7 Implications of norms and knowledge in customary reindeer herding units for resource governance

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Introduction

Unpredictable environmental conditions are an integral part of many pastoral systems. Fluctuations in abiotic conditions determine resource availability for livestock within and between seasons and from local to regional levels. For pastoralists, intimate knowledge about this heterogeneity is vital to adapt their herding strategies and practices in response (Fernández-Giménez & Le Febre 2006.). Most important among these is the spatial and temporal flexibility of herders' movements across the landscape. To govern these movements and allocate access to fluctuating resources between different herding units, internal rules may be necessary. Responses to an unpredictable environment, therefore, hinge not only on the bio-physical and ecological characteristics of the landscape but also on how people compete or collaborate in herding. Culturally embedded norms, values and customary laws, as part of the cultural and social capital in pastoral societies, are fundamental for building trust and facilitating collaboration between individuals and groups (Forbes 2013; Bodin 2017).

At high latitudes, forage availability for herbivores differs profoundly between seasons. This predictable pattern varies with unpredictable stochasticity in weather events. Furthermore, the directional trend in changing climate increases weather events that are less predictable and more extreme and can have unfavourable impacts on forage accessibility and on pastoralism as a whole (Forbes et al. 2016). These events make the planning of particular herding activities challenging (Chapter 5), while anthropogenic impacts of conflicting forms of land use reduce the availability of pastures for reindeer (Chapter 4). Moreover, colonial influences by the nation states, such as marginalization of reindeer herding communities and invalidation of their customary rights and institutions by superimposing conflicting norms out of the local context, have tarnished the history of reindeer husbandry in Norway, Sweden and Finland up to the present. These cumulative factors reduce the herders' capacity to fully exploit their cultural and social capital in shaping adaptive responses to environmental change.

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In light of these historical legacies and present-day challenges of unpredictable availability of and access to grazing resources, this chapter explores how reindeer herders' internal governance systems, including social networks, norms, customary laws and traditional knowledge, shape internal cooperation, as well as their relation to state policies.

Analytical framework

People and nature are interlinked as social-ecological systems (SES), with mutual influences upon each other. In her seminal work on the subject, Ostrom (2007) identifies, among others, the linkages between people (*users*), the *resource system* and the *resource units* within that system as key components of an SES. The capacity of people to manage natural resources and adapt to change depends on several characteristics within the social subsystem in an SES, such as the capacity to implement decisions and solutions that are responsive to ecological patterns and processes.

Social networks, norms and customary law

Through ties such as kinship, affinity and collaboration, individuals or groups build and maintain social networks. As such, social networks can enable people to build mutual trust, share knowledge and economic or social support, and thus enable them to address and solve problems or adapt to change together (Armitage et al. 2011).

To facilitate social interaction, networks create and rely on shared values and norms. Norms are culturally embedded, informal rules composed of beliefs, mental models and motivations instead of explicitly stated rules (Fehr & Schurtenberger 2018). Norms influence individual actions, cooperation and expectations, e.g., what behaviours are approved or taboo (Schelling 1980; Henrich & Muthukrishna 2021). In response to environmental and sociopolitical change, norms and practices, e.g., on resource management, are evaluated and revised. Sustainable use of natural resources, therefore, is more likely to succeed if norms and knowledge to promote such use are shared, respected and agreed upon between users (Ostrom 2007).

Similarly, customary laws and rights can promote sustainable use and protect resources if social groups benefit from such use (Schnegg 2018). These laws and rights are documented and passed on orally as traditions and practices, making them so fundamental to the respective culture, shared values and related worldviews that they are treated as laws.

Indigenous and traditional knowledge

Norms and customary laws are deeply connected to the ways Indigenous people, or others with nature-based livelihoods, use and understand their traditional lands

and waters – in material and spiritual ways. Their knowledge systems include language, skills and practices developed through experiences that are transmitted inter-generationally. Continuously tested against contemporary observations of environmental changes, these knowledge systems are dynamic and adaptive and are often described as a place-specific "way of life" (Berkes 2012).

Indigenous knowledge, in particular, embraces ethical aspects of behaviour towards human and non-human actors and spiritual ties to the bio-physical world (Berkes 2012). It is described as holistic and often practice- and language-based. Western concepts and epistemology may risk misinterpreting Indigenous practices, values and motives when not fully comprehending their knowledge base and epistemology (Berkes 2012). Hukkinen et al. (2006) refer to "ways of knowing" or "practitioners' knowledge", which is based not on ethnicity, instead refers to knowledge originating from engagement with the environment. Here, we use *traditional knowledge* to cover knowledge that originates from cultural continuity, independent of ethnicity, with the awareness that "traditional" is constantly revised against changes within the SES.

Internationally, the significance of Indigenous knowledge for biodiversity conservation and sustainable development was first acknowledged in the UN Convention on Biological Diversity (CBD) in 1992. Within their national context and legislation, countries that signed the Convention are obliged to "*respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities*" (article 8j), as well as to "*protect and encourage customary use of biological resources in accordance with traditional cultural practices*" (article 10c). Norway, Sweden and Finland have ratified the CBD. For land use governance, the voluntary Akwé: Kon Guidelines, developed based on article 8j of the CBD, give recommendations about the incorporation of Indigenous knowledge into impact assessment processes concerning lands and waters owned or used by Indigenous and local communities.

Similarly, the United Nations Declaration on the Rights of Indigenous People (UNDRIP), passed in 2007, seeks to reconcile, restore and protect Indigenous cultures and develop their self-determination. Article 31 stipulates that Indigenous people have the right to "*maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions*". Signatories shall ensure that these rights are protected and recognized. However, neither the CBD nor UNDRIP is legally binding or establishes new rights but aims at placing equal value on Indigenous and local knowledge and other forms of knowledge.

