

Sustainable and resilient reindeer husbandry in an increasingly uncertain world: A comparative analysis with yak husbandry in Tibetan plateau

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Photo: xtreme-Everest.co.uk

Background and aim of the study

- **Yak husbandry in Tibetan plateau** and **reindeer husbandry in Finland** need various policies and adaptation measures to cope with changes
 - Globalisation, climate change, land use change etc.
- These **social-ecological systems** are geographically distant, but socially and ecologically in many ways similar
- Our objective is to improve understanding of complexities and uncertainties related to changes in SESs to **inform policy and management**



Photo: Jonathan Kringle



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Photo: Mia Landauer

Approach

- Social-Ecological Systems (SES) framework (McGinnis and Ostrom 2012)
- **Comparative analysis:**
 - Resources
 - Governance, actors
 - Socio-economic
 - Land use change
- Identification of possibilities to **integrate traditional knowledge** with science in a **case study** context
- Material: Scientific literature, remote sensing data, field surveys and interviews with herders, workshop notes



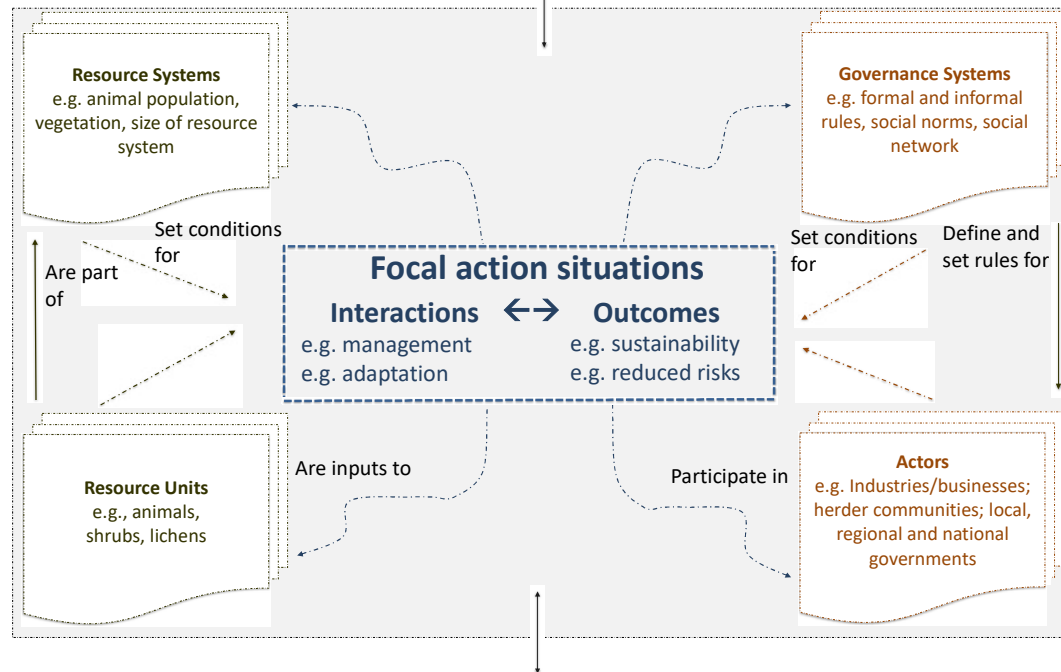
Photo: Mia Landauer



Photo: Gerfried Pongratz

Socio-Ecological System Framework

Climatic and environmental changes
e.g. climate patterns, environmental degradation patterns



Social, economic and political settings
e.g. economic development, demographic trends, markets, technology

Adapted from Ostrom (2009) and McGinnis and Ostrom (2014)

Photos M. Landauer and unknown

The two Social-Ecological Systems: yak and reindeer husbandry

- Yak herding in Yushu, China

- Reindeer herding in Finland

Yak (*Bos grunniens*)

Related to cattle

Himalaya region of southern Central Asia, the Tibetan plateau and Mongolia and Russia



Reindeer (*Rangifer tarandus*)

Related to deer

Native to Arctic, subarctic, tundra, boreal and mountainous regions of northern Europe, Siberia and North America

Reindeer husbandry area in Finland

- 36% of the area of Finland
- Sparsely populated area*
- ~ 200,000 reindeer
- 54 herding cooperatives
- ~ 4,500 reindeer herders
- ~ 20% of herders are indigenous Sámi



