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Stream: Theory (“The Environment Discourse and Common Property”)

Environmental Backlash and the Irreversibility of Modernization

By

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Summary:

Endangered wild species are an important part of the international environmental discourse. This is institutionalized in a number of conventions and treaties, among them the Bern-convention, the Biodiversity Convention and the Washington convention (CITES). But also the health and life of domesticated animals are protected by international conventions like the European Convention for the protection of Animals kept for farming Purposes (European Council). In addition there are international conventions that protect the material basis for the culture and economic life of indigenous peoples and tribal peoples in independent countries: ILO-convention no. 169.

Taken together, these international environmental obligations places responsibility on the states that ratifies the conventions to protect both endangered wild animals and their natural habitats, to protect domesticated animals kept for farming purposes and to protect the material base for the culture of indigenous peoples. In the case of endangered species of predators, this places the modern state in a number of difficult dilemmas that, if not handled properly, undermines the legitimacy of both national and international environmental policies. Predators, like bears, wolves, lynx and wolverines are in their natural state opportunists who kill the most easily accessible prey. Among these are often sheep and reindeer kept by farmers in small and economically vulnerable mountain communities and by indigenous peoples who rely on pastoralism as the material base both for their economic and cultural life. It is quite obvious that it then is a serious dilemma for the modern state to protect the domesticated animals and the local and indigenous communities from the same predators that it is also protecting, in many cases from angry sheep farmers and reindeer herders who want to exterminate predators. The impotence of many modern states in providing solutions to these dilemmas also have the effect of antagonizing the urban and the rural part of the environmental movement, and the growth of anti-environmental political factions.

The paper goes beyond this obvious political dilemma and searches for deeper reasons behind the growth of this type of conflicts. The motivation for this is that it is an important precondition for a continued meaningful environmental discourse to reach a deeper understanding of a number of similar or related processes at work in many localities in the world that has this character of “environmental backlash”. If the social sciences cannot

¹ © Audun Sandberg, Nordland Research Institute, Bodoe, Norway
and Workshop in Political Theory and Policy Analysis, Indiana University
The author appreciates the support of Norwegian research Council:
Utmarksprogrammet P.nr. 113411/720

provide analytical tools that helps us to understand this phenomenon, they fail in their capacity to address contemporary social problems.

In using examples both from Northern Norway and North America, the paper crosses boundaries by using modernization processes in agriculture and animal husbandry and corresponding ecological changes as variables in order to explain political processes: Increased political demands for economic efficiency and rationalization in animal husbandry has resulted in more extensive forms of grazing large numbers of animals on high altitude pastures. State subsidized breeding programs has resulted in heavier animals with higher grazing efficiency and weaker flock affinity. Changes in forestry patterns and in cattle grazing in village forests have changed a previous open cultural lowland landscape into a denser, reforested landscape. This has together with a general rural depopulation created improved opportunities for herbivores like roe-deer, deer and moose, both in their traditional areas and by migration to new areas. Following this expansion of wild herbivores there has also been a natural expansion of their accompanying predators, especially of lynx following the roe-deer.

One of the fundamental preconditions for the long process of rationalization of animal husbandry were state policies for extinction of larger predators in grazing areas - the idea of public authority creating "predator free areas". Already in the 2nd wave of internal colonization of the North, from 1730-1770, bounties for the killing of large predators were introduced in order to exterminate predators and enable surplus production animal husbandry - later also in order to increase the production of other game like grouse and hare. Bear and wolves were almost extinct in Norway the 1930s, when also the rural population of Northern Norway reached its maximum. But the bounty system for killing predators were kept in many northern municipalities until 1973, when a general ban on the hunting of large predators was introduced and conservation policies for large predators were introduced by the newly created Ministry of Environment.

One of the effects of the lengthy processes of rationalization of animal husbandry and changed grazing patterns are the availability of ample food resources for growing populations of wild herbivores and their predators. Thus dynamic ecological processes can take sectoral administrations by surprise, forcing them to either reverse policies or to invent new approaches. Crucial innovations that can act as a strategic tests of the feasibility of coexistence of predator conservation and rationalized animal husbandry, are a programs for changing animal husbandry in a way that increases predator resistance in domestic animals or minimizes contacts between domestic animals and predators in "predators' core areas". The paper also analyses reactions to such programs and the way this challenges fundamental institutions in modernized animal husbandry. Acknowledging the deep cultural cleavages within separate state sectors in many western countries, the paper finally discusses the consequences of delinking both the governing of predator resources and the governing of mountain and forest grazing from the state and the conditions for a transfer of responsibility for governing biodiversity to local self governing institutions.

