Chapter 3
‘Leaving No One Behind’ – Sustainable Development of Sámi Reindeer Husbandry in Norway

Kathrine I. Johnsen, Inger Marie Gaup Eira, Svein Disch Mathiesen, and Anders Oskal

Abstract Within pastoral systems there is deep knowledge of the dynamics of the landscape and nature; and the Sámi traditional reindeer herding understanding of sustainable reindeer husbandry holds adaptive mechanisms for dealing with changing conditions in nature and extreme weather events. The Norwegian state has had policies for sustainable reindeer husbandry since the early 1990s. This chapter discusses two conceptualizations of sustainable reindeer husbandry – that of the state and that based on Sámi traditional reindeer herding knowledge. Based on public documents and empirical data from a workshop where herders shared observations and reflections from an extreme winter event (*goavvi*) in Finnmark 2019/2020, we discuss the different knowledge systems and tools for dealing with change embedded in the two conceptualizations. Norway is a strong supporter of the global 2030 Agenda for Sustainable Development building on the principle of ‘leaving no one behind’, yet herders argue that policies and regulations for sustainable reindeer husbandry policies make their livelihoods vulnerable to climate change and other types of environmental change. The gap between the state’s and the participating herders’

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understanding of ‘sustainability’ and tools for maintaining the wellbeing of the herd create misunderstandings and mistrust between the actors. Moreover, state decisions undermine the traditional knowledge and practices and push herders to practice a ‘Norwegianized’ type of pastoralism. In the current public management of reindeer husbandry, Sámi traditional reindeer herding knowledge and practices have been left behind.

Keywords Reindeer husbandry · Sustainable development · Traditional knowledge · Climate change · Adaptation

A young reindeer herder follows the reindeer herd during Spring migration - leaving no one behind. (Photo: Inger Marie Gaup Eira)

3.1 Sustainable Reindeer Husbandry in an Unpredictable Environment

Like other extensive pastoral systems, reindeer husbandry requires large areas, migration routes and access to seasonal pastures. Climate and environment have always determined the conditions by which reindeer herding is practiced. Through mobility, reindeer herders take advantage and adapt to the temporal and spatial changes in nature – an adaptive mechanism they share with pastoralists all around the world (Scoones, 1994; Niamir-Fuller, 1999; Fernandez-Gimenez, 2000; Krätli

& Schareika, 2010; Behnke et al., 2011; Johnsen et al., 2019; Turner & Schlecht, 2019; Gillin, 2021). Traditional reindeer herding knowledge contains strategies for structuring a herd and moving through the landscape to benefit from the seasonal changes and the pastures' diverse grazing resources, and to minimize the negative impacts of the harsh climate, insect plagues and threats from predators (Paine, 1996). Like other local and indigenous livelihoods in the Arctic, reindeer husbandry is affected by climate change (Eira et al. 2018). Warmer temperatures are driving changes in flora, fauna, and the physical appearance of the northern landscapes. The mean winter temperatures are increasing, and consequences include changes in the snow structure, reductions in lake and river ice cover and increases in winter thaw events – all of which affects the reindeer's mobility and access to forage (Hanssen-Bauer et al., this volume, Chap. 8).

While reindeer husbandry is adjusted to annual differences and changes in nature, they sometimes face events that are especially challenging, such as a *goavvi*. *Goavvi* is a Northern Sámi term that refers to a snow condition that appears during extreme weather events (Eira, 2012). *Goavvi* is caused by ice layers on top of or in the snow (*jiekŋa*), ice frozen into the vegetation (*bodneskárta*), deep snow (*gassa muohta*), packed snow drifts (*čearga*) or a combination of these. These conditions can cause impenetrable pastures – often referred to as 'locked' pastures. The degree of *goavvi* is determined by precipitation, temperature and wind which forms the snow metamorphism and layers of ice (melt-freeze crusts). However, even when the snow is deep and there are ice layers in the snow, the grazing conditions can be good. Whether the reindeer can dig through and access the vegetation depends on the thickness of the ice layers, how hard the snow is, and whether the snow is loose to the ground where the vegetation is.

According to the dictionary, *goavvi* means 'ruthless weather and seasons' (Kåven et al., 1995). The term *goavvi* denotes the effects of extreme weather conditions which make pastures inaccessible and cause animal starvation and death. It is a condition that affects both the livelihood and the psychosocial well-being of herders. In the years following a *goavvi*, the calf production (*miesehis jagit*) decreases, the calves born are more vulnerable because the females produce less milk, and the herd is more vulnerable to diseases (Eira, 2012). There is no word for *goavvi* in the Norwegian language; a term often used is *beitekrise* (grazing crisis). The term refers to poor grazing conditions but does not contain an explanation for why the conditions are poor. Over the last hundred and some years, herders in Guovdageaidnu have experienced *goavvi* sixteen times (Fig. 3.1); most severe in 1917/18, 1967/68 and 1996/97 (Eira, 2012). The most recent occurrence was in 2022, and climate change scenarios predict that the occurrences of *goavvi* will likely increase (Hanssen-Bauer et al., this volume, Chap. 8).

Within pastoral systems there is deep knowledge of the dynamics of the landscape and nature; and within the Sámi traditional reindeer herding knowledge about and understanding of sustainable reindeer husbandry, there are built in mechanisms for coping with and adapting to unpredictable and extreme weather events that threaten their livelihood. The traditional knowledge differs, however, from the knowledgebase of the state policies for sustainable reindeer husbandry. And the

state policies provide a different set of tools to maintain the well-being of reindeer in times of crisis. The case presented in this chapter is sustainable development in the context of Sámi reindeer husbandry in Norway. It compares and discusses the two conceptualizations of 'sustainable reindeer husbandry', their knowledgebase for understanding 'sustainability' and their embedded adapting mechanisms considering climate change.

The analysis presented in this chapter is informed by accounts of the 2019/2020 *goavvi* event shared by 11 reindeer herders from 11 winter *siidas* in West Finnmark. The herders' accounts were shared via photos and text messages in March/April 2020 and a participatory workshop with six of these herders in June the same year. Figure 3.2 presents the reindeer herding regions of Norway and the geographical area covered by the study. The workshop assessed the *goavvi* event and the emergency response provided by the state. First, each herder shared his observations and concerns, and then, these inputs were discussed and analysed. Jointly, the workshop participants and the authors of this chapter developed a timeline presenting decision-making and herders' observations during the *goavvi* winter in Finnmark (see Table 3.1). The main language of the workshop was Northern Sámi. The research was conducted in accordance with ethical research standards (ICR, 2007; NESH, 2019). Perspectives and knowledge shared by the herders have been anonymized and are reflected in this text with the participants' written consent. In this text we use the term 'herder' to refer to both reindeer herders and owners. Translation of Norwegian quotes are made by the authors.

We start, however, by providing a backdrop through a brief review of two milestones in the global discourse concerning 'sustainable development' – the Brundtland Report (1987) and the 2030 Agenda (2015) – and how they present the role of indigenous peoples and traditional knowledge in achieving sustainable development and shaping a common future where no one is left behind.

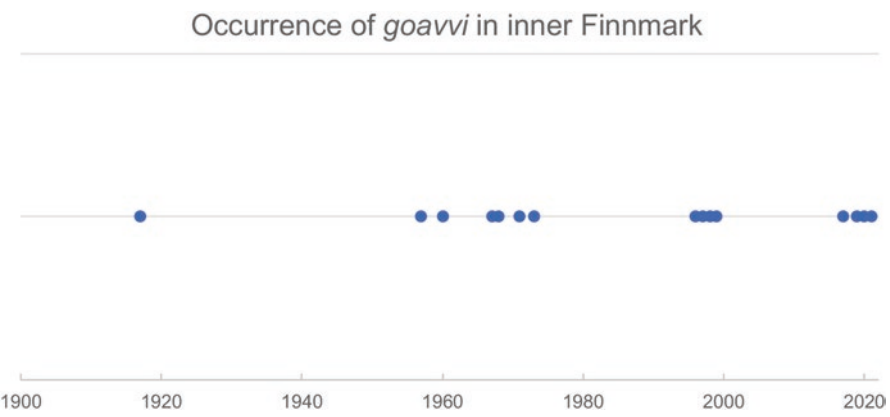

Fig. 3.1 Occurrence of *goavvi* in inner Finnmark. Based on Eira (2012) and conversations with reindeer herders

