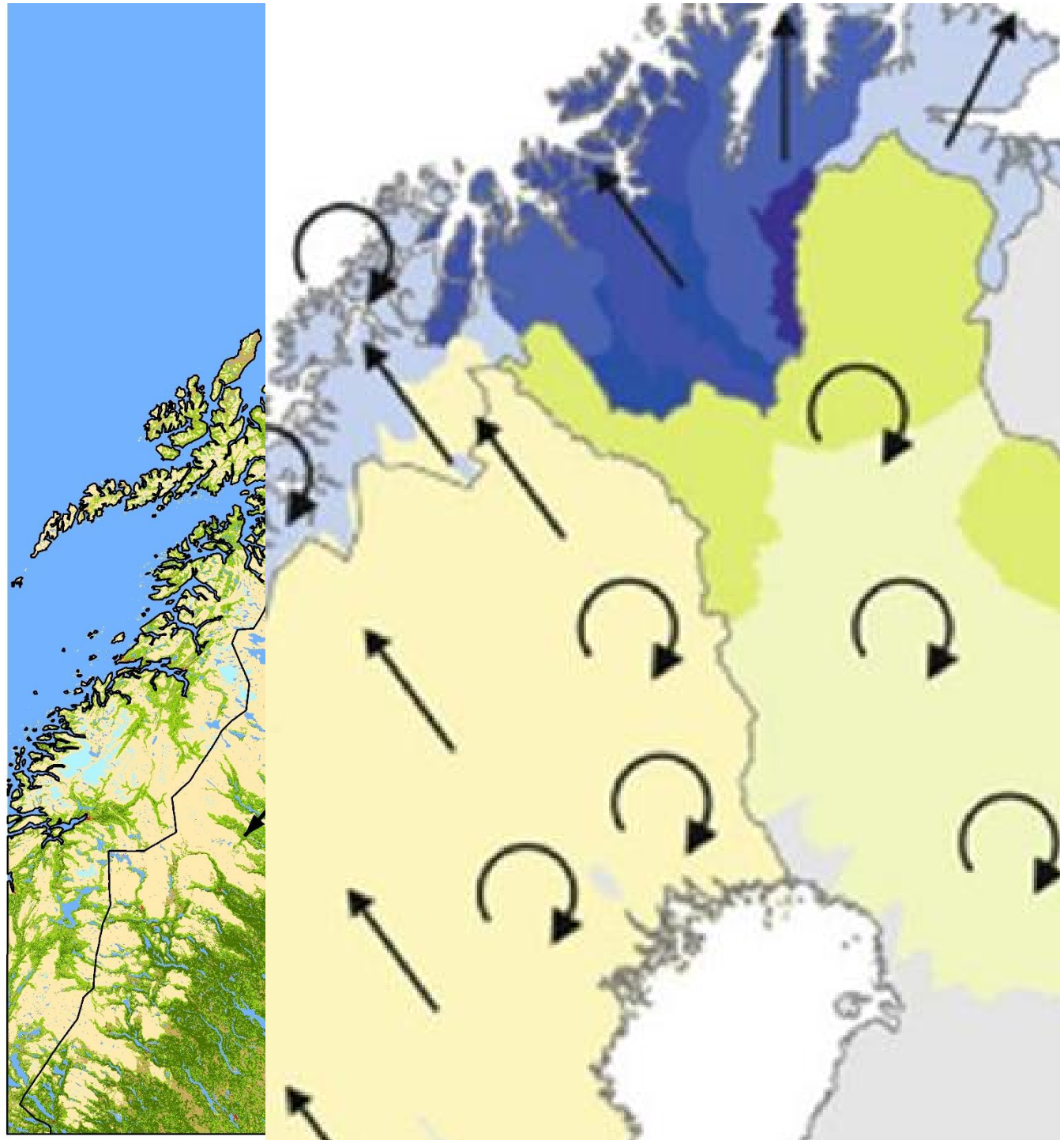
Norway: winter pasture
dense *Betula* forest