Traditional and Indigenous knowledge are also mentioned in the strategies for the Arctic Region to ensure development towards sustainability, both at the national and EU level. Despite these steps and commitments, the recognition and inclusion of traditional livelihoods, their customary laws and knowledge often remain weakly implemented (Chapter 8) and suffer from earlier suppression or delegitimization by laws instituted by state governments (Åhrén 2004). Likewise, holders of traditional knowledge perceive a persistent lack of trust about their ways of knowing (Wheeler et al. 2020).

Customary institutions in reindeer husbandry: *siida* and *tokkakunta*

The heuristic of an SES, i.e., the relationship between users, particular resources they manage and the resource system these resources are embedded in (Figure 7.1), corresponds to the conceptualization of reindeer herders' customary institution: the Sámi *siida* and the Finnish *tokkakunta*.

The *siida* is a herding unit in which herders seek to balance the relationship between reindeer herd size, available workforce within the herding communities and pasture resources, through social arrangements, often based on kinship or affinity (Figure 7.1; Bjørklund 1990; Sara 2009). Finnish herders have similar local herding units based on neighbourhood rather than kin groups. Finnish customary systems have stronger ties to living in local villages and surrounding pastures, resulting in comparatively lower mobility than most Sámi *siidas* (Heikkinen 2002).

Following the SES framework presented by Ostrom (2007), we describe these customary institutions and herders' social networks based on the history of land use that shapes the dependence on resources even today. Sustaining

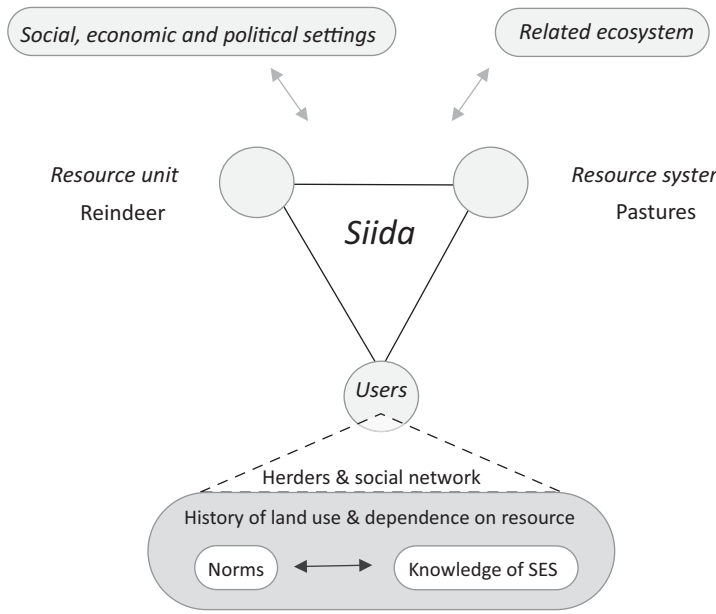


Figure 7.1 Conceptual model of the *siida*, integrated with selected elements of Ostrom's SES framework. The *siida* also interacts with the wider social, economic and political settings, as well as the related ecosystem, including migration routes and other habitats important for reindeer.

these resources involves sharing norms for collective action, as well as knowledge about the SES (Figure 7.1).

The *siida* has been described as the "own and only form of community organization" of Sámi society (Manker 1953:16). The *siida*, therefore, is an institution that existed before any regulations were implemented by the states to govern reindeer husbandry affairs. A *siida* is characterized as a decentralized social network, which establishes a working relationship between households with flexible group composition in space and time based on kinship or affinity (Paine 1994; Bjørklund 2013). Households and families joined as a *siida* live and migrate together, sharing the benefits and costs of the herding work of individually owned reindeer on shared grazing grounds, clearly delineated by borders between *siidas*. However, these borders are permeable due to the customary obligation to grant access to other groups, e.g., during difficult grazing conditions (Marin & Bjørklund 2015).

The land use pattern of a *siida* depends on trust between different *siidas* and interactions between herd structure, reindeer behaviour, weather and topography (Figure 7.1, Sara 2009). The composition and size of a *siida*, comprising people and reindeer, may change with seasons and between years, depending on seasonally changing availability of grazing resources and collective choice arrangements (Bjørklund 1990; Sara 2009). Groups that form a larger *siida* on summer grazing grounds may break up and join as different, smaller groups during migration or on winter pastures to enable a faster response to weather-related deterioration in grazing conditions. Environmental variability and monitoring of the shared grazing resources may, therefore, have social implications by redistributing *siida* members (Sara 2009). This emphasizes the importance of effective relationships within and between *siidas* in the complex meshwork of overlapping rights and territories and high mutual dependence.

Even though the *siida* has undergone changes and transformations in its organization, practices and meaning, its basic principles are still relevant today. However, whether or how the *siida* is understood, implemented and recognized in national law differs between the Nordic countries. The administrative units recognized by the respective state ("reindeer herding districts") encompassing the *siidas* and *tokkakuntas* are the *sameby* in Sweden, *reinbeitesdistrikt* in Norway and *paliskunta* in Finland. In Norway, summer *siidas* are formally recognized as legal units. In Sweden and Finland, there is no legal recognition of the *siida* or *tokkakunta*.

