LAW AND RESOURCE USAGE SYSTEMS[1]

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Introduction

«Rule-of-law» is a basic instrument for societies in overcoming the problems of collective action. The «Hardinian Tragedy of the Commons» in resource exploitation is basically a problem of collective action. Only in situations with no law, with «res nullius», as e.g. fish in international seas is considered to be, have situations approximating the «tragedy of the commons» been observed. A situation with no law can occur because there was none before as for the ocean fisheries, or because of breakdown of the social order. But everywhere, also on the high seas, one can observe a movement to create law to counter the problems created by the divergence of individual and collective reason.

The system of law developed in the West since the middle ages has, according to Berman (1983), three basic sources: the will of the ruling class (the lawmaker), the moral standards as understood by human reason, and the historically rooted values and norms of the community[2]. For the study of the relations between law and the statuses of renewable resources (biodiversity, biomass, productivity, recreational value, etc.) this means that we need to conceptualize three broad phenomena: the power relations of the political system, the ideas of justice of the people affected by the legal regulations, and the historical trajectories of the political and social systems (including their institutions) in relation to the resources. These systems interact among themselves and with the ecosystem. As systems they affect the ecosystem by resource extraction and other uses, and actors within and on behalf of the systems react to salient characteristics of the resources.

In the studies presented above, we have primarily attempted to describe the legal systems regulating resource usage in northern Fenno-Scandia and the Barents Sea. «Ius in re» is among the oldest and most stable parts of legal systems. The principles lied down there have affected all later legislation, also modern resource law. To really understand the legal systems regulating resource usage as human creations and forces of development, we need to put them in the broad historical and societal perspective of Berman. This has not

[1] Thanks to Audun Sandberg, Torgeir Austenå and Hans Sevatdal for constructive comments. I hope they will forgive me if I have added new errors or questionable reasoning to what they corrected.

[2] «Social theory must therefore accept a broader concept of law than that which Marx and Weber adopted. Law is, as they believed, an instrument of domination, a means of effectuating the will of the lawmaker. But this theory of law, usually identified with the positivist school of jurisprudence, tells only part of the story. Law is also an expression of moral standards as understood by human reason. This view of law, which is associated with natural-law theory, is also partly true. Finally, law is an outgrowth of custom, a product of the historically rooted values and norms of the community. This third view , identified with the historical school of legal philosophy, can also claim - like each of the other two schools - one third of the truth.» (Berman 1983:556)

been the objective for the present studies. But in thinking further on the problems of resource governance, we need to keep it in mind.

To pursue a discussion of the critical link from form and substance of legal institutions to the various relevant statuses of resources and resource systems, we must take for granted the embeddedness of resource law in this broad tradition of legal development.

Ways of describing resource usage systems

A resource usage system can, like any system, be described as embedded in an environment and as consisting of sub-systems or member units. The environment sets a context and the subsystems give conditions for the characteristics of the system.

The studies presented in this book have described resource usage both by contextual and conditional characteristics. But the main perspective has been the contextual: the international negotiations shaping the fisheries regimes, the international and national legislation shaping the rights and duties of the reindeer herders. In the long-term project of understanding how resource governance works, they are a first step. The next step might be to investigate closer both theoretically and empirically the various types of data for each level.

A resource usage system can also be conceptualized either as an actor system or as a non-actor system. The international system of states is a non-actor system. A non-actor system is an arena where several actors engage in struggles or co-operative ventures concerning the values perceived as resting in the various resources of the eco-system. But no single actor can be said to be a «system-responsible» actor, representing the various constituent actors as a collective. In many ways, the causal dynamics of non-actor systems can be compared to the dynamics of eco-systems[3], and in most respects, they will be radically different from those of actor systems.

Considered as an actor system a resource usage system must in some sense have incorporated itself. One of the actors with interests in the eco-system, or some new body, has taken on the task of representing the collective interests of the appropriators in governing the usage of various resources of the eco-system. The creation of effective legal regimes is tied to the development of actor systems. To be effective a «system responsible» actor must be acknowledged both by a majority of the appropriators and in some way by the external community. The problems of efficiency increase as the scale and scope of the system increase.

In modern states where rule-of-law governs resource management, the external acknowledgment of the legal powers of resource appropriators is done in acts defining the system of governance for the various types of resources. The

[3] The origin of social ecological studies was analogies to ecological processes in biology as understood in the 1920´s («the Chicago School»).

success of these actor systems in their tasks depends on the one hand on the political and economic environment as well as the local struggles among the appropriators, and, on the other hand, on the qualities of the eco-system and its responses to usage.

In describing the resource usage system, we should keep in mind the various ways social and natural contexts and internal conditions shape activities and outcomes for the various units.

To explore the possibilities we shall look closer at property rights to resources in Norwegian resource usage systems.

State property or common property?