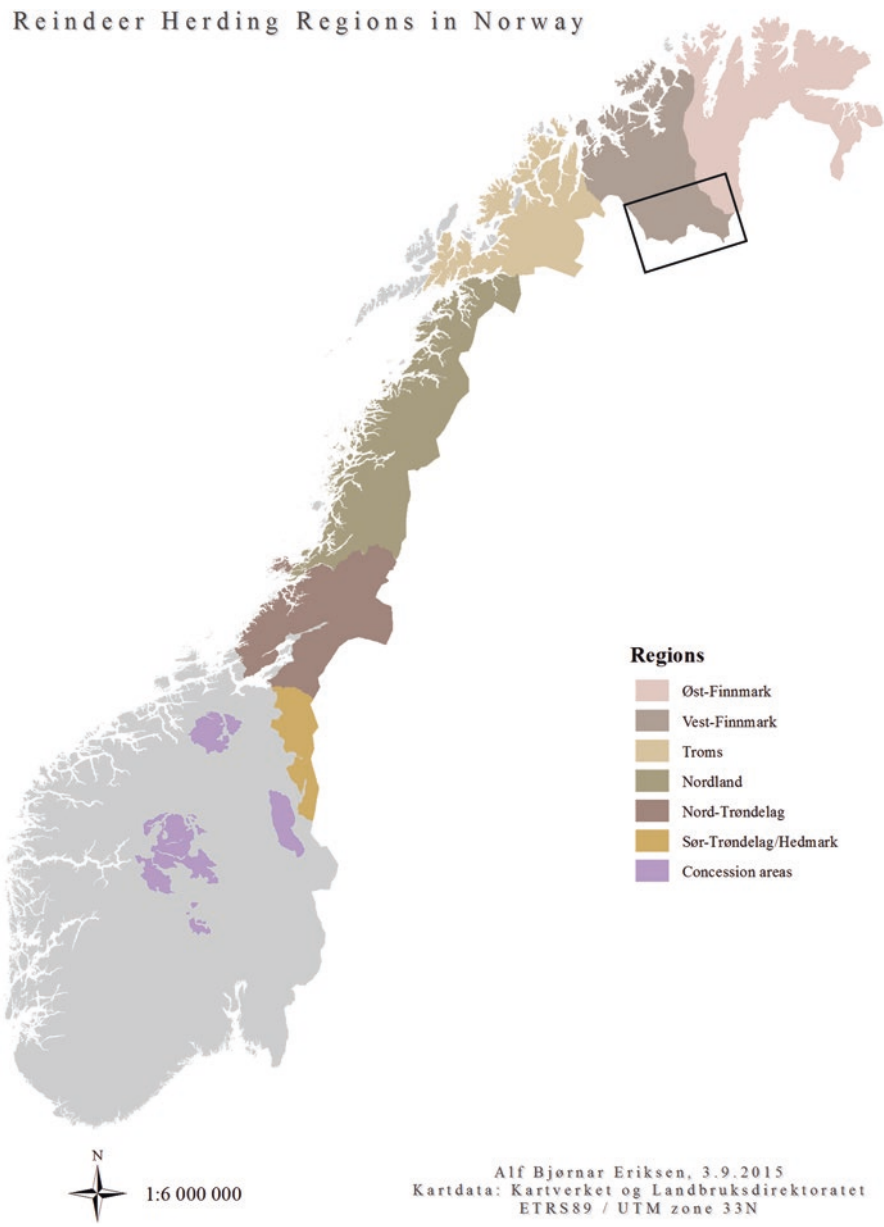

Fig. 3.2 Reindeer herding regions in Norway. The lines roughly frame the winter pastures of West Finnmark

Table 3.1 A timeline presenting decision-making and herders' observations during the *goavvi* winter in West Finnmark 2019/2020

Timeline of the *goavvi* winter in West Finnmark 2019/2020	
November 2019	At the beginning of November, the first reindeer herding districts report to the County Governor's office about difficult grazing conditions.
January 2020	**10/01** Several *siidas* report about challenging grazing conditions. **22/01** The Emergency Preparedness Committee (EPC) inspects one of the three herding zones of inner Finnmark (30B). **24/01** The EPC ascertains grazing crisis in parts of inner Finnmark. **28/01** Norwegian Agriculture Agency announces that there are challenging grazing conditions in inner Finnmark. **31/01** The government states that reductions in reindeer numbers have resulted in a clear improvement of the reindeer grazing conditions in inner Finnmark.
February 2020	**6/02** Reindeer herders of inner Finnmark (30A, 30B and 30C) meets with the EPC about the grazing crisis. **10/02** The County Governor's office approves the use of the districts' emergency savings and issues a press release about the grazing crisis in parts of Finnmark. **21/02** The County Governor's office announces a grazing crisis in two of three herding zones of inner Finnmark (30B and 30C). **25/02** The EPC inspects the third herding zone of inner Finnmark (30A). **27/02** The government increases the state emergency preparedness fund by NOK 10 million.
March 2020	**13/03** First payment of emergency grants for supplementary feed for reindeer; the County Governor's office encourages the herding districts to apply for emergency grant for supplementary feed. **20/03** The government informs that NOK 2.8 million has so far been distributed for feeding reindeer. **24/03** Mayors from 35 municipalities in northern Norway send a joint letter to the government asking for more support towards the immediate grazing crises and its long-term consequences.
April 2020	**3/04** Helicopter transport of supplementary feed to the winter pastures has started. **4/04** Grants issued to reindeer herding districts in Finnmark, Troms and Nordland. **7/04** The state emergency fund is increased by NOK 20 million. **17/04** The County Governor's office informs the herding districts that emergency funds will be granted beyond the period first announced.
May 2020	**5/05** The Minister of Agriculture and Food and the Minister of Regional Development and Digitalisation make a joint statement where they acknowledge the difficult conditions for reindeer husbandry. **8/05** The County Governor's office encourages again the herding districts to apply for emergency grant for supplementary feed. **19/05** The Minister of Agriculture visits Finnmark to look at the grazing conditions. **29/05** Helicopter transport of supplementary feed continues.
June 2020	**4/06** The last feed sack of supplementary feed is flown out to herding districts Finnmark and the state emergency fund is further increased by NOK 10 million.
July 2021	**19/07** The regional newspaper *Ságat* reports that the County Governor's office has reclaimed emergency grants from many reindeer herders and thereby adding an extra stone to the burden of families who were hit hard by the grazing crisis in the winter of 2019/20.

Sources: Eira M (2020); conversations with herders in Spring 2020

3.2 A Common Future Where No One Is Left Behind

Sustainable development' became part of common political jargon in the aftermath of the launch of "Our common future" in 1987, a report by the UN World Commission on Environment and Development (WCED). The report – often referred to as the Brundtland Report in recognition of former Norwegian Prime Minister Gro Harlem Brundtland's role as Chair of WCED – presented environment and development as a single issue in the concept of 'sustainable development'. The Brundtland Report provided several definitions of sustainable development, the most recognized being development which "meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 8).

To ensure a fair distribution of the benefits of development, the Brundtland Report promoted political systems that secure effective citizen participation in decision-making. WCED argued that all sectors of society should actively participate in consultation and decisions relating to sustainable development and recognised the special position of tribal and indigenous peoples. It stated that while development would, in most cases, lead to a gradual integration of local communities into a larger social and economic framework, some communities – such as the indigenous or tribal peoples – might not benefit from this development. On the contrary, WCED was concerned that insensitive development could threaten these peoples' knowledge and rights (WCED, 1987, p. 12):

> Tribal and indigenous peoples will need special attention as the forces of economic development disrupt their traditional lifestyles – lifestyles that can offer modern societies many lessons in the management of resources in complex forest, mountain, and dryland ecosystems. Some are threatened with virtual extinction by insensitive development over which they have no control. Their traditional rights should be recognized, and they should be given a decisive voice in formulating policies about resource development in their areas.

The WCED members from Canada (the founding Executive Director of the UN Environment Programme, Maurice Strong, and the Commission's Secretary General, Jim MacNeill) played important roles in formulating the dilemma that indigenous peoples' livelihoods and rights could be threatened by economic development in society at large. The Canadian members were informed by the situation of Canada's indigenous peoples as industrial development increasingly encroached upon their traditional lands (Robinson, 1999).