National border +
reindeer fence



Dislocation of Northern Sámi families after the border closure in 1889

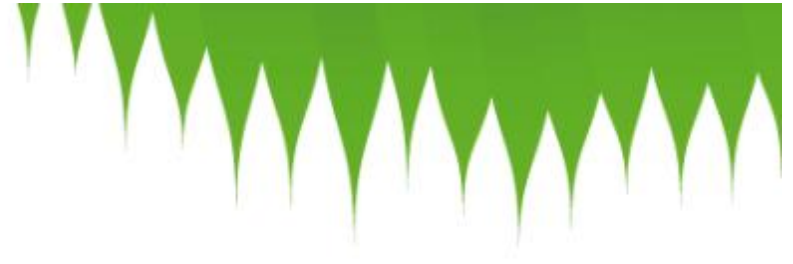
- Limited possibilities for migration between seasonal grounds





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Looking for bonuses:

Climate change mitigation

Sustaining the tundra keeps spring time albedo high

--> a potential climate mitigation tool



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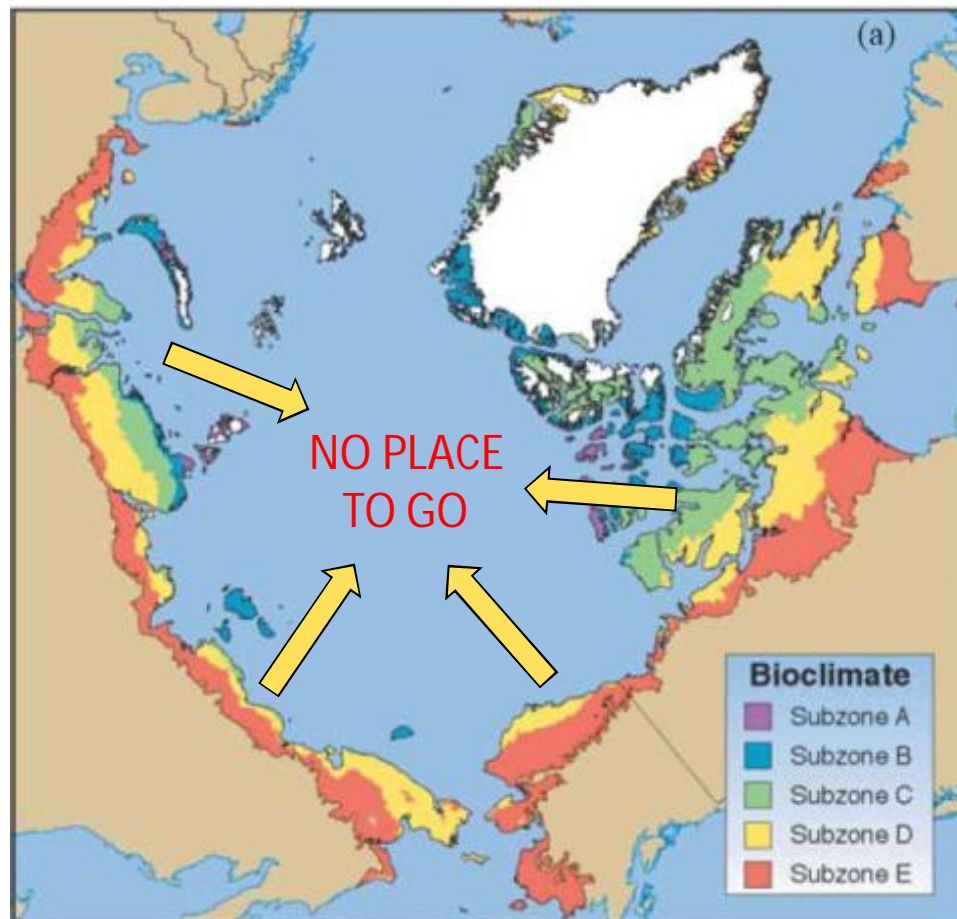




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The circumpolar tundra ecosystem has no escape in warming climate



Losing the tundra has global relevance:

- Biodiversity
 - *The whole biome would be lost*
- Climate
 - *Decreasing albedo would enhance global warming*

Map: Walker et al. *J. Veg Sci* 16, 2005



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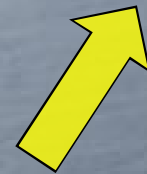




