

# **The Privatization of a Norwegian Common Pool Resource. The role of the state**

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## **Abstract**

Game populations normally satisfy the standard definition of a common pool resource. Still, little has been written about the management of game in the literature on European common pool resources.

In this paper we will study the development of the Norwegian Moose Management regime during the last 500 years. To which extent and in which ways has the resource been privatized? What have the drivers of this privatization process been, and what role has the state played? We will also discuss the successes and failures of the policies that have been implemented at various stages of this process.

Due to overexploitation, the Norwegian moose population was almost wiped out during the 17th century. In spite of several state interventions aimed at reducing the hunting pressure, the size of the moose population remained at a relatively low level until after the Second World War.

In the beginning of the 19th Century, the government introduced a law that attached moose hunting rights to landownership. This can be considered as the first phase of a privatization process. The second phase came after the Second World War with the introduction of a new Hunting Law that provided each landowner with an exclusive ownership right to portions of local felling quotas. In actual fact, however, the outcome is a combination of private ownership, state control, and local commons arrangements, since the right to determine the total number of shooting permits in an area is held by the state, and since the quota system forces the landowners to cooperate in order to use their ownership rights.

The new management regime has resulted in a major increase in the moose population, and the number of bagged animals increased from less than 1000 annually in 1900 to almost 40.000 a century later.

The relative success of the Norwegian moose management regime can be ascribed to the combination of state intervention and privatization. Alternatively, the game resources could have been made state property. There are probably several reasons why this alternative was rejected. In the 19th Century the landowners elected 2/3 of the members of the Norwegian Parliament, and state confiscation of commons was not a feasible alternative. The state was also far too weak to be able to implement a successful management regime without giving local farmers incentives to participate in the monitoring process by giving them ownership rights.

## **Introduction**

The Norwegian moose population is a common pool resource since it is prohibitively costly to build fences around forest properties that will prevent the animals from moving to neighboring land. In the 16<sup>th</sup> century the moose population suffered a drastic reduction due to increased hunting pressure. The state intervened a number of times, but it took 400 years before the government succeeded in introducing a management regime that resulted in sustainable growth for the moose population. The current management regime is a combination of central regulation, private property rights and local cooperation between owners.

The literature about the history of the Norwegian moose resource and its institutions is limited, mainly due to lack of detailed data. We have tried to supplement the information we can find from the literature with available archive data and old official documents.

We know that moose hunting and trapping was regulated in the Norwegian provincial laws 1000 years ago. There exist transcripts of some of these old laws (Gulating law and Frostating law), but others are lost. We believe to have detailed information about most of the changes in the central government's regulations of hunting rights from the first Norwegian law in 1274 until now. It may, however, be difficult to translate and interpret some of the older rules.

We have limited information about the existence of local institutions, formal or informal, which *may* have regulated the use of this common pool resource.

The information about moose population and annually felled moose is scarce until the end of the 19<sup>th</sup> century. Our data does not always make it possible with very precise statements, and we have struggled with quite a few interpretation problems. These limitations have indeed made it difficult and frustrating to try to put this paper together. We hope, however, that our history about the Norwegian moose population and the various initiatives that have been taken over the past 500 years to prevent the population from extinction, may give some insights that make the effort worthwhile.

Our main focus will be on how the state has tried to regulate this common pool resource, why the state at various stages has introduced different regulatory policies and how they have worked.

## **Some theoretical points**

If there are no efficient institutions regulating the use of a common pool resource, it may lead to the "tragedy of the commons". The "commons"-literature shows, however, that social groups may "establish" local institutions (community norms) that lead to sustainable resource use. Such institutions may, however, break down if individuals or

groups of individuals that do not belong to the “old” group moves into the area and start to harvest from the same resource.

Legal changes in hunting rights may in principle be a result of a *top-down* process where the state may try to pursue the interests of the elite (king, nobility etc.), or it may be a result of a bottom-up process where hunters and/or property owners succeed in using the state to pursue their interests. Hence, a legal change may be caused by changes in the power of different interest groups.

