

The Norwegian system for wild reindeer management – major development since the 19th century

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Abstract: In the 19th century the hunting of wild reindeer was relatively unrestricted in Norway. This, combined with a more efficient hunting, caused a severe reduction in the number of wild reindeer at the turn of the century. The national authorities responded by stricter hunting control, and in 1930 hunting quotas related to the size of the wild reindeer areas were introduced. The Ministry of Agriculture decided the number of licences, and the number of wild reindeer increased. During the 1950s a major controversy between the Ministry and local people arose in the Snøhetta area. People there increased their power over the wild reindeer management by organising a "Wild Reindeer Board" (WRB). This inspired people in other districts to organise similar boards. These WRBs had no formal power according to the law, but became important managers of the herds. An official organisation for each wild reindeer area, the Wild Reindeer Committee (WRC), was introduced in 1988. Since the WRCs are official institutions, legal power is decentralised to them.

Key words: co-management, common pool resources, *Rangifer tarandus*, Rondane, Snøhetta.

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The Norwegian wild reindeer areas

At the middle of the 1990s Norway had 26 wild reindeer areas (Fig. 1). Potentially the wild reindeer may use larger areas but human impacts have fragmented and reduced the size of the mountain areas suitable for wild reindeer. In northern Norway the wild reindeer was extinct in the 19th century. The management goal for the number of wild reindeer in each area varies substantially today. In small wild reindeer areas the goal is 40-150 individuals, whereas the goal for the largest area, Hardangervidda, is 10 000 individuals. The annual number of wild reindeer legally killed by hunting in Norway since 1889 is illustrated in Fig. 2. Generally, the hunting increased substantially in the 1950s, reflecting better management and an increased number of wild reindeer. In this article the general development of the wild reindeer management in Norway is supplemented by describing the development in the Rondane and Snøhetta wild reindeer areas.

Historical development of wild reindeer management in Norway

According to Middle Age laws of Frostating court and King Magnus Lagabøter's code of laws there were rules concerning the mutual organising of pitfalls in order to avoid trappers from disturbing one another (Reimers, 1989). An organised management of the wild reindeer herds does not seem to have existed. From the 18th century, official policy in Norway was to kill as many large predators as possible in order to maximise the conditions for domesticated animals and "useful" wildlife. The rapidly decreasing populations of carnivores created favourable conditions for wild reindeer but better guns, an increased human population and an infrastructure opening the mountain areas caused overexploitation of the wild herds.

As a countermeasure, the Norwegian State introduced from the second half of the 19th century new acts and regulations of hunting. The acts would reg-

Wild reindeer regions

-  Setesdalen
-  Hardangervidda-Nordfjella
-  Jotunheimen
-  Rondane - Dovrefjell
-  Østerdalen Østfjell

Wild reindeer areas

- 1 Setesdal Ryfylke
- 2 Skaulen Etnefjell
- 3 Setesdal Austhei
- 4 Våmur - Roan
- 5 Hardangervidda
- 6 Blefjell
- 7 Nordfjella
- 8 Fjellheimen
- 9 Brattefjell - Vindeggen
- 10 Oksenhalvøya
- 11 Norefjell - Reinsjøfjell
- 12 Lærdal - Årdal
- 13 Vest - Jotunheimen
- 14 Ottadalen Sør
- 15 Ottadalen Nord
- 16 Førdefjella
- 17 Sunnfjord
- 18 Svartbotnen
- 19 Snøhetta
- 20 Rondane Nord
- 21 Rondane Sør
- 22 Solinkletten
- 23 Knutshø
- 24 Forelhogna
- 25 Tolga Østfjell
- 26 Rendalen

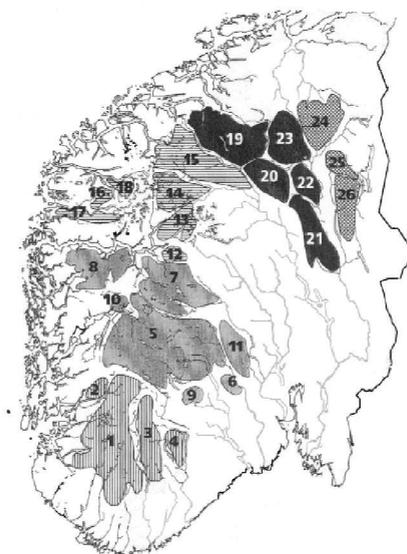


Fig. 1. Wild reindeer regions and wild reindeer areas in southern Norway in the mid 1990s (Jordhøy *et al.*, 1996).