An idling Environmental Discourse

There is a lack of studies relating to experience of field practitioners and researchers from a decade of post-Rio global environmental policies labeled "sustainable". The sustainability concept in its many different constructions, has been central in the environmental discourse during the decade, both as part of a large number of international environmental treaties, and as a crucial element in regional and local "Agenda 21" campaigns. One major question is therefore whether this decade of "sustainable environmental policies" conceived at the global or national level has "penetrated" all the way down to the level of field practitioners in agriculture, animal husbandry, forestry and other natural resource use. And if so, does it mean that "sustainability" is now widely entrenched both in the use of resources and in the governance of resources? And if local resource use is not sustainable, is this then because the "sustainability policy" has not penetrated far enough or with sufficient thrust?

A number of local studies carried out by social anthropologists have revealed a different picture of "sustainability" practice; one of authoritarian environmentalism and illegitimate protection of natural resources against the will of local people for whom these have served as livelihood and material base for distinct and diverse cultures. Based on such studies, modern

environmentalist movements and “state environmentalism” has been branded as a modern urban phenomena without reference to the real-life situation of natural resource dependent societies. And traditional ecological knowledge has been hailed as being more in line with modern ecosystem knowledge and is being promoted as a management rationale for the future (Berkes, Folke and Gadgil, 1995)

From the point of view of the single community of resource users, these studies usually make sense; The local interpretation of the “sustainable” environmental policies of central governments is often one of lethal threats to local resource use and local economy. But the sum of such local interpretations is, however, a problem, as it renders a larger environmental policies practically unfeasible in most areas of a country: For instance is “everyone” in principle for the protection of certain endangered species, but they do not want “varmint” in their own local area. The political mobilization on the basis of the sum of such local interpretation is often termed “environmental backlash”, as it halts not only the implementation of earlier agreed upon general environmental policies, but has also brought part of the environmental discourse into a stalemate of urban against rural, modern against traditionalist sentiments etc. A decade after the Rapport of the World Commission on Environment and Development, many aspects of the environmental discourse is therefore just idling - with no forward thrust.

But this can also be turned around, an idling discourse is also an opportunity to take stock and to make a stop along the road of urbanization, modernization and globalization of the environmental discourse. Such a stop can be used to investigate the real causes behind some of the present urban-environmentalist/rural-traditionalist controversies, especially those linked to some of the processes started by the enclosure movement in Europe (Sandberg 1995). And to understand an impasse can also extract and refine from a maelstrom of well intended, but ill-conceived environmental policies, those concepts and interconnections that can open up new possibilities to re-link the UN-level environmental discourse to what is happening at the local level. It is to such a larger program that this paper is a contribution.

A number of the present difficulties arise because “sustainability” easily can be regarded as widely different ways of “meeting the needs of the present generation without jeopardizing the ability of future generations to meet their needs”. Attempts to categorize such various approaches to sustainability have been made by many authors (Lafferty & Langhelle 1995, Hanna & Munasinge 1995). One innovative way to do this is to look at:

- **Economic sustainability** as the maximum flow of income that can be generated while at least maintaining the stock of assets which yields these benefits.
- **Social sustainability** as a people and equity oriented concept that seeks to maintain the integrity of social and cultural systems and reduce destructive conflicts.
- Environmental or **Ecological sustainability** as the resilience and dynamic ability of biological and physical systems to adapt to change through anti-degradation and anti-pollution measures and maintenance of biodiversity (Hanna & Munasinge op.cit.)

The crucial element in all these definitions of sustainability is maintenance - either the maintenance of an asset, or the maintenance of a social and a cultural system - or the maintenance of resilience through biodiversity. Between these objectives there is likely to be conflict, as the maintenance of an asset like a stock of e.g. one specie, does not always correspond to a multispecie management rationale or a biodiversity rationale. We will also find that maintaining or

maybe even enhancing biodiversity will challenge the integrity of a large number of social and cultural systems that has reached various stages of institutionalization and organizational maturity.

It is also worth noting that especially the concept of environmental sustainability has changed under the influence of new advances in the biological and ecological sciences. The old interpretations of “environmental” as the conservation of an ideal static state of “ecological balance” is slowly yielding to a more dynamic environmental paradigm of securing biodiversity and strengthening resilience in order to optimize (or maximize) the ecosystem’s ability to adapt to change and withstand external shocks (Perrings & al 1995). A patchy cultural landscape can thus in many cases demonstrate a higher degree of biodiversity than pure wilderness and can thus be viewed as more sustainable and more worth maintaining. Although challenging, this paradigmatic change in the concept of environmental sustainability does not make the sustainable governing of resources less complicated, especially when added to a need for a balanced consideration of all three elements of “sustainable development”.

As this paper shows, even in highly modern societies the interpretation of sustainability is ambiguous, both in different sectors of industry and in different government departments. At first glance it seems as it is exactly this lack of conceptual/political clarity that create a number of serious problems both for resource users, resource governors and for various environmental organizations. Some of these problems have in a number of countries developed into more serious conflicts that put groups up against each other in prolonged encounters. The rhetoric of some of these conflicts even paint as contradictions the need for economic sustainability as against the need for ecological sustainability, pointing towards in-built contradictions in the sustainability concept itself.