History of siida *land use and their dependence on natural resources*

From the 17th century onwards, reindeer husbandry gradually increased in economic and cultural importance for Sámi livelihoods that combined hunting wild reindeer and fur animals, fishing, gathering and herding for subsistence and taxes. Early *siidas* were primarily organized based on hunting and fishing groups (Tegengren 1952). To maximize the area and minimize distances to be travelled, *siida* areas could have a rounded shape, in particular in the Eastern

part of Sápmi, while more elongated borders possibly existed in Western Sápmi (Pennanen & Näkkalajärvi 2002). Natural topography, lakes and rivers, as well as artificial structures, delineated the borders between the land and water bodies, over which families joined in a *siida* had clear ownership (Vorren 1980). From the mid-17th century onwards, paying taxes for these lands [*Lappskatteland*] to the Kingdom of Sweden-Finland secured and confirmed private ownership of them, e.g., in court cases involving conflicts with farmers (Korpijaakko-Labba 1994). However, border conflicts between *siidas* have also been recorded in court cases from each country (Lundmark 1982). As reindeer husbandry increased in economic and cultural importance, herd size also increased, and early pastoralists adapted to the seasonal migration of reindeer. Formerly fixed borders between *siidas* became more fluid as new forms of collaboration developed to share labour between families or households and secure access to grazing grounds (Bjørklund 2013). Ownership structures, land use rights of taxed lands and the *siida* were eroded during the 19th century when the taxed lands fell under the jurisdiction of county administration boards rather than being sovereignly managed by reindeer herding communities (Lundmark 1982).

Geo-political conflicts during the 19th century resulted in border closures between Norway, Sweden and Finland (annexed by Russia from Sweden in 1809) and restricted movement of herders and reindeer across these borders to access season-specific pastures. They also prevented herders, now forced into the confinement of nation states, from maintaining necessary relationships between *siidas* across borders. Border closures resulted in forced relocations of Sámi families from northernmost Sweden, Norway and Finland to the south and east of Northern Fennoscandia. These relocations forced herders into areas that, by Sámi custom, belonged to other *siidas* that originally inhabited the area (Åhrén 2004). Some resultant conflicts persist to this day.

Moving from intensive to extensive herding, where reindeer are spread out over larger areas, e.g., due to the introduction of snowmobiles in the 1960s or to a lack of sufficient grazing resources due to competition with other forms of land use (Helle & Jaakkola 2008), has affected the role of the *siida* today and changed collaboration. For example, if a particular *siida* is more affected by encroachment than another, it may need to access grazing areas that are currently used by other *siidas*, raising the potential for internal competition or conflict (Labba 2015).

The role of the **siida** *and* **siida** *autonomy in legislation today*

Partial erosion of *siida* customs arose due to lawmakers' lack of understanding of Sámi traditions, customs and languages. Though the generalized characteristics of a *siida* described above still apply today, the *siida* structures differ between the three Nordic countries. Differences exist between what is meant by a *siida*, and whether and how *siidas* have been or currently are acknowledged by state legislations, including the respective national Reindeer Husbandry Acts. The Reindeer Husbandry Acts construct the right of reindeer herding as fully

collective and equal among all members of a herding district, in contrast to individualized and more complex customary rights and practices between *siidas* (Allard 2015).

Norway

The second Reindeer Husbandry Act in Norway (1978) failed to recognize the *siidas*' customary use and complex division of access and usage of the large grazing area of inner Finnmark, and instead defined it as "commons". As a result, state legislation did not take into account *siida* customs, leading to increased internal conflicts between *siidas* and families due to divergent and conflicting perceptions of rights to grazing areas (Turi & Keskitalo 2014). The revised Reindeer Husbandry Act of 2007 attempted to incorporate into law the reindeer herders' view that the traditional *siida* should be granted a greater degree of autonomy to handle internal affairs than previously stated in the Act. While the Act recognized the summer *siidas* as an administrative unit, i.e., herding units grazing their herds within a shared area ("district") during summer, district borders remain as defined by the state, and there were limited practical changes for reindeer herders (Johnsen et al. 2017). As most of the summer areas in Finnmark are managed by only one summer *siida* each, cooperation between different *siida*s on these areas is limited (Hausner et al. 2012). However, much cooperation is needed on migration routes, on both those shared between *siidas* and those which cross other *siidas*' seasonal grazing grounds.

On winter grazing areas, however, *siidas* may re-form into smaller groups of different compositions than summer *siidas*. For that reason, the Act of 2007 abandoned the collective right to undefined broad "commons" on winter grazing areas, and *siidas* need to share and regulate access to overlapping grazing areas between themselves. This creates a network of access rights that can differ between groups and seasons for a given area, based on topography or customary use of these areas. With the devolution of rights to the *siida* level, followed a greater responsibility for the *siidas* to reach policy goals for sustainable reindeer husbandry. This includes determining seasonal grazing patterns, number of reindeer, maintenance of herding infrastructure and division of labour, to be approved by a regional and, in the case of reindeer numbers, national comanagement board (Turi & Keskitalo 2014). However, state governance of reindeer husbandry, based on simplified indicators of sustainability such as carcass weights, does not heed to reindeer herders' complex body of knowledge. As a consequence, disputes between *siidas* can occur over what grazing areas may be used by whom, when, for how long and by how many reindeer (Marin & Bjørklund 2015; Johnsen & Benjaminsen 2017). A specific court has been established (*Indre Finnmark tingrett/Sis-Finnmárkku diggegoddi*) to resolve such conflicts. However, Hausner et al. (2012) found that reindeer herders in Finnmark disagreed about whether the degree of access to customary grazing areas should be regulated by informal agreements or by formalization through the courts or sanctioning of transgressions by an impartial authority.

Sweden

Like Norway, the borders of a *sameby* today do not necessarily correspond to the customary *siida* borders, and the level of recognition of *siida* borders may differ between *samebyar* in Sweden (Labba 2015). In the first Swedish Reindeer Husbandry Act (1886), the right to own and herd reindeer was collectivized for the members of a reindeer herding district (*sameby*). The same is still valid in the current Act (1971), in which the use of the *sameby*'s grazing area is for "the common needs" of its members (Reindeer Husbandry Act 1971:§15). Accordingly, there is no legislative acknowledgement or recognition of the *siida* and *siida* customs of place-specific access rights, which contributes to internal tensions (Allard 2015; Labba 2015). Nonetheless, the *siida* and associated norms still fulfil an important function, in particular in winter grazing areas.

