



Adaptation of reindeer husbandry to climate change – how to minimize the adverse effects? (CLIMINI; 2020-2022)

University of Lapland, Arctic Centre (Sirpa Rasmus, Minna Turunen, Mia Landauer)

Finnish Meteorological Institute (Heikki Tuomenvirta, Ilari Lehtonen)

The Natural Resources Institute (Jouko Kumpula, Jaana Sorvali)

Funder: the European Regional Development Fund (EAKR)

<https://www.arcticcentre.org/FI/climini/climini-EN>

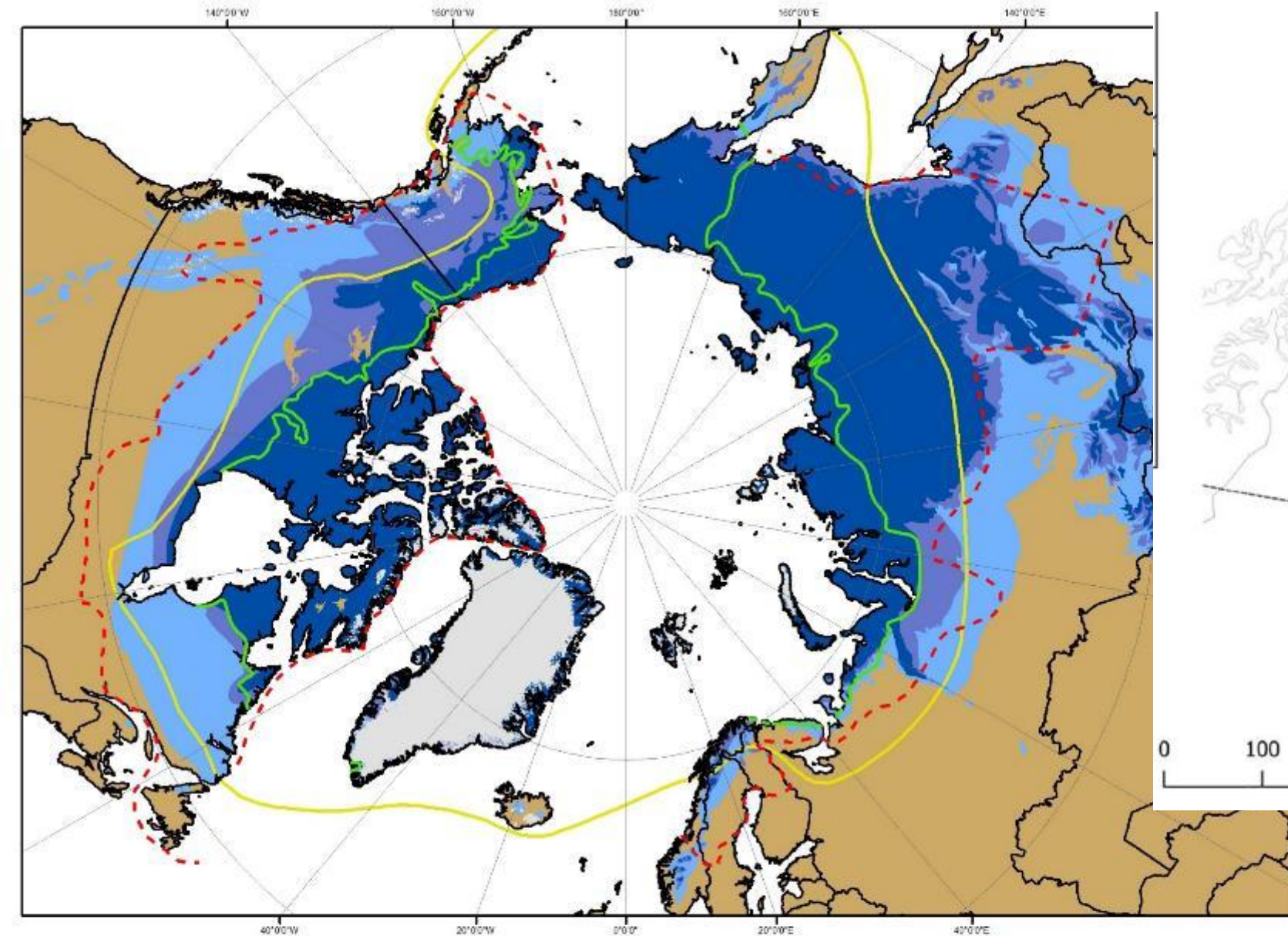


Euroopan unioni
Euroopan aluekehitysrahasto

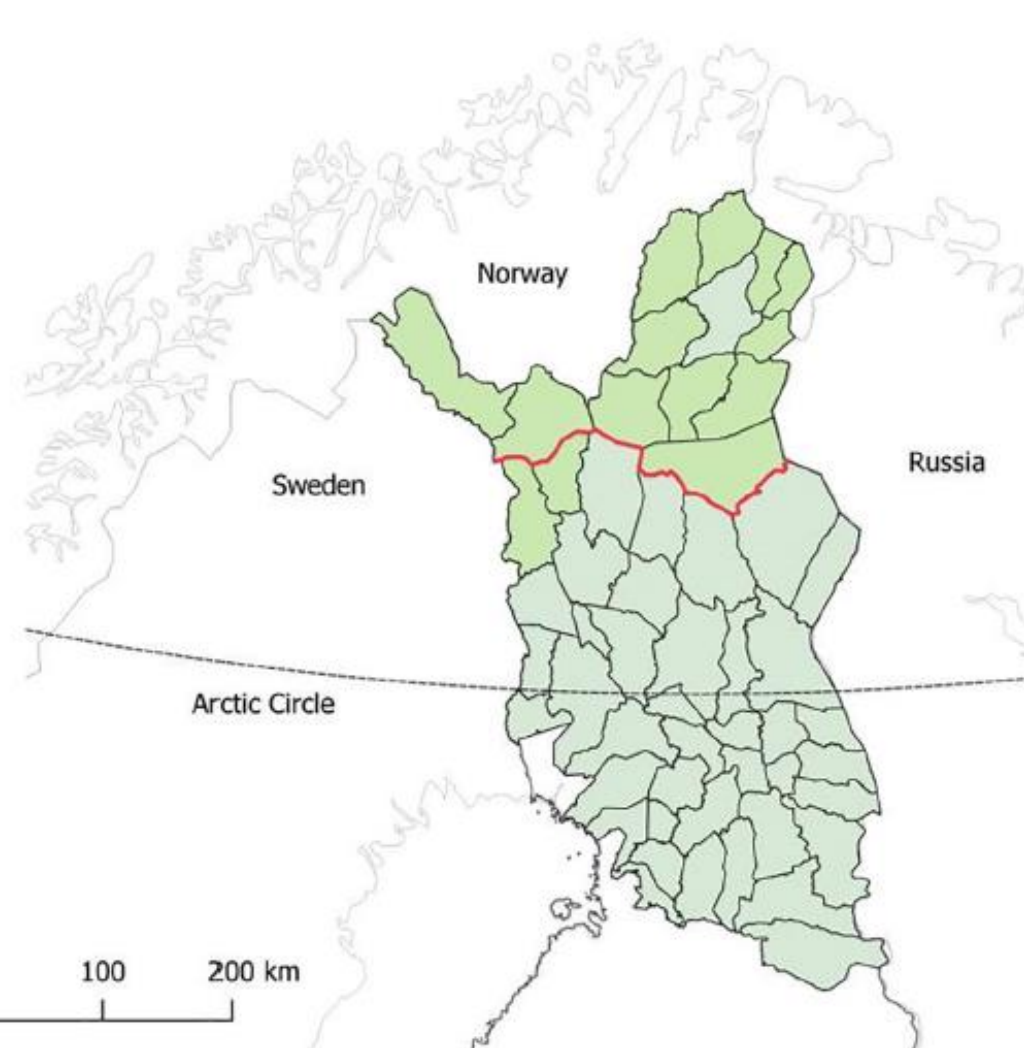
Vipuvoimaa
EU:lta
2014–2020

Kuvat:

