



 Nordregio

Reindeer husbandry in Sápmi:

How can we support a prosperous future for reindeer herding through research?

Ingrid Johnsen, Anna Berlina, Nelli Mikkola & Lise Smed Olsen (eds.)

NORDREGIO WORKING PAPER 2017:8

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is a leading Nordic and European research centre for regional development and planning, established by the Nordic Council of Ministers in 1997. We conduct solution-oriented and applied research, addressing current issues from both a research perspective and the viewpoint of policymakers and practitioners. Operating at the international, national, regional and local levels, Nordregio's research covers a wide geographic scope, with an emphasis on the Nordic and Baltic Sea Regions, Europe and the Arctic.

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Stockholm, Sweden, 2017

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1. Introduction

1.1 Background for the study

The Nordic Joint Committee for Agricultural and Food Research (NKJ) has commissioned Nordregio to provide an overview of research completed within the last 10 years in the field of reindeer husbandry in the Nordic countries. This report summarises and categorises those studies that have focused on socio-economic aspects of reindeer husbandry. Based on the literature overview and the interviews with experts and researchers, the report then provides a platform for proposals for further research that may be carried out within the NKJ framework.

In recent years, Nordregio has conducted applied research related to reindeer husbandry, for example, The Nordic Arctic Foresight Project. As part of that project, a series of workshops were held in which stakeholders discussed the future of regional development policy in the Arctic. Three workshops were organised in municipalities with a Sami population and reindeer herding as an important economic activity (Kautokeino in Norway, Jokkmokk in Sweden and Inari in Finland). In these communities, some of the opportunities discussed included: better utilisation of the whole reindeer for different market products (related to slaughterhouse regulations); increased local food production; and links between the Sami culture and economic experience¹. As part of the foresight project, a background study exploring business development potential in the Nordic Arctic was also produced, and included reindeer husbandry and related Sami business activities as part of the bio-economy, tourism and creative industries². Further, an academic paper was published on the topic of conflict and collaboration in tourism destination development, using Kautokeino and Jokkmokk as case studies³. Finally, Nordregio has produced a series of maps related to reindeer husbandry⁴.

1 www.nordregio.se/foresightsummary

2 Olsen et al. (2016)

3 Olsen (2016)

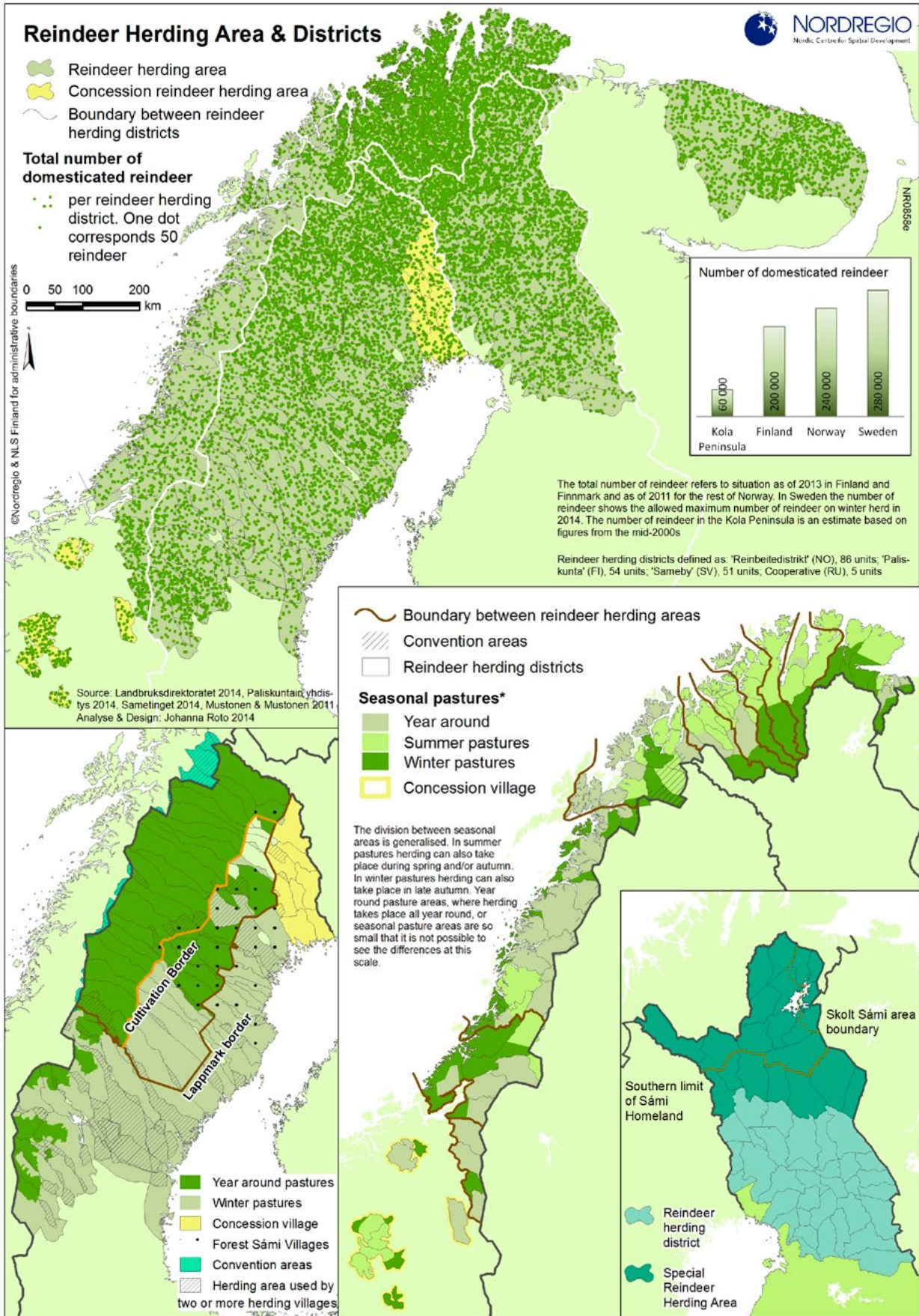
4 See <http://www.nordregio.se/en/Maps/> (search word: 'reindeer')