The broad distinctions of common property, state property, and private property have been seen to affect, at least to some extent, the way resources have been used. But in looking at major renewable resources like salt water fish (except anadrome species), reindeer pasture or forests in state or bygd[4] commons, the correlation between «type of property» and sustainability of use is far from high. A study of the law of salt-water fisheries compared to the legislation on forest commons or reindeer herding in Norway, show that fish, pastures or forests are not necessarily just one type of property, but a mixture (see appendix tables for details). The state is a central actor in all three examples. The fish is in a state of transition from being an open access resource to something, which today closely resembles state property. The forests in state commons is partly state property, partly commons, while forests in bygd commons are partly private property, partly commons. The resources needed for reindeer herding is not state property, not open access, not private property and not commons (as defined by Norwegian law), but have aspects of all. Most observers will concur that the sustainability of the usage of forests seems better than that of the reindeer herding which again would seem to fare better than the fish stocks. But if, and to what extent, this can be attributed to differences in legal institutions is still a matter of belief.

[4] «Bygd» is a Norwegian word which in the context of commons doesn't translate well to English. Sevatdal (1985) translates «bygd» commons as «parish common lands». But it has in connection with commons nothing to do with parish as usually understood. The concept «bygd» has been used in legal texts at least since Magnus Lagabøter's (1238-80) «Landslov» («law of the realm» from 1274 (see also page 61-66 in Solnørdal (1958)). The original meaning of «bygd» is something like «local community». And in most contexts village or local community will be the correct translation. Current usage of the word would suggest some kind of local community independent of more formally defined units such as school districts, parishes, or municipalities. Earlier in our history, bygd would be used for the smallest administrative unit, the local law district, and later the parish. In Sweden, the word would mean the same. However, in conjunction with commons this translation will not give the right associations. Because the areas burdened with rights of common throughout our history usually were tied to users from some specific local community (the bygd), the bygd became tied to a certain area recognized as «their» commons. During the past 800 years the original usage of the word «bygd» in the legal language has turned around, and today the bygd, in relation to commons, is defined as comprising of those farm enterprises which have rights of common in the area recognized in law as a «commons» (both state and bygd commons). This way of delimiting the units with rights of common has been in the law since 1687. Since translation of «bygd» to English in this case is seen as inadequate, the word "bygd" will be used.

State property is in general defined as being «owned by the citizens of a political unit who assign rule making authority to a public agency» (Hanna, Folke, and Mäler 1995 p.18).

This definition is the basis for saying that salt-water fish closely resembles state property. The Royal Ministry of Fisheries is mandated by the parliament as a rule making body responsible for the maintenance of the resource. Anybody owning an appropriately registered vessel can fish, provided the rules are followed. Yet the legal text does not either explicitly or implicitly treat the state as an «owner» in the ordinary meaning. One reason could be that not too long ago, say prior to 1917, salt water fisheries were more like an open access resource also within Norwegian waters, even if parts of it, such as the Lofoten fisheries, have state regulations (codification of customary law) going back to medieval times, and some of the coastal fishing was managed as local commons until late last century. But the increasing number of regulations is rapidly changing the nature of fishing and the direction seems to be state property.

The property rights regime called commons is usually defined as "owned by an identified group of people, which has the right to exclude non-owners and the duty to maintain the property through constraints placed on use"(Hanna, Folke, and Mäler 1995, p.18) This definition lumps all kinds of co-ownership together. Alone it is insufficient to differentiate among various resource usage systems.

The same authors further note that "Such regimes are often implemented for common pool resources, those which are difficult to divide or bound." (Hanna, Folke, and Mäler 1995, p.18). Applying this to forests we note that forests are not difficult to divide or bound in general, neither are the most important resources within forests to which rights of common[5] are defined: timber/ fuel wood, and pasture. Salt-water fish, however, is difficult to bound (but not to divide). But salt-water fish is not managed as commons. Thus the reasons for the long history of common property in forest resources and their diversity can hardly be found in technical resource characteristics. The specific historical instances of "commons" are more various than either the definition allows or the analytical distinctions of various user situations presume.

A first conclusion must be that the broad, established categories of property: common, state and private property, do not really help in closer investigations of the interrelations of law and resource systems. If we want to know exactly which aspects of the law will further a sustainable usage of the resources, more details on the legal regulations as well as on the biological statuses of the various resources in their ecosystems are needed. But which legal details do we need? What are the relevant biological characteristics of a resource system? How can we go about determining which legal institution makes what difference for the various statuses of a renewable resource?