Since 1987, the concept of sustainable development has altered to incorporate a greater focus on social inclusion (Sachs, 2015). The 2030 Agenda for Sustainable Development, adopted by the UN General Assembly in 2015, builds on the principle of 'leaving no one behind'. The 2030 Agenda includes 17 goals that jointly will secure a better and more sustainable future for all. The goals have an overarching focus on the human rights principles, justice, and the need for empowering vulnerable people. The 2030 Agenda does not have a strong explicit focus on indigenous peoples, but it encourages participation of indigenous peoples in the implementation and evaluation of the Sustainable Development Goals (SDGs) at country level (United Nations, 2015).

3.3 Norwegian Adoption of 'Sustainable Development' for Sámi Reindeer Husbandry

In Norway, there is a sectoral responsibility for following up on national commitments on sustainable development, and the responsibility for ensuring sustainable reindeer husbandry is placed within the Ministry of Agriculture and Food (MAF). The Norwegian follow up of the Brundtland Report was outlined in the report called "Environment and development" issued by the Ministry of Environment (St. meld. 46, 1988–1989). A main focus of this report, however, was Norway's international development aid. National sustainable development got less attention. The report included a chapter on agriculture, but there was no reference to Sámi pastoralism or other Sámi livelihoods.

The first White Paper which addressed sustainable reindeer husbandry was published 3 years later by MAF (St. meld. 28, 1991–1992). The White Paper was informed by the Brundtland Report, but it emphasised two aspects which it presented as vital to the continuation of reindeer husbandry as a livelihood and a basis for Sámi culture: (1) Reindeer grazing had to adapt to the pasture resources; and (2) the reindeer industry had to become economically self-sufficient to a greater extent. The White Paper refers to an assessment conducted by researchers at the Norwegian Institute for Urban and Regional Research (NIBR) which discussed 'sustainability' in relation to Sámi reindeer husbandry (Karlstad et al., 1990). This assessment argued that there were too many reindeer in Finnmark, and it presented the herders' "inherited legal notions, institutional arrangements and practices" as obstacles rather than solutions on the path to sustainable development (Karlstad et al., 1990, p. ix). The assessment refers to the herders' traditions, but there is no reference to their knowledge.

It is worth noting that also prior to the Brundtland Report, the government's political objective was a 'rationalization' of reindeer husbandry to both reduce the number of reindeer and to ensure a higher income among reindeer owners (see e.g., NOU 1972:33, 1972, pp. 65–66; St. meld. 13, 1974–1975). The concerns were that the Sámi reindeer husbandry was ineffective and that the herders had – compared with the development of wages within other Norwegian occupational groups – been left behind. The policies that followed the first White Paper on sustainable reindeer husbandry built upon the same notion of rational reindeer husbandry and introduced a threefold political objective: To develop a reindeer husbandry industry that was ecologically, economically, and culturally sustainable. The goals were presented as interrelated; ecological sustainability provided the basis for economic sustainability, and together ecological and economic sustainability provided an opportunity to safeguard and develop cultural sustainability (Innst. S. nr. 167, 1991–1992).

In 2007 the Reindeer Husbandry Act was renewed with a more inclusive focus: "ecologically, economically and culturally sustainable reindeer husbandry based on Sámi culture, tradition and custom" (Reindriftsloven, 2007). However, the Norwegian reindeer authorities were concerned about increasing reindeer numbers and alleged overgrazing, and this led to an emphasis on 'ecology' in a second White

Paper related to reindeer husbandry published in 2011. The threefold policy objectives continued, but special emphasis was put on the need for ensuring ecological sustainability (St. meld. 9, 2011–2012, p. 181). Another objective of the White Paper was the continuation reindeer husbandry as a nomadic form of pastoralism (St. meld. 9, 2011–2012, p. 183).

The third and most recent (2017) White Paper on reindeer husbandry continued the threefold policy objectives. In addition, it expressed "a political objective of developing the reindeer husbandry industry as a rational, market-oriented industry that is sustainable in a long-term perspective" (Meld. St. 32, 2016–2017, p. 7). To facilitate this objective, the White Paper suggested supporting those herders whose main income is from reindeer husbandry. Further, it presented the government's effort to change the overall purpose of the 2007 Reindeer Husbandry Act to give 'ecological sustainability' priority (Meld. St. 32, 2016–2017, p. 9). In this White Paper 'nomadism' was no longer among the policy objectives.

Where the Brundtland Report presented environmental, economic, and social sustainability as the three fundamental pillars of sustainable development, the Norwegian policies for a sustainable development of reindeer husbandry identified slightly different conceptual pillars of sustainability: ecology, economy, and culture. However, the wish to rationalise Sámi pastoralism led to an emphasis on the pillars of ecology and economy, and gave these pillars meanings that supported MAF's thinking of 'rational reindeer husbandry'. And in this context 'rational' meant herding practices that (1) are within the carrying capacity of the pastures (the number of reindeer which available pastures can support without environmental degradation), and (2) enhance the reindeer meat production (Meld. St. 32, 2016–2017; Prop. 99 S, 2019–2020).

Thus, in policymaking, 'sustainability' and 'rationality' become synonyms. And to ensure the sustainability and rationality of reindeer husbandry, the MAF issued in 2009 guidelines for estimating ecological sustainable reindeer numbers (LMD, 2008). The guidelines present standardised quantitative indicators and targets, such as production (living calves and carcass weights), reindeer numbers and animal densities, that could be used to monitor and evaluate the performance of reindeer herders (Reindriftsstyret, 2011, 2012). The guidelines were informed by the equilibrium ecology, estimates for how many reindeer the pastures can sustain (carrying capacity) and mathematical models for how to maximize meat production per animal. The rationale is that there is a correlation between the state of the pastures, animal density, animal well-being and production. The same theories informed the decision-making for rational reindeer husbandry in 1972 (NOU 1972: 33, 1972, p. 66), when a specific sex and age composition of the reindeer herds were promoted to ensure an optimal production of calves. The state monitors carefully how the herding units perform against the indicators.

3.4 Sustainable Reindeer Husbandry According to Traditional Knowledge

Traditional Sámi reindeer husbandry is not informed by reindeer numbers and carcass weights as indicators for sustainability; rather, through observing the behaviour and condition of the reindeer, the herders know when and how to interfere with the herd to maintain its well-being. Herders monitor the condition of the reindeer by observing its behaviour and features, such as the muscle mass and building, the antlers' structure and density, and the hair quality. The notion of sustainable reindeer husbandry as reflected in Sámi herding practices was first published by Eira et al. (2016). These authors identified and explained nine components that form the basis of sustainable reindeer husbandry. Here, we provide a shortened presentation of these components:

***Vuođđoolbmot* – People.** The long succession of Sámi reindeer herding people. The group of people that belong to the herding community, with entitlement to and understanding of the land, and knowledge about the reindeer's needs and behaviour.

***Báikevuođđu* – Basis for the household.** The members of the household and its practices led jointly by the husband and wife. The household consists of a core family that is often extended by close relatives and others that assist in reindeer husbandry. The household organize its human resources (who does what and when) and its belongings (houses/dwellings, vehicles, money); it makes strategic decisions about what animals to slaughter; it maintains subsistence and income-generating activities (sell reindeer, preserve food, make duodji, etc.); it makes strategies for maintaining a herd that fits the household's needs; and it is a place for knowledge transfer and socialising new generations into reindeer husbandry.

***Siidavuođđu* – Basis for the *siida*.** The *siida* is the core unit in Sámi reindeer husbandry management. It consists of a community of people, a reindeer herd, and the customary lands. The *siida* has deep knowledge of the landscape. It manages the use of seasonal pastures, when and where to migrate, maintenance of fences, and organizes the herding and gathering of animals for slaughter and earmarking. It maintains a herd structure that utilizes available pastures and as such, maximises production per square kilometre. The *siida* also manages its relations to the surrounding environment, such as the larger landscape, climatic factors and variations, and disturbances, as well as the neighbouring *siidas* and their land-use.

***Eallovuođđu* – Basis for the herd.** The reindeer herd is the basis of people's livelihood, culture and relationship to land and climate. The herd represents the people (each reindeer is owned by a person), land-use practices, the production needs of the *siida* households, breeding strategies and human relations (reindeer are given as gifts at special occasions). An ideal herd is robust and functional – that is, it reflects diversity (variety among the reindeer) and the landscape (use of pastures and migration routes), and it has continuity and a certain size that secures the herd's well-being and desired animal behaviour.