However, this paper searches for deeper reasons behind the growth of this type of conflicts at the age of High Modernity. Such conflicts cannot alone be caused by the ambiguous use of fashionable concepts in international conferences and in government papers, but must have some connection to real-life social processes going on in modernizing societies. The motivation for this search is that an important precondition for a continued meaningful environmental discourse is a deeper understanding of a number of similar or related modernization processes at work in many local communities in the world that undergo similar transformations. But modernization is not a new phenomenon, it is a process that has been going on for the last 300 years - some claim much longer. Therefore it will often be necessary to reach back into dormant layers of entrenched institutions and structures of thoughts in order to understand their workings in relation to the environmental discourse to the full extent. Provided that “environmental backlash” is an accurate label for some of the local conflicts we can observe in many areas of the world, the social sciences must be able to provide the analytical tools that can help us to understand this phenomenon. Otherwise they fail in their capacity to address contemporary social problems.

A Postmodern Environment ?

Replacing the paradigm of “ecological balance” with a new paradigm of “biodiversity as a source of resilience in ecosystems”, implies a different role for humans, whether they are government resource managers, local sheep farmers or environmental activists. Now their praxis does not only involve counting the number of species and individuals in a system, but also the mapping and the monitoring of the way these species are organized in the ecosystem. (Constanza

and Folke 1996). The consequence is for human communities to assume social responsibility for not just endangered species, but also for the resilience and long term functioning of life-supporting ecosystems - including their decomposability, recyclability and reorganizational abilities. This change is so fundamental that it is difficult to perceive, and in spite of the central position of the biodiversity paradigm in Agenda 21, very few practical applications of “institutions for governing biodiversity” have so far materialized. We are therefore venturing into an unmapped landscape with all the pitfalls and dangers of constructivist analysis, but also with ample opportunity for deconstructing some of the prevailing modern doctrines of resource use and environmentalism.

If we briefly go back to the first Economic revolution - the transition from hunting and gathering to sedentary agriculture about 8000 years ago - there are two crucial processes that need to be taken into consideration: One is the changing nature of property rights and the other is the demographic process (North 1981). It can be difficult to resolve whether this transition came from population pressure or from inadequate property rights. North is most probably correct in inferring that there was only modest population pressure in early hunting and gathering communities, high fertility rates were almost matched by high mortality rates. But when the small populations had reached a level where the common property game resource was fully utilized, further population increase led to a decline in the marginal produce of labor used in hunting/gathering. Thus the development of exclusive communal property rights can be seen as a solution to a common property dilemma in hunting and gathering, now enabling communities to sow seeds and harvest crops (North op.cit). The time it took to wait for crops to ripen, and the costs and organizational skills required for the defense of the exclusive communal property rights then became the basis for sedentary life, for the great civilizations as we know them - and for a far larger population growth than any other specie have ever achieved.

If we then move to the “modern project” initiated in the 17th century, this has been characterized by two processes of immense importance.

- One is the “demographic transition” whereby mortality rates first start to drop drastically - to be followed after a time span by a gradual decrease in fertility rates, spurring an accelerated population growth in the transition period. This process started in Western Europe around 1750 and has since spread to the whole planet, resulting in a stock of humans of nearly 6 billion in 1997. However, more than 30 countries have already gone through the transition phase and have by 1997 reached a “stable population” with low death rates and low birth rates. The world population growth rates peaked at 2% in the 1960s and have now decreased to 1,48%, while the nominal growth peaked in 1995. A number of newly industrialized countries and developing countries are closing the “fertility gap” considerably faster than previously expected, indicating a stabilization of the total world population already in 2050 (UN/DPCSD 1997). In large parts of the Northern Hemisphere, the human population expansion of the last 350 years has therefore ceased. An equally important aspect of the demographic transition is the accelerated urbanization of the world, in 1995 about 50% of the world population were living in urban centers. In North America and Europe about 90 % are living in urban centers in the 1990s and the rates of urbanization are still positive. This does not only mean that urban values and urban sentiments will be increasingly dominating in the public opinion on environmental matters, but it also has direct physical effects on ecosystems. Many northern and western countries experience a gradual “thinning out” of rural settlements

combined with a total depopulation of a number of rural areas. This has important long-term effects that are likely to increase in the next century, most importantly a decreasing pressure on the “human settlement margins”, and even a human settlement “retraction”. Thus “nature” is here in a position to “take back” ground “lost” to human society in earlier periods of vigilant colonization. Reforestation of large areas of previous “cultural landscape” is one such effect. But because this modern settlement withdrawal is combined with the global effects of human activities and the increase in modern recreational use of nature, these ecosystem processes are very different from former retractive periods, notably the long period after the Great Plague.