When a group perceives that a resource has become scarce, it may try to exclude others from using the resource by introducing property rights over the resource. Even if all land has been privatized and all the landowners have exclusive user rights over the resources on their land parcels, a single landowner will usually have limited control over the development of the stock of a common pool resource. Privatization will usually reduce the number of (legal) stakeholders of the resource, and this may reduce the pressure on the resource. However, when the user rights are privatized, each owner may want to use his bargaining power to pursue his own interests, and it may be difficult to achieve a cooperative arrangement between the owners that regulates the use of the resource. In order to achieve sustainable resource management, it may therefore be necessary with higher-level institutions that regulate how much each stakeholder can harvest. Privatization therefore requires a state that has the capacity to regulate the resource use and enforce private property rights.

Privatization of land may not solve the sustainability problem for the common pool resource, but individuals may want to privatize parts of “the commons” in order to reduce user conflicts. This type of zoning may increase an owner’s return from his investment in harvesting activities and may also reduce the external costs other users may induce on other types of economic activities in the (private) zone.

If the costs of defining and enforcing property rights are higher than the perceived gains from privatization they may not find it worthwhile to try to privatize user rights over the resource.

In this paper we focus on moose as a common pool resource. The economic value of the moose is in the meat, the hide and the antlers. Desire for a change in the institutional structure may be triggered by perceived changes in demand for any of the moose products. When the value of the products increases, the hunting pressure will increase, and individuals or groups may try to introduce rules that exclude others from using the resource.

Changes in available hunting or trapping technology may reduce the costs of felling a moose, and hence increase the pressure on the resource. Hunting costs will also change if opportunity costs of labor changes. New technology may also result in new user conflicts and others may disappear. New hunting technology may therefore induce demand for changes in the rules of the game.

The moose is a biological resource that may fluctuate due to natural causes (climate, diseases, the amount of prey animals etc.)

Institutions regulating moose hunting, may in principle

- Restrict who are eligible to hunt or trap in a specific area
- Restrict the number of animals each rightholder may fell
- Restrict what kind of technology a rightholder may use, at what time of the year and for how long time the rightholder may hunt or trap

In addition the state may impose regulations that indirectly have effects on the moose resource, for instance policies regulating the stock of prey animals and competing land uses (grazing, forestry etc)

To sum up: Central and local institutions regulating hunting and trapping may be introduced for achieving several different goals:

- Pursue sustainable resource use
- Redistribute income from hunting and trapping
- Reduce negative externalities from hunting and/or trapping, i.e. reduce negative spillovers on competing land use activities (agriculture and forestry)
- Reduce the costs (investments and/or use of labor) in hunting and trapping activities

## **The Resource**

Moose populated large parts of Europe when the ice melted down, and it came to Scandinavia 8-9000 years ago. The Norwegian moose population was probably quite large as late as in the Middle Ages. The black death in the middle of the 14<sup>th</sup> century reduced the human population by 2/3, and this obviously reduced the pressure on the moose and other wild animals. Farms were abandoned and the number of domesticated animals grazing in the outfields decreased. Hence, the moose population probably increased in Norway over the next couple of centuries.

The moose was exterminated in the Middle Ages or later in countries like France, Germany, Belgium and Hungary (Brusewitz 1969). It survived in Scandinavia and the Baltic. It seems however certain that the moose population decreased dramatically also in Norway in the 16th and 17th century, and in the 18th century the moose had become a rear animal in most parts of Norway (Claussøn-Friis 1599, Norske Rigsregistranter 1532-1648, Norge i 1743).

In the middle of the 19th century, brown bears and wolves - the two important prey animals on moose - had also become rear in Norway. In the years before and after 1900 about 1000 moose were felled annually, while 100 years later about 30-40.000 moose are killed in hunting each year.

## Hunting and trapping

The most efficient hunting technology 1000 years ago was probably chasing the moose with dogs at crust snow, using skis and killing the moose with bow and arrow or spear. It seems that the cross-bow was introduced in Europe around 1000 (Britannica), and over the next centuries different improvements made this a more and more efficient technology for big game hunting (Britannica online 2006, Brusewitz 1969). We now that the steel bow was in common use for big game hunting in (at least the southern part of) Norway in the middle of the 16<sup>th</sup> century (Claussøn-Friis 1599).