ulate the time for hunting, abandoned killing calves, restricted type of rifles permitted, etc. In 1902 - 1906 all wild reindeer hunting in Norway was prohibited. These efforts had some effects but did not lead up to a stable wild reindeer population, one reason being that every Norwegian citizen was allowed to hunt in the large nationally owned mountain areas of southern Norway. The Mountain Act from 1920 limited the number of hunters; in distinct commons hunters from the nearby communities had priority but there was no limitation upon the *number* of reindeer to be hunted. In addition, the division of a large area into many small commons produced a co-ordination problem.

In 1930, the authorities introduced quotas and only a specified number of wild reindeer related to the size of the mountain area were allowed hunted. Even the owners of the mountain areas had to apply for license to hunt. Thereafter the number of wild reindeer gradually increased. Paradoxically, the Ministry of Agriculture (MA) did not know the number of wild reindeer in each mountain area; instead they used the size of the areas as an indication of the number of reindeer.

The Hunting Act of 1951 defined a national hierarchy consisting of wild life managers in the local

authority districts and at the national level. Contrary to the management of other big game species, the local authority districts did not get any formal power for deciding the quotas of wild reindeer. The management of the wild reindeer became an issue for the land owners and the MA. A strong national administration in co-ordinating the management was needed, because the herds often crossed the borders of local districts and counties (Christensen, 1967). But as time passed, local influence upon the quotas was demanded. This development is illustrated by the conflicts in the Snøhetta area in the 1950s and early 1960s. According to the owners of the ground the MA did not allow for high enough quotas. Locals based their assessments upon some censuses but mostly upon observations of what they judged as many wild reindeer and over-used pastures. They also thought the size of the wild reindeer decreased and that the wild

reindeer fed on plants not ordinarily eaten. The Ministry argued that the herd was not too large, and that the quota was the correct one (Heitkøtter, 1981; Hansen, 1987; Jordhøy, 2001). This was a classical controversy between local people and national authorities.

As a response, in 1961 the land owners in the Snøhetta area organised the first local Wild Reindeer Board (WRB) increasing their power and influence relative to the MA, and the quotas increased considerably. After some years, a better balance between herd size and its resources was achieved. The WRB in Snøhetta inspired people in other wild reindeer areas, and similar boards emerged during the 1960s, although the new organisation had no formal power according to the Hunting Act.

The achievements of the WRB have been closely investigated in the Rondane area (Bråtå, 2001). In 1967, the largest owners of land there, the Mountain Boards (MB), agreed to found a *formal* WRB for improving the management of the wild reindeer. The MBs were the most important local actors and had co-operated about management since the early 1950s. In 1956 the MBs in Rondane initiated the first national park in Norway and continued as important actors until it was established in 1962. An

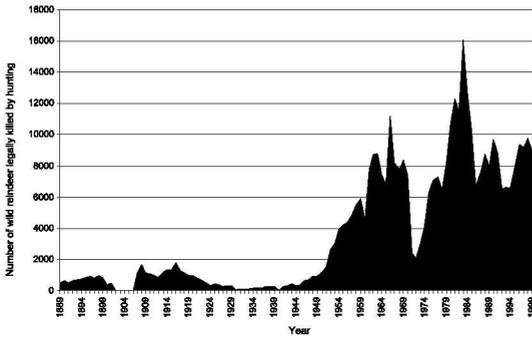


Fig. 2. The number of wild reindeer legally killed by hunting in Norway 1889-2000 (Source: Statistics Norway).

important reason for their initiative was to protect the important wild reindeer areas and migration routes against increased human exploitation.