***Mearkavuođđu* – Basis of the earmark.** Earmarks are cuts in the reindeer's ears and is an identification marker for the individual who owns the reindeer and what family and *siida* it belongs to. The earmark is cut according to specific rules that communicate the heritage of the reindeer owner. Having earmarked reindeer gives access to decision-making (about the reindeer and herd) and a prospect of learning reindeer husbandry and establishing a vital herd.

***Birgenvuođđu* – Resource base.** The resources needed to sustain the welfare of the household or the *siida* (including work force, money, and pasture areas) and the practices of using and maintaining these resources. For example, utilizing the full potential of the reindeer and natural resources for producing food, clothes, and equipment for one's own use and for generating an income; knowing when the resources are available and have the best quality; and knowing how to preserve the resources. The household's practices and maintenance of resources relates to its obligations towards the *siida*.

***Vuoigatvuohtavuođđu* – Basis for rights.** The legal basis for and customs includes the *siida* right to pastures and migration routes, as well as when and how to use these. Further, it includes the individual rights to own an earmark and develop a herd; to acquire knowledge and skills to practice reindeer husbandry; and to belong to a *siida*. The parents, household and *siida* are responsible for transferring knowledge to the next generation. There is also the individual obligation to attend to all *siida* members' reindeer and contribute to knowledge transfer. There are three levels of decision-making: The individual (reindeer owner), the household and the *siida*.

***Vuođđoipmárdus* – Worldview.** The worldview and ethics that navigate the holistic relationship with the reindeer, the herd and nature. This is a relationship based on negotiations and compromises. The reindeer is *boazu* – an animal that largely lives freely in its natural surroundings. People interact but should not seek complete control over the reindeer or nature. Rather, herders follow the reindeer, they facilitate the animal's natural behaviour, its adaptation to the natural environment, and the annual cycles and weather conditions, and they protect the reindeer from external threats. Herders that fulfil these obligations can harvest from the herd and make use of the reindeer. The people's relationship with the reindeer is part of a larger socio-ecological system that is both predictable and unpredictable; there are repetitions, as well as continuous changes. Also, people's understanding of the landscape, seasons, climate and other (human) beings is strongly influenced by their relationship with the reindeer.

***Máhttovuođđu* – Knowledgebase.** The accumulated knowledge transferred between individuals within the household and the *siida* through Sámi reindeer herders' language and with a high level of precision for descriptions. This knowledge is related to the other eight components of sustainable reindeer husbandry – knowing what to do, how and when. It includes extensive knowledge about the nature of the reindeer, the topography, weather and climate, skills in observing the reindeer and its surroundings, and an understanding of the mutual relationships between these. Knowledge about how to develop and maintain a robust and functional herd adjusted to local landscape and climate.

Summarized, these nine components present a complex model for understanding sustainable Sámi reindeer husbandry which is very different to that of the Norwegian state. The next sections further discuss the two conceptualizations of sustainable reindeer husbandry and how they influence the state and Sámi reindeer herders' tools and practices for managing extreme events.

3.5 Conceptualizations of Sustainable Reindeer Husbandry – Different Ways of Knowing

The two conceptualisations of 'sustainable reindeer husbandry' build on different models for understanding of the human-animal-nature relation. The state' description of sustainable reindeer husbandry emphasizes practices that are based on nature's carrying capacity, ensures productivity and sufficient income for the herders. By setting fixed targets for reindeer numbers and carcass weights, the state does not only address the political objective of rational production; it also enhances the predictability and its control of reindeer husbandry. Another measure to ensure predictability is the requirement that each herding district makes land-use plans (Norwegian: *bruksregler*), that includes dates for moving from one seasonal pasture to the next (Reindriftsforvaltningen, 2009). A herding district is an administrative unit established by the state with the 1978 Reindeer Husbandry Act. In Finnmark, the herding districts typically include several *siidas* – the traditional management units of reindeer husbandry.

From a traditional reindeer herding perspective, however, the understanding of sustainable and rational reindeer husbandry does not include notions of predictability and stability. In an address to the World Environment Day in 2007, Secretary General of the Association of World Reindeer Herders Johan Mathis Turi stated that 'stability' is a strange word in Sámi reindeer herders' vocabulary (Turi, 2007). He explained that herders do not seek 'stability'; they rather seek becoming accustomed to changing conditions. The Sámi traditional reindeer herding knowledge about sound reindeer husbandry acknowledges the seasonal and spatial changes in nature and climate, and changes in the intensity of disturbances (for example from predators and human activities). From this perspective, sustainable and rational reindeer husbandry is facilitated through building resilience to changes and disturbances, including extreme events. The resilience is enhanced by maintaining flexibility in how the *siida* operates, as well as in the reindeer numbers, herd structure, grazing patterns, migration routes, etc. The Sámi traditional reindeer herding conceptualisation of sustainable reindeer husbandry, producing meat, and securing an income are important elements of sound herding practices. Yet, income generating activities are only part of a larger picture needed to reflect the complex role of reindeer husbandry as a livelihood, lifestyle, and culture.

A common representation of 'sustainable development' is three overlapping circles (Fig. 3.3). The circles symbolize ecology, economy and society, and sustainable development is the intersection of the circles. As discussed above, MAF's

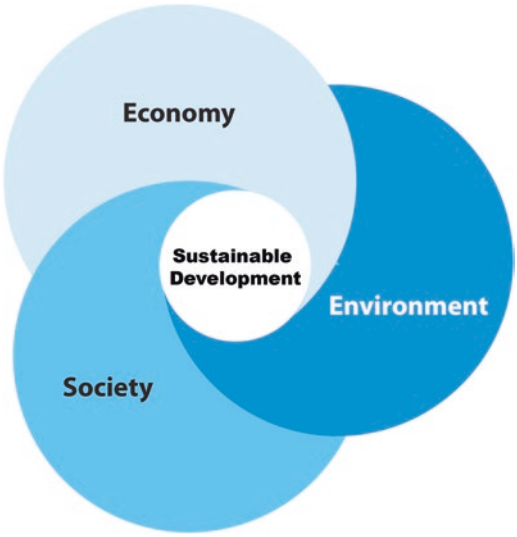

Fig. 3.3 An illustration of sustainable development closely associated with the definition used by the Brundtland Report

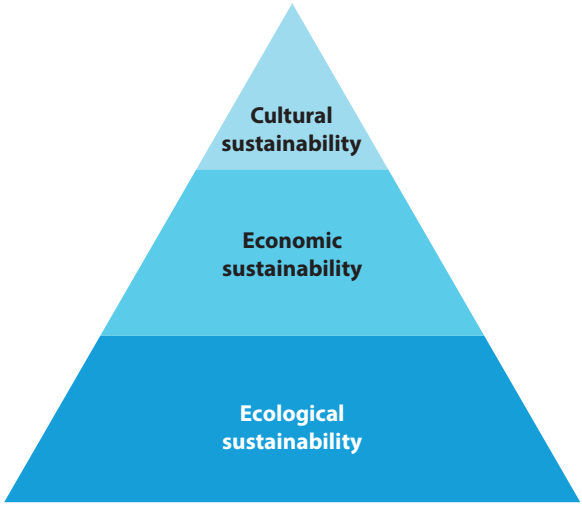

Fig. 3.4 A visual presentation of MAF's definition of sustainable reindeer husbandry

definition of sustainable reindeer husbandry differs in several ways; it is based on other components – that is, ecology, economy, and culture – with an internal hierarchy and a certain relationship of dependency: Ecological sustainability provides the basis for economic sustainability, and together ecological and economic sustainability provide an opportunity to safeguard and develop cultural sustainability. As such, MAF's conceptualization of sustainable reindeer husbandry could be illustrated as a pyramid where the bottom component forms a basis, and a precondition, for the components above (Fig. 3.4). A third conceptualisation of sustainable reindeer husbandry, as reflected in Sámi herding practices, was first illustrated by Eira et al. (2016) (Fig. 3.5).