*Finland 338,424 km², 5.5 Million inhabitants



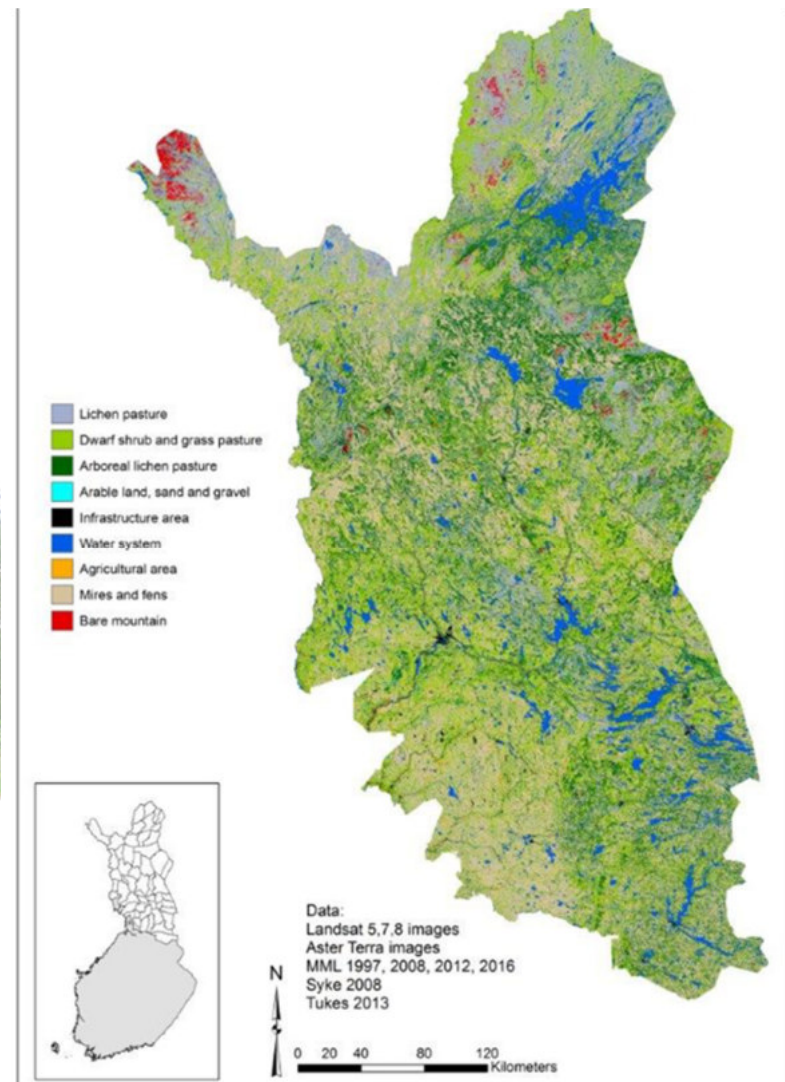
Reindeer pastures in Finland



- Forest, mire and fell pastures, including nature reserves and national parks



Photos: Mia Landauer

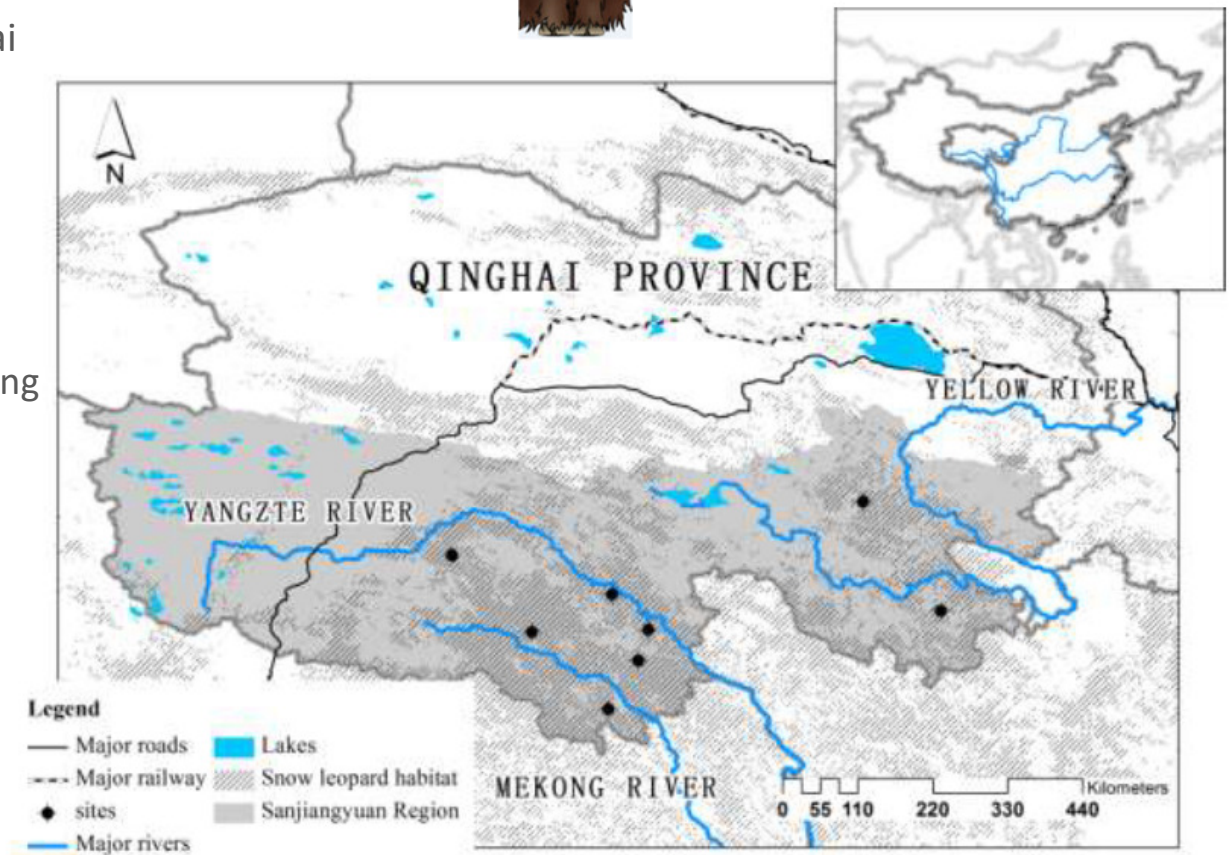