1.2 Geographic, thematic and institutional coverage

This literature overview focuses on research into reindeer husbandry in Norway, Sweden and Finland. Map 1 shows the reindeer herding area which, from the highlands of Oppland to the east coast of the Kola Peninsula, covers an area of over 500 000 km². In each of the Nordic countries this equates to approximately 30–40% of the total land area, or 140 000 km² in Norway, 160 000 km² in Sweden and 123 000 km² in Finland. On the Kola Peninsula, the reindeer herding area is approximately 83 000 km². Reindeer herding is central to the Sami livelihood and is viewed as a fundamental part of Sami culture – even though only 10–15% of the Sami people are now involved in such practices. In some parts of the Nordic countries, only those designated as Sami can practice reindeer herding. The total number of reindeer reflects the situation in 2013 in Finland and Finnmark (Norway) and in 2011 in the rest of Norway. In Sweden, the number of reindeer reflects the allowed maximum number of reindeer in winter herds in 2014. The number of reindeer on the Kola Peninsula is estimated based on figures from the mid-2000s.

The focus of this literature overview is on socio-economic aspects of reindeer husbandry, including the production of related traditional Sami handicrafts. Fisheries and hunting are traditional Sami activities, and are considered in the overview to the extent that they relate to reindeer husbandry. New Sami business areas include food, tourism, media and design. Food and tourism are especially linked to reindeer husbandry and research concerning these aspects was also included. However, since the primary focus was on the bioeconomy, media and design were excluded. In this regard, socio-economic implications from climate change are also identified as part of the literature overview. Other themes include institutional frameworks and the role of subsidy schemes. Reindeer health has also been identified by the NKJ as a relevant topic that should be included in the study.

Table 1 shows a list of research and knowledge institutions in Norway, Sweden and Finland that



Map 1: Reindeer herding areas and districts (2014)

Table 1: Overview of identified research environments, and regional and national authorities

Norway	Sweden	Finland
<ul style="list-style-type: none"> • Sami University of Applied Sciences • The International Centre for Reindeer Husbandry (ICR) • Norwegian Institute for Bioeconomy Research (NIBIO) • Norwegian University of Life Sciences • Statens Reindrifstforvaltning • Norske Reindrifstsamers Landsforbund (NRL) 	<ul style="list-style-type: none"> • Swedish University of Agricultural Sciences • Umeå University • Nordregio • Svenska Samernas Riksförbund (SSR) • Sametinget 	<ul style="list-style-type: none"> • The Arctic Centre, Lapland University • Lapland University of Applied Sciences • The Natural Resource Institute (LUKE) • The National Forest Centre • The Finnish Environmental Institute • Reindeer Herders' Association

have conducted research into reindeer husbandry. In addition to academic research (i.e. peer-reviewed articles and books), the literature overview comprises studies commissioned by regional and national authorities such as Statens Reindrifstforvaltning in Norway, Sami Parliaments and Sami reindeer herding interest organisations (NRL in Norway, Svenska Samernas Riksförbund [SSR] in Sweden, and the Reindeer Herders' Association in Finland).

1.3 Methodology

A literature review provides a foundation for exploring a topic. It involves an overview and evaluation of the writings in a specific area of interest. The purpose of a literature review is to bring together and analyse significant writings on a given topic.

We used the literature review methodology as a basis for our study. However, in this report we mainly focus on providing an overview of the topics covered in the research as well as topics for future research. In addition to reviewing abstracts and summaries of reports and books, several consultations were conducted (via phone interviews and email correspondence) with specific experts. These experts provided a source of information about relevant publications that are unavailable in English, Finnish or the Nordic languages, and aided with identifying current state-of-the-art topics and topics for future research. A full list of experts consulted is in Annex 1.

This literature overview represents scholarly articles listed in the database Scopus, as well as relevant reports and books found through a Google search. The search was limited to the following subject areas: social sciences; agricultural and biological sciences; and arts and humanities. Scopus

includes only articles written in English.