The first portable fire arms was constructed in the middle of the fourteenth century, but it took some time before fire arm technology could compete with the use of older hunting weapons. The oldest guns were matchlock guns that had to be ignited by fire. It took a long time to load them and they were far from accurate. In the first part of the 16th century, the snaphance was invented. This gun ignited the priming powder by means of sparks produced by a flint, and it was safe for the hunter to wander around with his gun loaded and to open fire without any time consuming preparations (Brusewitz 1969). We know for sure that firearms were used in hunting in Norway in middle of the 16th century (Claussøn-Friis 1599).

It seems that the snaphance gun was widely distributed among Norwegian farmers around year 1600. When the Danish king organized a Norwegian army where all the farmers had to contribute with soldiers equipped with wheel-lock arms (fyrllaasbøsser), the farmers was granted permission to use Snaphane arms (snaplaasbøsser) instead (Rasch-Eng 2004, Norske rigsregistranter 1607). Tax protocols available for parts of the country show that firearms were common among farmers at least in remote areas where big game hunting was important for their livelihood. (Straffeskatten 1613).

The flintlock gun represented the next generation of weapons, and this type of guns could be used under unfavorable weather condition (rain), and towards the end the 17th century this technology had become the dominant firearm for hunting, perhaps also in Norway. Further improvements came with the percussion weapons in the 19th century, and in the middle of the century the self-sealing unit cartridge was invented, and hence the modern sporting gun had become a reality (Brusewitz 1969, Eknæs 1979).

In addition to hunting, moose was killed by using pitfalls and other kinds of traps. A pitfall-system could be intersecting a track route that the moose used to move between different habitats. It could for instance consist of 10-15 pitfalls, or more, with fences between each pit. Some of these systems were in use for 3000 years or more. We know that some pitfall systems were abandoned after the black death in the middle of the fourteenth century, but many Norwegian pitfall-systems were in use as late as the beginning of the 18th century, and we know for sure that this technology was in use as late as 1852 in Sweden (Barth 1986).

Some of these systems must have been very efficient. A study of five sub-systems in

Southern Norway that all in all consisted of 121 pitfalls combined with wooden fences which was 2,5-3,5 meters tall between each pit, show that this system could capture almost all the moose that passed through the area twice a year on the way between their winter- and summer habitats (Jacobsen & Andersen 1992).

The pitfall system and other trapping technologies was in use a couple of thousand years before firearms were introduced for moose hunting. The two technologies coexisted for at least a couple of hundred years and the law finally banned pitfall systems at the middle of 19th century.

Before the guns were introduced, both hunting and trapping were probably group activities. The firearm resulted in an individualization of big game hunting. One man with a gun could track down and kill a moose, red deer or reindeer without help from others (Rasch-Eng 2004).

### **Institutions aimed at reducing user conflicts. Existence of community norms?**

We have transcripts from the 13th century of two of the provincial laws (Gulating and Frostating ). There were different rules for hunting big game with dogs, without dogs and trapping. Hunting without dogs was free for anyone, hunting with dogs and trapping were an exclusive right for the property owner. The area where a farmer had exclusive rights consisted of some arable plots around the farm dwelling, forest sufficient for firewood and materials and some grazing land for farm animals. In most parts of the country, the privately hold area amounted to a minor part of the moose habitat. Vast areas were “commons” in the sense that nobody had exclusive rights to trap or hunt in the area.

With the existing weapon technology a hunter might have to chase an animal over long distances. One arrow was usually insufficient to kill an animal. The law gave the hunter the right to follow the animal wherever it ran, and if another interrupted and killed the animal, the animal still belonged to the person that started the hunt. When a successful result of the hunt depended on actions of two hunters, one chaser who had lost control and one hunter who finally killed the animal, the law specified how the animal should be divided between the two. The main purpose of these rules must have been to reduce user conflicts, i.e. forbid activities that interfered negatively with other economic activities (agriculture) and avoid fights and unnecessary resource use in hunting and trapping. It is hard to see that the intention with these rules was sustainable management of the moose resource.

A common Norwegian law substituted the provincial laws in 1274. This law also regulated trapping in the commons. Anyone was allowed to construct a trap in the commons. The law did, however, regulate how close to an existing trap a newcomer could construct his trap. If a person did not use his trap for a period of 10 years, anyone could take it in use and establish exclusive property rights over the trap. These rules were (most likely) introduced in order to secure the investments of the trap owners, to prevent

others from reducing the efficiency of an existing trap and hence reduce user conflicts in the commons.