- The other process characterizing the “modern project” is the “wedding of science and technology” that took place in the latter half of the 19th century. This happened only after a long period of increasing demand for and application of systematic knowledge in industry during the industrial revolution, and the establishment of property rights to technological innovations in the form of patent laws. And it happened only after an equally long period of maturing and establishing of solid foundations for the different branches of sciences, as we know them today, with explicit programs for scientific progress. This marriage has been termed the “Second Economic Revolution” to indicate that its importance is of equal significance to the First Economic Revolution, when man started to sow seeds and settled to wait for the harvest (North 1981). The production of knowledge was now organized so that science could become one of the most important factors of production and the supply of new knowledge could become the most important element in economic growth. The important point here is that all the marvels of this revolution has changed the most fundamental relationships between humans and nature, and not just the “Social Construction of Nature”. The division of labor and the increasing specialization has, together with the application of science in agriculture and drastically decreased transaction costs and transport costs, resulted in dramatic increases in the productivity in agriculture, improved efficiency of storage and enlarged the market for agricultural products to become a world market. Modern biotechnology and increase in recycle-based industrial processes does also tend to remove more of the modern food production from the farmer’s fields and pastures. This means that far fewer people are now needed to produce the food for the rest, in the modernized phase probably less than 5% of a population in one of the world’s regions can produce the food for the other 95%, predominantly urban population. But it also means that for reasons of food production alone, far fewer people have to be settled near the agricultural resources: the fields and the pastures of the cultured landscape. In Western Europe and North America rural depopulation is therefore one of the crucial characteristics of this landscape towards the end of the modern project.

Every period is using the scientific knowledge available to its time. However, often this kind of knowledge is entrenched in institutions designed according to specific perceptions of cause-effect relationships. Sometimes the entrenchment is so deep and the layers of refinement so thick that we can use the term *doctrines* about such institutionalized knowledge. Thus institutions with a solid foundation have a tendency to continue their survival long after their knowledge base is eroded or made defunct by new advances in science. And the modern age is typically characterized by layers of institutions that draws upon doctrines of different ages and which

incorporate interests that participate in the public discourse from such different platforms of institutionalized knowledge.

Before modern textiles made outer shell-clothing efficient weatherbreakers, the furs of predators were highly priced commodities. For many marginal local communities, trapping and hunting fur animals for distant markets were like modern cash crops, the only way to get the means to obtain imported goods. In the Medieval Age in the Nordic Countries, most of the taxes extracted by the kings from the northern provinces were predators' furs (*klovare*), most probably because of their high value to weight ratio. As an important source of income, predators could thus be regarded as a resource with a common property character, where a depletion of the stock of predators could seriously harm the local economy. However, at a low level of hunting technology and with large numbers of wide-roaming predators, it would be wrong to construct in postmodern categories a distant past where theories of managing the predator stock for sustainable harvest was part of the folk science of the middle ages (Brosius 1997). According to legends, bear, wolf, wolverine, fox and lynx were regarded as not only strong, clever and brave animals that demanded respect, but also as useful animals that gave warm furs and income. Such legends are the only institutional survivors of a way of thinking that differed from the patterns of thought at the beginning of the modern age. But in areas of the world where fur hunting and trapping is still an important economic activity, the threat of the most advanced hunting and tracking technology (e.g. snowmobiles) has for instance in Northern Canada made the depletion of the wolf-stock a modern common property problem of overuse of an important resource (Globe and Mail, March, 1998).

The 17th and 18th century had ideas of progress and rationalization of man's relation to nature. But the mercantilist state also had ideas of saving on foreign exchange by stepping up domestic food production and better use of the resources for the rapidly growing populations of the emerging nation states. In northern countries internal colonization was one of the measures used for this purpose. Frontier human settlements were established in many parts of these countries and like frontier settlements everywhere, they suffered from the close contact with the "wild" ecosystems, either in the form of diseases, weeds, pests, ticks, vermin or predators. In order to secure a surplus of food from agriculture and animal husbandry over and above the needs of the farm itself, religious and scientific knowledge of the time was employed to motivate the "enhancement of nature". Only by domesticating and refining nature through modern agricultural methods and modern animal husbandry could a surplus be achieved that could feed the workers needed in the growing manufacturing sector. Already in 1730 and 1733 we find the first specific predator laws in Norway (frd. March 2. 1730, frd. May 8. 1733 - Kingdom of Denmark/Norway 1795). We find similar developments in other "western" countries at about the same time. This marks the beginning of a new incentive system; a state launched bounty system for eradication of predators, starting with wolves in 1730 to be followed by bears in 1733. The basic ideology behind the new system is clearly reflected in the title of some of the later laws that followed: "Law of Eradication of Predators and of Protection of other Game" (August 1845, Revised 22 June 1863). According to some sources as much as 29 different species were listed as harmful species to be eradicated (Kvaalen 1997). In the 1845 law these included explicitly Bears, Wolves, Lynx, Wolverine, Eagles, Eagle Owl and Hawk. Together these laws and regulations give a clear account of the "social construction of nature" at the peak of modernization optimism. Thus we can see that the call for human enhancement of nature was institutionalized at an early stage, where the production of useful creatures was to be promoted by the removal of harmful or useless