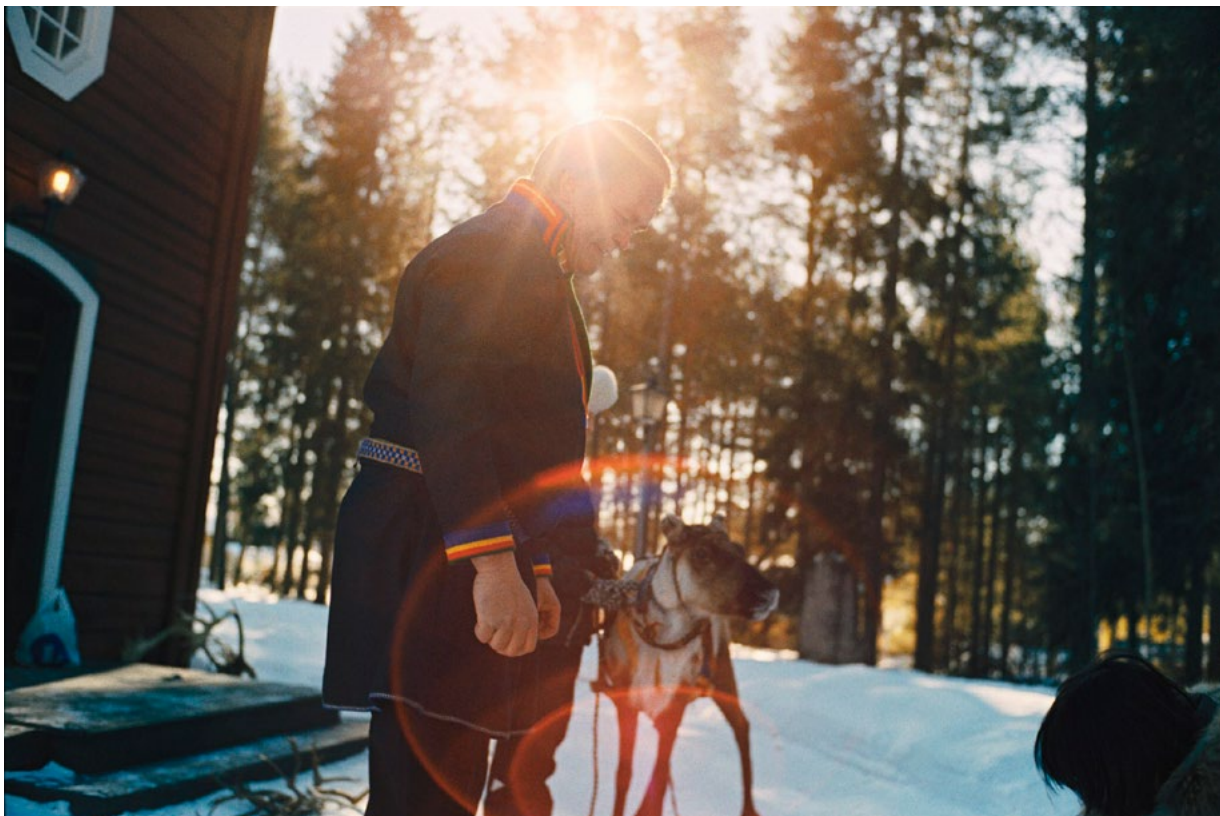
Publications in Norwegian and Sami were found using the library search engine Oria.no using the search word "reindrift". The Norwegian publications include peer-reviewed articles, books, reports and doctoral dissertations. Articles written in Norwegian were also found via the database Idunn.no. In addition, several references were identified via phone interviews with experts from NIBIO and Norwegian University of Life Sciences (NMBU).

Publications in Finnish were found through Helka database searches. Additional articles and research were provided by researchers at the Arctic Centre of the University of Lapland.

Publications in Swedish were found through recommendations for research provided by the interviewees and university websites of the Swedish University of Agricultural Sciences (SLU) and Umeå University. The webpages of Sametinget⁵ were also used as a source of information about publications in Sami and Swedish.

Preliminary findings of the literature overview were presented at the Nordic Conference on Reindeer Husbandry Research in Kiruna on 29–31 May 2017, where experts were invited to give feedback on the future topics in reindeer husbandry research. Discussions at the conference served as quality assurance of the results, and experts in the academic community provided valuable feedback. The conference presentations and discussions were also used as a source of information about current controversies within reindeer husbandry research. The report was revised based on input from and discussions with conference participants.

⁵ <https://www.sametinget.se/renforskning>



Sami reindeer herder in Kvikkjokk.

Photo by Simon Köcher.

1.4 Report outline

The report is structured as follows: Chapter 2 presents an overview of the literature, while Chapter 3 summarises and provides conclusions based on

the main findings and presents suggestions for future research on socio-economic aspects of reindeer husbandry in Sápmi.

2. Socio-economic aspects of reindeer husbandry

This chapter summarises the key topics related to socio-economic aspects of reindeer husbandry based on the literature review.

Table 2 presents the identified key topics and subtopics. The main topics were identified based on a review of available abstracts, summaries and

keywords. It is evident from the table that some of the topics overlap and that the same subtopics appear under several main topics. Thus, the categorisation should be used as an indicator of the main topics that have been identified from the literature.

Table 2: Key topics of the identified studies

Main topic	Subtopics
Adaptation and resilience	Climate change Governance Gender and community Herding strategies and policy instruments Land use rights
Climate change	Impacts of climate change on reindeer herding and livelihoods Vulnerabilities Adaptation and mitigation measures and strategies Place-based and community-led solutions, traditional ecological knowledge and practices Knowledge creation and capacity building among herders
Economic situation for reindeer husbandry	Co-management of forestry and reindeer herding Calculating externalities: estimating distributions of benefits and costs between forestry and reindeer herding Consultation process Herd management strategies and pastoralist behaviour Incorporating cultural values in a measure of welfare
Herding practices and management	Sustainable reindeer herding practices Productivity Changes in herding (increased pasture fragmentation, domestication of reindeer, larger herds, climate change) Predation and predator risks
Reindeer health	Previous epizootics among reindeer Diseases related to feeding Chronic wasting disease (CWD)
Governance, land use and regulation	Governing system of Sami reindeer husbandry Land use conflicts, land use policy and legislation Adaptation Resilience, power relations and decision-making Climate change Impact assessment Common-pool resources
Social conditions and health issues of reindeer herders	Sami health and sense of coherence Mental health Suicidal attitudes and expressions Quality of life "Human factors"

Ethnographic and historical analysis	Evolutionary demography Human–reindeer interaction Socio-ecological impact on reindeer grazing lands Women's participation in reindeer herding Nomadic reindeer herding
Tourism	Identity discourses Presentation of Sami culture and livelihoods in the tourism business Potentials and challenges related to indigenous destination management, including handicrafts and festivals
Interdisciplinary research and other topics	Interdisciplinary research Theoretical approaches Research overviews Working hours survey

2.1 Adaptation and resilience

Research at the interface of reindeer husbandry adaptation and resilience covers several viewpoints in relation to the vitality of Sami reindeer herding in the contemporary world. The literature overview outlines topics such as the relationship between reindeer husbandry and climate change and the role of sustainable herding strategies and compensation schemes in relation to the resilience and adaptation capacity of the reindeer husbandry communities.