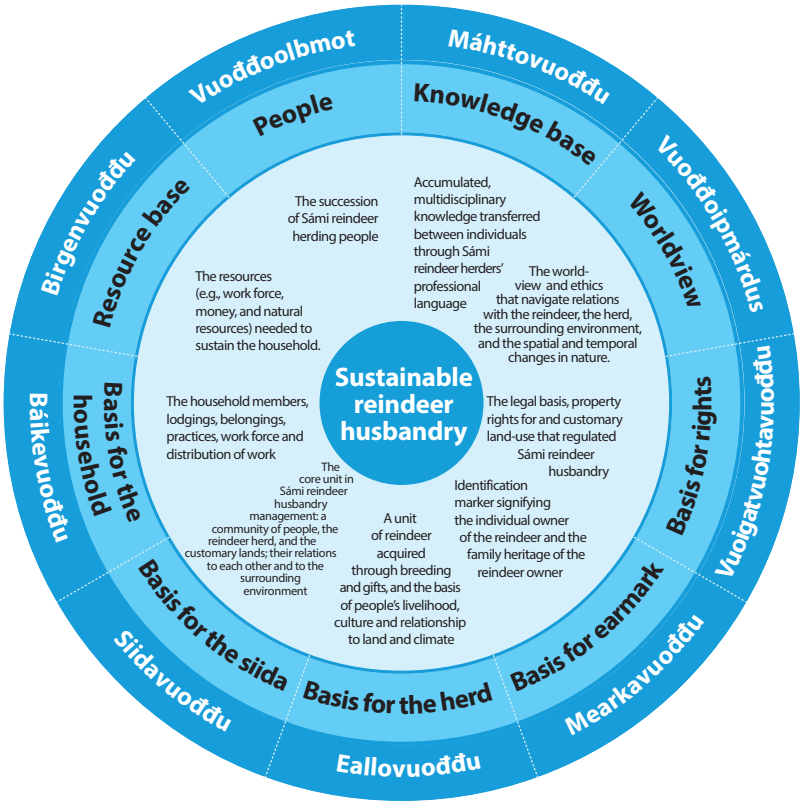

Fig. 3.5 A visual presentation of the Sámi traditional reindeer herding conceptualization of sustainable reindeer husbandry. The figure is based on an illustration first published by Eira et al. (2016)

The three illustrations of sustainability (Figs. 3.3, 3.4 and 3.5) are **models** that simplify reality to more easily communicate complex coupled human and nature systems (see e.g., Liu et al., 2007). The accuracy of a model reflects its ability to present reality; however, the more complex a system is, the more difficult it is to construct a model that mimics this reality (Barrow, 2014 [1995]). None of the figures reflect the full complexity of the 'real world'. Figures 3.4 and 3.5 are rather representations of the state's and the Sámi traditional reindeer herding's conceptualizations of sustainable reindeer husbandry, which inform these actors' planning and decision-making.

When comparing the two conceptualizations, it becomes apparent that they are based on different knowledge systems, and how different ways of regarding and dealing with threats to the sustainability of reindeer husbandry. For example, where the model based on traditional knowledge emphasises the relationship with the landscape and external factors that affect reindeer husbandry, MAF's focus on 'ecology' (that is, how many reindeer the pastures can support without being degraded) minimizes other environmental threats in the state-led attempts to secure sustainable reindeer husbandry. The all-consuming focus on reindeer numbers can be exemplified by a news item published by MAF late January 2020 where they announced that the conditions of the pastures in Finnmark are improving due to a reduction in reindeer numbers (LMD, 2020c). At the time of this announcement, herders in Finnmark were in the middle of a crisis caused by 'locked' pastures. Ten days later, MAF publicly confirmed the crisis. It described the crisis as climate related and not driven by reindeer numbers but it pointed to reindeer numbers as part of the solution: "Through a reindeer number customed to the pastures, the reindeer herders are now also better prepared when crises occur" (LMD, 2020b).

3.6 Mechanisms for Adapting to External Threats to Secure Sustainable Reindeer Husbandry

In the aftermath of the difficult grazing conditions during winter and spring 2017, an ad hoc working group of representatives of the herding community and the authorities reviewed the capacity within the reindeer husbandry to cope with 'locked' pastures and adapt to unpredictable and extreme events. The working group emphasized the importance of the herders being well prepared by having good plans for all eventualities to minimize the negative effects of a grazing crisis (Landbruksdirektoratet, 2017, p. 22):

> It is the person herding that is in charge and who makes decisions about where the herd should graze at any time based on weather, wind, and snow conditions. This is part of daily operations and can thus be regarded as a basic, preventive emergency response work. There is always a well thought out plan for how to use different pastures at different times of winter, as well as what alternative measures can be taken if unforeseen situations occur.

While acknowledging the adaptive capacity of reindeer herders, the working group also recognized that herders' ability to act upon 'locked' pastures is especially challenging; locked areas often reach far, and other land-use interests have occupied traditional grazing lands and limited the herd's access to alternative pastures. The working group listed the following coping mechanisms within reindeer husbandry:

- Use supplemental feed
- Reduce the size of the herd
- Move earlier between seasonal pastures
- Ensure that the herd rests (to avoid unnecessary use of energy within the herd)
- Transport animals from winter to summer pastures by trailer

In previous studies and dialogue with reindeer herders, we have found that Sámi traditional reindeer herding knowledge provides three key mechanisms for enhancing the resilience of reindeer husbandry. These mechanism form a basis for dealing with a reality of changing conditions and different type of disturbances, out of which poor grazing conditions is one: Maintaining a diversity within the herd (that is, keeping reindeer of different sex and age), maintaining mobility to make the best use of the landscape and its grazing resources, and keeping flexibility (Johnsen et al., 2017). The reindeer herders' notion of flexibility includes having 'buffers'; that is, to keep more reindeer than 'needed' as there will always be a loss of animals, to have access to alternative grazing areas in times when the regular pastures are unavailable because of the weather or disturbances, and to have access to labour (Johnsen et al., 2017). Today, this labour force typically consists of reindeer owners and family members who do not herd daily but who help in the more labour-intensive periods of reindeer husbandry; for example, migration, earmarking, and rounding up the animals for slaughter.

In spring 2020, we invited six reindeer herders to a workshop discussion about their experiences of *goavvi* events and more concrete approaches to minimize the negative effects of 'locked' pastures. The participants emphasised the importance of spatial and temporal mobility, and they pointed to the following measures that were not addressed by the ad hoc working group:

- Moving to other areas within the winter pastures
- Using seasonal pastures out of season
- Dividing the herd for a better distribution of the grazing resources/to attend to the weaker animals
- Herding around the clock
- Completely releasing control of the reindeer to let them search for available forage themselves

The workshop participants also pointed to the long-term measure of building and maintaining a resilient herd. This is done through the selection of animals for breeding and slaughter to ensure a diversity and structure adapted to the local landscape and climate conditions.

3.7 The State's Emergency Response

As a direct response to the grazing crisis in winter and spring 2017, MAF and the Norwegian Reindeer Herders' Association (NRL) agreed to establish a national emergency fund (Landbruksdirektoratet, 2017; LMD, 2020a). The coordination of emergency preparedness was delegated to the County Governor offices. And for each reindeer herding region, an Emergency Committee was established with the mandate to monitor the grazing conditions and advise the County Governor. In addition, each herding district was instructed to keep their own emergency savings.

As with the national emergency fund, these were savings for buying and transporting supplemental feed to the herd.

Today, if a herding district wishes to spend its savings, it must first get an approval from the County Governor. The County Governor also controls that the districts' emergency savings and grants are used according to its purpose (Landbruksdirektoratet, 2017). During periods with 'locked' pastures, the County Governor distributes national emergency grants for supplementary feed. The grants are distributed according to the severity of the crisis, the number of reindeer and the distance from the herd to the closest road – and in accordance with the following process (Landbruksdirektoratet, 2017; Eira, 2020):

- The herding districts report about poor grazing conditions.
- The County Governor's office gathers information to determine if there is a grazing crisis.
- The Emergency Committee is informed, evaluates the grazing conditions, verifies the grazing crisis and advises on what measures should be taken.
- The County Governor's office decides whether the herding districts can use their own emergency savings and/or apply for emergency grants.