Trees – dark, **absorption**



No trees - pale white snow, **reflection**





Effect of reindeer grazing on snowmelt, albedo and energy balance based on satellite data analyses

Juval Cohen ^{a,*}, Jouni Pulliainen ^a, Cécile B. Ménard ^a, Bernt Johansen ^b, Lauri Oksanen ^c, Kari Luojus ^a, Jaakko Ikonen ^a

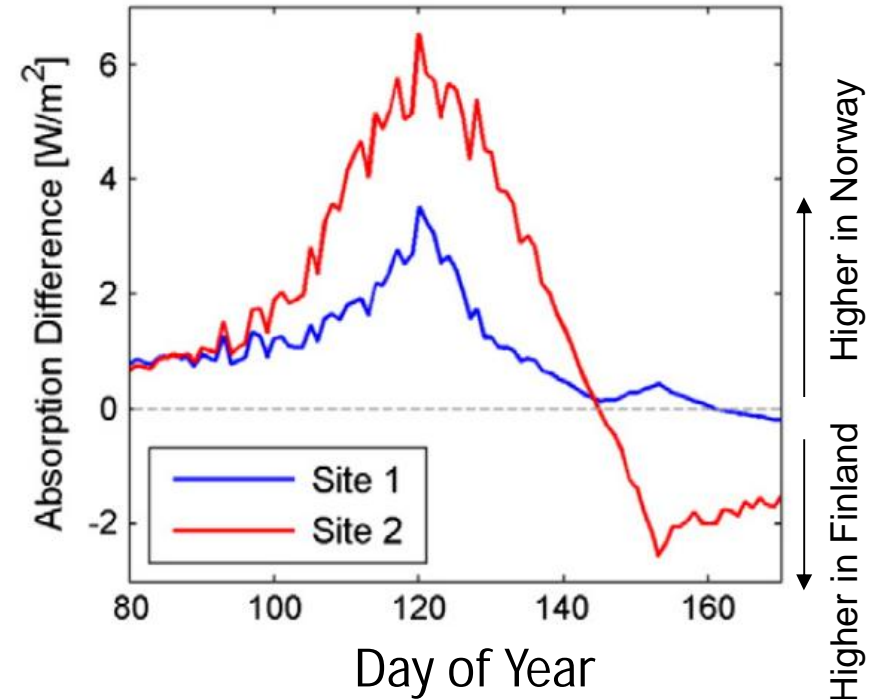
^a Finnish Meteorological Institute, PL 503, 00101 Helsinki, Finland

^b Northern Research Institute, Postboks 6434 Forskningsparken, 9294 Tromsø, Norway

^c University of Turku, FI-20014 Turku, Finland

Norway: winter pasture, dense *Betula* forest
-> lower albedo -> more absorption

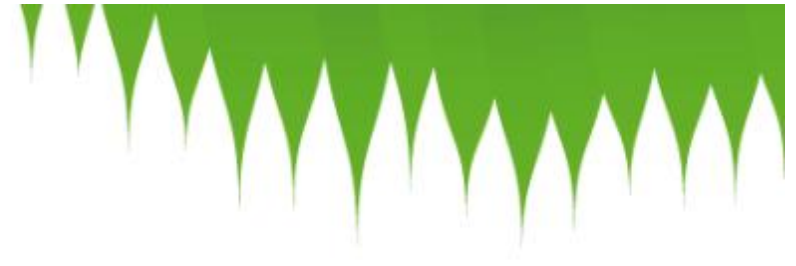
Finland: year-round pasture, few *Betula* trees
-> higher albedo -> less absorption





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So, reindeer can inhibit tree growth by grazing, and this is beneficial if managed wisely, but how about ...

Socio-cultural aspects – the everyday life?