An important theme for the MBs in Rondane in the second half of the 1950s was, by the means of censuses, to obtain processed knowledge (Friedmann, 1973, 1987; Polanyi, 1976, 1978; Rolf, 1989; Flyvbjerg, 1992) about the number of wild reindeer. The count was not initiated by the Ministry who decided the quotas but by local people deeply concerned with what seemed to be too high quotas. The first census was carried out in 1960. Subsequent counts were carried out in 1962, 1964, 1967 and thereafter annually. Through the organising of a formal WRB in Rondane in 1967, a systematic effort began in order to obtain an overview of the quotas and number of wild reindeer killed by hunting in the area. Such detailed processed knowledge existed in the Ministry but was only published later in a summarised version by the Statistics of Norway. However the WRB needed the knowledge earlier and more detailed for keeping control with each owner's hunting in the Rondane area. To better control the management private landowners in 1970 were invited to join the WRB, and they became active members. This expansion increased the need for precise information at the right time of the year.

The WRB in Rondane managed to extend the quotas in 1968, and have generally achieved the quotas they applied for to the national authorities. In 1970 the first WRB was divided into three WRBs. Fig. 3 shows that the quotas in the northern part of the Rondane area are closely related to the number of wild reindeer in the censuses. The number of animals in the herd was adapted to the local goals. During the 1970s the WRB in Rondane, and probably several other WRBs, became the real managers of the wild reindeer in many areas. Still, the WRBs had no formal power according to the Hunting Act. From

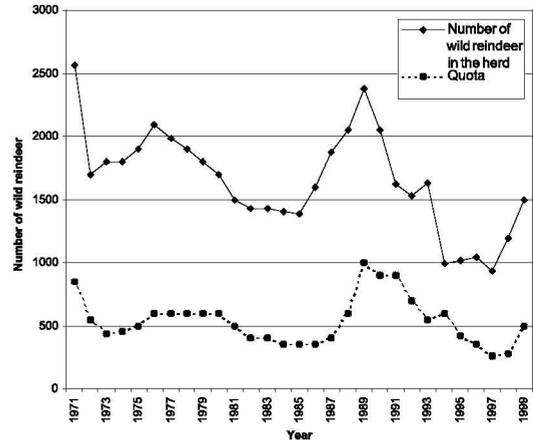


Fig. 3. The number of wild reindeer and the quota in the northern part of the Rondane region 1971-1999.

the 1970s, the national authorities and the Rondane North WRB developed a good relationship. The relationship to the Directorate for Wildlife Management, established in 1965, was an example of co-management to the best of the common pool resource.

Despite good co-operation, in some wild reindeer areas it became a problem for the national authorities during the 1970s that no official wild reindeer institutions adapted to the size of each area existed. The new Wild Reindeer Committees (WRC) proposed at the first half of the 1980s, were supposed to be the missing link in the national hierarchy of wildlife institutions, and would consist of officially elected representatives from each local authority district in a wild reindeer area. Several members of the existing Rondane North WRB opposed this proposal.

Notwithstanding the criticism, official WRCs for each wild reindeer area were introduced in 1988. The existing WRBs were supposed to continue as clearly defined organisations for the owners of the land and to have the daily responsibility for the management of the wild reindeer areas, whereas the new committees were supposed to be supervisors. As the WRCs were formally defined in the Wildlife Act and linked to the hierarchy of administrative organisations, power was decentralised to them from the Directorate for Nature Management. The WRCs were supposed to decide upon e.g. the quota for each wild reindeer area. Local officials were given formal power and as part of the official power hierarchy the WRCs had an official responsibility for the state of the resource system, one of their duties was to make assessments of proposed human impact in the wild reindeer areas.

A presupposition for official and decentralised decisions, for example quotas, was the existence of management plans for each wild reindeer area and processed knowledge was a necessity for such plans. The landowners in a WRB, were obliged to elaborate a plan which the WRC was supposed to approve or reject. At the beginning of the 1990s the Directorate for Nature Management thought that the basic biological questions of wild reindeer were solved; research funding was directed to other topics and annual counts in each herd were not considered necessary. Instead a coordinated program for scientific monitoring of herds was introduced. Based upon e.g. the management plans for the wild reindeer areas, the grants for management were supposed to be directed to wild reindeer areas with specific problems (Jaren, 1991).

Explaining the described development

The wild reindeer, an open resource

In order to control the overexploitation before and after 1900, the wild reindeer became a theme for what Max Weber (1995) called an official jurisdictional area, and gradually the theme for a bureaucracy. The efforts to control the hunting of wild reindeer can be understood as part of a broader process of rationalisation increasing the control of nature and society. The Mountain Act of 1920 is a part of this process because a modernised Norway needed defined property rules.