The law also gave the farmer exclusive rights to use skis on moose hunting on their private land. These rules may have been copied from the provincial law for East Norway, but we cannot be sure since no transcript from this law exists any longer. Skiing on crust snow was a very efficient way of hunting, and we know that the moose (even nowadays) tend to seek down to populated areas in snowy winters in order to look for food. This rule was probably introduced to reduce user conflicts, but it may have helped to reduce the hunting pressure, since one farmer was given exclusive rights to fell the moose when the costs was lowest.

It was mainly in the wintertime the moose was seen around the settlements, and according to Claussøn-Friis (1599) the farmers had been able to enforce a sustainable management regime. Those who didn't have moose on their own property had to hunt for them in the mountains, and might have to follow a moose for up to 80 km before they succeeded in killing the animal with spear or steel cross bow.

### **The 16th century – exports, guns, poaching and tough regulations**

The state became after the Lutheran reformation a dominating landowner in Norway, and he ordered regular shipments of salted game meat, hides and antlers to his castle in Copenhagen. However, in the middle of the century he must have received reports from his civil servants in Norway about drastic decline in big game populations. Already in 1551 he banned all red deer hunting for three years in western region Bergenhus (NRR 1551). In 1555 he ordered his servants to spare the game on the islands to prevent a complete destruction of the noble red deer. He even gave orders to the nobility to stop hunting on all land, except on their own farms (1556). The first measure seems to have been to regulate hide trade by imposing a state monopoly. He may have given up this policy already in 1554, at least partly. We know that farmers from the Jämtland region, after petitions to the king, were allowed to take up again trade in moose hides this year (NRR 1554).

In 1562 the king imposed “continental” laws against poaching. Anyone caught in poaching should be blinded. The king also accused hanseatic merchants of having a vital role in the destruction of the game populations by both delivering weapons and exporting the hides.

New measures were taken in 1568 to regulate at least red deer hunting. These regulations of “deer” hunting may also have been aimed at moose- and reindeer hunting. The normal interpretation of “deer” (“diur”) in this type of documents is red deer, moose and reindeer. Nevertheless, these regulations are the first examples of introduction of bag limits combined with exclusive rights for the property owners for big game hunting in Norway. Farm owners were allowed to fell two ”deers” on their own property, and the hunting season was limited to 4 weeks in the fall (Østlie 1953, pg 13). Only 20% of the

farmers owned the land they farmed, and privatization of hunting rights had therefore little support even among the farmers (Thomle 1893).

Five years later the king also imposed seasonal restrictions on moose hunting. Moose should only be hunted from August 24th to November 11th (NRR 1573). It seems likely that the above referred bag limit for “deer” was aimed at red deer hunting only.

We also know that the king’s civil servants, at least in some districts, banned the use of moose traps. These restrictions were unpopular, but the farmers petitioned and the king lifted the restrictions. The traps should, however, only be used during the prescribed hunting season. (NRR 1574, NRR 1579 & NRR 1589).

In 1578 “poor men from the valley Hallingdal” were allowed to shoot one moose each in the wintertime (NRR 1578). The farmers also complained to the king that hunters with firearms had been sent to their communities. We don’t know much about these hunting missions. The king’s representatives could have organized them, but it is also possible that these hunts were organized or at least financed by hanseatic merchants in Bergen or other traders (Østlie 1953, p 14).

Claussøn-Friis (1599) also reports that poachers using firearms in the wintertime had dramatically reduced the moose population in southern part of Norway after 1570.

Hunting of moose, red deer as well as reindeer was often motivated by the value of the hide. According to correspondence between the king and his administration, it seems that the hunters did not even bother to keep the meat and left it in the forest. The king made it illegal for anyone to sell moose hides to “german merchants or other foreigners” (NRR 1604), and in 1634 all exports of fresh moose-hides were banned (NRR 1634).

Leather tanning had become widespread in Europe in the 15th century (Encyclopædia Britannica 2006a). It was a time consuming process to tan hides, and banning of exports of fresh hides was probably imposed in order to reduce poaching of moose. Olaus Magnus reports that thousands of moosehides were exported from Scandinavian countries in the 16th century (Brusewitz 1969). The moose had been exterminated in most countries on the continent, and this probably opened up a profitable Scandinavian hide trade for hanseatic traders and others.