The research looks at the impact of climate change and other factors influencing adaptation options in an indigenous reindeer herding community, including political and institutional transformation⁶, and the role of socio-economic forces and aspects of governance influencing adaptation⁷. Analyses of long-term perspectives of the vulnerability within reindeer husbandry and examination of adaptation strategies are also pertinent topics⁸. Developing a holistic understanding of the drivers connected to globalization and climate change that affect reindeer husbandry in Fennoscandia is also on the agenda of the newly launched Nordic Centre of Excellence ReiGN Reindeer husbandry in a Globalizing North⁹.

The sociological connotations of adaptation and resilience are addressed as well, examining, for instance, the roles of gender and community¹⁰. The issue of rights to land and the influence of national government policies are studied in relation to the capacity of Sami reindeer husbandry communities

to create adaptive and resilient herding practices and societies.

The literature further explores community resilience factors among adolescents in the Sami community, including Sami language competence, use of recreational and natural resources, and traditional ecological knowledge, such as reindeer husbandry-related activities¹¹.

2.2 Climate change

Climate change appears to be a relevant issue in reindeer husbandry research. The literature examined in this report largely addresses the issue of the vulnerability of European and Nordic reindeer husbandry to global climate change from numerous angles¹². These include the long-term trends and the role of climate in the population dynamics of Eurasian reindeer¹³. Extreme weather conditions, the land's carrying capacity and the means to mediate these phenomena are studied widely from the reindeer husbandry perspective¹⁴. For instance, one study looked at the trends and variability in snow and climate characteristics during 1978–2012 in the Värriötunturit fell area of northern Finland. Cold season changes were examined using long-term observational data of snow depths, meteorological data, large-scale climate indices and reindeer herders' experiences with difficult snow conditions¹⁵. The study suggests that a shortened duration of snow cover may facilitate reindeer grazing, whereas the potential for more frequent formation of ice layers and mould growth on pastures in the future would be

6 Löf (2013)

7 Brännlund & Axelsson (2011)

8 Næss et al. (2011)

9 <https://www.nordforsk.org/en/programmes-and-projects/projects/reindeer-husbandry-in-a-globalizing-north-resilience-adaptations-and-pathways-for-actions>

10 Buchanan et al. (2016)

11 Nystad et al. (2014)

12 Rees et al. (2008); Magga et al. (2011)

13 Uboni et al. (2016)

14 Weladji & Holand (2006); Moen (2008); Vuojala-Magga et al. (2011); Næss & Bårdsen (2013); Jansson et al. (2015)

15 Kivinen & Rasmus (2014)

disadvantageous for reindeer husbandry.

The issues of knowledge creation and capacity building among herders, as well as place-based and community-led solutions in relation to climate change adaptation and mitigation, are also discussed¹⁶.

Ecosystem processes and their influences on the climate system have been studied. One study specifically looked at the long-standing differences in reindeer herding practices in Norway and Finland¹⁷. By examining ecosystem-wide contrasts between potentially year-round (but mainly summer) grazing regions in Finland and mainly winter grazing regions in Norway, the researchers found dramatic differences in the tree-layer component of these ecosystems. The findings support recent suggestions that ecosystem processes in the Arctic can significantly influence the climate system, and that such processes must be considered when developing climate change scenarios and adaptation strategies.

2.3 Economic situation for reindeer husbandry

Forestry and reindeer husbandry are described as the two most important uses of forest land in northern Sweden¹⁸, northern Finland¹⁹ and Norway. Thus, a substantial part of the research on economic aspects for reindeer husbandry addresses the interactions and conflicts between forestry and reindeer husbandry, and ways to sustain joint benefits from forestry and reindeer grazing, for instance through integrated natural resource management²⁰, or by applying a model that reduces the impacts of forestry on reindeer husbandry while maximising commercial operations²¹. The research within this area also attempts to quantify the amounts and distributions of benefits and costs between the timber industry and reindeer herding²².

Policy reform is touched upon in two identified studies. One article explored how reindeer herders' traditional knowledge and social organisation are incorporated into policy implementation through legislative, economic, institutional and informational means, focusing on western Finnmark, where implementation challenges have been most

pronounced²³. Another study from northern Sweden analysed the economic effects of three policy-relevant issues on timber and reindeer products for forests and reindeer in three communes²⁴.

Consultation processes between forestry owners and reindeer owners are among the issues most frequently addressed. Related to the economy, these issues involve the transaction costs associated with the consultation process among stakeholders in multiple land use situations such as reindeer herding and forestry²⁵. The research also emphasises the importance of incorporating cultural heritage values associated with the reindeer industry into a broader measure of welfare²⁶, as well as sustainable economics in reindeer husbandry²⁷. In addition, the literature addresses policies and effects of cost-reducing subsidies²⁸. A report titled *Economy of the North 2015* touches on traditional production activities of the indigenous peoples²⁹.

Several studies focus on Saami reindeer herders' economic behaviour and herd management strategies. The research concerns the pastoralist economic behaviour of the reindeer herding Saami community, individual behavioural preferences³⁰, co-operative pastoral production in nomadic pastoralist households and the importance of kinship relations³¹. Another aspect that has been investigated is the degree to which slaughter strategies in Saami reindeer husbandry are both state dependent and interdependent on actions undertaken by neighbouring herders³².

2.4 Herding practices and management

Several studies on herding have focused on sustainable reindeer herding practices.

An introductory book used in secondary school education in Norway provides insights into the ecological, economic and cultural factors, including historically important milestones for reindeer herding areas that affect modern husbandry practices³³.