creatures. The enhancement drive, at that time labeled development, was both initiated and supported by a state-initiated incentive system which hopefully would bring back increased tax-revenue from new farms established in the wastelands as well as great savings on food imports and foreign exchange. In the beginning the bounty was financed through an imposed levy on all tax subjects at the local level (*tinglaget*), this was most probably also a legitimate tax as it was generally perceived as producing a public good - an enhanced and predator-free environment. Later, as predators became scarcer and bounties had to be raised to provide sufficient incentive, the financing was moved to the provincial level (1845) and later to the national level.

The bounty incentive worked very well, and combined with a continued demand for furs, expanding human settlements and advances in shotgun and rifle technology, it resulted in a virtual extinction of predators in the course of 200 years. Bears and wolves were first hunted to near extinction, later also the rich stocks of lynx and wolverine were depleted to the extent that they later were declared endangered species. Two hundred years constitute more than six generations; thus we find that the early modern ideology of enhancement of nature for surplus production and the eradication of predators also have become the “traditional” sentiment in most contemporary rural communities. Even among the Sami reindeer herders, whose nomadic pastoralism most probably goes back to the 15th century, the creation of “predator-free ranging areas” is now presented as a traditional value. Any previous “traditional values” connected to the hunting and trapping of fur animals for cash only and not for eradication, are lost to the grindstones of history and are only to be found in written sources, in the memories of rural communities there is no recollection of older days than the “good old days” of bounty hunting for eradication of varmint and predators. Thus the conventional traditional-modern dichotomy can be deconstructed and replaced by a continuum of ideas about nature that in its time has penetrated both government bureaucracies and rural communities. A more correct labeling of present controversies would therefore be one of early modern rural communities against late modern conservationists.

But in order to understand the depth of the emotions in the type of conflicts called environmental backlash, it is also necessary to take a look at the modernization processes of agriculture and animal husbandry themselves. The result is also an important element in a postmodern environment. The long-term program for eradication of predators resulted in the creation of large predator-free areas in most of the Nordic countries, especially after 1950, when rural population was at its maximum in most provinces. But this also created an opportunity for a rationalization and expansion of animal husbandry that could not be envisaged before, notably an extensification of reindeer ranching and sheep ranching that could maintain the production levels in spite of a decreasing rural population towards the end of the 20th century.

In large parts of the northern countries, transhumance had been the traditional adaptation to the seasonal variations in plant production. This meant moving the entire household and all the domestic animals of the farm to a *Saeter* (summer farm) in a high mountain valley, and tending them, herding them and milking them with a basis in the *Saeter*. This system was quite predator proof, but was not very efficient in economic terms. However, with the creation of predator-free areas, manpower for intensive herding and guarding of sheep for meat and wool-production was not a limiting factor any more. The opportunist sheep owner could therefore now exploit the resources freed from the grip of predators and he could specialize his production, increase the herd size and utilize the large mountain and forest pastures for unhindered grazing of large flocks of summer sheep. The entrepreneurs of the reorganized sheep industry could tap into a vast unused resource and expand their operations dramatically. From 1946 to 1994 the number of

“summer-sheep” (stock pr. June 1st) in Norway rose from 1,7 million to 2,5 million (Mysterud and Mysterud 1995).

The new limiting factor now became the amount of winter fodder for sheep that could be grown and harvested on the farm. This determined the amount of “winter sheep”, i.e. the production capacity of the stock. But since the predator-free summer pasture now was a virtually costless public good, the economic incentives worked towards having as high summer meat production as possible on common lands, within the constraints posed by the privately owned winter fodder productive capacity. Thus research and development, including breeding programs, became targeted towards a certain kind of rationalization of sheep production. All of the totally 12 different operations related to sheep ranching were gradually rationalized and gradually adapted to an almost predator-free environment: The production planning, the yearly cycle, the area use, the winter-fodder production, the spring-pasture/ autumn-pasture/ winter-feeding, the water use, the stock composition and breeding strategy, the animal health program, the expected loss, the slaughtering and marketing strategy and the organizational designs. (Mysterud op.cit.). The same state that initiated the eradication of predators has also been consistent in supporting the modernization of animal husbandry with research, extension services and subsidy programs. In the course of more than 80 years of breeding programs, the goal for modern sheep-ranching has been to maximize the meat production relative to the amount of winter-fodder from the farm. Thus the ratio of “summer sheep” to “winter sheep” has been maximized through selection for twin and triplet birth ewes, through controlled mating/insemination and the lowering of lamb-birth mortality. The ratio of winter sheep to total summer sheep was as low as 41% in 1984, by 1994 it had been decreased to 39%. The summer meat production has been maximized through the selection for meat weight (no horns) and for lower flock affinity. The resulting modern sheep ranching operations are thus characterized by large numbers of unherded, hornless, hefty ewes with their lambs (no rams) spreading out in the mountain pasture to seek fresh pasture and avoiding grazing competition. With government subsidies that acted as incentives to rationalize animal husbandry along these lines, the result is an extensive ranching system that has become gradually more predator prone as more predators have been eradicated. It is important to note that the strong reaction of sheep-ranchers to the state initiatives of protection of predators also is seen in relation to this long process of state induced rationalization of the sheep industry. Most sheep farmers are thus caught in what might be called a “modernity trap”. For milk goats, who are returning as a flock to the *sæter* (summer farm) every evening to be milked, the rationalization has not been as thorough as it has for sheep ranching and the loss to predators in the goat industry are minimal.