Yle, Minna Turunen, Hannu Heikkinen



0 100 200 km

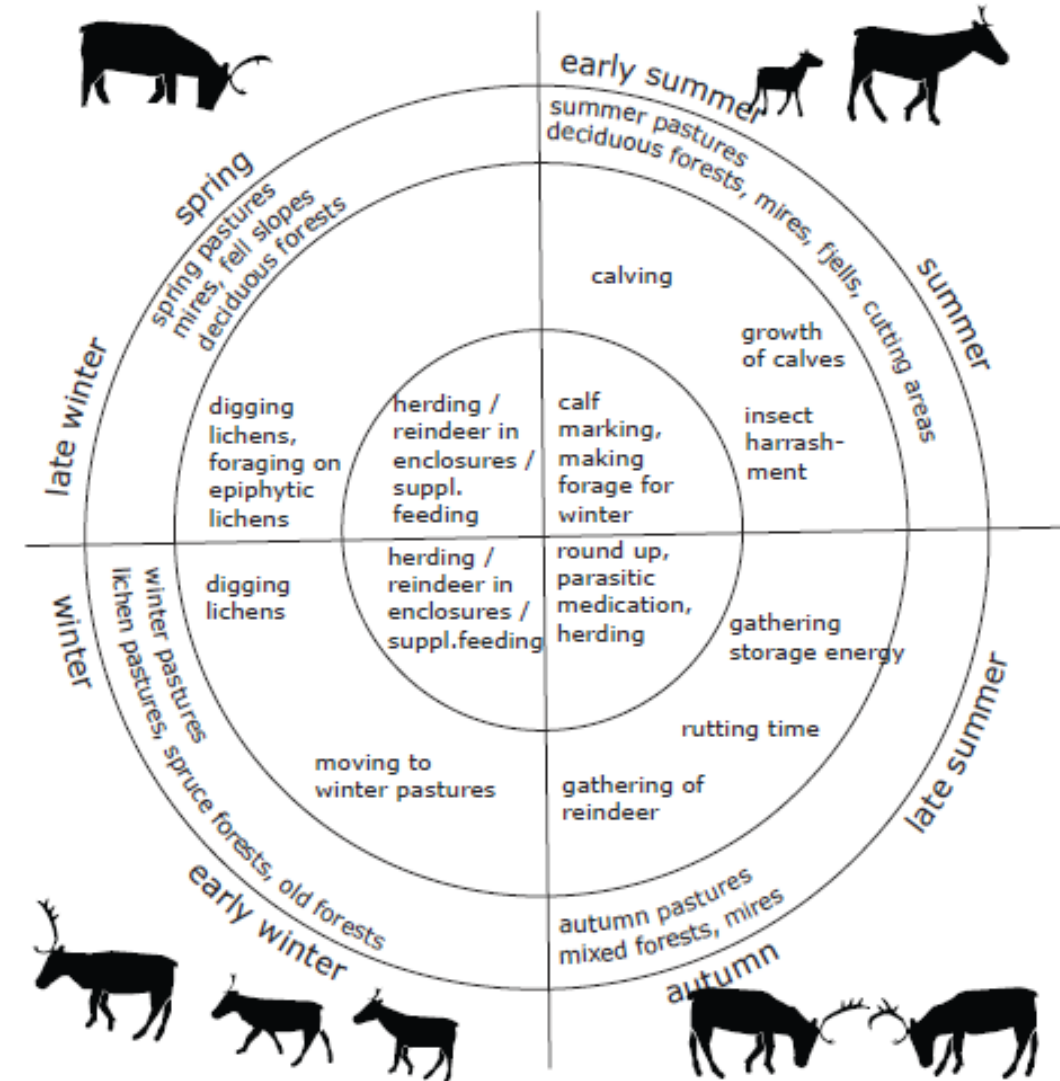


≈200 000 reindeer (in winter)
 ≈4500 reindeer owners
 ≈900 full-time herders

Reindeer husbandry in changing climate



- Seasonal weather and herding environment determine the welfare of reindeer and the success of the reindeer husbandry as a livelihood
- High climate vulnerability and several weather/climate risks involved
- Climate change within the reindeer management area and climate impacts on the livelihood are studied a lot, but studies on adaptation are few



Coping or long-term adaptation?