Another study explored the effect of an intensive harvest strategy on reindeer abundance

16 Stoyanova (2013)

17 Biuw et al. (2014)

18 Zhou (2007)

19 Boden (2014)

20 Bostedt et al. (2003)

21 St John et al. (2016)

22 Parks et al. (2002)

23 Valinger et al. (2011)

24 Zhou (2007)

25 Bostedt et al. (2015)

26 Bostedt & Lundgren (2010)

27 Pettersen et al. (forthcoming)

28 Kvakkestad & Aalerud (2012)

29 Glomsrød et al. (2017)

30 Bostedt (2005)

31 Næss et al. (2010)

32 Næss et al. (2012)

33 Riseth (2015)

in Finnmark, Norway³⁴. The study highlighted the need for an adaptive monitoring programme that could effectively detect the impact that management actions may have on body mass, recruitment and productivity within reindeer husbandry.

Reindeer mortality is often linked to predation, and several studies have focused on different aspects of predation risk. One study looked at habitat selection by female reindeer in relation to spatial and temporal variations in brown bear predation risk on the reindeer calving grounds³⁵. Another study investigated high female mortality that resulted in herd collapse among free-ranging domesticated reindeer in Sweden, concluding that predation, primarily by lynx and wolverine, is the most plausible cause³⁶. One article explored the relative importance of lynx and wolverine predation and density-dependent and climatic food limitation on claims of losses, recruitment and population growth rates in the context of Norwegian reindeer husbandry³⁷. Another research looked at the effects of predators on the reindeer used by Sami pastoralists³⁸.

Reindeer herding is also facing changes, which may impact reindeer health and disease status. These changes are related to increases in feeding, transport, herd size, animal density and stress load on the animals, which may affect animals' abilities to cope with infectious diseases³⁹. Changes in weather conditions and climate may also, over time, lead to restricted availability of pastures, changes in vegetation and changed conditions for parasites and insect vectors⁴⁰. For instance, one study investigated the population dynamics of Swedish semi-domestic reindeer for the period 1945–2012 at the reindeer herding district level (Sameby), to identify possible population collapses or declines⁴¹.

The discovery of chronic wasting disease (CWD) in Norway and the challenges it poses for reindeer herding is a topic that received media coverage during 2016–17 and which is also now undergoing research⁴². The implications of CWD for reindeer husbandry practices were also discussed during the Nordic Conference on Reindeer Hus-

bandry Research in Jukkasjärvi (Kiruna), Sweden, 29–31 May 2017.

Long-term changes in animal conditions have also been studied by investigating carcass records from the commercial slaughter of reindeer. The aim was to assess the suitability of this indicator for use within adaptive management programmes for reindeer husbandry grazing resources⁴³.

2.5 Reindeer health

Several studies have identified health problems affecting reindeer. While the general zoo-sanitary situation in Fennoscandia is currently highly favourable, reindeer herding is sometimes challenged by disease outbreaks from viruses, bacteria, fungi and parasites⁴⁴. A thorough understanding of virus diversity affecting wildlife provides an epidemiological baseline for information about pathogens. For instance, in one study, eye swab samples were obtained from semi-domesticated reindeer in Norway during an outbreak of infectious eye disease⁴⁵. Another study focused on herders' experience with infectious keratoconjunctivitis (IKC) and how they deal with it⁴⁶. In the same study, the herders claimed that IKC and other diseases had less importance than predators for loss of animals.

As previously mentioned, CWD is a recently studied topic related to both herding practices and reindeer health. In 2016, Norway confirmed two cases of CWD, one in a wild reindeer and the other in a wild moose. Consequently, the European Commission requested that the European Food Safety Authority (EFSA) recommend surveillance activities and, if necessary, additional animal health risk-based measures to prevent the introduction of the disease and its spread into/within the EU. Thus, a three-year surveillance system has been proposed, differing for farmed versus wild or semi-domesticated cervids⁴⁷.

Climate change impacts on reindeer health have been examined in relation to the increased insect harassment and activity due to increased summer temperatures in Arctic Canada⁴⁸. Another study focused on the emergence of serious disease outbreaks of filarioid nematodes that was promoted by climate change and resulted in substantial reindeer morbidity and mortality⁴⁹.

34 Bårdsen et al. (2014)

35 Sivertsen et al. (2016)

36 Åhman et al. (2014)

37 Tveraa et al. (2014)

38 Hobbs et al. (2012)

39 Tryland (2012)

40 Tryland (2012); Tryland keynote speech at the Nordic Conference on Reindeer Husbandry Research, Kiruna, on 29 May 2017

41 Bårdsen et al. (2017)

42 Several presentations relating to predators and disease can be found here: <http://www.dyrdrift.no/index.php/263-vel-blast>

43 Olofsson et al. (2011a)

44 Tryland (2012)

45 Smits et al. (2013)

46 Tryland et al. (2016)

47 Ricci et al. (2017)

48 Witter et al. (2012)

49 Laaksonen et al. (2010)

2.6 Governance, land use and regulation

Governance was a widely covered topic in the literature overview. Much of the identified research has focused on processes of institutional change that have influenced the current governance system⁵⁰. Some studies took a more critical perspective, for instance by looking at the challenges related to the implementation of a recent policy reform for indigenous reindeer husbandry in Norway⁵¹. Another critical study of reindeer herding in Finnmark claimed that the discourse has relied on flawed assumptions regarding land tenure. Through a historical analysis of the term "common" in relation to resources in Finnmark, the authors demonstrated how the term reflects a misunderstanding of local categories, practices and concerns related to pastures, territories and natural resources more generally⁵². A third study investigated why key actors' perceptions of Norwegian policy objectives aimed at securing sustainable reindeer husbandry through participation have failed in West Finnmark⁵³.