Yak husbandry area in Yushu, China

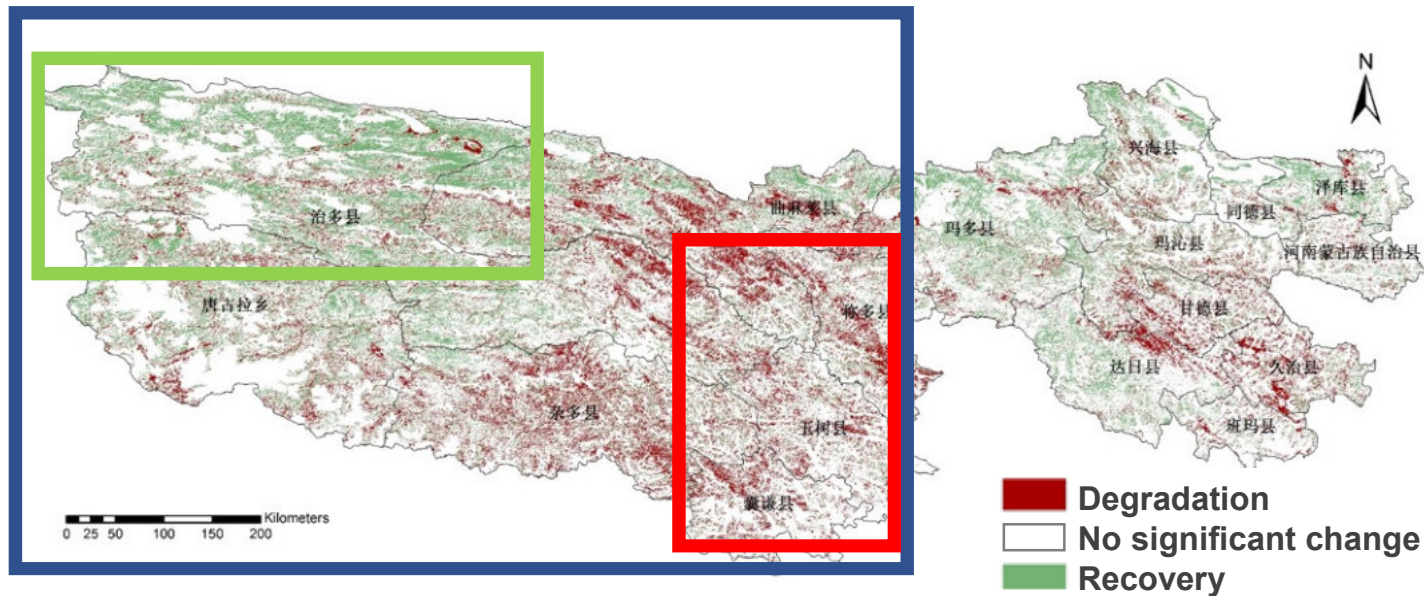


- Part of Sanjiangyuan in Qinghai province of China
- ~267,000 km²
- 1.95 Mio yaks
- 4,000-5,000 herder households
- Lifestyle change
 - Nomadic pasturing decreasing