The County Governor can further assist the herding districts by facilitating exemptions from the grazing regulations (that is, the land-use plans; *bruksreglene*) (Landbruksdirektoratet, 2017). All in all, it can seem that there are many types of mechanisms available that can support sustainable reindeer husbandry – also in a future with more unpredictable winters and 'locked' pastures. However, many herders experience that current regulations, decision-making processes, and the knowledge used to inform these processes, are obstacles for adapting to change and coping with a crisis. As the competition from other land-use interests (for example, mineral extraction, wind power production and cabin development) increases, the herders' ability to adapt to environmental change decreases.

In the following, we present the workshop participants' presentation of the *goavvi* event 2019/2020, their assessment of the emergency response provided by the state, and how the state's understanding of sustainable reindeer husbandry affects the herders' ability to adapt to extreme events.

3.8 Presentations of an Extreme Event – The *Goavvi* Winter 2019/2020

Having presented the state's organisation of emergency response for reindeer husbandry, we now present a synthesis of the participants' observations related to the *goavvi* event in inner Finnmark in 2019/2020 before we summaries the authority's assessment of the same winter (see also the herders' photo documentation in Fig. 3.6):

> While one herder described the autumn pastures as "good", another herder said that in his area, the mountain vegetation did not turn green and there were very little mushrooms.

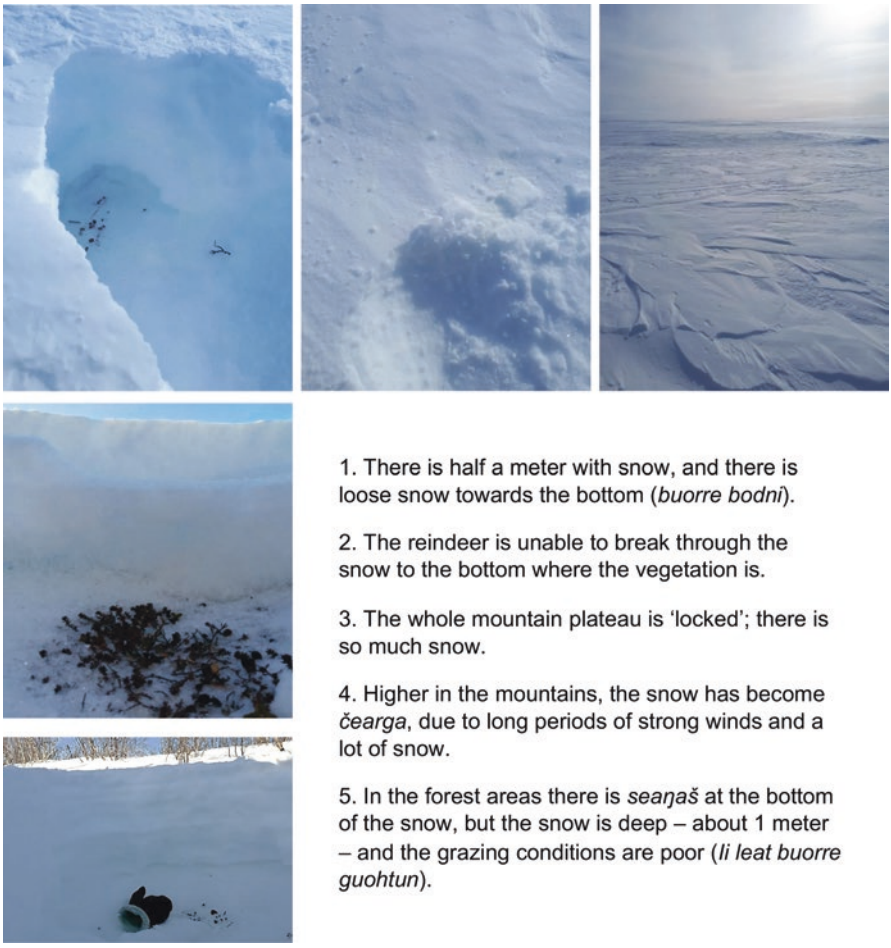

Fig. 3.6 Examples of text and photo documentation of snow conditions causing a *goavvi* during the winter of 2019/2020. The documentation was done by herders attending to the reindeer herds

Therefore, the herds from such areas were not in the best condition when winter started. The cold and snow came early, and there were few milder periods. Normally, the first snow disappears again, but this year it did not; instead, it turned into ice. Before Christmas, more snow (*vahca*) made access to the pastures difficult. Then, in late December the snow was wet (*gohpalat*; new wet snow that fastens immediately to things (Eira, 2012)), and it became difficult to move – for both reindeer and snowmobiles. And in January, the air temperature got colder, and there was a lot of wind, drifting snow and bad visibility (*guoldu*). The snow became very dense (*čearga* and *čiegar*; snow hardened by reindeer trampling (Eira, 2012)), and the reindeer could not dig through. The pastures were 'locked'. There were varying degrees of 'locked' pastures. In some forest the snow was loose (*seaŋaš*); in the mountains, it was *čearga* most places. In inner Finnmark, large parts of the pastures were inaccessible due to ice crust in spring-winter (*cuonju*)) and ice throughout winter.

Usually there are periods during winter with milder winds (*Hallemas-njáhcu* (Eira et al., this volume, Chap. 4)) that changes that snow structure and helps access to the ground

vegetation, but these types of weather did not occur this year. Due to the poor grazing conditions, the reindeer did not rest in January; they were constantly on the move in search for better access to vegetation. The herders worked around the clock to keep the herd together and avoid intermingling with other herds. For some *siidas*, the work intensified already from late November. It required a lot of driving, wear on snowmobiles and equipment, and herders worked coordinated to control the herd. Still, it was not possible to avoid reindeer from moving out of the winter pastures. Some *siidas* decided to divide the herd and move into different locations within the winter pastures. Others moved the herd to the spring/autumn pastures earlier than scheduled. Some *siidas* did not feed their reindeer, but most used supplementary feed from February and onwards. However, the feeding caused intermingling of herds. The reindeer smell the feed from afar. They were attracted to the feeding areas, and the predators followed the reindeer.

The winter was very long. Even in late April there were only small patches without snow at the spring/summer pastures. Some *siidas* organized trailer transport to spare the reindeer from the efforts of migration, and some had to continue with supplementary feeding until late May. Many reindeer died during the *goavvi*. In the beginning the herders recorded all the dead animals they found. But after a while, they stopped counting and checking the earmarks because of the mental strains.

The Norwegian Agriculture Agency agreed about the severity of the winter of 2020, which it referred to as a climatic 'crisis' and the most challenging winter in more than hundred years (Eira, 2020). The Agency explained that unusual amounts of snow and dense snow layers led to 'locked' pastures and difficult grazing conditions early in the winter in large parts of Sámi reindeer herding areas. "Reindriftsnytt" (a magazine about reindeer husbandry issues published by the Agency) reported that the grazing crisis of 2019/2020 affected 165,000 reindeer (Eira, 2020); that is, more than 75% of all semi-domesticated reindeer in Norway. The crisis, according to the Norwegian Agriculture Agency, was worst in Finnmark where many pastures were 'locked' from early January. All herding districts in West Finnmark received state emergency grants to buy and transport supplementary feed to their reindeer (letter from County Governor, dated 26. June 2020). The total allocation to reindeer herders in 2020 was NOK 42.7 million. In addition, the herding districts emergency savings totalled NOK 7 million at the beginning of the crisis (Eira, 2020, p. 10). The herders interviewed by "Reindriftsnytt" and the herders participating at our workshop all stated that the state grants were crucial for the survival of the reindeer during the *goavvi* event.

3.9 Obstacles for Adapting to Change and Coping with Crisis

2020 was the first *goavvi* event where the system with emergency funds was used in practice, and we invited the workshop participants to share their experiences with how it worked. The participants pointed to several issues that hindered efficient response to the critical situation on the ground. They said that the decision-making power to define when a crisis occurs, and the control of the emergency support, were distant from the individual herders responsible for the herds – and that this

distance limited the herders' autonomy in attending their animals' well-being and created obstacles for using traditional knowledge to effectively adapt to environmental change and cope with the crisis.

The participants said the decision-making created a delay from when herders identified and reported on the crisis to when they got access to funds to purchase supplemental feed (see Table 3.1). Further, the allocation of grants depended on the Emergency Committee's assessment of the grazing conditions, and grants were distributed only when the Committee' evaluation confirmed that the herders' reports on 'locked' pastures were accurate. The workshop participants, however, questioned the competence with the Emergency Committee to interpret its observations of snow and ice, and they questioned why the Committee did not include local herders on their inspections.