Increased foreign demand made it possible to finance firearms. Firearms reduced the need for cooperation in hunting and made poaching profitable. It seems likely that the regulations in the 16<sup>th</sup> century mainly were imposed to try to prevent a complete destruction of Norwegian big game, and that the increased hunting pressure was demand driven. To which extent the local authorities enforced these regulations are, however, still an open question.



## The 17th century – new “enemies” of the moose enters the scene

In 1604 the king introduced a new general law (Christian IV's Norwegian Law). This was mainly a translation of the 1274-law from Old Norwegian to Danish. The property owners kept their old exclusive rights to hunt with dogs and trap on their private land. The 4-week hunting season, exclusive hunting rights for “deer” (“diur”) and 2-animal bag limit was now codified in the law. (Østlie 1953, p.17). Historians argue whether “deer” in this setting in addition to red deer also included moose and reindeer. There are several reasons why we believe the intention with these regulations was only meant to regulate the red deer hunting. First, there are no indications that the king still wanted to ban moose trapping, and the 4-week season would probably make trapping of seasonal migrating moose inefficient. We also know that the king in 1641 extended the hunting period for (adult) moose. Moose hunting should now be banned from Christmas to mid-summer (St.hans) (NRR 1641). In the next major law revision in 1687, the 4-week hunting season and 2-animal bag limit explicitly referred to “red deer” (“hiorter”) (Østlie 1953, p. 19).

Judgement protocols from one district in the south and one district in the east covering some years (mainly) in the first part of the 17<sup>th</sup> century, prove that at least some were caught and sentenced for breaking both hunting and trading regulations. It must have been difficult to enforce this type of regulations, and it is likely that both poaching, especially in the wintertime on crust snow, and illegal hide trade was not uncommon. These cases also prove that the increased hunting pressure had not led to a complete destruction of moose population.<sup>1</sup>

We also know that the farmers continued to send petitions to the king complaining about the hunting restrictions. If there had not been moose, there is no reason to believe that they had bothered complaining over the regulations. Farmers from some districts bordering Sweden (where the natural conditions for moose no doubt was good) complained in the 1660s that moose migrated over the border in the wintertime. Even if the hunting regulations on the Norwegian side were enforced, they could not prevent the moose population from being destroyed by the Swedes (Eriksen&Fladby 1990, pp 103f, 177, 180).

The farmers also accused Finnish-speaking immigrants practicing shifting cultivation in more or less remote forest areas in large parts of Eastern Norway, from ruining the moose population by intense winter hunting (1660-62 - Eriksen&Fladby 1990, pp 177, 180). This immigration took mainly place in the first part of the 16th century, and in 1686 it was registered 1225 finish settlers in forest areas of Eastern Norway. (Store Norske Leksikon). The moose population had been under heavy pressure long before the immigration took place, but it's likely that the Finnish settlements had a negative impact on the moose population. It was probably especially difficult to enforce the hunting

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<sup>1</sup> Shot moose on crust snow: Examples from Judgement register for Iveland in Nedenes/Robyggjelag (Agder county) in 1626/27 and Åseral in Nedenes/Robyggjelag 1616/17, Cases numbers 200 and 250 Judgement register (Tingbok) for Solør (Hedmark county) 1638-41. Case nr. 47 Solør 1651-53. Illegal trade of moose hides: Fine register (“Sakefall”) 1617/18, Birkenes in Nedenes/Robyggjelag and Case number 490 in Judgement register for Solør 1638-41.

regulations over people that often lived far away from existing farm settlements and were marginally integrated both economically and socially. We do not know whether the rural communities had strong norms against poaching, but even if such norms existed it is not likely that they influenced the behaviour of the Finnish settlers.

The state interventions in the 17<sup>th</sup> century did not reverse the negative trend in the moose population. A new “enemy” of the moose had entered the scene, and this time it was Finnish “subsistence” farmers. We have little information about the commercial hide trade in this period, but it is likely that the demand was still strong and created strong incentives to violate the rules banning winter hunting and hide trade.