[5] For explanations of some technical terms see Berge and Sevatdal page 195 in volume 2

Table 1 Variables used by the legal system in definitions of property rights regimes

VARIABLE	CATEGORIES	RELEVANT RESOURCE USAGE SYSTEM
Type of management unit responsible for resource system	1) actor system 2) state bureaucracy 3) municipality 4) co-managed	1) bygd commons, forest in state commons 2) reindeer herding, salt water fisheries 3) state commons except forest 4) forests in state commons, 14 special districts of salt water fisheries
Appropriator units	1) legal person (citizen, firm) 2) cadastral unit (farm, fishing vessel, herding unit) 3) registered person (individual according to registered residence)	1) state commons, salt water fisheries 2) bygd/ state commons, salt water fisheries, reindeer herding 3) bygd/ state commons, reindeer herding
Powers of local choice	1) yes 2) no	1) bygd commons, state commons, 1pecial districts of salt water fisheries 2) reindeer herding, salt water fisheries
Professional administration	1) required of actor 2) supplied by state bureaucracy 3) both 1) and 2)	1) bygd commons, 2) reindeer herding, salt water fisheries 3) state commons
Basic resource classes	1) ground and remainder 2) pasture, timber, fuel wood, 3) hunting of small game (except beaver) 4) hunting of big game 5) anadrome species 6) fresh water fish except anadrome species 7) salt water fish except anadrome species	1) bygd/ state commons 2) bygd/ state commons, reindeer herding 3) bygd/ state commons, reindeer herding 4) bygd/ state commons 5) bygd commons 6) bygd/ state commons 7) salt water fisheries
Rights of common	1) rights of common 2) no rights of common	1) bygd/ state commons, reindeer herding 2) salt water fisheries
Economic activity	1) collective required 2) individual or collective by choice	1) bygd commons, forest in state commons 2) reindeer herding, salt water fisheries
Form of ownership of resource	1) fee simple 2) in common, fractional interest 3) joint, equal interest	Varies by resource class and resource usage system
Alienability	1) inalienable 2) alienable	Resources are in general inalienable from appropriator units, but appropriator units are alienable
Quantity regulation	Varies by resource class and resource usage system	
Technology for harvesting	Varies by resource class and resource usage system	

What are the relevant variables differentiating resource usage systems?
A preliminary investigation of the kind of variation one can find in legal instruments will be helpful. A closer study of the Norwegian acts for salt water fisheries (except anadromous species), reindeer herding, and bygd and state commons in forest areas looking for the kind of distinctions the lawmakers have found necessary to introduce, might alert us to important variables. Variables listed in table 1 are used fairly often (See also appendix tables).

The survey reveals several interesting aspects, and not all of them will be apparent from the tables.

- General rules for resource management seems to be absent from the legal framework. Some of the recent legislation such as the Act on nature protection from 1970 or the Act on anadrome species and fresh water fish from 1992 contains statements of goals to manage resource to preserve diversity and productivity of nature. But the rules of how to do this are rather specific and their relation to the goal far from obvious. In regulating the use of various resources, the character of the various resources and the technology of utilizing them combine to present unique problems for the regulator. The result is resource specific regimes of regulation. The level of resource specific details varies enormously. Distinctions used in acts for resource usage systems on land are less detailed than on sea. On land such distinctions as that between timber and fuel wood, or between small game except beaver and big game are used. The act on salt-water fisheries contains much more detail. Here we find regulations for single species (e.g. seaweed, shellfish, whale, seal, lobster, crab, crayfish, shrimp, herring, cod, haddock, halibut, mackerel, angler, coalfish, capelin, ling, rosefish, and sea scorpion). One reason for the difference between sea and land might be the growth in public regulations of nature and land usage in other parts of the law (e.g. Act on Nature Protection of 19th June 1970) not applicable at sea.
- The act on reindeer herding states explicitly that the goal is to secure the well-being of reindeer herders and the status of reindeer herding as an important aspect of Saami culture. The acts on salt-water fisheries and on forests commons do not say anything explicitly about the goal of the lawmaker. But implicitly the purpose obviously is to secure sustainable conditions for an industry. Resources are regulated to create the best possible returns to the industry with one major limitation. Fair access to a resource is more important than maximizing returns for the industry. The major conflict lines in the salt-water fisheries are obviously about access.

It seems fair to say the legislation tries to pursue the following, not always or completely compatible, goals

- equity
- economic performance
- ecological maintenance

and usually also in this order in case of conflict.

The lawmaker will always have goals for acts enacted. Judging from the first known written law (from the 12th century), the major concern for rules about resources was equity and the procedural implications of that. Later on, from about the 18th century, concern about limiting the removal of timber was read into the law. The 19th century brought concern about economic performance. In addition, in our own century a concern about the sustainability of wild game populations was introduced.