The power of the national institutions applied in the years preceding 1930 did not create sustainable use of the wild reindeer. One important reason was the absence of limitations upon the number of wild reindeer to be hunted. In fact, the wild reindeer was an open resource. That, and its migratory behaviour, disposed for the "tragedy of the commons". It was rational for the hunters to shoot as many wild reindeer as possible when they had the opportunity (Olson 1965; Hardin 1968, 1998; Berkes, 1998). Aggregation in flocks may also give an impression of many wild reindeer, independent of the total population. These aspects, which the reindeer share with other migratory species, make it difficult to manage the wild reindeer (Buck, 1989; Gibbs & Bromley, 1989; Feeny *et al.*, 1990; Berkes, 1998).

National institution fix the quotas

When the MA in 1930 introduced quotas as a mean to reduce overexploitation, a nationally situated institution was assigned all power in the wild reindeer management. Some authors appraise nationally centralised power as the only possible way to manage common pool resources (Ophuls, 1973). Others

appraise it as being one of several solutions, including privatisation and managed commons (Berkes & Taghi Farvar, 1989; Ostrom, 1990). When quotas are based upon the size of a wild reindeer area, the quotas relied upon quantitative and objective knowledge ideal for a bureaucratic organisation (Weber, 1995). The introduction of quotas prevented overharvest but a weak point was that the number of wild reindeer in the mountain areas was unknown.

The Hunting Act in 1951 implied that the wild reindeer became managed within a clearly shaped hierarchy. Still, the local authority districts had no formal power regarding its management. The advantage of all power assigned to the national level was one institution being responsible for the wild reindeer management across administrative borders. The drawback was the total reliance upon the judgements of the bureaucrats in the MA (Lütken & Rom, 1959).

The Snøhetta case illustrates problems associated with a centralised wild reindeer management, and how the nationally based power was challenged when the owners of the land organised themselves. The organising of the land owners is interesting, because they at the same time kept their position in the national system, and by organising an arena outside the system, violated its basic assumptions. Disagreements between national authorities and the owners of the land, as in Snøhetta, are frequent in wild reindeer and caribou management (Freeman, 1989; Andersen & Rowell, 1991; Thomas & Schaefer, 1991). Different types of knowledge may influence those relations because local people often use personal knowledge (Friedmann, 1973, 1987; Polanyi, 1976, 1978; Rolf, 1989) based upon own observations, whereas national agencies are inclined to favour processed knowledge.

If the bureaucracy relies upon processed knowledge (Weber, 1995) one should anticipate that the MA increased its efforts to obtain the best possible knowledge for action but in the 1950s and early 1960s, the Ministry did not initiate a quantification of the wild reindeer in Rondane. The decisions of the MA in those years are characterised by a limited rationality caused by "cognitive limits" (Forester, 1989; March & Simon 1993) aiming at a "good enough", and not necessarily the "best", wild reindeer management. Almost unchanged quotas in the northern part of Rondane in 1952 - 1967 supports the indication that national actors do not necessarily seek an optimal wild reindeer management.

According to Ostrom (1990) precise information is a necessity for centralised management. It was however non-existing in the Rondane area until the MBs in 1960 made the first count and thereby

reduced uncertainty (Ostrom, 1990). It was also the MBs that by the means of observations and context dependent processed knowledge documented an asymmetrical distribution of wild reindeer in the Rondane area in the 1970s. The quotas had prevented an overexploitation of the herd as an area unit but not prevented overexploitation in most parts of the area. A centralised and national actor with much power but without knowledge on the real distribution of the animals was not able to manage them properly. This illustrates the assertion by Grima & Berkes (1989), that national decisions not being influenced by the knowledge of local people and their concern for the well being of the resources (Berkes & Taghi Farvar, 1989; Ostrom, 1990), can be a problem.