### **The 18<sup>th</sup> century – bag limits and a failed privatization attempt**

The leading civil servants were concerned about the situation for the deer populations in Norway, and they perceived that the Norwegians did not comply with the royal decrees about hunting and trapping. They accused even some of their subordinates of breaking the seasonal hunting regulations. In 1730 the king therefore “privatized” moose and reindeer. Hunting should be an exclusive right for the owners. The majority of the farmers were tenants, and this group was excluded from hunting of all kind of deers on privately owned land if they did not get permission from the owner. The king also imposed a 2-animal baglimit and 4-weeks hunting season for those animals.

The penalty for violating the rules was hard. Those who were caught should pay 100 rigsdaler, which was equivalent with the value of 33 moose hides. He also introduced strong incentives for reporting illegal hunting. Half of the fine should be paid to the person that gave the authorities information that made it possible to sentence a person for violating the rules, and the rest of the money should be used for helping the poor people in the region. In addition, the lawbreakers should be sentenced to three years of penal servitude “in iron”.

Moreover, those who were travelling around in the country were banned from bringing a weapon that could be used for hunting. The sentence for violating this rule was supposed to be penal servitude for life.

The king also imposed a bounty system for wolves. Wolves were perceived as being the most harmful pest for both deers and livestock. (Royal Decree 1730, in Østlie 1953, p. 21f).

Three years later the king banned all hunting and trapping for moose for a period of three years. He also prohibited anyone except the nobility (and perhaps other property owners) from having hunting dogs (except those used for bear or bird hunting), and the bounty system was expanded to include bears. All export of moose hides were banned, and anyone shooting a moose should sell the hide to a local civil servant (Royal Decree 1733, in Østlie 1953, p. 25).

The reason for this privatization of property rights was no doubt mainly to try to save the resource from being exterminated. What do we know about the Norwegian moose population in the first part of the 18<sup>th</sup> century? In 1743 local civil servants had to answer a questionnaire from the king about wildlife and a number of other issues. We have studied the reports sent in from the southeastern region of Norway (Norge i 1743, in Røgeberg 2003). Moose now had become a rear animal in most parishes. No moose had been seen the last years in coastal districts, but it seems to have been quite viable populations in some “remote” forest districts, including many of the districts where the Finns had settled about 100 years earlier. It seems fair to conclude that the most viable populations must have been in some of the districts bordering Sweden. We know, however, that the hunting regulations were unpopular in rural communities. This indicates that it was probably still possible to track down and fell a moose in many forest districts.

The king lifted the 1730 and 1733-regulations already in 1744 (Royal Decree 1744, in Østlie 1953, p. 26f). Moose hunting without dogs was once again free for anyone even on privately owned land, and in the commons the only remaining regulation was the seasonal restrictions on hunting. We do not know the exact reason for this policy change. They did not have popular support. Hence, it was probably difficult to enforce the regulations. The leading civil servants may have been convinced that the costs of regulations were too high compared to the gain. Some of the local civil servants had actually argued in the 1743-reports that the hunting and weapon-restrictions had been counterproductive since they resulted in larger populations of pest animals.

We have no indication that this policy shift was of any help for the moose population. Kraft (1784) reported 40 years later from the forest areas at the Swedish border (where hunting used to be important) that there were almost no moose left even in these districts, because of extensive poaching in the wintertime. Moose hunting was not an important source of income for any group, perhaps with an exception for parts of the Finnish community, according to Kraft.

A few years later moose hunting once again was banned for 3 years and later for 6 years. In years when hunting was allowed anyone who hunted moose was restricted to kill one each and the hunting season should be from June to November. Those who were caught violating these rules should be given a 20 rigsdaler fine, which should be shared by the informer (50%), the property owner (25%) and the poor in the parish (25%). ((Royal Decrees of 1760, 1784 and 1787 referred to in Østlie 1953, p. 31). The king had given up to exclude non-owners from hunting, but tried instead to impose the same game limit for all households, landowners, tenants and workers.

### **The 19<sup>th</sup> century – non-owners excluded from moose hunting**

In 1814 Norway got a constitution and a parliament. Two thirds of the members of parliament should be elected from rural areas, where the right to vote mainly was reserved for male farmers (that either owned or rented a farm and hence paid land tax).