Legal history of resource usage

The history of law is sometimes instructive. For forest commons, the history goes back at least to the 11th century. The reindeer herding legislation is younger, but still the «The Lapp Codicill» of 1751, regulating the movements of Saami between Norway and Sweden, is part of the legal framework. The legislation on salt-water fisheries can in principle trace its roots as far back as the forest commons. But there is a disruption of legal traditions starting early last century. Ideologically motivated liberalism enforced at least a partial break with the «local commons» management, which until then had had increasing recognition and protection[6]. Later, in the 1890'ies, some aspects of local commons management were reintroduced in a few special districts with local powers for regulation of technology and coordination of appropriation (on the Lofoten district, see Jentoft 1989). The break with tradition was probably part of a general trend. In 1848, the Norwegian parliament allowed selling out the forest commons as a response to problems of sustainable usage. But in forestry the reversal came already in 1863 (more on this below). The development of technology in the coastal fishery was significant but not large between 1830 and 1890. From then it was picking up speed. Coordination of activities became necessary. These developments made some involvement from the fishers themselves necessary and facilitated the reintroduction of local management powers. But it never developed further, in our century the rapidly growing faith in the ability of the state to regulate the activities of its citizens have been the foundation of the legislation on salt water fisheries (on the political status of co-management see Baland and Platteau 1996, ch 13).

The historical legacy of resource usage systems in Norway is definitely one of co-management. Powers have been divided between the State (the King at the start) and the local population (the «commoners»). Today this is with us in strong form in the bygd and state commons, but also, even if weaker, in the boards of the reindeer herding areas. In its weakest form, we see it in the 14 special districts in the salt-water fisheries. Its general form is differentiation of rights and duties by area. Residence of persons, or location of appropriator (farms, herding units or fishing vessels), are used to distinguish between those who legitimately can appropriate from a resource and those who cannot.

[6] See Robberstad 1978. In Finnmark the break came in the Act of 13. Sep 1830 «On Fisheries in Finnmark», see Pedersen 1994.

On the History of Forest Commons in Norway

The legal conception of common property as developed in Norwegian Law institutionalize the collective experience and historical adaptations of people depending on these resources, tempered by the perceptions of the legal profession and the lawmaker. Its basic form is medieval, and most of the variation introduced during the last 3-400 years predates the modern nation state. To a very large degree new aspects were introduced by case law as need for adaptations to new circumstances arose.

Two significant processes have shaped the development: the sale of commons by the King and the measures taken against processes of unsustainable harvesting (Solnørdal 1958:43-46).

During the 1720-30, we find concern about the conditions of the forests[7]. A paragraph limiting the right of common to timber and fuel wood to the needs of the farm had been inserted in the law of commons in Christian V's Norwegian Law of 1687. The reason then was probably more to extend the rights of the King to the resources in "his" commons, and also to further the interests of the sawmills, rather than to protect forests against unsustainable usage. But in the 18th century it came to be seen as a tool for the regeneration of the forests and enforced more strictly[8]. It was later extended to apply to pasture. It is interesting to note that the principle of limiting some rights to the "needs" of the farm is older in the relation between a landlord and his tenant[9].

The most important external impact for the development of Norwegian forest commons is simply that the King began to sell off "his commons" in the 17th century[10]. The King could sell only what was his: the ground and the remainder. He could not sell the rights of common. The rights of common remained (in theory) undisturbed. The repercussions of these sales are felt even today. The case of Skjerstad was judged in the special court on the mountains in Nordland and Troms[11] 26 April 1990, and in the High Court of Norway 19 November 1991 (Norsk Retstidende Vol 156, 1991 part II:1311-1334). The conclusion, crudely put, is that while the state lands of Nordland and Troms

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[7] See Acts of 20.August 1726, 7 October 1728, 8 December 1733, and 8 March 1740.

[8] This coincided with the first two efforts to establish as professional forest administration, the older «generalforstamt» from 1739-1746, and the younger «generalforstamt» from 1760-1771. These were modeled on German experiences. See Opsal 1956, 1957, 1958. They failed to establish themselves mostly as a result of resistance from the forest owners (Vevstad 1992:12).

[9] In the Law of Frostating (from about 1160), the tenant is allowed to cut down threes for one ship of 12 oars, but not larger without permission from the landlord (Frostatingslova XIII.4, p.190 in Hagland and Sandnes 1994). In Magnus Lagabøter's Law of the land (from 1274) the principle is repeated (VII.52, p.148 in Taranger 1915).

[10] The relationship between what we would call the King's private property and the extent of his control over the property he managed as the sovereign is an interesting topic. The expression «the King's commons» should not be taken to mean anything like his private property. In Denmark-Norway, the distinction between the private property of the king and the property of the sovereign was kept clear. It is also clear that the sovereign throughout the centuries after 1687 rather consistently worked to increase the share of profit falling to the state to the detriment of the commoners. It also seems clear that the Swedish king had more success in this than the Danish-Norwegian king had during the important 18th and 19th centuries.

[11] The King sold his lands in Nordland and Troms to Joachim Irgens in 1666 and bought them back in 1682. This sale was in the 19th century used as argument for the stipulation that the lands were not state commons.

must be considered to be state commons, the injustices done during the preceding 200 years by preventing the local population from enjoying their former rights of common, has removed all rights of common except the rights of pasture.