The reindeer industry has also gone through a major transformation during the last 50 years. However, the basic biological properties of reindeer husbandry has remained unchanged; Mountain pastures are not rich and the need for reindeer pasture area is higher than for any other animal production: approximately 36 km² pr ton of reindeer meat. And because the reindeer has to be able to survive the harsh arctic winter without additional fodder, little scientific breeding for increased meat weight has been done. Thus mating has been “natural” and the flock and escape properties of the reindeer has been maintained. But the same tendencies of extensification in predator-free areas that we saw for sheep ranching have also been working towards a “ranchification” of the traditional indigenous Sami reindeer herding. The increased stocking of the pastures has, however, resulted in overgrazing of the fragile mountain pastures. The reindeer numbers in Norway (excluding wild reindeer) thus peaked in 1989 with 258.000 animals, later to

be reduced by a state incentive system (a subsidy to those who quit) to the present 220.000 animals, which is about the calculated carrying capacity for reindeer husbandry in Norway. The further “tragedy of the commons” was thus avoided by tough state “managing” of the industry, because the reindeer owners were unable to avoid it themselves (Hardin 1998). But the extensive need for pastures for the increased stocks has resulted in a high degree of mechanization of the reindeer industry, both in herding and migratory operations (snowmobiles, off-road-bikes, helicopters, herding cabins), in communications (VHF, GPS & mobile phones) and in slaughtering operations (mobile certified slaughter trucks). This modernization has increased the investments “necessary” to be a serious operator in the reindeer industry, and put heavy pressure on the economic returns from the herds.

Although the reindeer owner is forced to let the shifting nature of the all-year pastures decide his herd size and slaughter weight of animals, some aspects of rationalization are also entering the reindeer industry. Among the 12 crucial operations in reindeer herding, it is especially the yearly spring/fall migrations and the slaughter-strategies that have been affected by modernization. However, in strict terms, it is difficult to describe an optimally adapted traditional reindeer herding system; From its entrepreneurial innovation as a long distance nomadic pastoralism in the 15th century, the reindeer herding system has always had to accommodate external disturbances, most of them more disruptive than the presence of predators. The demarcation of exact boundaries between Norway (Denmark), Sweden, Finland and Russia started already in 1751 and were completed in 1852 (Ministry of Agriculture 1992). The establishment of national boundaries was usually followed by closure of boundaries for the long distance reindeer pastoralism; This resulted in modified migration routes and in a less efficient utilization of the area than the full ecological potential (Mysterrud and Mysterrud 1995). Not only did the utilization of available pasture become suboptimal under the constrained regime, but also the predator avoidance strategies during critical stages in the yearly cycle (“calving time”) was hampered by the enforcement of national boundaries. Thus predator eradication became a necessary strategy for the Sami reindeer herders at about the same time as the national boundaries were closed and bounty was first introduced as part of a new state development strategy. After 250 years of predator eradication, this is now interpreted as part of the “traditional” Sami reindeer herding strategy to reduce calf mortality and increase reproduction rates.

In their natural state wild reindeer employ a number of strategies for defense against predators, and through thousands of years they are also selected for efficiency in employing these kinds of strategies:

- Flock formation and flock behavior
- Seasonal migrations
- The use of natural “refuges” - or protection areas (Mysterud and Mysterud 1995)

In open landscapes like the mountain pastures of Scandinavia, the native mountain reindeer naturally form flocks as defense groups with both males and females, while the forest reindeer have a tendency to hide individually in forest areas. The long seasonal migrations is not only a way to continuously reach fresh pastures, but is also a way to keep a distance to predators, who are seasonally confined to their pens during birth and weaning of their cubs. For experienced reindeer the use of natural predator free “refuges” during mating and calving is also of great importance. The herded reindeer of the Sami is often a mixture of mountain reindeer and forest

reindeer and it is now the owners' and herders' herding strategies within the constraints of an institutionalized system of pasture rights which decide the success or failure of the reindeer industry. (Skogseid 1997)