Studies related to the governing system of Sami reindeer husbandry covered community-based management (CBM) and discussed why some Sami communities living in reindeer foraging areas (siidas) self-organise to sustainably manage pooled resources, while others do not⁵⁴. Two studies took a critical approach to the governing system of Sami reindeer husbandry: one by looking at how reindeer husbandry is currently governed and how governing has changed over time⁵⁵; and the other by looking at how the new governance changes in 2010, which decentralised and delegated the right to manage protected areas to locally elected politicians and elected Sami representatives on newly established National Park Boards, affected adaptive capacity within the reindeer industry⁵⁶.

Land use is another pertinent topic in the identified literature. Studies focused on multiple land use activities in the Sami reindeer herding communities⁵⁷ to consider employment potentials and carbon sequestration perspectives⁵⁸. They also considered sustainable forestry versus reindeer herding⁵⁹, and impact assessment of infrastructure development, including roads and power lines and consequences

for reindeer summer grazing areas⁶⁰, development of ports⁶¹, wind farm projects⁶² and the mining industry's impact on reindeer husbandry⁶³.

Land use also relates to access to grazing resources and studies have covered: assessment of predator population impact on food production⁶⁴; effects of modern forest management on winter grazing resources for reindeer in Sweden⁶⁵; effects of intensive reindeer grazing on vegetation shifts in the Arctic tundra⁶⁶; decline of ground lichen forests in the Swedish boreal landscape and implications for reindeer husbandry and sustainable forest management⁶⁷; monitoring changes in lichen height for early detection of changes in lichen abundance in reindeer grazing areas⁶⁸; and evaluation of use agreements in the middle zone of the West Finnmark reindeer grazing area⁶⁹.

Studies on regulation related to land use focus on how reindeer herders' traditional knowledge and social organisation are incorporated into policy implementation through legislative, economic, institutional and informational means⁷⁰, as well as through incentives and regulations to reconcile conservation and development⁷¹. Power relations and land use conflicts have also been covered, including: mining projects⁷²; conflicting interests and objectives among industrial land users and those with other livelihoods⁷³, and experiences of applying a multi-criteria decision analysis interview approach in conflicts related to adverse impacts of forestry on old forests⁷⁴.

Resilience and sustainability have been discussed in relation to land use, including: historical profiling of resource use in northern Sweden and how this relates to adaptive cycles and resilience⁷⁵; potential effects of predicted climate change on the forage conditions during both summer and winter for semi-domesticated reindeer⁷⁶; and policy approaches related to nature conservation initiatives and sustainable reindeer husbandry to deal with the problem of predators⁷⁷.

50 Löf (2014)

51 Turi & Keskitalo (2014)

52 Marin & Bjørklund (2015)

53 Johnsen et al. (2015)

54 Hausner et al. (2012)

55 Löf (2016)

56 Risvoll et al. (2014)

57 Widmark et al. (2013); Widmark & Sandström (2012); Hagsgård (2016); Sandström et al. (2006)

58 Berg et al. (2016); Horstkotte & Roturier (2013); Horstkotte et al. (2014); Burkhard & Müller (2008)

59 Kivinen et al. (2012); Kivinen (2015); Holm (2015); Borch (2015)

60 Skarin et al. (2013); Skarin et al. (2015)

61 Tømmervik et al. (2015)

62 Skarin et al. (2015)

63 Lawrence & Larsen (2016); SEI (2016)

64 Strand (2016)

65 Kivinen et al. (2010)

66 Olofsson et al. (2010)

67 Sandström et al. (2016)

68 Olofsson et al. (2011b)

69 Olli (2007)

70 Turi & Keskitalo (2014)

71 Ulvevadet & Hausner (2011)

72 Johnsen (2016)

73 Horstkotte et al. (2016); Korosuo et al. (2014); Sandström & Widmark (2007)

74 Mustajoki et al. (2011)

75 Moen and Keskitalo (2010)

76 Moen (2008)

77 Heikkinen et al. (2011)

2.7 Social conditions and health issues of reindeer herders

During the poster presentation at the Nordic Conference on Reindeer Husbandry Research in Kiruna on 30 May 2017, it was emphasised that "human factors" (including health, environment and safety for reindeer herders' economic situation, and sick leave) is an important field of research.

Studies related to social conditions and health issues focus on quality of life and Sami mental health.

Quality of life has been studied by looking at the relations between living conditions and positive health among the Swedish Sami, specifically looking at the relations between sense of coherence, living conditions and health by comparing Sami and non-Sami populations⁷⁸. Another study looked at the confidence in primary health care, psychiatry and social services among the reindeer-herding Sami and non-Sami populations of northern Sweden⁷⁹.

Studies related to mental health have focused on the experience of being a young male Sami reindeer herder in Sweden, a group previously subject to stigma and specific health issues, in an attempt to understand these experiences from the perspective of mental health⁸⁰. Attitudes toward and expressions of suicide have been studied in the Swedish context by looking at unnatural deaths among reindeer-herding Sami families in Sweden during 1961–2001⁸¹.

2.8 Ethnographic and historical analysis

A small number of the identified studies focused on ethnographic and historical analyses of how reindeer husbandry has evolved.

The shift from nomadic foraging to sedentary agriculture has been studied by looking at key life-history traits and population growth rates, using comprehensive data from the seventeenth to nineteenth centuries in northern Finland. The study provides a detailed demonstration of the demographic changes and evolutionary benefits of an agricultural revolution⁸².

Histories of reindeer husbandry resilience: land use and social networks of reindeer husbandry in Swedish Sápmi 1740-1920⁸³ and the forest Sami society in transformation 1650-1800 have been

78 Abrahamsson et al. (2013)

79 Daerga et al. (2008)

80 Kaiser et al. (2013)

81 Ahlm et al. (2010)

82 Helle et al. (2014)

83 Brännlund (2015)

researched⁸⁴.

