Reindeer husbandry and climate change

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Observed and expected global changes

- Rise in global mean air temperature
- Rise in global mean sea temperature
- Sea level rise
- Decreases in snow and ice covers
Why are we interested?

- Seasonal weather events and the quality of the 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.
Impacts of changing climate on reindeer husbandry

• Primary effects – changing weather conditions etc.
  ➢ Secondary effects – changes on pastures, new parasites etc.
  ➢ Tertiary effects – adaptation actions, effects on culture and language etc.

• Changes affect reindeer as animals, on working environment and pastures, on herding practices...
• Some parts of the “value chain of reindeer husbandry” more climate sensitive than others

Figures:
Yle, Minna Turunen, Hannu Heikkinen
Knowledge for better adaptation

• Climate change has been studied a lot, but studies on adaptation of reindeer husbandry are few

• 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 plans are often missing
  ➢ Need to exploit the knowledge we have
  ➢ What we are doing, when we collect / use local observations? And why?
  ➢ Validating/comparing vs bridging or two-eyed seeing (Abu et al. 2019; doi: 10.1080/07900627.2018.1558050)

Figures:
Yle, Minna Turunen, Hannu Heikkinen
• 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.”

Photos: Hannu Heikkinen
Example 1: Gridded climate data + survey

• Herders’ observations on seasonal changes during past 30 years, gathered via a survey questionnaire
• Distributed systematically to all herding districts through the information services of the Reindeer Herders’ Association and the professional journal Poromies in Finland
• A set of temperature-, precipitation- and snow-related indices relevant for herding, derived from spatially interpolated daily meteorological data (1981-2010) with high spatial resolution.
Meteorological data example

• Number of zero-crossing days in the winter
• Mean values (1981-2010) on the map with 10x10km resolution
• Annual time series in fell and forest districts. The dots depict spatial averages and the shaded areas show the ranges across the grid boxes of the regions.
Survey results (n=90)

- Herder observations generally comparable to meteorological observations
- Some regional differences
- Distribution of answers – agreements and disagreements
- Problems because a bit different time slot was considered for the knowledge sets (e.g., recent rainy summers not seen in the meteorological data but affected the herder views)
• “The soil freezes a bit...wet snow falls...ice is formed...again wet snow... the reindeer wander south against the wind.”

• “Rain around Christmas and the New Year is almost an annual phenomenon nowadays. It puts an end to digging almost every winter.”

• “Advanced arrival of spring is good for reindeer, and growth on the pastures starts earlier, since there is food available already during the calving time.”
Changes experienced/expected

- Warmer springs, summers, autumns, winters
- Later snow formation and earlier snow melt
- Longer and warmer growing season, more intensive heavy rains?
- Winter rain more common, crossing of zero degrees more common

Above: trend in the number of hot summer days, 1981-2010

Below: trend in the number of warmer-than-average weeks in the winter, 1981-2010
Interesting knowledge gaps

- Formation of ice layers in the snow cover
- Formation of mold below the snow cover
- Wild mushroom yield
- Insect harrassment

- Weather-related phenomena
- Very important for reindeer and for herders
- Changes expected in a changing climate
- Observations few, forecasting/simulation skills poor
Example 2: From the archives - icing of the pastures

• Dataset on the annual extent of ice formation events in northern Finland between 1948 and 2016
• Based on reindeer herders’ descriptions of the cold season in their management reports
• Time series for the percentage of reindeer herding districts reporting basal ice formation events

• Five out of seven of the most extensive basal ice formation events (90th percentile) occurred between 1991 and 2016.

• The most commonly reported processes related to ice formation were thaw or rain-on-snow events followed by freezing of the snow cover.
• “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)
Some lessons learned

• Multi/Inter/Transdisciplinary work is useful; co-creation of knowledge; working with herders, other land users, policy makers, educational institutes

• Using practitioners’ knowledge from the archive sources, interviews and surveys, and participatory methods (e.g. workshops)

• No validation, comparison, or integration – relating, parallel examination or bridging

• Presenting scientific observations using ”human scale”

• Emphasis on seasonal weather, not on climate

• Emphasis on coping strategies, not on adaptation
• Adaptation of reindeer management to climate change CLIMINI; https://www.arcticcentre.org/FI/climini

• Reindeer husbandry in a Globalizing North ReiGN; http://www.reign.no/

• Drivers and Feedbacks of Changes in the Arctic Terrestrial Biodiversity CHARTER; http://www.charter-arctic.org/

• Arctic Rain-on-Snow Study AROSS; https://nsidc.org/rain-on-snow

• (SAAMI –project; https://www.oulu.fi/cerh-fi/saami)


Thank you!
Herding year 2019/2020

• 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 the adaptation measures of herders, and support from governance, guidance and education