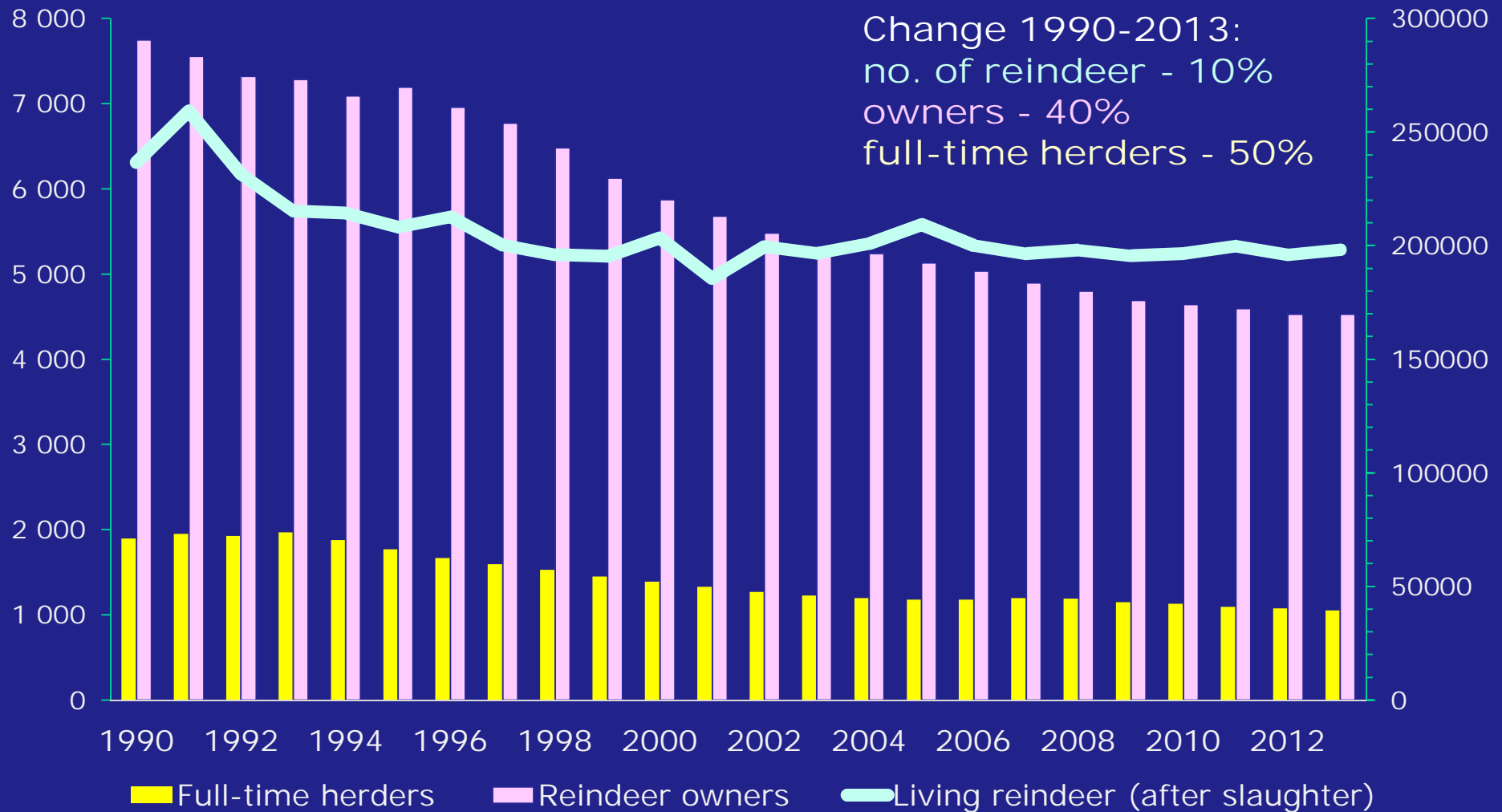
--> How to implement grazing practices as a management tool to sustain the ecosystem plus the livelihood, and mitigate climate?