Mostly as a consequence of the King's sale of "his commons", new measures against the tragedy of the commons had to be introduced in the act on forestry from 1863. Both in the early 18th century and later in the middle of the 19th, the inadequate regulation of access[12] to timber in the commons and good timber markets evidently led to overuse. Limiting the right to take timber to the needs of the farm made it illegal for the ordinary farmer to take timber for sale. After the King's sale of "his" commons, the new owners did not have to observe such rules for themselves and many did not have the resources to enforce them for the commoners (where rights of common to timber existed). A situation resembling the tragedy of the commons developed both in the commons and in privately owned forests. The first reaction was to allow privatization of state commons (Act of 5. August 1848)[13]. This was ended by the 1863 law on forestry. This law introduced public control of forestry activities for all forest land, both private and commons.

In many cases, those with rights of common (or a subgroup of them) came to be owners of the ground (and then the remainder, after the rights of common were accounted for). This seems to have come about in three ways:
1) through the recognition that long use of a part of the King's commons in other ways than what was implied by the rights of common, defined property rights to the ground for the users, or
2) through buying of a part of the King's commons, or
3) through buying the ground from the investors the King first sold it to.

If those buying the ground represented more than 50% of those with rights of common the area burdened with rights of common have come to be known as "bygd commons". If they were fewer than 50% they were called "private commons". These "new" types of commons were first defined in acts from 1857 and 1863[14].
The denotation "bygd commons", however, is older. Tank (1912) traces the expression to the middle of the 18th century. The rest of the King's commons are today known as state commons.

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[12] New technology and/ or new markets can make established regulations ineffective.

[13] The act annulled §38 in the act of 20. August 1821 which said " The forest commons owned by the state shall until further notice not be subject to sale or alienation". Selling the commons had obviously been debated. But the «ideologically motivated liberalism» seems to have had more problems changing the legislation on forests than on fisheries.

[14] The act from 1857 on forest commons introduced a management system for forest commons other than state commons. In an act from 22. June 1863 on forestry, private commons were required to go through a land consolidation process dividing the forest area between the owners of the ground and the commoners. If an area was left with rights of common, it became a bygd commons. All private commons where the rights of common included rights to timber are believed to have been dissolved in this way. However, there exists private commons with rights of common to pasture, fishing and hunting of small game. One such, Meråker almenning, is discussed in NOU 1985:32,pp.36-38. Presumably, there are more of them. How many is not known and the acts enacted since 1863 have to an increasing degree disregarded their existence, since their significance was declining.

The forest commons of Norway have existed since pre-medieval times in one form or another. They have changed from being the open access "wastelands" around the local communities in pre-medieval time by way of being the King's commons open to be used by the people of the local communities, later to become the more or less exclusive property of the sovereign. The current system grew out of the struggle for control of the various forest resources among the King, the growing group of capitalists looking for investment and profit, and the local farmers. The shifting fortunes of monarchy, the industrialization of the economy, and democratization of the polity all affected the system of forest commons that emerged. What can we learn today from their form and substance?

Describing variations in the form of commons

Bygd commons and private commons are distinguished by how ownership to the ground is distributed among those with rights of common.

In state commons, the company Statskog SF holds title to ground and remainder. This company was established rather recently (in 1993, by transforming the Directorate of state forests) and the political and cultural significance of the relationship between it and the state is not quite clear. Ideally, one would want the company to hold the ground and remainder of the commons in trust for the state.

The rules governing the rights of common in state commons are rather similar to those for bygd commons for timber and fuel wood, somewhat different for pasture, fishing and hunting, and depart significantly for the structure of governance. The use of timber and fuel wood in state commons is regulated in a separate act (Act of 19 June 1992 no 60). If rights of common to timber and fuel wood exist in a state commons, the state government can decide that it shall be managed according to the law on bygd commons for timber and fuel wood. The rest of the state commons are regulated by the act on mountains (Act of 6 June 1975 no 31).

Today we can describe a bygd commons as a forest where the rights to the ground (and the remainder[15]) is inalienably[16] "quasi-owned" in common by a majority of the farms with rights of common. Here several problems appear: Which are the farms with rights of common? What are the rights of common? Which profits can those with rights of common take away? Again we have to turn to the law to see how the profits are defined and which characteristics they have been given.

[15]The most important of the remainder is today hydroelectric power, leasing of ground for cabins, and - perhaps - landscape and nature conservation.

[16]But of course there are some exceptions such as sale for conversion to agricultural land and leasing of building lots.

Rights of common is defined as rights to remove something of value from another owner's property. These «profits-à-prendre» have above been classified into 4 types.