These strategies have to be flexible and adaptive, as the winter and spring weather decides the quality of the winter and spring pastures and thus the overall condition of the reindeer. Strong animals give strong calves who can profit from the natural group defense of the flock while weak animals give weak calves who often freeze to death before being taken by predators. The complex choices regarding snow-depths, pasture nutritional value and predator risks of the winter pasture are therefore crucial for the economic returns from the flock. The prevailing culture has been to follow the "natural" mechanisms of the reindeer as closely as possible and allow the natural death of weak animals during adverse snow conditions or diseases or actively weed out weak animals (*galdring*). Usually no supplementary feeding or veterinary treatment was given to weak or sick animals. The Sami herder also allowed the reindeer as an opportunist grazer to follow the nutritious budding vegetation after the receding snow line, and allowed "natural selection" within the herd during mating. However, by new methods of selecting animals for slaughtering, by emergency feeding and by truck transport of reindeer, the demographic structure of a number of herds are affected, usually with an aim to increase slaughterweight of animals and total meat production from the herd over a time period. Such "rational" production plans are often made with selection for slaughter as one of the most important tools to make the reindeer enterprise more profitable. But the effects on the predator-resistance of the flock-composition resulting from the adherence to such plans are not known yet, as little research has been done on these types of relationships. However, if not properly conceived, such economically motivated selection strategies can make the herd more predator prone and induce more frequent predating than in the natural state (Mysterud and Mysterud 1995). The design of modern management strategies for increased production made by state extension workers are mostly done with reference to a predator-free environment, thus these strategies have no provision for effects of various degrees of predation. Despite opposition from older Sami herd owners, "calf slaughtering" and "restructuring of reindeer herds" is advocated as profitable herd management techniques. Whereas predation is generally regarded as having a positive effect on the adaptation of the reindeer to their ecosystem, and human selection for maximum meat production from a given pasture has also been regarded as a profitable strategy, the combination of these two impacts on a reindeer herd can be disastrous. Even if the selection by slaughter should not alter the genetic composition of the reindeer herd, any human alteration of the demographic composition of the herd that make it more prone to predators can have grave consequences for the individual herd owner.

Consequently we are faced with a situation where a continued modernizing trend of rationalization in the reindeer industry is on collision course with the trends of not only protecting endangered species, but also with policies of actively reintroducing extinct species of predators and increase the biodiversity in order to strengthen the overall resilience of the total ecosystem. Thus also the reindeer herders increasingly find themselves in a "modernity trap" from which there seems to be no way out. The overriding question is whether it is impossible to reverse the modernization of the reindeer industry in face of the technological developments and the state incentive systems, and revert to illegal shooting of the protected predators as the only remaining solution. Or whether there is a more advanced rationalization that utilizes the most recent advances in ecological sciences and evolutionary biology. In order to get closer to an answer to

that question, it is necessary to look also at the environmental consequences of modern game management.

As far back as 1730, one of the rationales for the state policies on “eradication of worthless predators” was the concern for the productivity of the “beneficial game”. In the Nordic countries the most prominent game were the ptarmigan, the roe deer, the stag-deer, the wild reindeer and the moose. It has for more than 200 years been strongly believed that a reduction in predation would automatically yield higher productivity in the populations of useful game. These ideas were propagated by early forestry people and later supported by the first generations of field biologists. They quickly entered the “Nordic Mind” and are still the epistemological basis for ecological thinking in most rural communities and in the hunting communities and associations. By scientifically based human enhancement of nature, not only could the conditions for domesticated animals be improved, but also the relations in the wild nature could be rationally managed in order to produce the greatest benefits for humans. These are similar thoughts that we find in many localities in the world, especially where a distinct frontier situation has been in existence for a considerable period producing or “demanding” a frontier ideology (e.g. 19th century USA, Dunlap 1991).

The ptarmigan was the first game that behaved differently from the old theories of human enhancement. Towards the end of the 19th century it was widely believed that ptarmigans benefited greatly from the successful predator eradication programs, while scientific advances in this century suggest that its fluctuations were unrelated to the decreasing stocks of predators, and probably more related to weather conditions in early summer, the availability of insects and the fluctuations in the stocks of small rodents as favorite prey of predator birds. This points towards much more complicated relationships than a pure predator/prey relationship (Steen 1978).