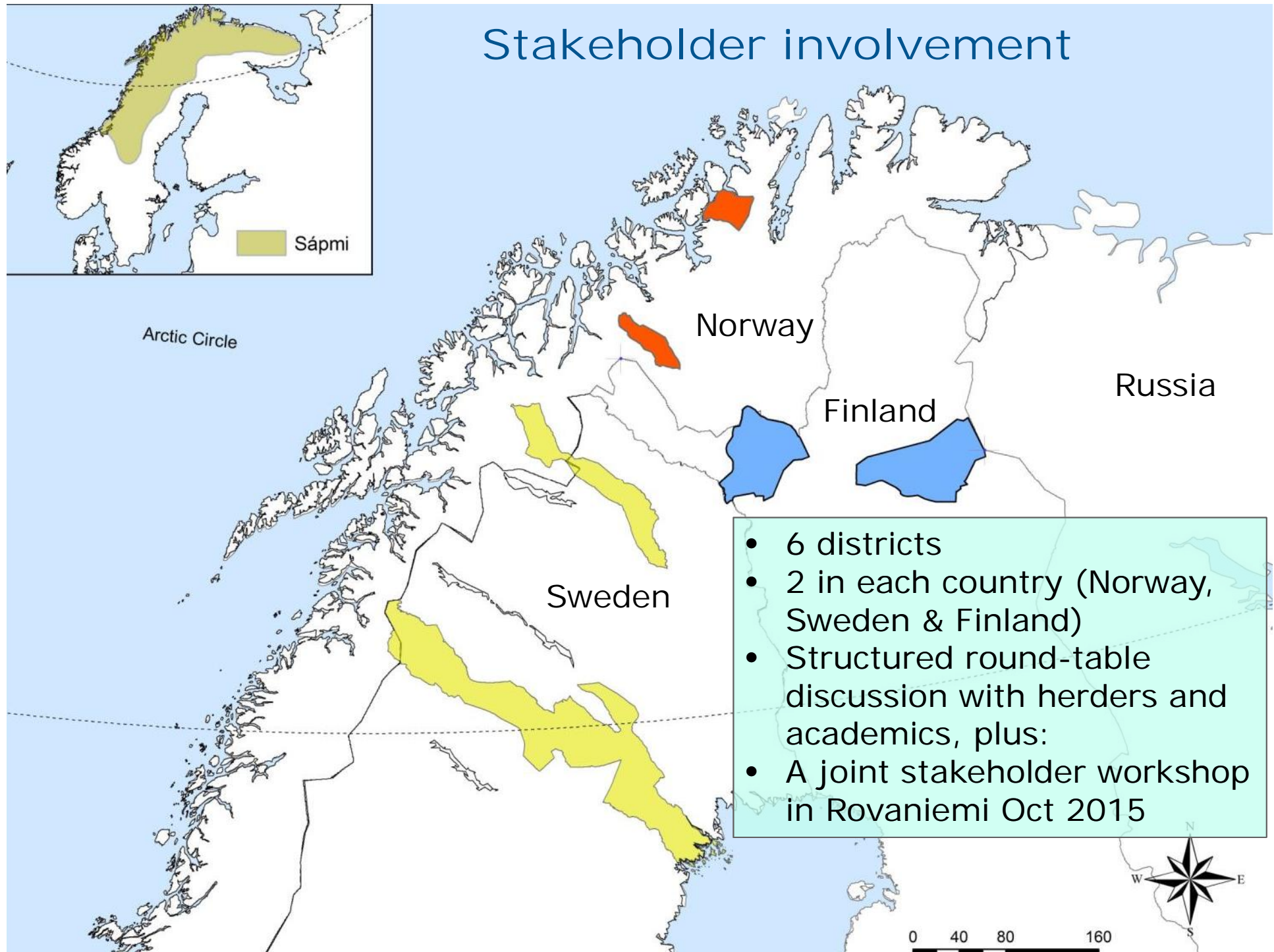
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Number of reindeer owners and full-time herders (left axis)
and living reindeer (right axis)
in Finland 1990-2013