In 1818 the parliament passed a new law giving the farmers exclusive hunting rights on their land. Hence, the right to hunt moose was reserved for those who had the right to vote in the rural areas. (Jagtloven 1818, in Østlie 1953).

In many regions a majority of the rural households lost their old hunting rights, at least on privately owned land. We know that there were twice as many rural households as registered farms in 1880 (SSB 1881), and some decades earlier the proportion of non-farm households in rural communities was even larger. The new hunting act also imposed a one moose bag limit per farm (regardless of the size of the farm or household).

As in the old medieval laws, the hunter was still allowed to follow after and fell a moose on land owned by others if the moose had been raised on his land. It was of course difficult to prove that a farmer had not started the hunt on land where he had property rights. The main effect of the law must have been to exclude a majority of households from participating in moose hunting.

Unless in situations with early snowfall, it must have been very difficult for a property owner suspecting that another farmer had been hunting illegally on his property, to prove that the moose also had been raised on his property. If this right to follow and fell a moose on others land had removed from the law, the probability of felling a moose would have fallen dramatically for a large part of the holders of hunting rights. Hence, the farmer-dominated parliament would not have passed a law where the old medieval right to follow had been taken away. It is perhaps no big surprise that (according to the available parliament documents from 1808) nobody even proposed to delete this right from the law. Almost 100 years later, the government tried to remove this right in the Hunting act of 1899. This would de facto have been the same as to take away the hunting rights for moose from owners of smaller properties, and a majority in the parliament voted down this proposition.

This new hunting law gave (tax paying) farmers, and not only the landowners, exclusive hunting rights (for moose). It was no strong opposition against this privatization in the parliament. Since the bag-limit for those keeping their rights was reduced from two to one moose per year, the parliament must have perceived the situation for the moose to be critical. As a matter of fact, the parliament even banned all hunting for 6 years.

A majority in the parliament voted down a paragraph that would have given the same type of economic incentives to report poaching as those introduced in 1730. Those who were caught poaching had to pay a heavy fine (of 100 speciedaler), but the money should be used for financing schools and aid to the poor. However, if it was possible to prove where the illegal hunt had started, the landowner (or leaseholder) should be compensated for the loss of a moose.

If it was not possible to prove where the illegal hunting had started the compensation should go to schools and rural poor. (Jagtloven 1818 in Østlie 1951 and Storthingsforhandling 1818).

Trapping for moose and red deer was finally banned in the 1863, and the authorities could now give owners of large properties licence to hunt more than one moose. Furthermore, the state should regulate moose hunting (as well as red deer and beaver hunting) in the so-called state owned and village owned commons, which covered large forest and mountain areas in many in moose districts (Jagtloven 1863).

About 1000 moose was felled annually in the period 1891-1925 (SSB 1978). The hunting rights had been privatized, and owners could no longer blame wolves for ruining the moose population. That problem had more or less been solved in the middle of the 19th century (Søbye 2004).

Perhaps about 1/3 of Norway's 138,000 farm households (in 1880) were located in areas where there might be a (often small) chance to shoot a moose (SSB 1881). Hence, the average probability for a household in "moose districts" to fell a moose in a year could be 2-3 %.

There is not much available information about illegal hunting in this period, but it might have been a big problem. A large part of the rural poor spent a lot of time working in forest or mountain areas. They, if anyone, had a fair chance of meeting a moose. The stake was high and the risk for being caught poaching was usually small. Even if a landowner happened to catch someone in poaching, it is not obvious that he reported the "crime". Moose was a common pool resource, and the perceived loss for a single landowner of a reduction in the moose population by one moose was probably small. Many landowners may have chosen not to report, since the private loss of this reduction was often small compared to the perceived "costs" of reporting a neighbour or worker for poaching.

The privatization had not solved the common pool problem. Too many stakeholders were allowed to hunt compared to the size of the moose population, and the incentives to enforce their property rights by devoting time for surveillance and report poaching, were small since a majority of the farmers seldom were able to fell a moose.