Processed knowledge and wild reindeer management

Annual censuses became crucial for the Rondane North WRB when applying to the national authorities for quotas. The owners of the land also engaged experts in order to increase the local knowledge about the pasture. In that way professional processed knowledge was integrated with the personal knowledge of the local mountain rangers, cf. Johnson (1992). "A skilful pooling and blending of scientific knowledge and local time-and place knowledge" (Ostrom, 1990: 34) reduced the uncertainty in the local management. A good relationship between scientists and local managers evolved from the 1970s due to the involvement of the mountain rangers in the practical scientific fieldwork. Mutual trust is important for successful integration of processed knowledge into local management, but is difficult to obtain (Freeman, 1989; Thomas & Schaefer, 1991; Johnson, 1992; Weeks & Packard, 1997). Still, it became one of the characteristics for the wild reindeer management in Rondane from onwards the 1970s because the owners of the land needed processed knowledge illustrating that "traditional environmental knowledge" and western scientific knowledge were not two excluding forms of knowledge.

Censuses are based upon quantification, which is basic for statistics. Statistics imply that a population is transferred from an undefined mass of individuals to a collection of individuals characterised by certain parameters (Foucault, 1999). By the means of quantification, the wild reindeer in Rondane became a collection of individuals. Statistics, and the categories upon which it is based, increased the option for controlling the wild reindeer resource (Hacking, 1991). Quantified quotas illustrate the assertions that power is not necessarily something negative

since quotas can hinder overexploitation (Foucault, 1999).

The initiatives of the MBs in Rondane in the 1950s have some similarity to Canadian Dene Indians and Cree Indians efforts to increase their knowledge about the caribou. Also the Indian tribes collected synchronic and diachronic data about the wild reindeer or caribou and their distribution in the landscape. On the other hand the MBs wanted quantitative knowledge about the total number of wild reindeer and the hunting success whereas the Indian tribes based their action upon qualitative data (Smith, 1978; Thomas & Schaefer, 1991; Berkes, 1998). Such use of qualitative and quantitative data illustrates a basic difference between "native systems" and systems influenced by western science (Freeman, 1985).

Foundation of a formal reindeer board in Rondane

The development towards a formal WRB in 1967 is in accordance with the optimism in group theory that individuals with a common interest voluntarily advance such interests (Ostrom, 1990). Others have been doubtful about the ability of achieving such an organisation. Unless the number of individuals is quite small, or unless there is coercion to make individuals act in a common interest, rational, self-interested individuals will not act to achieve their common or group interests (Olson, 1965). Despite Olson's scepticism the MBs in Rondane gradually organised during the 1950s and 1960s, probably because the process of organising started with so few "individuals" (the MBs), that mutual trust between the members was established. They developed a social capital, which is basic for developing institutions for common pool resource management (Coleman, 1990; Ostrom, 1995). The organising was important because it gave more power to local people and thereby local control of the wild reindeer herds.

Conflicts concerning the quotas were moved more to the level of the wild reindeer area; in the period 1930 - 1967 the quotas, and disagreements, were primarily a theme for the MA and each land owner. When establishing the WRB local actors had to agree before applying to the national authorities for quotas. Possible conflicts had to be solved locally. Due to the fact that the landowners received a quota equal to their share of the total area, few conflicts between them should exist. But still in the early 1970s the landowners disagreed about the total quota for the northern part of Rondane. One reason was that the sustainable number of wild reindeer was interpreted in the separate context of each landowner. This illustrates that the acceptable limit for

resource use has a biological and a social dimension (Gjølme-Andersen, 1993; Cozzens & Woodhouse, 1995; Gjessing, 1998). Despite some disagreement, the shareholders usually agreed upon the quotas inquired at the national authorities.

Because the Rondane North WRB, and elsewhere was not defined in the Hunting Act, the landowners themselves decided the rules for the board. Such discussions generally increase in complexity with the number of actors involved, as does the risk for an unsuccessful group activity (Olson, 1965). The Rondane North MBs judged the advantage of having a mutual agreement for a bigger wild reindeer area as being greater than the disadvantage of including private landowners, because the risk of free-raiding was reduced (Gibbs & Bromley, 1989; Ostrom, 1990). Since the landowners themselves defined the rules for the WRB, the definition of the rules became complicated, and the ones having most of the land achieved more formal power. That power was sometimes expressed openly, although generally speaking, open conflicts were not the case. The question of non-decisions due to the fact that the weaker landowners may have avoided conflicts, then arises, but is hard to investigate.