Human–reindeer interactions and the effect of human activity and infrastructure on reindeer have also been studied. The effects of hydropower development and its socio-ecological impacts on reindeer grazing lands have been studied in the Swedish context⁸⁵. Another study looked at how reindeer respond to wind farm construction in the Malå reindeer herding community in Sweden⁸⁶. The study concluded that despite a long domestication process, reindeer within Sami reindeer-herding systems exhibit similar patterns of large-scale avoidance of anthropogenic disturbance, as do wild Rangifer.

Two books published in the Sami language focus on women's participation in reindeer herding⁸⁷ and nomadic reindeer herding in Finnmark⁸⁸.

2.9 Tourism

Tourism covers aspects of business potential and challenges related to indigenous destination management.

The role of Sami tourism in destination development is one of the issues addressed by examining the diverging and converging interests of the Sami population and regional tourism entrepreneurs and developers⁸⁹.

The relationship between tourism, Sami culture and reindeer herding has been studied from a socio-economic perspective⁹⁰. Identity discourses and ethics are widely discussed topics, as are the use of stereotypical or one-sided images of Sami culture and reindeer husbandry within the tourism industry⁹¹. In addition, the potential of Sami tourism has been studied, particularly from the viewpoint of events and festivals organised in collaboration with the Sami, including case studies of the winter festival in Jokkmokk, Sweden⁹².

A study of agriculture-based tourism in Norway specifically focused on challenges related to herder-based tourism⁹³. The study raised questions about practical and regulatory factors that hinder herders from combining tourism development with herding.

84 Marklund (2015)

85 Össbo & Lantto (2011); Össbo (2014)

86 Skarin & Åhman (2014)

87 Utsi (2013)

88 Ravn (2007)

89 Olsen (2016)

90 Boden (2014); Olsen (2006); Ireland (2003); Viken & Müller (2006)

91 Kelly-Holmes & Pietikäinen (2014); Johansen & Mehmetoglu (2011); Tuulentie (2006); Viken (2006)

92 Müller & Huuva (2009); Müller & Pettersson (2006)

93 Milford et al. (2016)



A traditional Sami wedding in Kvikkjokk with reindeer antlers and other attributes used during the ceremony. Photo by Simon Köcher

2.10 Interdisciplinary research and other topics

Much of the identified research was cross-cutting in its approach. Cross-cutting topics included consultation between forestry and reindeer husbandry, as well as studies of the impact of infrastructure (including wind farms) and human activity on reindeer⁹⁴. Cross-cutting themes also included balancing the multitude of land use and stakeholder interests in generating a sustainable management regime, and reindeer-adapted policy regarding forest management.

The issues of adaptability and reindeer husbandry, interactions between indigenous rights and nature conservation, and the effects of legislation and policies in reindeer herding areas, as well as governance issues in general⁹⁵, have also been discussed. Other cross-cutting topics that have been identified relate to the economic situation of the pastoralist societies, including estimation of the opportunity costs created by externalities caused by small margins for livelihood and resources other than forestry and reindeer husbandry (e.g. development of biodiversity, tourism and hunting) in an empirical welfare economics framework; the potential importance of cultural benefits provided by natural-resource-dependent industries was also addressed in this study⁹⁶.

Studies on the socio-economic aspects of rein-

94 Interview with researchers from SLU

95 Elenius et al. (2016)

96 Interview with researchers from SLU

deer husbandry have also touched on several other topics, including: different theoretical approaches and research overviews, such as studies of the applicability of theories of animal agency to studies of human–animal relationships in the academic disciplines of environmental history and archaeology⁹⁷; multilevel ecological and administrative--political complexities of reindeer husbandry in connection with the concept of scale⁹⁸; the potential future of reindeer husbandry in northern Fennoscandia, taking into account different choices and trade-offs between various goals and ambitions⁹⁹; and research overviews targeting new integrative research approaches that will focus on the entire human–ecological system of “reindeer husbandry” to develop solutions to current challenges¹⁰⁰.

Other topics covered include the working hours within reindeer husbandry¹⁰¹; Sami reindeer herders' extensive ecological knowledge of winter forest pastures¹⁰²; and indigenous custom rights in modern landscapes from a multidisciplinary perspective¹⁰³.

Herein we summarise the main findings from the literature overview and provide suggestions for future research topics related to the socio-economic aspects of reindeer husbandry in Sápmi.

97 Nyssönen & Salmi (2013)

98 Keskkitalo & Horstkotte (2016)

99 Käyhkö & Horstkotte (2017)

100 Pape & Löffler (2012)

101 Presvik (2014)

102 Roturier & Roué (2009)

103 Elenius et al. (2016)

3. Main findings and conclusions

3.1 Summary of main findings

Our study shows that there are several cumulative and cascading effects that impact reindeer husbandry. Cumulative effects are defined as changes to the environment that are caused by an action in combination with other past, present and future human actions. In the case of reindeer husbandry research, cumulative effects of forestry, infrastructure, tourism and other issues make research challenging.

The overview of topics identified in the research also demonstrates that much of the research is multidisciplinary and cross-cutting and that several issues are addressed in a holistic way. "One cannot study one without the other"; for instance, one cannot study climate change without considering land use planning, access to winter grazing fields, etc.

Regarding differences across Nordic countries with respect to research on reindeer husbandry, some interviewees pointed out that Sweden's approach is more bottom-up than in Finland and Norway. In Sweden, the reindeer herders are doing the work on data collection for the development of reindeer husbandry plans and the tools are developed for the reindeer herders' use. Norway and Finland have a more top-down approach, and mapping of the grazing land is done by an agency rather than the reindeer herders. However, our literature overview also suggests that both Finnish and Norwegian research studies appear to be quite participatory and bottom-up, with several studies that include the herders and their perspectives.