### **The 20<sup>th</sup> century – exclusive ownership to portions of local felling quotas**

The moose population remained low and the annual number of felled moose was between 1000 and 2000 until 1940. The moose population increased somewhat in the 1930s and 1940s, probably due to changes in forestry and reduced use of forests and mountains for animal husbandry (grazing and forage harvesting). Now almost 40,000 moose are felled annually (SSB 2006). Necessary but not sufficient conditions for the dramatic increase in the moose population, have been the above-mentioned changes in agriculture and forestry. We would not have seen this development if the parliament had not passed an act in 1951 completing the privatization process of the moose resource. The state has now for 50 years regulated the annual harvest of moose, and distributed the felling rights to the landowners according to how many hectares of moose habitat each own. Most properties are too small to be eligible for a hunting permit. As a rule, landowners

therefore establish moose-management associations with their neighbours and they receive felling permits from the state and jointly decide how to organize the hunt and how to distribute the income or meat from the hunting.

The 1951-law forced most landowners to cooperate with their neighbours. Poaching does not seem to be a problem anymore, perhaps partly due to local community norms that have developed over the years. Strong institutions on both local and state levels, as well as cross-scale institutional linkages between the two levels, has resulted in a 50 year sustainable growth period of the Norwegian moose population.

## CONCLUSION

The management regime that was established in 1951 has been a success-story. In this paper, I have mainly focused on previous efforts to regulate the harvest of this common pool resource.

It is reasonable to believe that the moose resource before the 16<sup>th</sup> century, at least in some areas, have been managed by some local institutions. Some of the trapping systems would have ruined local moose populations if the trappers had not voluntarily restrained from maximizing their catch every year.

The resource was set under pressure due to increased demand in the 16th century. At the same time hunting technology had improved. Hunting with firearms became an alternative to older hunting and trapping technologies, and the new technology could be efficient even in individualized hunting while hunting and trapping with older technology must have been much more efficient if many individuals cooperated. The probability of a successful hunt improved probably substantially with the firearms, individualized hunting became an alternative to cooperative trapping.

The state responded in order to prevent total destruction of the resource. Seasonal restrictions were implemented mainly in order to get rid of hunting on crust snow, which must have been the most efficient form of hunting. These restrictions were not sufficient to prevent the moose population from decreasing, probably at a rapid rate.

The king then tried to ban all moose hunting some years, and in the 1800<sup>th</sup> century he also tried to privatize moose hunting by giving the property owners exclusive hunting rights on their land and imposed in addition a two moose bag limit per property owner. This policy was given up after short time, probably because of protests from the rural population. It seems fair to conclude that the privatization attempt had a marginal impact on the regulated resource. The state must have been too weak to enforce these rules, and too few in the rural communities had incentives to help the state enforcing the restrictions. It is also questionable whether the rules could have helped much even if they had been enforced. In most areas there were probably too many property owners compared to the carrying capacity of the resource.

At the second part of the century the state tried to enforce a one moose baglimit for all households, and since this rule was even more liberal it could not have been of great help for the moose population, even if the state had been able to enforce the rules.

Four years after the new democratic constitution was established in 1814, moose hunting was again de jure privatized. The new law restricted the number of stakeholders in the “commons” by excluding non-farmers from hunting, and each farm household could only shoot one moose each. But since the lawmakers did not remove the medieval right to fell a moose anywhere as long as it was raised on their own land, the common pool resource was in principle a commons where there were too many rightholders being entitled to fell one moose each year.

We have no reason to believe that farmers on the local level even tried to establish local institutions restricting the annual harvest of moose in the 17<sup>th</sup>, 18<sup>th</sup> or 19<sup>th</sup> century. Why? First and probably most important, hunting technology did not require cooperation. Hunting could be operated on an individual basis. Second, the moose migrate over vast territories, often crossing many property borders. An efficient local management regime would have required knowledge of the complete habitat of the moose, and it is not likely that this information was available or easily accessible with the existing information gathering technology. If farmers in one community had agreed to follow a common management plan, this would have increased the probability of shooting a moose in a neighbouring area. Those stakeholders would probably have taken the advantage by increasing their harvesting of the common pool resource. An efficient moose management regime in a situation where hunting was individualized would have required information and voluntary commitment from a big number of farmers.

As long as the state was too weak to enforce detailed regulations on the local level, privatization was the only available alternative. But the private property rights did not lead to sustainable growth of the moose population until 1951-law that forced the farmers to cooperate. The main lesson we can learn from 500 years of Norwegian moose history is that a sustainable management regime of this type of a common pool resource requires strong institutions on both the central and the local level.

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