Climate adaptation related to reindeer herding

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NASA LCLUC Science Team Meeting May 1st 2008
Reindeer herding and climate change
Reindeer herders’ vulnerability network study.

EALÁT-Network Study
THE EALÁT CONSORTIUM, 2007-2010

www.EALAT.org

Project leaders Prof. Ole Henrik Magga,
Prof. Svein D Mathiesen, Director Anders Oskal

Association of World Reindeer Herders
Sami University College / Nordic Sami Institute
Association of World Reindeer Herders
International Centre for Reindeer Husbandry

Saami Council
Abisko Scientific Research Station
Royal Swedish Academy of Sciences.
CICERO
GRID-Arendal
Norske Reindriftsamers Landsforbund (NRL)
Norwegian School of Veterinary Science
Norwegian Meteorological Institute
Norwegian Research Council
Reindriftsforsvaret
Suoma Boazosámit
NORISS - Other Canon Foundation
University of Oslo
University of Tromsø
NASA, NORUT, KSA, ESA
Heintz Sentre, USA
The IPY EALÁT Consortium

- EALÁT-Research
  - Multi-disciplinary research on climate change, adaptation and traditional knowledge – Competence building

- EALÁT-Outreach
  - Communication of results from IPY EALÁT and other research projects and activities under the International Polar Year

- EALÁT-Monitoring
  - A Future Circumpolar Monitoring Network for World Reindeer Husbandry
  - CAFF endorsement (CBMP)

- EALÁT-Information
  - An information project about climate change and traditional knowledge
  - Reindeer herders’ voice on climate change to the Arctic Council
Association «Оленеводы Мира»
Association of World Reindeer Herders

President
Dimitry Khorolia

Sectertay general
Johan Mathis Turi

Established in 1997, Nadym, Yamal Nenets AO
How to live with climate variability and change in Eurasia?
EALÁT - Good pasture
EALLU - Herd
EALLIN - Life
Ealát adopt a novel methodological approach.

We recognize that reindeer herders' ability to adapt to change is based on traditional knowledge embodied in their language, in the institutions of herding and in the action of individual herders.
Reindeer (Rangifer tarandus)
As species about 15 million years old.
Intermediate highly adaptable ruminant anatomically and physiologically.
Pastures used by domestic reindeer in the circumpolar north
Reindeer husbandry is a human coupled ecosystem
“Reindeer herding practices, ancient in origin, represent models in the sustainable exploitation and management of northern terrestrial ecosystems that is based on generations of experience accumulated, conserved, developed and adapted to the climatic and administrative systems of the north.”
The LASSO RING is Arctic indigenous people’s most important invention. With it the human arm is extended by 15 meters, which represents the difference between life and death in the North.

Stonecarvings from North Norway about 11,000 years old
• About 2 mill. domesticated reindeers
• Below 100 000 reindeer herders
• About 4 mill. square km, across 9 national states
• More than 20 different indigenous peoples
IPY EALÁT - Reindeer herding and adaptation to climate change and variability A unique circumpolar place-based study

Fokus:

- Samisk
- Nenets AO
- Yamal-Nenets AO
- Sakha (Yakutia) Rep.
- Chukotka AO
- Alaska

Traditional knowledge
Climate research, biology, linguistic research, anthropology, social science, remote sensing, and economy.
Multidisciplinary
EALÁT Workshop
Nadym, YNAO
March 2, 2007
EALÁT workshop on Yamal, Western Siberia, September 2007

Two parts:
- Brigade 17, Yarsalinsky Sovkhoz
- City of Yar Sale

Brigade 17, Yarsalinsky Sovkhoz
Picture: Svein D Mathiesen
Vassily Vassilievich, senior reindeer herder of the brigade noted: *It is not us reindeer herders who have been the cause of climate change. The reindeer know which routes to take. Many people have lost their connection with nature, but the animals maintain this connection and that is why we follow the reindeer.*
EALAT workshop Topolini, Sahka-Jakutia April 8th, 2008
One people in four countries

- The Saami live in four national states
- Common language, culture and traditions
- Common Saami flag, national day and national anthem
- About 600,000 reindeer
MAJOR CHALLENGES:

- Loss of grazing land
- Climate change
- Predation
- Wild reindeer/caribou.
When the lights is turned on in the north....
Globalization of the Arctic:
“...We parliamentarians strongly believe the impact of climate change to be a matter of urgency. The climate change already has a strong impact on the living conditions of the Arctic indigenous peoples. And if the ice disappears for large parts of the year, we will see an explosion in human activities in the Arctic. We need to find ways to regulate this activity and keep ahead of the development.”

Hill Marta Solberg, Chair of the Arctic Parliamentarians, Arctic Council Ministerial Meeting, Yamal October 2006
LNG Hammerfest Norway
1/3 of the grazing land for domestic reindeer is lost in the Barentz region.
There are more than >60,000 cabin build in Grazing land used by reindeer in Norway. Each year as much as 500-1000 new cabins.
In Norway:

1) About 25% of grazingland used by reindeer is lost due to industrial and infrastructure development.

2) About 35% of summer grazingland along the coast of North Norway is lost.

3) About 78% of coastal calving ground will be lost the next 30-45 years if development continue.
A simple perspective on vulnerability to change.