Official Wild Reindeer Committees and increased use of planning

The largest, and most powerful, landowners in Rondane North were especially reluctant to the new and official WRC in Rondane in the mid 1980s because in the WRC the power would be equally divided between the local authority districts. In the existing WRB the power was distributed according to each landowners share of the wild reindeer area. A conflict between representation and power based upon a symmetrical and an asymmetrical representation of the resource system emerged (Knight, 1992; Ostrom, 1995). Despite the resistance the WRCs were introduced, and the WRBs were subordinated to them.

An interesting question is why the national authorities wanted official WRCs, as long as the WRBs existed. Official documents tell the committees were needed since there were no official bodies at the level of the wild reindeer area. This can be interpreted as a tendency for hierarchies to develop a perfect structure. The introduction of the WRCs coincided with a general tendency of decentralisation; therefore is also the possibility that the national authorities wanted a regional official body because it paved the ground for decentralisation of power to the areas and an official framework for including the advantages of knowledge, goals and values held by local people.

Planning was an important pre-condition for the decentralisation of formal power because management plans approved by the WRCs bound the future decisions of the landowners. Still the management plans would be monitored every year in order to check the relationship between the plan and the reality. The emphasis on management plans coincided with a general belief in planning (Ministry of Environment 1991, 1996; Emmelin & Kleven, 1999). Processed knowledge became an important pre-condition for demanding management plans since it was anticipated that science had unravelled the basic relationships for the development of wild reindeer herds, and it was easy to gather such processed knowledge. An additional advantage of processed knowledge was that it could be communicated formally and critically examined to a larger extent than personal knowledge (Friedmann, 1973). The possibility of critical examination of the plans, because they were based upon processed knowledge, paved the ground for decentralising their approval to the WRCs. There seems to be a strong linkage between an increased body of processed knowledge, planning and decentralisation.

Conclusion

Historically the management of the wild reindeer becomes an issue for an official jurisdictional area with an official bureaucracy. This is caused by a tendency to solve the negative effects of modernisation and overexploitation by the means of technocratic management (Rabinov, 1991). The power situated in this structure has been especially evident since 1930 when the national state introduced quotas for wild reindeer hunting. This decision prevented overexploitation, but at least in the Snøhetta area, it turned into a problem because quotas were too low. The reason was that the Ministry possessing the power lacked knowledge about local conditions or did not accept the personal knowledge of the landowners. The landowners in many mountain areas in the 1960s organised influential boards for wild reindeer management, adapted to the size of the wild reindeer area. The WRBs based their management upon local values, personal knowledge, and processed knowledge but were voluntary and had no official power according to the law. The WRCs, introduced in 1988, were supposed to keep up with the advantages of a management based on local values and the advantages of the hierarchy. Essential for the decentralisation was the elaboration of management plans for each wild reindeer area. The plans were based upon scientific knowledge and locally produced personal and processed knowledge. An increased

amount of processed knowledge produced for a local context, had increased the power of the landowners. But in order to be used, the knowledge had to be acceptable for those possessing the power.