The participants experienced the County Governor's office response to the herders' reports about 'locked' pastures as unpredictable. Some herding districts managed to convince the office to coordinate an inspection of the pastures rather quickly. Other herding districts felt dismissed; they were told the office was busy working with other herding areas in Finnmark. According to the workshop participants, the first reports about poor grazing conditions were sent from some herders to the County Governor's office already in November 2019. However, the County Governor did not approve use of the districts' emergency savings until 10th of February (Fylkesmannen i Troms og Finnmark, 2020), and the first emergency grants were not distributed before mid-March (Eira, 2020). The participants argued that the immediate possibility to act upon changing weather conditions and 'locked' pastures should lay with the herders, and that the time gap from when the herders reported about the crisis to when they received support from the authorities, affected the well-being of both animals and people.

The participants argued that the decision-making process made it difficult to attend to the needs of those herders with the most severe grazing conditions. The grants were distributed to the herding districts, but in reality the grazing conditions varied within the districts and therefore, not all herders had the same need for support. According to the participants, it would have been better if the emergency savings and grants should be distributed to and managed by the *siidas* independently, and not by the districts. They explained that the winter herding districts in West-Finnmark are very large and include many *siidas*, which might face different grazing conditions. This also affects how the winter districts assess the severity of a crisis, and how fast they act on expressed needs from individual *siidas*. Due to different interests and concerns, it can be challenging to reach consensus about the need for emergency grants and the internal distribution of these.

Yet another factor that the participants identified as limiting herders' autonomy in attending their animals, were the restrictions set on how the savings and grants should be spent. The herders furthest away from the road were offered helicopter transport, but a precondition was the use of concentrated feed to minimize the volumes. The herders could not decide themselves what feed to give the reindeer. Due to Covid19 travel restrictions, herders were prevented from purchasing cheaper

concentrated feed in Finland, and thus, a large portion of the emergency funds went to helicopter companies (see also Eira, 2020, p. 10).

In addition to discussing the decision-making related to the emergency support, the workshop participants pointed to various elements in the state's model for understanding sustainable reindeer husbandry – and decision-making tools for facilitating sustainability – that become obstacles for the herders' ability to use traditional knowledge to adapt to a nature where 'locked' pastures and extreme events occur:

Firstly, the state regulation of reindeer pastures requires that each herding district has approved plans for the temporal and spatial land-use (Norwegian: *bruksregler*). The workshop participants argued that the fixed dates for moving from one seasonal pasture to the next removes some of the mobility and flexibility needed to adapt to disturbances and 'locked' pastures. The ad hoc working group that assessed the reindeer husbandry's capacity to cope with 'locked' pastures emphasized the importance of herders having good plans for all eventualities to minimize the negative effects of poor grazing conditions a grazing crisis (Landbruksdirektoratet, 2017, p. 7):

> Both the fact that a crisis deviates from the normal and is an unexpected event are factors that make dealing with the crisis difficult if one is not well prepared and has developed good plans for all eventualities. Lack of control and time pressure to find a solution to the crisis reinforces and substantiates the need for good plans when a crisis arises.

The template for obligatory land-use plans, however, does not include plans for *goavvi*. Moreover, the land-use plans are defined as internal management plans for each herding district, and are not used to inform regional or national decision-making related to extreme events. Furthermore, because the grazing boundaries in Finnmark were set in 1933, they do not fit the current climate or grazing conditions. Thus, the participants argued for a more flexible and adaptive land-use system that takes environmental changes and unpredictable events into account.

Secondly, the increased competition for land has led to encroachment and fragmentation of reindeer pastures and limits the herds' access to alternative pastures when the grazing conditions are poor. The participants also pointed to the social stigma of having reindeer that grazes where it 'ought not to be', something that makes it challenging to move into alternative pastures. Thus, the herders said that lost pastures should be compensated by new grazing areas.

Thirdly, the state has allowed some herding districts to use part of Inner Finnmark as summer pastures. The consequence is a reduction in the size of important winter pastures, and – according to the workshop participants – this is not the best use of available pastures.

Fourthly, the state incentives for maximizing meat production (with an emphasis on calf production) affects the robustness of the herd. The participants argued

that to slaughter young animals before they have been able to show their full capacity and potential makes strategic breeding challenging. Due to economic incentives offered by the state, the herds have few bulls and castrates that can dig through deep snow and ice crusts and thereby provide access to forage for the rest of the herd.

Fifthly, the participants addressed the state's emphasis on supplementary feeding to deal with poor grazing conditions. They explained that the focus on feeding undermined other adaptive measures. Not all herders want to use concentrated feed because it might alter the behaviour of the herd and make it more vulnerable to other threats, such as predators. Moreover, some reindeer will not eat the supplemental feed. The participants also explained that it is vital that the reindeer maintains its capacity to find forage on its own – also during winter.

The consequences of a *goavvi* are severe. A *goavvi* causes reindeer losses and fewer calves are born the following years. The negative effects on the herds' wellbeing make them less robust when faced with new occasions of unfavourable weather and poor grazing conditions. After the *goavvi* winter 2019/2020, the Agriculture Agency reported that there was a decrease in the number of calves. Less reindeer than normal were sent to the slaughter houses, which negatively affected the income of the *siidas* (Hætta, 2020).

While one can argue that there are institutions in place to ensure co-management between Sámi reindeer herders and various governmental levels (such as the Reindeer Husbandry Agreement and the Consultation Agreement), representation in decision-making has not lead to the inclusion of traditional knowledge in the state governance of reindeer husbandry (Heikkilä, 2006; Turi, 2016; Johnsen & Benjaminsen, 2017). Thus, the state governance becomes an additional burden as the indicators used to monitor sustainable and rational sustainable husbandry, challenge the traditional practices for strategic breeding and knowledge for rebuilding a resilient herd in the aftermath of a *goavvi*. Moreover, a year after the grazing crisis, the herding districts had to fight to keep the emergency grants which had been allocated to them. The County Governor had reclaimed grants which they argued had been spent outside the periods defined as 'crisis' by the Emergency Committee. The dispute about definition-power received attention in the press. In July 2021, the editorial of the regional Sámi newspaper *Ságat* stated that "the County Governor is creating a new crisis" (Ságat, 2021). It argued that there was a structural discrimination of reindeer herders and pointed to farmers who are automatically compensated if they experience a similar volume of crop failure due to climate conditions. The newspaper argued that favouritism had affected the herders' access to grants during the *goavvi*. The workshop participants shared the same observation.

3.10 Conclusion – Traditional Knowledge Left Behind

In this chapter, we present two different models for understanding sustainable reindeer husbandry – that of the Norwegian state and that of Sámi traditional reindeer herding knowledge. There are two key differences in the two models. Firstly, the model based on traditional knowledge presents a complex understanding of the interconnectedness of the components that jointly form the basis for sustainable reindeer husbandry, whereas the state model has a narrower and linear understanding of sustainability. Secondly, where the traditional knowledge model inheres notions of 'flexibility' and 'diversity' as measures for adapting to the surrounding environment and a changing reality, the state model is informed by notions of nature's 'carrying capacity', optimal herd structures, maximum reindeer numbers and fixed dates for when herds should move from one seasonal pasture to the next. Table 3.2 contrasts the differences between the Sámi traditional reindeer herding knowledge and the state's knowledge of reindeer husbandry. While the table presents the dichotomy between two knowledge systems, it is important to note these knowledge systems are neither static nor developed in vacuums. Sámi traditional

Table 3.2 The dichotomy between two models for the understanding of reindeer husbandry

Model for understanding…	…within reindeer husbandry based on traditional knowledge	…within the public management of reindeer husbandry
Sustainable reindeer husbandry	Complex, integrated, holistic, nomadic	Simplified, linear, reductionistic
Reindeer husbandry	A livelihood, way of life	An industry (Norwegian: *næring*)
The herd	Should be robust, functional, diverse	Should be productive, standardised, static
Reindeer-human relationship	Negotiated and built on compromises between the herder and reindeer	Reindeer fully controlled by humans
The surrounding environment	Always changing, both predictable and unpredictable	(External factors tend to be excluded in decision-making regarding reindeer husbandry)
Knowledgebase	Non-equilibrium thinking, traditional knowledgebase	Equilibrium thinking, knowledgebase from biology and ecology
Management	Adaptive, rule of thumb, living with uncertainty	Fixed targets, monitoring performance
Tools for decision-making	Qualitative, experience-based, observable (the reindeer's behaviour, muscle mass and building, hair quality, antlers, etc.)	Quantitative, theoretical, measurable (standardized indicators, norms and statistics about carcass weights, reindeer numbers, animal densities, etc.)
Mechanisms for coping with external threats, such as a *goavvi*	Contextual, flexible, and adaptive responses	Universal responses, based on rules of procedures

reindeer herding knowledge is constantly improved and informed by the herders' experiences and analysis, knowledge transferred from one generation to the next, science and technologies (Eira et al., this volume, Chap. 4).