Finland

In the north-eastern part of the then Kingdom of Sweden-Finland, known as Kemi Lappmark, the resident Forest Sámi practised reindeer husbandry with smaller herds in combination with hunting, fishing and gathering (Tegengren 1952). When Finnish settlers entered Sámi lands from the 17th century onwards, they adopted these practices in addition to their farming, fishing and hunting-based livelihood (Heikkinen 2006; Kortesalmi 2008). In 1898, the Senate of Finland legalized this more stationary *paliskunta*-system as the official administrative unit of reindeer husbandry, establishing borders based on the more stationary livelihood rather than on the migratory Sámi *siida*. However, migratory Sámi reindeer herders resisted, and still resist, the system as ill-suited to their way of life and customary rules, as it mainly fitted the needs of settled people, peasants and fishermen of lakes and rivers, including Sámi (Pennanen & Näkkäläjärvi 2002). Even though *siida* or *tokkakunta* arrangements can act as the local units that organize reindeer herding on a daily basis, only the *paliskunta* (herding district) is a legally recognized administrative unit, irrespective of ethnicity, managing all official administration, political power and reindeer herding-related land use planning. The end result is that the majority of Finns are able to dominate reindeer and Sámi-related negotiations (Heikkinen 2002). This complicates the options to defend or uphold reindeer herders' rights and customary rules when Sámi herders and Finnish herders, separately or together, compete with the state and other land users for land and resources.

Different cultures, therefore, (co)exist in the Finnish reindeer husbandry area. While reindeer husbandry is a keystone of Sámi ethnic identity and culture, the cultural dimension is also relevant in the context of reindeer husbandry practised by ethnic Finns, but with no clear relation to ethnic identity (Sarkki et al. 2021). Finnish reindeer herders can be characterized as a minority established through the history of cultivation in northern Finland, passing on their traditional livelihood and way of life, including their own customary rules and reindeer-related dialect.

Norms and customary law

Norms that structure herding practices and social interactions within and between *siidas*, from the nested levels of the individual herder to the household, the family and the *siida* as a whole, are strong in contemporary Sámi reindeer herding communities. Norms also affect the enforcement of borders between neighbouring *siidas*, clearly defined but permeable, in regulating access to grazing resources. Transmitted orally, norms often do not exist in any systemized or written form. However, Finnish court cases from the 18th century documented that herders were already being accused of not following local agreements on pasture use (Kortesalmi 2008).

Norms within *siidas*

Norms for sharing, reciprocity and cooperation between members of a *siida* are fundamental for distributing workloads and risk management, to recover from disasters or to come to shared decisions (Sara 2009). Reciprocity between herders encourages existing or prospective working relationships but can also express affinity or approval of the recipient's capability as a reindeer herder (Thomas et al. 2015). The *siida* can also increase equality among its members, irrespective of differences in wealth, age and domestic status (Paine 1970).

Kinship, e.g., relatedness by blood or marriage, is an important social marker, well-recorded by specific terminology and passed on in Sámi communities (Ruong 1975). In Finnmark, Northern Norway, kinship combined with the capacity to work together in comparatively small groups on summer grazing grounds enabled herders to build up larger herds, compared to non-kin working relationships (Næss et al. 2010). Larger districts or lack of obstacles to reindeer movement such as topography or fences demand more complex cooperation with more groups, so that kinship relations alone may no longer suffice to establish and navigate cooperative behaviour (Næss et al. 2010).

Norms between *siidas*

The *siidas*' social network provides flexibility and stability at the same time. Social fluidity to join groups, based on the spirit of cooperation between individuals (Labba 2015) and to adjust herd sizes provide flexibility to react to, e.g., environmental variability, while clearly defined, but permeable, customary borders between *siidas* and migration routes provide stability by agreed patterns of land use (Sara 2009; Marin & Bjørklund 2015).

Though borders between *siidas* are permeable, no *siida* is supposed to graze their reindeer on another's territory without agreement. Norms between *siidas* strictly regulate this right to access territories of others and the length of stay depending on grazing conditions, so that access to grazing grounds is not free for everyone to exploit (Hausner et al. 2012). Trust between *siidas* is, therefore, important to establish functional relationships. However, trust

between *siidas* may erode. For example, in Finnmark, the unclear relationship between customary borders and the legislation of the Reindeer Husbandry Act of 1978, making pastures "commons" for all *siidas* within the same winter grazing area, caused border disputes and loss of trust, as well as having many other implications for Sámi reindeer husbandry (Hausner et al. 2012). Selfish behaviour that disrespects these norms may result in sanctions and retaliation, as it is seen as a conscious act of transgression (Laakso 2008; Marin & Bjørklund 2015). Therefore, *siidas* can be understood as an informal authority with jurisdictive power not enforced by the state, shaping cooperation between and access to different *siidas*. Diversity in strategies and goals exist in reindeer husbandry, such as herd composition and slaughter strategies. The relationship to other herders and other *siidas* can have an important influence on shaping these strategies, often as a response to state regulations (Johnsen & Benjaminsen 2017).

Cooperation also influences one of the most disputed incongruent realities between reindeer herders' customs and state governance: the perception and significance of what constitutes sustainable reindeer herd sizes (Chapter 9). While herders can be concerned about the workload to prevent excessively large herds from different *siidas* from mixing with each other, management authorities are concerned about unsustainable grazing pressure and exceeding "carrying capacity" (Johnsen & Benjaminsen 2017).