Stakeholder involvement



Landscape has multiple values, priorities and practices



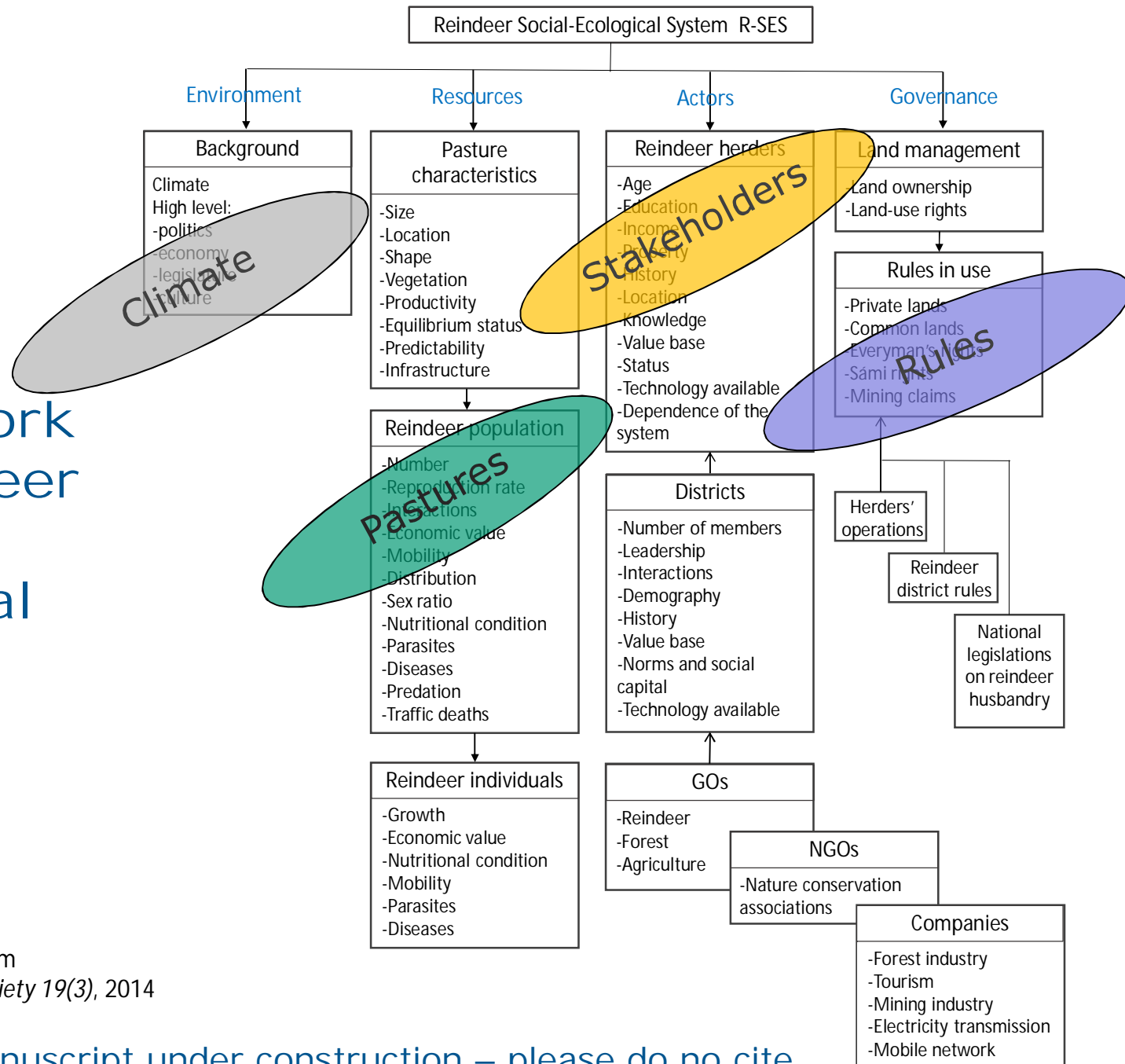
Understanding stakeholder standpoint is crucial



KEY MESSAGES FROM HERDERS:

- Yes, changes are happening
- Most changes are negative (not all)
- We can adapt (always have)
- Young generation is willing to continue
- Other land uses disturb herding
- Lack of self-governance is a serious bottleneck
- More stakeholder discussion needed