*approx. 400,000 people in the area
(99% Tibetans)



Yak husbandry pastures in Yushu, China



Vegetation change (measured by EVI – Enhanced vegetation index) 2000-2016

- Study Area: Yushu Autonomous Prefecture
- “Eastern Three Counties”: alpine meadow and shrub, with higher grassland production, higher population, higher livestock density and longer grazing history
- Hoh Xil Protected Area and World Heritage site: Wilderness

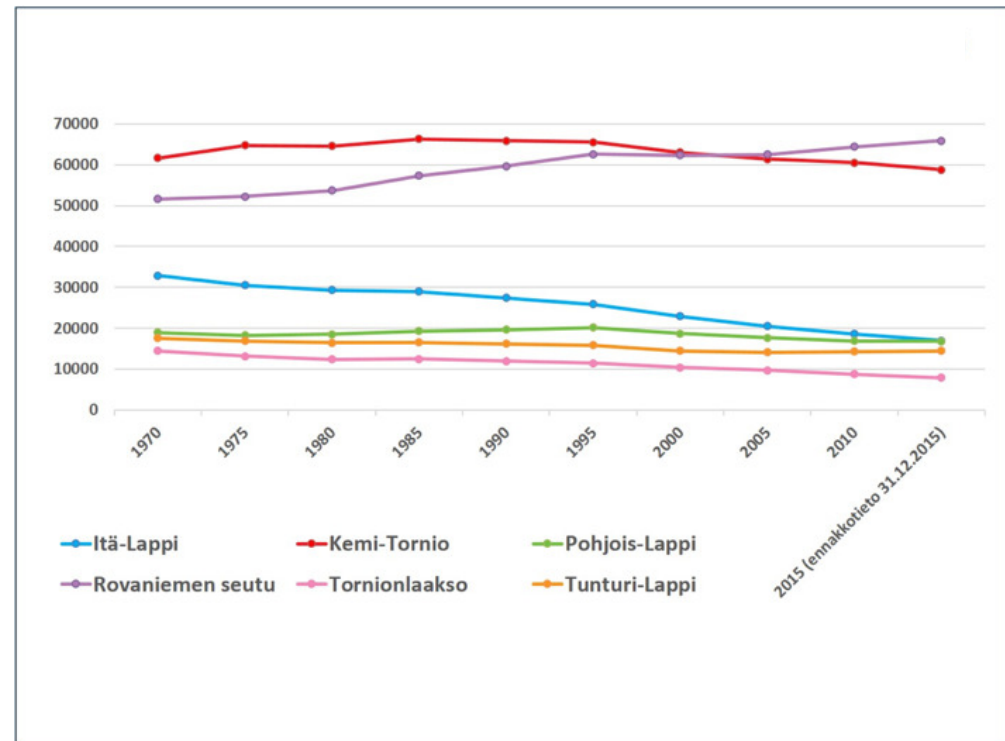
Human population change: comparison



The Yushu Tibetan Autonomous Prefecture 1950-



Lapland region 1970-