From a herder's perspective, herd size is a means to claim the right to grazing grounds, both in interaction within and between *siidas*, or against other forms of land use (Johnsen & Benjaminsen 2017). Kinship ties often imply a high degree of cooperation and shared workload between *siidas*, enabling cooperating herders to increase their herd sizes (Næss et al. 2010). Furthermore, slaughter strategies may depend not only on the number of animals to slaughter within a single herd but also on neighbouring *siidas*' strategies and the cooperation between them regardless of kinship ties (Næss et al. 2012). By not slaughtering more than neighbouring *siidas*, access and claims to winter pastures depending on herd size can be upheld (Næss et al. 2012).

Sámi *siidas* in Finland follow similar norms and strategies in herd management, sometimes contrary to management decisions by the state (Laakso 2008). According to custom, but today also according to the Reindeer Husbandry Act (848/1990), voting rights of individual herders in matters relating to the *paliskunta* depend on the individual's herd size. As the Ministry of Agriculture and Forestry sets the highest permitted reindeer numbers and sanctions at the level of the *paliskunta*, internal struggles and erosion of trust have been evident between Sámi *siidas* and between *tokkakunta* units of Finnish herders. This struggle can create great tension**s**, e.g., when rebuilding herds following catastrophic winters (Laakso 2008). Where Sámi and Finnish herders compete for access to grazing areas, tensions between them are evident and, in certain places, severe. However, intermarrying, mixed families and local cooperation have been, and still are, common (Kortesalmi 2008).

Indigenous and traditional knowledge in reindeer herding communities

Knowledge about the SES in which reindeer husbandry operates links people to norms and practices (Figure 7.1). It also connects people by knowledge exchange, learning or transmission to subsequent generations. It is, therefore, an irreplaceable resource in order to adapt to changes in local realities brought about by environmental or anthropogenic impacts. Sámi languages are an integral part of Sámi traditional knowledge (*árbediehtu*, "inherited knowledge" in Northern Sámi) and vector for knowledge transmission. However, colonial assimilation practices in the 19th and early 20th centuries in all three countries strongly reduced the degree to which the different Sámi languages are spoken today (Chapter 1). Likewise, traditional knowledge as lived experience is also transmitted in Sámi communities, even where Sámi is not spoken on an everyday basis.

Languages codify knowledge and the Sámi worldview of mutual relationships between people, reindeer and nature (Johnsen et al. 2017). Originating from the need to identify and communicate critical situations and phenomena, a nuanced vocabulary exists about, e.g., reindeer behaviour, morphologies, age classes, as well as weather and snow-related conditions (Magga 2006; Sara 2009; Eira et al. 2013). Complex categories can describe interdependent factors, such as the term *guohtun* (Northern Sámi) describing the relationships between the vegetation community, snow cover and reindeer behaviour that in combination determine the accessibility of grazing resources to reindeer temporally and spatially (Roturier & Roué 2009). Likewise, the vocabulary used by Finnish herders often has its origin in Sámi languages (Heikkinen 2002).

Recognition of traditional knowledge

Reindeer herders' knowledge can still be challenged, questioned or marginalized, and power imbalances between different types of knowledge limit the capacity to find common solutions to shared concerns in multiple-use landscapes or nature conservation (Sjölander-Lindqvist et al. 2020).

Complementarity between different forms of knowledge has gained increased recognition in the scientific community. However, the willingness to incorporate such knowledge as an evidence base into decision-making processes often hinges on whether it fits within current resource management models and paradigms and on power asymmetries between government approaches and local communities (Turi & Keskitalo 2014). A key challenge remains to ensure that Indigenous and local knowledge is not taken out of context, misinterpreted or misused when included in research or environmental management decisions. Accordingly, traditional knowledge of reindeer herders has been recognized or implemented to varying degrees, effect and satisfaction of involved parties in decision-making processes, as the selected cases below illustrate.

Norway

Losses to apex predators are a major concern for reindeer herders in all countries (Chapter 6). Sámi traditional knowledge about these predators has been documented, but much knowledge was also lost when the number of predators declined to near extinction. Due to the recovery of predator populations by successful conservation efforts in the mid-20th century, this knowledge is newly revived (Gaup Eira & Sara 2017).

In Norway, the Nature Diversity Act §8 (2009) refers to the CBD in emphasizing that Sámi traditional knowledge, as well as the Sámi Parliament, needs to be considered in decision-making processes regarding biodiversity conservation. However, reindeer herders call for a more holistic outlook, where interactions between reindeer, predators and the surrounding landscape are seen as interrelated. Predator management in Norway relies on a science-based system that leaves little room for local herders to present their knowledge as legitimate and valid (Risvoll & Kaarhus 2020). Herders have recently expressed concern that neither their traditional knowledge of predators nor their daily realities of living with them is reflected in the national management strategy (Sjölander-Lindqvist et al. 2020). For instance, the methods to document and verify predator abundances and kills are difficult to align with reindeer herders' observations. A mismatch between Western scientific methods and reindeer herders' observations, therefore, threatens to erode mutual trust and may impede finding solutions. One example is the diverging view on reindeer losses if caused primarily by a combination of density-dependence and environmental stochasticity, increasing their vulnerability to predation, or predators as the main source of mortality (Tveraa et al. 2014).

Sweden

Mapping of reindeer herders' Indigenous knowledge about their vital grazing grounds, migration routes, GPS-location of reindeer and other relevant environmental information has been realized in a participatory GIS (*renbruksplaner*, Reindeer Husbandry Plans, Sandström et al. 2012). The resultant maps can bridge Western academic knowledge and the herders' Indigenous knowledge, interpreting their animals' movement based on this knowledge.