- Herders have developed coping strategies against harmful weather events but it is not common to plan for long-term climate change adaptation
- Governance, guidance and education of reindeer husbandry supports coping, but adaptation strategy / plan is missing
- Herding year 2019/2020 is an illustrative example: rare weather and snow conditions since autumn until spring caused problems and reindeer losses
 - These kind of conditions are probably more common in the future (high temperature and precipitation during the winter)
 - Clear needs were noticed for developing sustainable adaptation measures of herders, and support from governance, guidance and education

CLIMINI aims to



- 1) Produce a synthesis based on **available knowledge** about the impacts of climate change on reindeer husbandry of Finland, as well as its adaptation to climate change,
- 2) Give **recommendations** for measures for reindeer husbandry to minimize the harmful effects and utilize potential benefits of climate change, and
- 3) Root the operational models for adaptation (**“Best practices”**) into the reindeer herding work through reindeer management plans of individual herding districts.

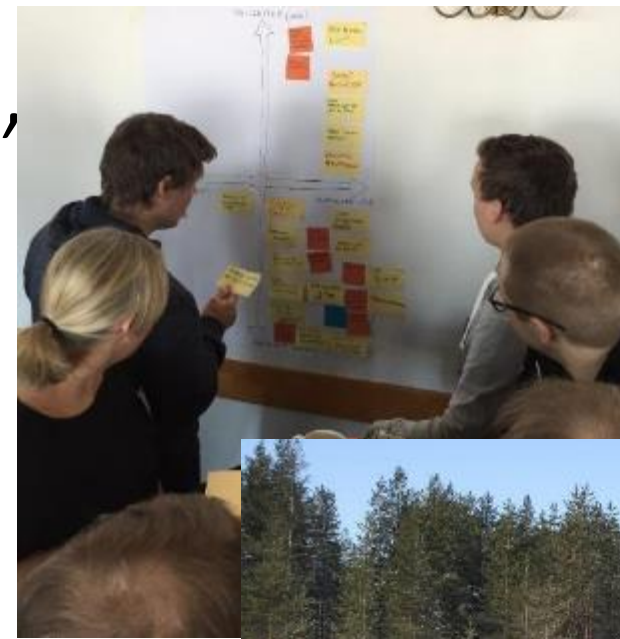
CLIMINI will



- Synthesize **existing knowledge** on climate impacts and adaptation needs
- Analyze the existing **policy documents and legislation**, in relation to climate change adaptation of reindeer husbandry in Finland
- Work with reindeer husbandry professionals (herders, meat processors, feed producers, reindeer tourism entrepreneurs...) and map **existing coping strategies** / adaptation measures, as well as planned or needed adaptation measures and the related **possibilities and barriers**
- Work with the **governance** (e.g. MAF new working group "Future of reindeer husbandry in Finland"), guidance (Paliskuntain yhdistys) and **education** (Saamelaisalueen koulutuskeskus, Lapin AMK) to support long-term adaptation planning

Dialogue, participatory workshops, knowledge co-creation

- IPCC (2019): “Learning is needed to relate different knowledge sets, as through this process new and relevant understanding for improved decisions and solutions can be created.”
- Regional workshops (autumn 2021, 2022), interviews and focus group meetings
- Special attention is paid to sustainability and climate-friendly adaptation measures and discussions on “good adaptation”



CHARTER – Drivers and Feedbacks of Changes in Arctic Terrestrial Biodiversity



CHARTER intends to advance the adaptive capacity of Arctic communities to climatic and biodiversity changes through state-of-the-art synthesis via data collection, analysis and modeling of Arctic change with major socio-economic implications and feedbacks. The project has three central aims:

- Work with Arctic communities to co-develop strategies and policy pathways for livelihoods such as herding, hunting and fishing
- Simulate the effects of social-ecological changes for indigenous and local communities and traditional livelihoods
- Better understand responses of Arctic terrestrial social-ecological systems to changes in the cryosphere across decadal and centennial timescales