Source: Lapin liitto / Statistics Finland

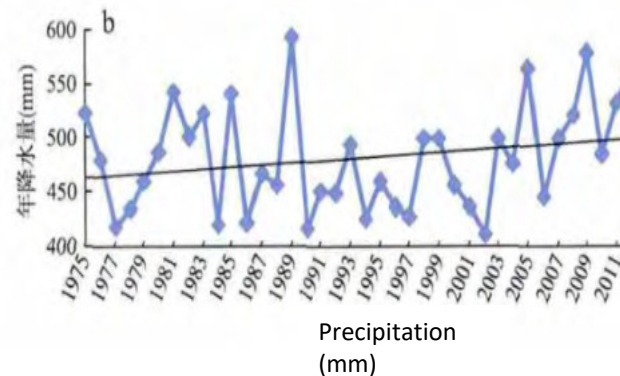
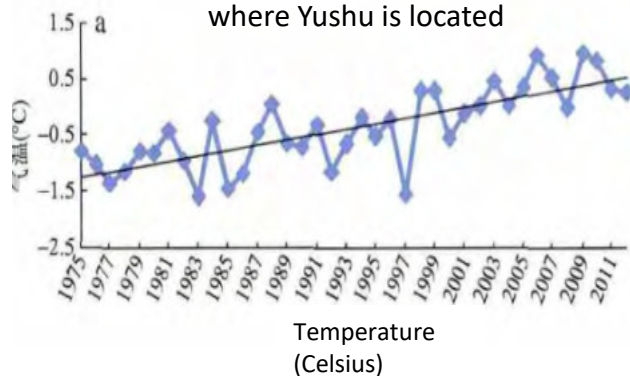
Climate and weather: comparison

Qinghai-Tibet plateau

- Semi-arid
- Average warming 2-3x of global average (0.3 degree/decade)
- Glacier melting
- Increasing runoff and size of open water
- More frequent winter snow storms



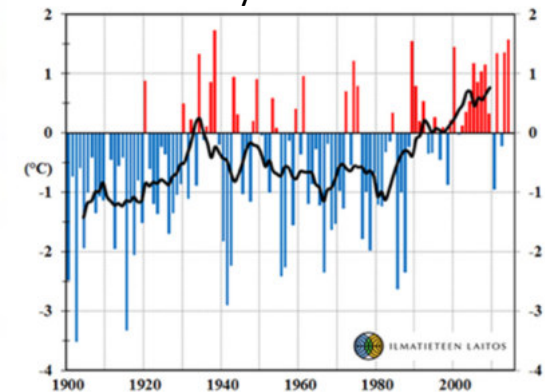
Climate variability in Sanjiangyuan area (1975-2011)
where Yushu is located



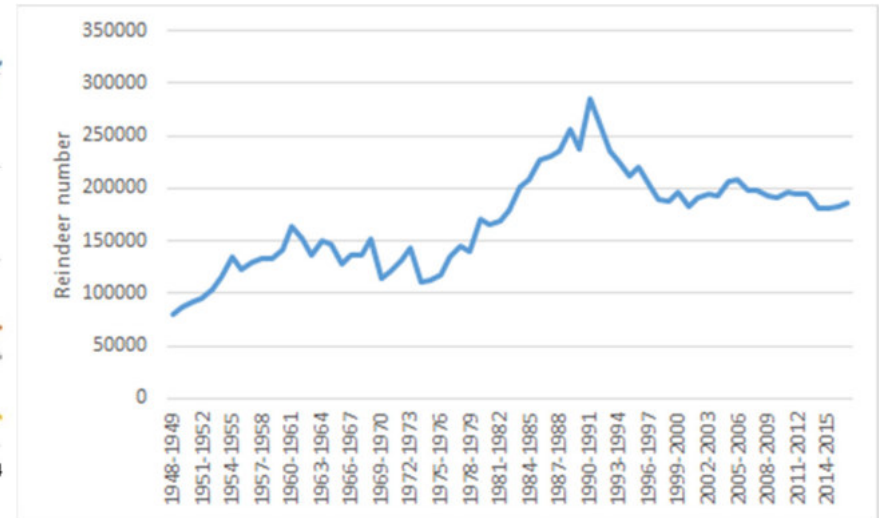
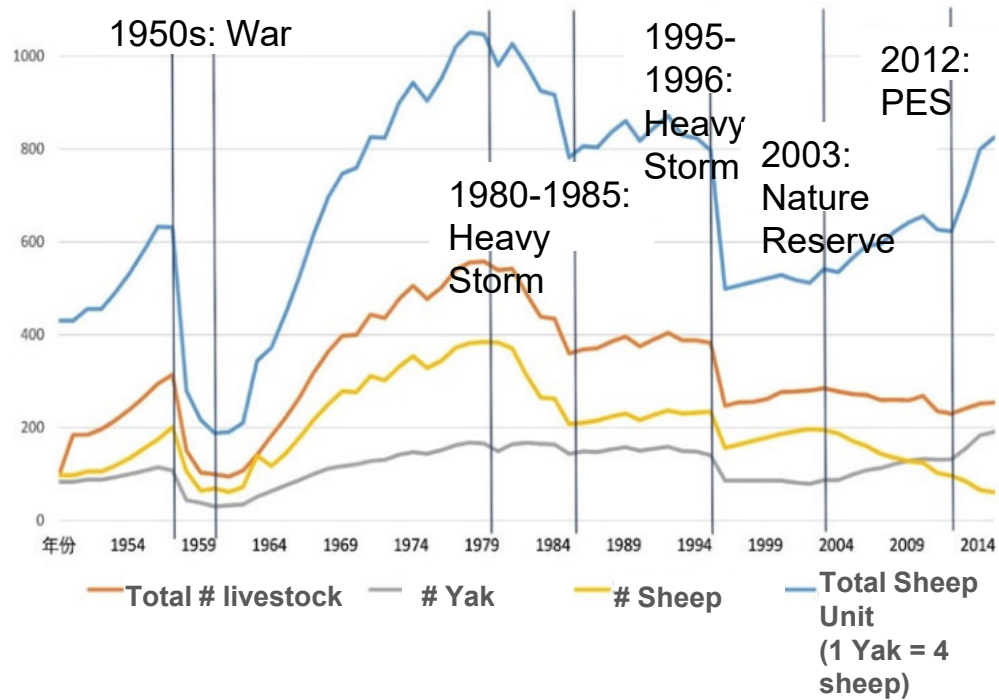
Finland