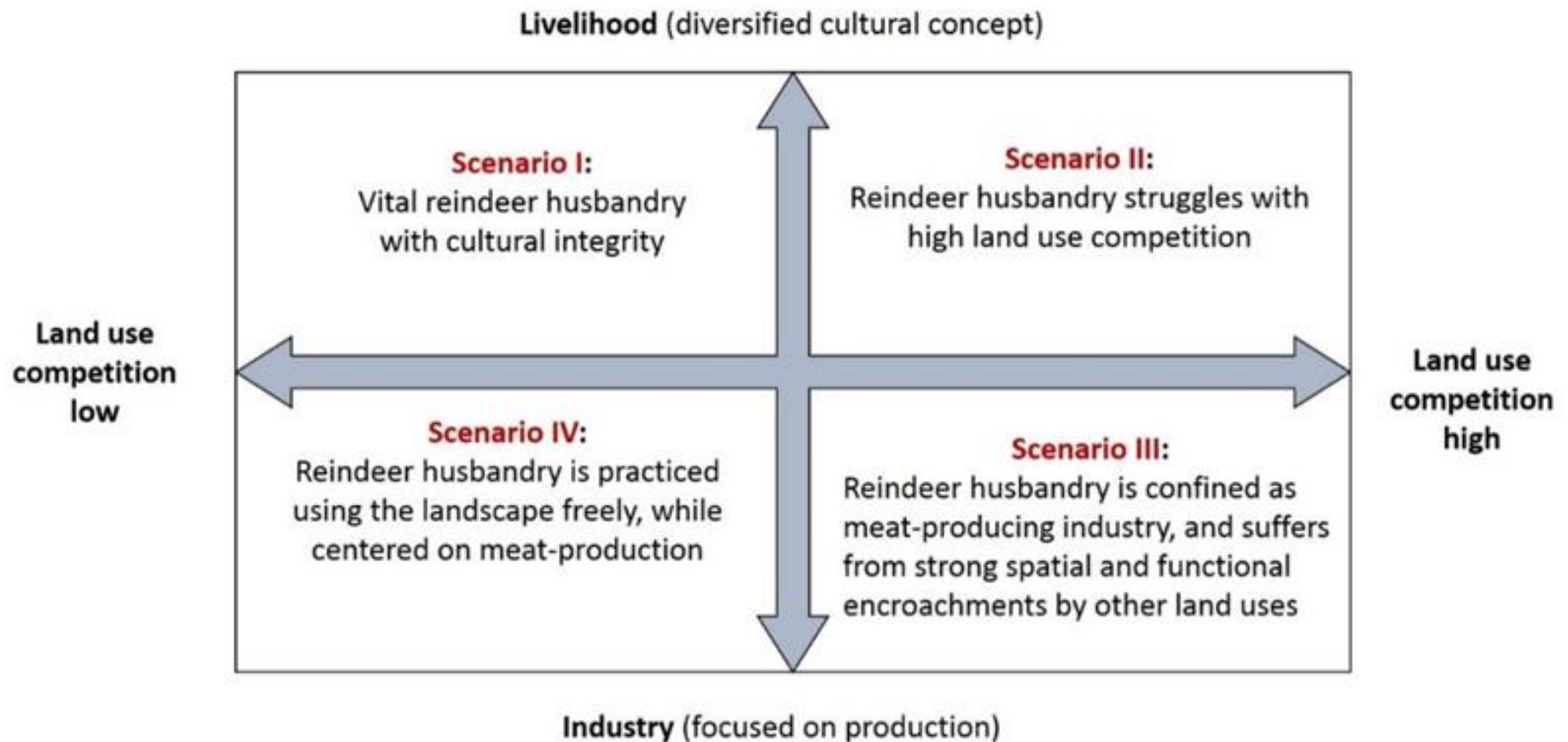
A framework of a Reindeer Social-Ecological System (R-SES)