Another general finding is that while numerous studies have been conducted on the socio-economic aspects of reindeer husbandry within these three Nordic countries, there are few studies that provide a joint Nordic perspective and, hence, there is a potential for comparative research across the Nordic region¹⁰⁴.

104 The lack of joint research on the status of reindeer husbandry in Fennoscandia has also been highlighted by Professor Øystein Holand in the Nordforsk project Reindeer Husbandry in a Globalizing North – Resilience, Adaptations and Pathways for Actions (NCoE ReiGN)

3.2 Topics for future research

Reindeer husbandry is a multidisciplinary research area that requires a holistic, integrated and inclusive approach. For instance, research focusing on climate change is likely to include land use planning, grazing rights and forest management as well as other, related topics.

Through phone interviews and consultations with key experts in this research field, several issues for future research on the socio-economic aspects of reindeer husbandry were emphasised. At the Nordic Conference on Reindeer Husbandry Research in Kiruna on 29–31 May 2017, topics related to future research on reindeer health were also discussed. The various issues raised by experts we consulted (see Annex 1), may provide a platform for discussing relevant topics for further research in the field:

- Integrating indigenous local knowledge, skills and practices (ILKP) in reindeer husbandry and co-production of knowledge are important. For instance, research toward understanding the Sami reindeer herders' extensive ecological knowledge of winter forest pastures and the characteristics they observe when managing this resource¹⁰⁵. The need for integrating ILKP has been particularly highlighted in the work of the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) and will be further emphasised in the forthcoming report to be released by the end of 2017.
- Further research is needed on the governance aspects of reindeer husbandry, considering the existing tensions and cumulative effects on reindeer grazing and the transformation of the governing system¹⁰⁶.
- Fostering good planning practices (road and rail infrastructure, wind farms, hydropower, mining, etc.) based on a functional land use dialogue and including reindeer interests is a pressing issue. This concerns both existing and planned infrastructure projects. The need for

105 Roturier & Roué (2009)

106 Löf (2014); Elenius et al. (2016)

building overpasses in several existing infrastructure projects, such as over the E4 road, was highlighted as one way to improve reindeer access to grazing land.

- The economic component has not been strong in research on reindeer husbandry in the Nordic Arctic. Studies on the economic importance of reindeer husbandry for the local communities, and their multiplier effects, are needed. Such studies should examine the entire value chain and develop strategic ideas, taking into account climate change and other socio-economic factors.
- Decline in lichen coverage is a pressing issue that requires adequate forest management.
- Land use rights and conflicts with other land uses such as forestry, wind power and biological conservation need attention.
- Reindeer husbandry should be examined from the viewpoint of environmental and minority law research, including, for instance: reindeer herding as a land use right; administration and administrative legislation for reindeer herding; liability to pay costs for damages caused by reindeer; and developments concerning ratification of ILO Convention No. 169.
- Improving understanding of the damage caused by predators (directly by killing the reindeer and indirectly by interfering with the reindeer husbandry), and the factors that can affect the amount of damage. In addition, research on the management of predators and how it is conducted in relation to the reindeer husbandry is needed.
- The economic household situations of reindeer herders need further attention.
- Stress, depression and suicide require further study.
- A better understanding of the needs and challenges of the different actors involved in reindeer husbandry, including market value for the involved industries and the benefits for rural communities, could be the basis for

a joint research project across the Nordic countries¹⁰⁷.

- Increased knowledge of today's disease situation related to infectious microorganisms in Fennoscandia reindeer is needed to understand future changes, for instance by using prediction models¹⁰⁸.
- Reindeer husbandry in cold climate (occupational medicine)
- Research on forest Sami reindeer herding (skogssamernas rensköttsel)
- To better cope with changes in reindeer herding practices, which may impact reindeer health and disease status, increased efforts should be made to gather reference data on health and disease parameters from the different reindeer herding districts, and epidemiological risk factor analysis should be undertaken. This would increase the ability of reindeer herders to cope with changes and to continue producing quality meat products for the market¹⁰⁹.
- The lack of structured long-term co-operation in studies related to reindeer health has meant that different countries have worked on individual health problems according to national relevance, often in the aftermath of disease outbreaks. This has led to individual research groups specialising in given pathogens, with this knowledge having little impact on neighbouring countries¹¹⁰. In future research, international co-operation is needed, for instance to improve surveillance and the availability of disease data¹¹¹.
- Last but not least, there is an increasing need for a comparative research across the Nordic countries studying both natural, political and legal conditions influencing the reindeer husbandry. ReiGN Nordic Centre of Excellence is a good example of Nordic research cooperation, but there are many more topics that could be addressed from a Nordic perspective.

107 Boden (2014)

108 Anna Omazic: "Infectious disease in Fennoscandia reindeer". Presentation at Nordic Conference on Reindeer Husbandry Research, Kiruna, 29 May 2017.

109 Tryland (2012); Morten Tryland: "reindeer health in perspective". Keynote speech at the Nordic Conference on Reindeer Husbandry Research, Kiruna, 29 May 2017

110 Reindeer Health Research, 2009

111 Anna Omazic: "Infectious disease in Fennoscandia reindeer". Presentation at the Nordic Conference on Reindeer Husbandry Research, Kiruna, 29 May 2017.

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Camilla Sandström, Professor, Department of Political Science, Umeå University, phone interview 27 March 2017

Per Sandström, Researcher, Department of Forest Resource Management, Landscape Studies, Swedish University of Agricultural Sciences, phone interview 28 March 2017

Peter Sköld, Professor, Executive director, Arctic Research Centre at Umeå University, email correspondence 31 October 2017.

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