Consortium

9 European countries

21 Research Institutions

Coordinator

Arctic Centre

University of Lapland
Finland

Duration

08.2020 – 07.2024

Budget

5.9 M Euro



www.charter-arctic.org

Reindeer herding areas of Northwest Eurasia

A 1.8 million square km region occupied by 1.8 million reindeer





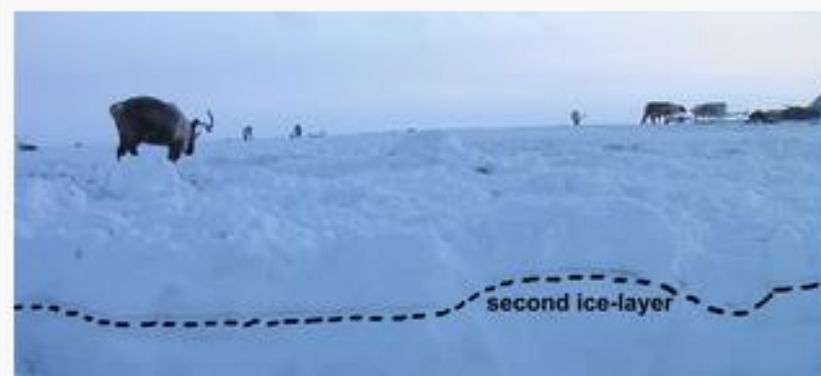
Arctic Rain on Snow Study

[Overview](#)[Team Members](#)[Rain on Snow Events](#)

Overview

When rain falls on an existing cover of snow, followed by cold temperatures, or falls as freezing rain, it can leave a hard crust. Surface melt followed by cold can do the same. There is growing evidence that such events are becoming more common in the rapidly warming Arctic, and it is increasingly recognized that they can have pronounced impacts on Arctic wildlife, domesticated reindeer, and human activities, like travel.

These events have sometimes resulted in large die-offs of reindeer because the icy crust makes it difficult for reindeer to find forage and their movements may be inhibited. The Arctic Rain on Snow Study (AROSS), a collaboration between the University of Colorado Boulder, the Alaska Pacific University, the University of Lapland and involving extensive community engagement and co-production of knowledge, seeks to better



Co-production of knowledge needed to fill the knowledge gaps

- Insect harrassment
- Wild mushroom yield
- Formation of ice layers in the snow cover
- Formation of mold below the snow cover
 - Weather-related phenomena
 - Very important for reindeer and for herders
 - Changes expected in a changing climate
 - Observations few, forecasting/simulation skills poor



Example: icing of pastures

- Annual management reports of herding districts (1948-2016) used as a material
- Ice formation / basal ice on pasture events listed and analysed
- Valuable time series - and authentic voice of herders



IOPscience  Journals ▾ Books Publishing Support  Login ▾

ENVIRONMENTAL RESEARCH LETTERS

LETTER • **OPEN ACCESS**

Basal ice formation in snow cover in Northern Finland between 1948 and 2016

Sirpa Rasmus^{1,2} , Sonja Kivinen³ and Masoud Irannezhad^{4,5}

Published 1 November 2018 • © 2018 The Author(s). Published by IOP Publishing Ltd

[Environmental Research Letters](#), [Volume 13](#), [Number 11](#)

Citation Sirpa Rasmus *et al* 2018 *Environ. Res. Lett.* **13** 114009

- “Winter grazing was bad, because wet snow fell in the autumn and froze together with lichen during the following freezing weather.” (Vätsäri district, 1955-1956)
- “A strong heat wave in November that turned snow to watery slush, which then froze and prevented reindeer from foraging.” (Alakylä district, 1971-1972)
- “Rain at the end of November hardened the snow. Pastures like skating rinks.” (Pyhä-Kallio district, 2007-2008)





Interesting questions:

- What makes adaptive capacity?
- What is good adaptation?
- How to take regional characteristics into account, when planning adaptation?
- What about local knowledge?