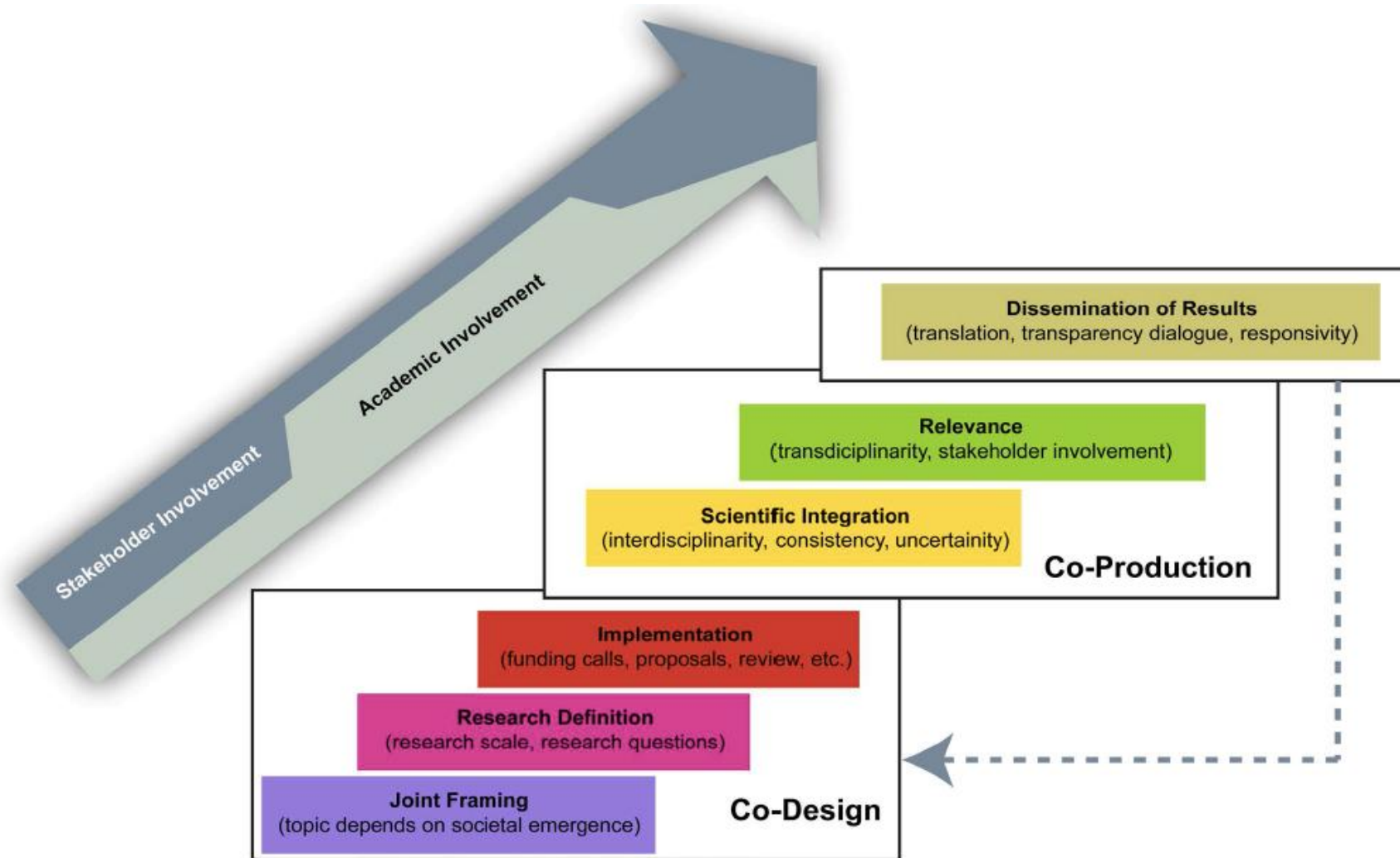


Modified to reindeer SES from
Hinkel et al. *Ecology and Society* 19(3), 2014

NCoE Tundra; manuscript under construction – please do not cite

Four reindeer husbandry scenarios built upon **cultural** and **land use** dimensions





STAKEHOLDERS: Scientists from different fields, decision makers and their assistants, citizens, NGOs, private sector, media



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Conclusive remarks (many co's on the list 😊)

- Consider and collect together stakeholders
- Co-design a vision of future reindeer husbandry
- Co-define scenario(s) of desired development
- (Appreciate diversity and contrasting views [democracy])
- Co-consider and co-decide what needs to be researched;
ecosystem functions, admin bottlenecks, no-regrets policies,...
- Appreciate temporal and spatial scales
- Co-produce results
- Co-implement findings in policy
- Co-review, continue as necessary



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NCoE Tundra Partners



ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE



Thank you!



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