- Continental subarctic and boreal climate
- Average warming 2x faster than global average
- Less frost periods
- Winter temperature rising
- More precipitation and heavy rain events
- Storm winds increasing

Climate variability in Finland 1900→



Livestock population change: comparison



Graph left: Z. Zhu

Graph right: S. Rasmus

Governance system and actors: comparison

Similarities:

- Public ownership of land, herders have the use right of rangeland, especially indigenous peoples
- Both herding cooperatives affected by:
 - Privatization, divide and limitations of livestock and rangelands
 - Environmental protection and land use policies
 - Government subsidies and compensation



Past changes that affected yak and reindeer husbandry



1950s-1980s: Public ownership of livestock and pastures, strong policy to increase livestock

1984: Livestock divided to each household, start to encourage herders to move to settlements

1990s: Pasture divided to households, fences were introduced

2000s: Nature Reserves, and Payments for Ecosystem Services (PES) started, hunting was banned

2010s: Higher PES, and National Parks to limit livestock number

Between 19th and 20th centuries: reindeer cooperative system established. Closing of international borders

After WW2: Policy priorities changed: Intensification of forestry, infrastructure

1960s: Technological development: Snowmobiles

1970s: Supplementary feeding, vaccinations, calf-harvest

1980s: Meat image damages (e.g. Chernobyl), strong land use change, nature conservation increased

1995: Finland joins European Union



Example of governance differences: Predator policy

Yak husbandry

- NGOs and protected area management encourage local herders to participate in conservation practice



Credit: CC0 Public Domain

Graph: Minna Rosti, photos: Jussi Murtosaari
Source: Maaseutuvirasto



Reindeer husbandry

- Compensation paid for reindeer losses



Predator losses reported in FIN

Vuosi	Ahma	Ilves	Karhu	Susi	Tunnistamaton suurpeto	Kaikki yhteensä
2016	2 858	718	1 111	832	78	5 597
2015	2 148	612	1 157	798	66	4 781
2014	2 505	628	1 033	683	75	4 924

Example of governance differences: Stocking rate control

Yak husbandry in Yushu

- Government give **cash payments** for herders to control the number of yaks and do more conservation
- Pastures are **not closely monitored**



Reindeer husbandry in Finland

- **Government decides** on maximum number of live reindeer per cooperative every 10 years
- **EU provides subsidies** only if herd size is min. 80 reindeer / herder
- **Regular monitoring** of pasture quality and quantity due to overgrazing in the past

Stocking rates are indirectly affected by protected area and wildlife policies

Discussion

- **Heterogeneity / diversity** characterizes the reindeer and yak husbandry systems
- **Similarities and differences** in drivers of changes, policies and their impacts
- Effectiveness of policy interventions and **unintended consequences of change** need more investigation
- **Participatory approaches** required for policy design, planning and implementation
- **Inter- and trans-disciplinary research and multi-stakeholder partnership** necessary to increase evidence-based policy making



Photo: Mia Landauer

Next steps of the project

- Build a network of individuals and organizations interested in relevant comparative studies
- Link the study with other comparative studies between the Arctic and the Third Pole Environment program
- Publication of a review article
- Organize a joint workshop and scientific session in 2019

Thank you for your interest!

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