Aimed primarily as a tool for conflict resolution with forestry, these digitized maps can visualize cumulative effects and have shown their potential to facilitate both knowledge-based dialogue about mutual influences and collaborative learning processes with representatives of other forms of land use (Sandström et al. 2012) and within the reindeer herding community. However, the tool is time consuming to keep updated. Furthermore, the representation of some of the herders' knowledge in spatial terms can force them to "prove" all their knowledge, as partners in consultation can be unfamiliar with or sceptical about knowledge that is not represented on maps. These plans, therefore, are not a substitute for reindeer herders' knowledge but rather depend on it for continuous adaptation as a living document.

Finland

Disputes and disagreements over local land uses are prevalent, long-term and continuing in Finland. For instance, in the municipality of Eanodat (Enontekiö) in north-western Finland, the state-owned Finnish Forest Enterprise Metsähallitus has developed management plans for so-called "wilderness areas", including the preservation of Sámi livelihoods together with nature conservation, tourism and potential prospecting for minerals (Markkula et al. 2019). These plans follow guidelines articulated in the CBD for co-developing land use plans and to increase knowledge about *siida* customs within the state-owned forest enterprise Metsähallitus. However, as the *siida* system is not officially acknowledged in the Finnish Reindeer Husbandry Act, Sámi reindeer herders saw this gap as a serious concern with respect to customary rights, comanagement of land use and acknowledgement of their Indigenous knowledge. Herders perceived a difference between Indigenous and local knowledge being heard versus actually having an impact on decisions for land use planning and development (Landauer & Komendantova 2018). However, land use planners argued that reindeer herders' knowledge needs to be made more spatially explicit, as verbally communicated knowledge is difficult to integrate into planning processes (Markkula et al. 2019). These dilemmas have been ongoing for decades (Raitio & Heikkinen 2003).

Concluding remarks

The examples presented in this chapter demonstrate how customary laws, norms and traditional knowledge structure the social relationships between reindeer herders, as well as their relevance in responding to unpredictable environmental conditions. The present-day challenges of rapid climate change, resource extraction, growing predator populations and competing national law make it difficult for reindeer herding communities to maintain desired relationships between each other, as well as within the wider social, economic and political settings and the related ecosystems (Figure 7.1). Where the herding community has to adopt undesired responses to such external pressures, these responses may reinforce unsustainable outcomes – culturally, socially and/or environmentally. To escape these traps of reinforcing feedbacks, a revitalization of customary laws could increase the fit to the dynamics of the SES. The engagement of customary laws in broader social and political structures for meaningful and effective participation in environmental governance would offer increased empowerment (Grey & Kuokkanen 2020). One example includes the re-institutionalization of customary rights to distribute access to grazing areas between different *siidas*.

Recognition of customary rights, as well as traditional knowledge, as an evidence base in national laws and international agreements and a reversal of colonial influences of knowledge invalidation, has been identified as pathway to escape social-ecological traps (Eckert et al. 2018). While traditional knowledge and non-Western epistemologies are increasingly recognized by international laws, rules and guidelines, challenges due to power imbalances persist

in practice. National governments can dominate the discourse and decision-making processes with practical implications for reindeer husbandry (Johnsen et al. 2015). Power imbalances thus threaten the viability of reindeer herders' customary institutions and thereby impose different norms that may run contrary to the customary ones. This may result in conflicts within the herding society that intensify the severe and increasing pressures from parallel land use or other impacts by the majority of society. As long as reindeer herders' customs and knowledge do not receive legal recognition or contradict national legislation, they are vulnerable, may collapse or lead to internal conflict. Loss of community cohesion and erosion of social ties may thus threaten the internal capacity of the livelihood to escape social-ecological traps (Boonstra et al. 2016).

While reconciliation of the colonial past, in particular Sámi–state relationships including weakening or disempowering customary institutions and traditional knowledge, is to some degree going ahead, relevant resources and genuine opportunities for self-determination and effective participation in environmental governance are still lacking (Kuokkanen 2020). For instance, engagement of reindeer herders in planning and decision-making processes during the early stages is necessary to value their knowledge and foster coproduction with other knowledge systems (Tengö et al. 2014; Landauer & Komendantova 2018). Respectful inclusion of herders' knowledge through collaborative processes that respect the integrity and complementarity of each knowledge system can increase the validity and relevance of decision-making processes; it is a step towards shared power and responsibility in resource governance.

As the unprecedented pace of environmental change challenges herders' traditional knowledge and Western science, integration of knowledge systems may thus become an impactful resource to address the challenge of climate change and to adapt to increasingly unpredictable environmental conditions.

References

Åhrén, M. (2004). Indigenous peoples' culture, customs, and traditions and customary law-the Saami people's perspective. *Arizona Journal of International and Comparative Law.* 21, 63–112.

Allard, C. (2015). Some characteristic features of Scandinavian laws and their influence on Sami matters. In: Allard, C. & Skogvang, S.F (eds.) *Indigenous Rights in Scandinavia–Autonomous Sami Law*. 49–64. Farnham: Ashgate Publishing, Ltd.

Armitage, D., Berkes, F., Dale, A., Kocho-Schellenberg, E. & Patton, E. (2011). Co-management and the co-production of knowledge: Learning to adapt in Canada's Arctic. *Global Environmental Change*. 21(3), 995–1004.

Berkes, F. (2012). *Sacred Ecology*. New York: Routledge.

Bjørklund, I. (1990). Sami reindeer pastoralism as an indigenous resource management system in northern Norway: a contribution to the common property debate. *Development and Change*. 21(1), 75–86.

Bjørklund, I. (2013). Domestication, reindeer husbandry and the development of Sámi pastoralism. *Acta Borealia*. 30(2), 174–189.

Bodin, Ö. (2017). Collaborative environmental governance: achieving collective action in social-ecological systems. *Science*. 357(6352) eaan1114.