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References

- Andersen, C. & Rowell, J. 1991. Joint management in action – George River caribou herd. – *Rangifer* Special Issue No. 7: 67-72.
- Berkes, F. 1998. *Do resource users learn from management disasters? Indigenous management and social learning in James Bay*. Paper at the conference: Crossing Boundaries, Vancouver, June 10-14, 1998. The International Association for the Study of Common Property (IASCP).
- Berkes, F. & Taghi Farvar, M. 1989. Introduction and overview. – In: Berkes, F. (ed.). *Common property resources. Ecology and community-based sustainable development*, pp. 1-17. London: Belhaven Press.
- Bråttå, H.O. 2001. *The management of the wild reindeer and its resource system in the Rondane region, with arena, knowledge and power as theoretical perspectives. (Forvaltningen av villreinen og dens ressursystem i Rondane. Belyst i et arena-perspektiv med makt og kunnskap som teoretiske innfallsvinkler)*. Dr. scient.thesis. Det matematisk-naturvitenskapelige fakultet. Universitetet i Oslo. (In Norwegian).
- Buck, S. J. 1989. Multi-jurisdictional resources: testing a typology for problem structuring. – In: Berkes, F. (ed.). *Common property resources. Ecology and community-based sustainable development*, pp. 127-147. London: Belhaven Press.
- Christensen, H. 1967. *The wildlife and hunting legislation, with comments. (Lovgivningen om viltstell og jakt, med kommentarer)*. Oslo: Aschehoug. (In Norwegian).
- Coleman, J.S. 1990. *Foundations of social theory*. Cambridge, Mass: The Belknap Press of Harvard University Press.
- Cozzens, S.E. & Woodhouse, E.J. 1995. Science, government, and the politics of knowledge. – In: Jasanoff, S.H., Markle, G.E., Petersen, J.C. & Pinch, T. (eds.). *Handbook of science and technology studies*. Thousand Oaks, Cal: Sage.
- Emmelin, L. & Kleven, T. 1999. *A paradigm of environmental bureaucracy? Attitudes, thought styles and worldviews in the Norwegian environmental administration*. Oslo: NIBR (NIBRs PLUSS SERIES 5-99).
- Feeny, D., Berkes, F., McCay, B.J. & Acheson, J.M. 1990. The tragedy of the commons: Twenty-two years later. – *Human Ecology* 18: 1-19.
- Flyvbjerg, B. 1992. *Rationality and power. A case study of planning, politics and modernity. (Rationalitet og magt. Et casebasert studie af planlægning, politik og modernitet)*. København: Akademisk Forlag. (In Danish).
- Forester, J. 1989. *Planning in the face of power*. Berkely: University of California Press.
- Foucault, M. 1999. *Discipline and Punish: The Birth of the Prison. (Overvåkning og straff. Det moderne fengsels historie)*. Oslo: Gyldendal. 3. utg. (In Norwegian).
- Freeman, M.M.R. 1985. Appeal to Tradition: Different Perspectives on Artic Wildlife Management. – In: Brøsted, J. & Eide, A (eds.). *Native power: the quest for autonomy and nationhood of indigenous peoples*, pp. 265-281. Bergen: Universitetsforlaget.
- Freeman, M.M.R. 1989. Graphs and gaffs: A Cautionary tale in the common-property resources debate. – In: Berkes, F. (ed.). *Common property resources. Ecology and community-based sustainable development*, pp. 92-109. London: Belhaven Press.
- Friedmann, J. 1973. *Retracking America: A theory of transactive planning*. New York.
- Friedmann, J. 1987. *Planning in the public domain: From knowledge to action*. Princeton University Press: Princeton.
- Gibbs, C. J.N. & Bromley, D. W. 1989. Institutional arrangements for management of rural Resources. – In: Berkes, F. (ed.). *Common property resources. Ecology and community based sustainable development*, pp. 22-32. London:Belhaven Press.
- Gjessing, J. 1998. *Research methods in Resource Geography. (Forskningsprosess og metode i Ressursgeografi)*. Oslo: Geografisk institutt. Ressurs- og miljøgeografi. Fagnotat 1 - 3. utg. (In Norwegian).
- Gjørlme-Andersen, K. 1993. *Acceptable risk. Discussions about the fixing of acceptable limits. (Akseptabel risiko. Om fastsettelse av tålegrenser i risikoesamfunnet)*. Oslo: TMV-senteret (Rapport nr. 60). (In Norwegian).
- Grima, A.P.L. & Berkes, F. 1989. Access, rights-to-use and management. – In: Berkes, F. (ed.). *Common property resources. Ecology and community-based sustainable development*, pp. 33-54. London: Belhaven Press.
- Hacking, I. 1991. How should we do the history of statistics? – In: Burchell, G., Gordon, C. & Miller P. (eds.). *The Foucault effect: studies in governmentality*, pp. 181-195. London: Harvester Wheatsheaf.
- Hansen, I. 1987. The Snøhetta herd, and wild reindeer management before 1970. (Snøhetstammen- villreinforvaltning frem til 1970). – *Villreinen* 1987: 39-40. (In Norwegian).
- Hardin, G. 1968. The Tragedy of the Commons. – *Science* 162: 1243-1248.
- Hardin, G. 1998. Extensions of “The tragedy of the commons”. – *Science* 280: 682-685.
- Heitkøtter, O. 1981. *Wild reindeer and wild reindeer hunting. (Villrein og villreinjakt)*. Oslo: Grøndal. (In Norwegian).
- Jaren, V. 1991. The Monitoring Program for Ungulates