Vulnerability (V) = the difference between the Impacts (I) from multiple stressors and the ability of a system to Adapt (or its adaptive capacity AC):

\[ V = I - AC \]

Vulnerability decreases by increasing the value of adapting capacity (AC) by accepting and using indigenous peoples' traditional knowledge and insights (McCarthy et al. 2005)

Arctic reindeer herders formel for practical reindeer herding and survival strategies
Coproduction of knowledge, partnership between reindeer herders and scientist
Projected Surface Air Temperature Change:
1990s–2090s (winter Dec–Feb)
Warming will effect reindeer pastures

Arctic as an global window:
10 years change in Arctic = 25 years change other places on earth

Average warming in winter
0.7° C/10 år
10% increased

Globale estimates for temperature in Norway

High resolution estimates for temperature change i Norge.
mean annual temperature in Finnmark, Norway
Past and future mean annually temperature in Finnmark Norway

Statistical downscaling of annual mean temperature in Finnmark based upon 11 global models under A1B.
Snow depth in reindeer grazing land, Nov 1st 2007
Snow depth in reindeer grazing land, Jan 1st 2008
Snow depth in reindeer grazing land, April 1st 2008
Max snow depth in Finnmark in winter (cm)
data from met station.

Red: bad grazing year
Green: good grazing year
Number of days with snow covering the pastures in Finnmark, Norway, data from met station

“One year is not another years brother – variability”

Red bad: grazing year
Green: good grazing year
Daily temperatures in Finnmark Norway 2006-2007
Saami reindeer herders use more than 300 words on snow and snow change. Reindeer herders traditional knowledge should be used to decrease vulnerability to change in future.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>skáva</td>
<td>“very thin layer of frozen snow”</td>
</tr>
<tr>
<td>vahca</td>
<td>“loose snow (especially new snow on the top of a layer of older snow or on a road with snow on it)”</td>
</tr>
<tr>
<td>geardni</td>
<td>“thin crust of snow”</td>
</tr>
<tr>
<td>vahca</td>
<td>“loose snow”</td>
</tr>
<tr>
<td>gaska-skárta</td>
<td>'hard layer of crust'</td>
</tr>
<tr>
<td>ceavvi</td>
<td>'layer of hard snow'</td>
</tr>
<tr>
<td>seanjaš</td>
<td>“granular snow at the bottom of the layer of snow”</td>
</tr>
<tr>
<td>skoavdi</td>
<td>“empty space between snow and the ground”</td>
</tr>
<tr>
<td>skárta</td>
<td>“thin (…) layer of snow frozen on to the ground”</td>
</tr>
</tbody>
</table>
Vulnerability = Impacts - Adaptive Capacity

Clearly, coping/adaptation is at regional/local scales!
Example of adaptation knowledge: Castration

- Castration is a key element of traditional knowledge that persists in everyday usage in Nenets reindeer husbandry.
- A tool for herd structure management:
  - Nenets reindeer herders stated that a ban on castration would generate need of a lot more cash to buy and maintain machines for travelling.
  - Male reindeer can more easily break through ice layers in the snow, and thus help females and calves getting access to food under difficult conditions.
Preliminary conclusion:
Adaptation to climate change in reindeer husbandry in Eurasia:

- Limit the increasing permanent loss of ecological niches available to reindeer, due to loss of grazingland.

- Structuring herds to decrease vulnerability to climate change. Modify government incentives to improve understanding of biodiversity and traditional knowledge.

- Making sure herders have a solid economic base, which enable them to absorb the costs associated with climatic change.
We have some knowledge about how to live in a changing environment. The term ‘stability’ is a foreign word in our language. Our search for adaptation strategies is therefore not connected to ‘stability’ in any form, but is instead focused on constant adaptation to changing conditions

Johan Mathis Turi, Chairman of International Centre for Reindeer Husbandry (ICR), Tromsø, UN Environmental Day, June 2007
EALÁT: PASTURE | EALLU: HERD | EALLIN: LIFE

Welcome to the website for the EALÁT project: An International Polar Year (IPY) endorsed project (No. 399) and also endorsed by the Arctic Council.

EALÁT is a Reindeer Herders Vulnerability Network Study and is a project that examines reindeer pastoralism in the light of climate change. On this site you will find background information about the project, presentations by Ealát researchers, details of the various work packages, lots of news related to the project, a wide variety of photo galleries, web video pages and more. Ealát is Sámi word with a multi layered meaning. Ealát signifies Pasture, but related words Eallu means 'Herd' while Eallin means 'Life' in the Sámi language. The primary research institution in EALÁT is the Sámi University College-Nordic Sámi Institute (SUC-NSI). A wide number of other research institutions are involved in the project, along with the Association of World Reindeer Herders(WRH) and the International Centre for Reindeer Husbandry. All these bodies are located in the heart of the Sámi region, Guovdageaidnu-Kautokeino, Norway. Learn more about IPY EALÁT here.
Reindeer herding is based on:
A coupled human-ecosystem, with an original high resilience to climate variability and change.

It is critical to empower indigenous reindeer herders with the best technologies available to combine with indigenous knowledge for advancing the development of sustainable reindeer husbandry.
Information at
www.reindeerportal.org

Picture by Øyvind Ravna