Boonstra, W.J., Björkvik, E., Haider, L.J. & Masterson, V. (2016). Human responses to social-ecological traps. *Sustainability Science*. 11(6), 877–889.

Eckert, L.E., Ban, N.C., Tallio, S.C. & Turner, N. (2018). Linking marine conservation and Indigenous cultural revitalization. *Ecology and Society*. 23(4), 23.

Eira, I.M.G. & Sara, M.N. (2017). Reindriftsnæringens erfaringsbaserte kunnskap om reindrift og rovvilt. www.statsforvalteren.no/siteassets/fm-nordland/dokument-fmno/landbruk-og-mat-dokumenter/reindrift-dokumenter/forskningsrapporter/eira-og-sara-2017_reindriftsnaringens-erfaringsbaserte-kunnskap-om-reindrift-og-rovvilt.pdf [01.02.2021]

Eira, I.M.G., Jaedicke, C., Magga, O.H., Maynard, N.G., Vikhamar-Schuler, D. & Mathiesen, S.D. (2013). Traditional Sámi snow terminology and physical snow classification—Two ways of knowing. *Cold Regions Science and Technology*. 85, 117–130.

Fehr, E. & Schurtenberger, I. (2018). Normative foundations of human cooperation. *Nature Human Behaviour*. 2(7), 458–468.

Fernandez-Gimenez, M.E. & Le Febre, S. (2006). Mobility in pastoral systems: Dynamic flux or downward trend? *The International Journal of Sustainable Development and World Ecology*. 13(5), 341–362.

Forbes, B.C. (2013). Cultural resilience of social-ecological systems in the Nenets and Yamal-Nenets Autonomous Okrugs, Russia: a focus on reindeer nomads of the tundra. *Ecology and Society*, 18(4).

Forbes, B.C., Kumpula, T., Meschtyb, N., Laptander, R., Macias-Fauria, M., Zetterberg, P., Verdonen, M., Skarin, A., Kim, K.Y., Boisvert, L.N. & Stroeve, J.C. (2016). Sea ice, rain-on-snow and tundra reindeer nomadism in Arctic Russia. *Biology Letters*. 12(11), 20160466.

Grey, S. & Kuokkanen, R. (2020). Indigenous governance of cultural heritage: searching for alternatives to co-management. *International Journal of Heritage Studies*. 26(10), 919–941.

Hausner, V.H., Fauchald, P. & Jernsletten, J.L. (2012). Community-based management: under what conditions do Sámi pastoralists manage pastures sustainably? *PloS one*. 7(12), e51187.

Heikkinen, H. (2002). *Sopeutumisen mallit–Poronhoidon adaptaatio jälkiteolliseen toimintaympäristöön Suomen läntisellä poronhoitoalueella 1980–2000*. Oulu: University of Oulu.

Heikkinen, H. (2006). Neo-entrepreneurship as an adaptation model of reindeer herding in Finland. *Nomadic Peoples*, 10(2), 187–208.

Helle, T.P. & Jaakkola, L.M. (2008). Transitions in herd management of semi-domesticated reindeer in northern Finland. *Annales Zoologici Fennici*. 45(2), 81–101.

Henrich, J. & Muthukrishna, M., 2021. The origins and psychology of human cooperation. *Annual Review of Psychology*. 72, 207–240.

Hukkinen, J., Müller-Wille, L., Aikio, P., Heikkinen, H. I., Jääskö, O., Laakso, A., Magga, H., Nevalainen, S., Pokuri, O., Raitio, K., & West, N. (2006). Development of participatory institutions for reindeer management in Finland: A diagnosis of deliberation, knowledge integration and sustainability. In: Forbes, B.C., Bölter, M., Müller-Wille, L., Hukkinen, J., Müller, F., Gunslay, N. & Konstantinov, Y. (eds.) *Reindeer management in Northernmost Europe*. *Ecological Studies*. 184, 47–71. Berlin: Springer.

Johnsen, K.I. & Benjaminsen, T.A. (2017). The art of governing and everyday resistance: "rationalization" of Sámi reindeer husbandry in Norway since the 1970s. *Acta Borealia*. 34(1), 1–25.

Johnsen, K.I., Mathiesen, S.D. & Eira, I.M.G. (2017). Sámi reindeer governance in Norway as competing knowledge systems. *Ecology and Society*. 22(4): 33.

Korpijaakko-Labba, K. (1994). *Om samernas rättsliga ställning i Sverige-Finland: en rättshistorisk utredning av markanvändningsförhållanden och-rättigheter i Västerbottens lappmark före mitten av 1700-talet*. Helsinki: Juristförbundets förlag.

Kortesalmi, J. (2008). *Poronhoidon synty ja kehitys Suomessa. Suomalaisen Kirjallisuuden Seuran toimituksia* 1149. Helsinki: Tiede.

Kuokkanen, R. (2020). Reconciliation as a threat or structural change? The truth and reconciliation process and settler colonial policy making in Finland. *Human Rights Review*. 21, 293–312.

Laakso, A.M. (2008). The shadow field of reindeer management: A case study from Finland. *Acta Borealia*. 25(2), 138–159.

Labba K. (2015). The legal organization of Sami Reindeer Herding and the role of the siida. In: Allard, C. & Skogvang, S.F. (eds) *Indigenous Rights in Scandinavia–Autonomous Sami Law*. 141–154. Surrey: Ashgate.

Landauer, M. & Komendantova, N. (2018). Participatory environmental governance of infrastructure projects affecting reindeer husbandry in the Arctic. *Journal of Environmental management*. 223, 385–395.

Lundmark, L. (1982). *Uppbörd, utarmning, utveckling: det samiska fångstsamhällets övergång till rennomadism i Lule lappmark*. Lund: Arkiv för studier i arbetarrörelsens historia.