TYPES OF PROFITS

Rights vest		
	inalienable[17]	**alienable**
in land	appendant	appurtenant
in persons	all men's rights	in gross

Norwegian law on forest commons and reindeer herding distinguish 4 groups of resources as profits. These are 1) timber and fuel wood 2) pasture for farms[18], 3) fishing and hunting, and 4) pasture, timber, fuel wood, fishing and hunting for reindeer herding.

Two of the rights of common, the rights of pasture and wood, are held inalienably[19] in joint quasi-ownership (appendant) by all farms located in the "bygd". The right of pasture includes rights to put up necessary houses for utilizing the pasture in the traditional system of transhumance. For both the right to pasture and to wood, the need of the farm will define the extent of usage. If sustainable usage of the commons is unable to supply all the farms according to their needs, there will be a proportional reduction in what they are entitled to harvest.

The rights of common to hunt and fish are held inalienably by persons in joint ownership. This means that the right is attached to the person owning the farm unit and his immediate family and household and will follow this person if e.g. the farm is leased to some tenant. There are different rules regulating hunting of big game and small game as well as access to fishing.

In the Norwegian bygd commons the right to fishing and hunting of small game can be described as an inalienable personal profit for all persons who are members of the households on the farms "quasi-owning" rights of common to hunt (a kind of local all men's right). In the state commons all persons who for the past year have been living permanently in Norway and who continue to do so hold inalienably the right to fish (except fishing of anadrome species (salmon, trout) and hunting of small game without dog[20]. The clause "without dog" is interesting as an example of a limitation on harvesting technology. The

[17] In Roman law usufruct was considered inseparably attached to the person enjoying it (Lawson and Rudden 1982, p.163). The same kind of property rights relation is today created by inalienable life interests as in protective trusts (England) or spendthrift trusts (USA) (Lawson and Rudden 1982 p.164).

[18] In state commons farms with rights of common to pasture has the right to buy land suitable for tillage.

[19] Here there are no exceptions

[20] Rules for hunting of small game with dog can be decided upon by the local government of the state commons, the municipal "mountain council", and can thus vary from one commons to the other. The mountain council can also extend the right to fish to persons without permanent residence in Norway. See Act of 6 June 1976.

municipal mountain councils managing the use of the state commons can allow hunting with dogs for all or reserve this for people from the bygd[21].

The right to reindeer herding is regulated in a separate act (Act of 9 June 1978 no 49). The rights entailed are held alienable[22] in common with equal fractional interests by all registered reindeer herders within a reindeer herding district. The rights of common to timber and fuel wood and to put up constructions can be described as being held inalienable in joint quasi-ownership by the reindeer herd. The herd, seen as a cadastral unit, is an «owner» of these rights in the same sense as the farm was described as an «owner» of rights of common. The extent of their use is limited by the needs of the herding.

The difference between the *joint quasi-ownership* of pasture and wood and the *joint ownership* of hunting is significant in relation to limiting the resource use. In quasi-ownership, the needs of the farm define the upper limit for the total allowable harvest. For hunting public authorities decide on the necessity of regulations and limits the resource use by such techniques as limitation on time periods, type of technology and areas for hunting as well as quotas and price of hunting permits.

Concluding remarks: modeling the human impact on resource systems

The loss of biodiversity, the reduction of forests, and the declining fish stocks in the oceans are seen as major problems of humankind. Around the world, there are many efforts to change and improve the management of renewable resources. Yet, very little is known of what is the best design of an institution for resource management. One strategy for learning about what works well and what does not work well enough, is to study cases with a long history of management (Ostrom 1990).

The studies presented in this book and the discussion of Norwegian resource legislation has revealed a rather bewildering complexity in the various local constellations of resources, users and institutions. The search for significant variables capturing the variation in resource usage systems has also uncovered several interesting characteristics such as the role that «ground and remainder» plays for coordination of activities and distribution of benefits, the prevalence of co-management, and the resource specific systems of rights and duties cutting across the social categories distributing the benefits from the resources.

But we cannot claim to have come closer to being able to answer questions about exactly how legal institutions affect resource usage systems.

[21]They can also limit the number of hunters of small game but will then have to distribute the hunting permits fairly among people from outside and inside the bygd.

[22]The right to reindeer herding is alienable in about the same sense as a Norwegian farm is alienable. In other words to buy you need concession from public authorities. But instead of the kin preference on the farm market, there is a requirement of ethnic and industrial attachment in the "market" for reindeer herding rights. Concession will be given only to Norwegian Saami who either themselves were active reindeer herders on or after 1.July 1979 or who have at least one parent or grandparent who were active reindeer herders on that date.

Comparative studies in the meaning pursued here is clearly not sufficient. The discussion has however clarified what the problem is.