- starts this year. (Overvåkningsprogrammet for hjortevilt startet i år). – *Villreimen* 1991: 14-16. (In Norwegian).
- Johnson, M.** 1992. *LORE. Capturing traditional environmental knowledge*. Ottawa: Dene Cultural Institute and International Development Research Centre.
- Jordhøy, P., Strand, O., Skogland, T., Gaare, E. & Holmstrøm, F.** 1996. *Monitoring Program for Ungulates – Wild reindeer 1991-95. (Oppsummeringsrapport, overvåkningsprogrammet for hjortevilt – villreindelen)*. Trondheim: NINA - Fagrapport 022). (In Norwegian).
- Jordhøy, P.** 2001. *The wild reindeer in the Snøhetta area. (Snøbettaeimen)*. Lesja: Snøhetta forlag. (In Norwegian).
- Knight, J.** 1992. *Institutions and social conflict*. Cambridge: Cambridge University Press.
- Lütken, C. & Rom, K.** 1959. *The Hunting Act. (Jaktloven med kommentarer)*. Grøndahl & Søn (2. ed.). (In Norwegian).
- March, J. & Simon, S.** 1993. *Organizations*. Second Edition. Oxford: Blackwell Business.
- Ministry of Environment.** 1991. *The management of bear, wolverine, wolf and lynx. (Om forvaltning av bjørn, jerv, ulv og gaupe)*. St.meld.nr. 27 (1991-92). (In Norwegian).
- Ministry of Environment.** 1996. *The management of predatory animals. (Om rovviltforvaltningen)*. St.meld. nr. 35 (1996-97). (In Norwegian).
- Olson, M.** 1965. *The logic of collective action. Public goods and the theory of groups*. Cambridge, Mass: Harvard University Press.
- Ophuls, W.** 1973. Leviathan or Oblivion. – In: Daly, H.E. (ed.). *Toward a steady state economy*, pp. 215-230. San Francisco: Freeman.
- Ostrom, E.** 1990. *Governing the commons. The evolution of institutions for collective action*. Cambridge: Cambridge University Press.
- Ostrom, E.** 1995. Constituting social capital and collective action”. – In: Keohane, R. O. & Ostrom, E. (eds.). *Local commons and global interdependence. Heterogeneity and cooperation in two domains*. London: Sage.
- Polanyi, M.** 1976. *The tacit dimension*. New York: Anchor Books.
- Polanyi, M.** 1978. *Personal Knowledge. Towards a Post-Critical Philosophy*. London: Routledge & Kegan Paul. Reprint.
- Rabinov, P.** 1991. Introduction. – In: Rabinov, P. (ed.). *The Foucault reader*, pp. 3-29. London: Penguin Books.
- Reimers, E.** 1989. *The wild reindeer. (Villreimens verden)*. Oslo: Aschehoug. (In Norwegian).
- Rolf, B.** 1989. *Wittgenstein and the untold, and Polanyis personal knowledge. (Wittgensteins osägbarhet och Polanyis personliga kunnskap)*. – In: Johannessen, K. & Rolf, B. (eds.). Om tyst kunskap. Två artiklar: Uppsala: Universitetet i Uppsala, Centrum för didaktik (Report nr. 7). (In Swedish).
- Smith, J.G.E.** 1978. Economic uncertainty in an “original affluent society”: Caribou and caribou-eater Chipewyan adaptive strategies. – *Arctic Anthropology* 15: 68-88.
- Statistics Norway.** *Hunting statistics*.
- Thomas, D.C. & Schaefer, J.** 1991. Wildlife co-management defined: The Beverly and Kaminuriak Caribou Management Board. – *Rangifer* Special Issue No. 7: 73-89.
- Weber, M.** 1995. *Power and bureaucracy. Essays about politics and class, social science and values. (Makt og byråkrati. Essays om politikk og klasse, samfunnsforskning og verdier)*. Oslo: Gyldendal. (In Norwegian).
- Weeks, P. & Packard, J.M.** 1997. Acceptance of scientific management by natural resource Dependent communities. – *Conservation Biology* 11 (1): 236-245.