Magga, O.H. (2006). Diversity in Saami terminology for reindeer, snow, and ice. *International Social Science Journal*. 58(187), 25–34.

Manker, E.M. (1953). *The Nomadism of the Swedish Mountain Lapps: The Siidas and their Migratory Routes in 1945*. Stockholm: ActaLapponica/Nordiska museet.

Marin, A. & Bjørklund, I. (2015). A tragedy of errors? Institutional dynamics and land tenure in Finnmark, Norway. *International Journal of the Commons*. 9(1), 19–40.

Markkula, I., Turunen, M. & Kantola, S. (2019). Traditional and local knowledge in land use planning: insights into the use of the Akwé: Kon Guidelines in Eanodat, Finnish Sápmi. *Ecology and Society*. 24(1), 20.

Næss, M.W., Bårdsen, B.J., Fauchald, P. & Tveraa, T. (2010). Cooperative pastoral production—the importance of kinship. *Evolution and Human Behavior*. 31(4), 246–258.

Næss, M.W., Bårdsen, B.J. & Tveraa, T. (2012). Wealth-dependent and interdependent strategies in the Saami reindeer husbandry, Norway. *Evolution and Human Behavior*. 33(6), 696–707.

Ostrom, E. (2007). A diagnostic approach for going beyond panaceas. *PNAS*. 104(39), 15181–15187.

Paine, R. (1970). Lappish decisions, partnerships, information management, and sanctions: a nomadic pastoral adaptation. *Ethnology*. 9(1), 52–67.

Paine, R. (1994). *Herds of the Tundra: A Portrait of Saami Reindeer Pastoralism*. Washington DC: Smithsonian Institution Press.

Pennanen, J. & Näkkäläjärvi, K. (2003). *Siiddastallan: From Lapp communities to modern Sámi life*. Inari: Siida Sámi Museum.

Raitio, K. & Heikkinen, H. (2003). Enemmän oma-aloitteisuutta, vähemmän valitusta. Hallinnon näkemyksiä poronhoidon osallistumiseen perustuvien instituutioiden kehittämisestä. Helsinki: Helsinki University of Technology.

Risvoll, C. & Kaarhus, R. (2020). Struggling with 'clear zoning'-Dilemmas of carnivore-pastoral coexistence in Nordland, northern Norway. In: Breidlid, A & Krøvel, R. (eds) *Indigenous Knowledges and the Sustainable Development agenda*. 185–206. New York: Routledge.

Roturier, S. & Roué, M. (2009). Of forest, snow and lichen: Sámi reindeer herders' knowledge of winter pastures in northern Sweden. *Forest Ecology and Management*. 258(9), 1960–1967.

Ruong, I. (1975). *Samerna*. Stockholm: Aldus Bonnier.

Sandström, P., Sandström, C., Svensson, J., Jougda, L. & Baer, K. (2012). Participatory GIS to mitigate conflicts between reindeer husbandry and forestry in Vilhelmina Model Forest, Sweden. *The Forestry Chronicle*. 88(3), 254–260.

Sara, M.N. (2009). Siida and Traditional Sámi Reindeer Herding Knowledge. *Northern Review.* 30, 153–178

Sarkki, S., Heikkinen, H.I. & Löf, A. (2021). Reindeer Herders as Stakeholders or Rights-Holders? Introducing a Social Equity-Based Conceptualization Relevant for Indigenous and Local Communities. In: Nord, D. (ed.) *Nordic Perspectives on the Responsible Development of the Arctic: Pathways to Action*. Cambridge: Springer. 271–292.

Schelling, T.C. 1980. *The Strategy of Conflict: With a New Preface by The Author*. Cambridge: Harvard University Press.

Schnegg, M. (2018). Institutional multiplexity: social networks and community-based natural resource management. *Sustainability Science*. 13(4), 1017–1030.

Sjölander-Lindqvist, A., Risvoll, C., Kaarhus, R., Lundberg, A.K. & Sandström, C. (2020). Knowledge claims and struggles in decentralized large carnivore governance: insights from Norway and Sweden. *Frontiers in Ecology and Evolution*. 8, 120.

Tegengren, H. (1952). *En utdöd lappkultur i Kemi lappmark*. Turku: Åbo Akademi.

Tengö, M., Brondizio, E.S., Elmqvist, T., Malmer, P. & Spierenburg, M. (2014). Connecting diverse knowledge systems for enhanced ecosystem governance: the multiple evidence base approach. *Ambio*. 43(5), 579–591.

Thomas, M.G., Næss, M.W., Bårdsen, B.J. & Mace, R. (2015). Saami reindeer herders cooperate with social group members and genetic kin. *Behavioral Ecology*. 26(6), 1495–1501.

Turi, E.I. & Keskitalo, E.C.H. (2014). Governing reindeer husbandry in western Finnmark: barriers for incorporating traditional knowledge in local-level policy implementation. *Polar Geography*. 37(3), 234–251.

Tveraa, T., Stien, A., Brøseth, H. & Yoccoz, N.G. (2014). The role of predation and food limitation on claims for compensation, reindeer demography and population dynamics. *Journal of Applied Ecology*. 51(5), 1264–1272.

Vorren, Ø. (1980). Samisk bosetning på Nordkalotten. In: Badou, E. & Dahlstedt, K.-H. (eds) *Nord-Skandi-naviens historia i tvärvetenskaplig belysning*. Umeå. 235–261.

Wheeler, H., Danielsen, F., Fidel, M., Hausner, V.H., Horstkotte, T., Johnson, N., Lee, O., Mukherjee, N., Amos, A., Ashtorn, H. & Ballari, Ø. (2020). The need for transformative changes in the use of Indigenous knowledge along with science for environmental decision-making in the Arctic. *People and Nature*. 2, 544–556.