The problem we want to solve can be conceptualized by the following figure:

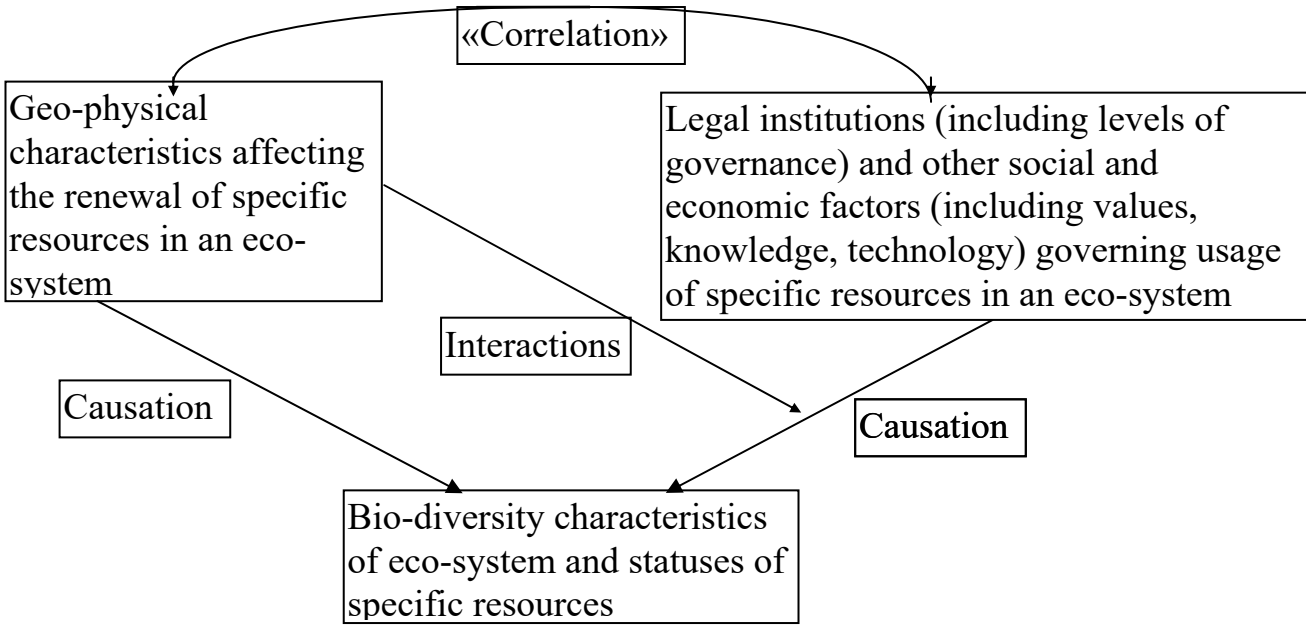

Figure 1

The figure defines a simple causal structure. The hypothesis is that the biodiversity and sustainability measures characterizing an eco-system and its resources are determined by two sets of variable characteristics. One set is the geo-physical parameters circumscribing the eco-systems and its development. The other set is the human usage of the eco-system and its resources. The figure depicts two complicating features. One is the possibility of correlations between legal and socio-economic variables, and geo-physical characteristics. Decisions on management rules are not taken without a view to the broad characteristics of the area they are intended to apply to. And even more important, the geo-physical characteristics of the area will through historical adaptations shape the world view of people living there, their values and perceptions of resources. This affects local choices of institutional solutions in governing resource usage (compare Folke and Berkes 1995). The other complication is the possibility of interactions between legal variables and geo-physical characteristics. The consequences of particular institutional variables may depend on the values of some geo-physical characteristic (such as variability in weather, elevation above sea, etc.).

To estimate the true impact of human activity we need to specify the correct model. This means we need to account for variation in resource system, geo-physical characteristics, background correlations and interactions in relation to the total impact on the various resources.

If we disregard for a moment the problems of measurement for legal institutions and other relevant social and economic characteristics as well as

eco-system and resource characteristics, the problem could be solved by collecting data on the three sets of variables for «enough cases» from «enough samples». Multivariate studies of correlations will with enough replications help us sort out the institutional characteristics, which make a difference in sustainability of a resource from those who do not.

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APPENDIX TABLE 1
PROPERTY RIGHTS REGIMES IN NORWEGIAN FOREST COMMONS, REINDEER HERDING AND SALT WATER FISHERIES