In scientific literature and within science-policy platforms (such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES) a more plural approach to knowing and valuing nature is emerging. More attention is given to what and whose values and knowledge are reflected in public decision-making (Pascual et al., 2017; Díaz et al., 2018; Kenter, 2018; Jacobs et al., 2020; Pascual et al., 2021). For example, Pascual et al. (2021) explain that policymaking and knowledge production based on certain actors' conceptualization of nature can exclude other ways of defining, knowing and valuing it. These authors argue that a consequence of setting aside local and Indigenous understandings of non-human life and other human needs and worldviews is decisions that are preserved irrelevant locally. They point to the need for a more pluralistic perspective on conservation to ensure fairer decision-making and social equity. Thus, in pursuing a sustainable management of nature, Pascual et al. (2021) suggest a more inclusive and open-minded approach to defining policy goals and practical measures needed to achieve these goals.

The data on reindeer numbers and carcass weights which MAF uses to monitor sustainability assumes a predictable form of livestock production in stable conditions. However, standards and averages are not suited to inform pastoral production systems that operate in landscapes with temporal and spatial variations in distribution of forage (Krätli & Schareika, 2010). The assumption about stability, also diminishes the factors that herders understand as the greatest threats to their livelihood – encroachment, predators, and climate change – in the decision-making concerning reindeer husbandry. And while the Sámi traditional reindeer herding knowledge holds techniques for living with uncertainty, adapting to annual cycles and weather conditions, and protecting their reindeer from external threats, the regulations for 'sustainable reindeer husbandry' hinder an effective use of this knowledge. Moreover, the regulations enhance the state's control of Sámi pastoralism; the regulations provide tools for steering towards what the state sees as a 'rational reindeer husbandry', and they undermine the herders' possibility of self-governance.

The lack of recognition of traditional Sámi reindeer husbandry knowledge in policies and decision-making stands in contrast to Norway's action plan for sustainable development. With reference to the 1992 Rio Declaration, which defines principles for the relationship of states to each other and the relationship between states and their citizens in the field of environment and development, the action plan says (Norwegian government, 2004, p. 38):

> Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. (…) States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development

According to O'Brien et al. (2009), however, the Norwegian policies and public debate have tended to focus on Sámi rights and failed to address the factors and the

knowledge that underlie the Sámi reindeer husbandry. While Norway's 2016 report on the follow up of the 2030 Agenda states: "The protection, restoration and sustainable use of ecosystems can also safeguard the basis for a sustainable Sami culture" (MFA, 2016), there are no targets for how much land should be preserved to ensure a sustainable reindeer husbandry today and in the future (Stortinget, 2020). Norwegian policies recognize reindeer pastures as the material basis for Sámi livelihoods and culture, but the focus is rather on protecting the land from 'too many reindeer' than for reindeer husbandry. Simultaneously, Sámi reindeer pastures are lost to recreational cabin areas, wind and hydropower development, mining activities and types of infrastructure and human use. (For an analysis on the loss of pastures, see van Rooij et al., this volume, Chap. 9).

The overall objective of the 2007 Reindeer Husbandry Act is an "ecologically, economically and culturally sustainable reindeer husbandry based on Sámi culture, tradition and custom" (Reindriftsloven, 2007). Yet, the state decision-making neglects the Sámi traditional reindeer herding knowledge about the socio-ecological system they are part of, and the herders' understanding of how to maintain the well-being of reindeer in times of crisis. Instead of facilitating Sámi tradition and customs, the state governance for a sustainable and rational reindeer husbandry, forces herders to practice a 'Norwegianized' type of pastoralism. A consequence is that the reindeer herders cannot use their own knowledge to adapt to a *goavvi* or other types of extreme events.

The Norwegian state governance of reindeer husbandry stands in contrast to the increasing recognition of traditional knowledge and practices by international research and policymaking. For example, the Intergovernmental Panel on Climate Change (IPCC) and IPBES emphasize the value of diverse knowledge systems, including indigenous peoples' knowledge, in developing fair, holistic and effective conservation and climate change adaptation strategies for the well-being of both nature and humans (IPCC, 2014; IPBES, 2018). While the IPCC, IPBES and the Brundtland Report points to an opportunity in learning from indigenous peoples' relations to complex forest, mountain, and dryland ecosystems, the Norwegian state governance has not included these aspects in its policies and regulations. Instead, the Sámi traditional reindeer herding knowledge and practices are left behind.

The winter of 2019/2020 was described as exceptional, but only two years later, reindeer herders in Finnmark experienced another *goavvi*. The 2017 White Paper on reindeer husbandry stated that a future with a warmer and more unstable climate will increase the need for an emergency response to avoid animal tragedies caused by lack of forage and water during extraordinary weather conditions (Meld. St. 32, 2016–2017, p. 21). In some years, there will be a need for emergency funds and additional feeding. But these are short-term there-and-then measures; and not all winters with difficult snow and ice conditions need to turn into extreme winters with large losses of animals. As a long-term strategy to ensure the well-being of reindeer and sustainable reindeer husbandry, the authorities should allow the herders to maintain their adaptive capacity. By having diversity in the herds, flexible grazing strategies and maintaining mobility, reindeer husbandry can utilize the changes in nature in line with the reindeer's natural behaviour. An important step towards a

more inclusive and sustainable governance of reindeer husbandry is to include traditional knowledge and perspectives on nature-human relationships as legitimate, relevant, and valued contributions in policymaking. A broader recognition of Sámi traditional reindeer herding knowledge and practices would also help maintain the heritage of, as well as the adaptive capacity within, Sámi pastoralism.

3.11 Post-script

As this chapter was finalized early 2021, MFA had a public hearing of a report presenting suggestions for new criteria and indicators for monitoring the sustainability of reindeer husbandry. The report was put together by an ad hoc working group consisting of representatives of MFA, NRL and the Sámi parliament (Landbruksdirektoratet, 2020). MFA, however, specified the mandate of the working group as follows: Indicators identified should be in line with current reindeer husbandry policies and objectives (ecological, economic, and cultural sustainability); the indicators should be easy to measure and based on existing databases; and the existing criteria for ecological sustainable reindeer husbandry – such as, carcass weights, reindeer numbers and animal densities – should not be changed.

One of the new criteria for cultural sustainability suggested by the ad hoc working group was "the inclusion of traditional knowledge in public management" of reindeer husbandry. The group, however, was not very clear about what they meant by 'traditional knowledge'. They argued that this criterion is difficult to measure, and therefore, they did not suggest a quantitative indicator for the inclusion of traditional knowledge. Instead, they suggested that the Norwegian Agriculture Agency included a description of the importance of dialogue and consultations with reindeer herders in the annual reports on reindeer husbandry (Landbruksdirektoratet, 2020, p. 72).

In the public hearing about the suggested criteria and indicators for sustainable reindeer husbandry, both the national Reindeer Husbandry Board and the local association of herders in West Finnmark (*Guovdageainnu johttisápmelaččaid searvi*) emphasised that the inclusion of traditional knowledge is important for all management aspects of reindeer husbandry (LMD, 2021). The herders from West Finnmark also suggested that one way of measuring 'traditional knowledge' in the management would be to count the number of employees at the Norwegian Agriculture Agency with competence in Sámi traditional reindeer herding knowledge, as well as knowledge of the specialized Sámi language of reindeer husbandry. The Sámi Parliament responsed to the hearing by referring to the model of sustainable reindeer husbandry as reflected in Sámi traditional reindeer herding practices and first published by Eira et al. (2016) (and translated to English in this chapter). This model, the Sámi Parliament agued, should have been the starting point for developing new criteria and indicators for monitoring the sustainability of reindeer husbandry.

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