ITEMS				
REGIME TYPE	**BYGD COMMONS**	**FORESTS IN STATE COMMONS organized as bygd commons for rights to wood**	**REINDEER HERDING within the defined pasturing districts within «reindeer pasturing areas»**	**SALT WATER FISHERIES fishing in salt water except for salmon and sea trout but including whaling and seal hunting**
other names used	parish commons[23]			
Geographical areas linking resource usage and appropriator units	"bygd" and reindeer herding districts	"bygd" and reindeer herding districts	reindeer pasturing areas defined according to established usage	*Norway for most issues *14 special districts with local powers of regulation
No of units	51	8	1 - divided into 6 reindeer pasturing areas, each divided into districts	1 14 special districts
Type of unit	actor	actor	bureaucracy	bureaucracy
management and organizational variables				
system responsible actor	board elected by commoners	1) a board elected by commoners "allmennings-styret" [24] and 2) the local chapter of Statskog SF **co-manage** the wood resource	The Royal Ministry of Agriculture by delegations to the board of reindeer herding and the boards of the various reindeer pasture areas.	The Royal Ministry of Fisheries
voting rights	2 votes for each quasi-owner of rights of common	2 votes for each quasi-owner of rights of common to wood	no	no for Norway yes for special districts
professional administration	required	required	yes	yes
change of area	severe restrictions	severe restrictions	no	* Norwegian jurisdiction by international treaty * special districts by Ministry
common economic activity	variable	variable	no	no
profits for owners of ground or equivalent	variable	possible	yes	yes
duties of elected board	represent both owners and commoners, management of resources, support the improvement of the local community	1) represent the commoners, co-management of funds designed to cover road maintenance, forest rejuvenation, etc., 2) represent the interest of the owner of the ground, regulation of timber felling	implement the policy of the government	regulate use of established technology and coordinate appropriation activities

[23] Used by Sevatdal 1985, Rygg and Sevatdal 1995

[24] A board elected by the municipality ("fjellstyret") manages resources other than wood

ITEMS				
REGIME TYPE	**BYGD COMMONS**	**FORESTS IN STATE COMMONS**	**REINDEER HERDING**	**SALT WATER FISHERIES**
distributional variables				
owners		title to ground and remainder is held by STATSKOG SF in trust for the state	right of access to pasture within designated pasturing district is held by individual persons	«title» to Total Allowable Catch (TAC) is held by the state
"quasi"-owners	ground and remainder is held by a group of farms with rights of common			quotas of fish distributed by the Ministry of Fisheries are held by registered fishing vessels
form of «Quasi»-ownership	ground and remainder is held in common	ground and remainder is held in fee simple	right of access is held in fee simple	quotas are held in joint ownership
alienability	ground is inalienable from quasi-owner	ground is in general inalienable, but with exceptions	right of access is alienable among those with rights to practice reindeer herding	quotas are inalienable from quasi-owner
legitimate appropriators	*owners * rights of common are held by all legitimate farms in the "bygd", * and, if relevant, all reindeer herding units registered within the local reindeer herding district	*owners * rights of common are held by all legitimate farms in the "bygd", * and, if relevant, all reindeer herding units registered within the local reindeer herding district	* rights to practise reindeer herding are held by Norwegian citizen of Saami descent being active reindeer herder on 1. July 1979 or having one parent or grandparent being active reindeer herder	* rights to receive quotas are held by legitimate fishing vessels (in quasi-ownership)
form of ownership of rights	joint	joint	in common	joint
alienability of rights	inalienable	inalienable	inalienable	inalienable
resource systems where rights of appropriation are defined	there are specific rules governing *buildings, *pasture, *timber, *fuel wood, *hunting of small game, *fishing * pasture and wood used in conjunction with reindeer herding	there are specific rules governing *timber, *fuel wood *pasture and wood used in conjunction with reindeer herding	there are specific rules governing *movements and stopovers with reindeers *corridors for movements *pasture *infrastructure (fences, bridges, buildings etc.) *firewood and timber *hunting and fishing	there are (as of 1. Jan. 1996) specific rules at least for seaweed, shellfish, whale, seal, lobster, crab, crayfish, shrimp, herring, cod, haddock, halibut, mackerel, angler, coalfish, capelin, ling, rosefish, sea scorpion

APPENDIX TABLE 2
RESOURCE SPECIFIC PROPERTY RIGHTS REGIMES IN NORWEGIAN FOREST COMMONS, REINDEER HERDING AND SALT WATER FISHERIES

	ground and remainder in forest commons	**pasture, timber, and fuel wood in forest commons**	**fresh water fishing and hunting of small game except beaver in forest commons**	**hunting of big game and beaver**	**pasture, fishing, hunting, and wood for reindeer herding**	**fresh water fishing and anadrome species (salmon, trout)**	**salt water fish except anadrome species (salmon, trout)**
Rights of common	no	yes	yes	yes	yes	variable	no
Co-owner-ship	in common	joint	joint	joint	joint	in common	
Appropriator units	farm	farm	registered persons	registered persons	reindeer herding unit registered in the local reindeer herding district	*person registered as owner of ground *persons below age 16 are from 1 Jan. to 20 Aug. entitled to free fishing licenses wherever licences are sold *in some rivers fishing is a right of common	fishing vessel
Use and quantity regulation	internal ("owner decision")	internal ("needs of the farm")	internal ("owner decision")	external ("publicly decided needs of the species")	internal ("needs of the industry")	external («publicly decided needs of the species»)	external («publicly decided needs of species vs industry»)
Power of local choice	yes	yes	yes	yes	yes	yes	yes, in 14 separate districts