Larger herbivorous game, like moose, deer, roe-deer and wild reindeer have had a dramatic growth in most of Scandinavia during the last 100 years, both in absolute numbers and, apart from wild reindeer, also in the extension of their living areas. Since all of the 4 major species have increased their numbers, and not one has grown at the expense of others, there must be some common cause for their growth. However, there are several hypotheses that are candidates to explain this growth, most of them originally developed from one species studies:

- Predator/prey-hypothesis: The most popular hypothesis is that the successful eradication of predators should take all the credit for the current plenty of useful herbivorous game. Thus it is the reduced predation on all herbivores that explains the growth in all species.
- Reforestation hypothesis: Another hypothesis is that dramatic changes in animal husbandry and forestry, and depopulation of rural areas, together with climatic changes, has led to a reforestation of highly productive areas which has been beneficial for wild herbivores and increased the availability of fodder dramatically. Consequently also their numbers have grown, especially during the last 50 years.
- Scientific-management-hypothesis: A third hypothesis is that the management of wild game has become more scientifically based and more professional in its operations. Thus poaching is eliminated and hunting is strictly managed with detailed quotas for each area, specifying the age and sex of the animals that can be harvested. Usually this means shooting calves and young males during the autumn hunting season, allowing as many productive females as possible on the limited winter feeding areas. Like for sheep ranching, the maximization of

summer grazing animals relative to winter animals gives the “maximum sustainable harvestable yield”. (Mysterud and Mysterud 1995)

Modern evolutionary biology has not managed to conduct a strategic test between these alternative hypothesis, but the empirical facts are that in about 100 years, the harvested 5-year-yields (official statistics) from Norwegian wild herbivores has increased from a few thousand animals to 60.000 roe-deer, 40.000 moose, 10.000 reindeer and 6.000 stag/deer. This is part of a total change of the environment in the Norwegian rural areas, from an open landscape teeming with cattle, horses, sheep and goats on summer pastures, to a reforested landscape teeming with wild herbivores on all year pasture. Fig. 1 and Fig. 2 gives a good indication of the long term changes on landscape processes.

Figure 1. Intensely grazed landscape in Salten, Norway : 1938



(Photo:)

Figure 2. Reforested landscape in Salten, Norway: 1998



(Photo: Hjalmar Berg, Bodø)

The growth in sheep-stocks and in herded rein-deer has mostly taken place in unforested mountain areas, to the extent of threatening crucial protein-plants for the ptarmigan (Seldal 1994), but thus leaving the renewed forest niche vacant for the expanding wild herbivores.

Most probably a number of causal factors are playing together, so that the hypotheses are not really genuine alternatives, the dramatic growth in wild herbivores is the sum effect of all three. But still the existence of three different hypothesis in the public discourse points towards important differences in ways to think about nature - or of different “Social Constructions of Nature” (Beck 1996, Eder 1996):

- The modern perception of environment, where scientific management and human enhancement is believed to continually create an improved environment for the changing needs of humans. To an increasing extent modern ecological and biological research will equip us better to adjust both domestic and wild herbivores to the vegetation base and to adjust the level of both natural predation and human predation (hunting) to optimal levels. Scientific management of wild game only needs small refinement to accommodate a higher level of natural predation, especially of young calves. And scientific animal husbandry only need to refine their breeding of sheep and their advice on slaughter of reindeer to improve their flock and herd properties, and thus their predator resistance.
- A post-modern perception of environment, where the modern rationalization and disenchantment of nature has come to an end and where there is a social need of a re-enchantment and a revival of nature’s autonomous will and power of resistance (Bauman 1992). The belief that reforestation starts autonomous natural processes beyond the control of man’s science is thus contributing to a re-animation of nature that gives purpose in life to large sections of urban dwellers. The same goes for beliefs in a close relationship between predator and prey. The dramatic growth of herbivores in almost predator-free areas - speaks

of an autonomous vitality in nature, and so does the reverse -, a prey/predator relationship that explains the growth of predators by their natural vitality and ability to exploit the vastly increased stocks of herbivores - beyond the control of scientific management. Nature is seen to take its own course in areas of human contraction and is on track towards a longed-for re-spiritualization.

These different ways to think about nature points towards a discourse on nature that affects deep questions of human constitutions that were temporarily resolved in the early modern period, and whose irreversibility is now being questioned (De Chardin 1959). It is therefore far from satisfactory to limit the discourse to agrotechnical versus conservationist ideologies (Blekesaune and Stræte 1997); it also has to be taken to the institutional and constitutional level. The move from nature to an explained environment is definitely a modern phenomenon. The question of whether western countries without human expansion already have a postmodern environment, is much more difficult to answer at this stage. First we have to look at current praxis, both in the way science deals with predators and in the way biodiversity is governed in the institutional framework of the late 20th century.

Man-made wolf

Sociology has long been charged with having an “ecological deficit” and eliminating nature from its analysis. The cause for this is believed to be the faults of the founding fathers of sociology: Durkheim’s call to explain social phenomena with social facts, Weber’s insistence on the analytical importance of social actions and Simmel’s preoccupation with social forms (Luhman 1989, Dunlap & Catton 1993). However, both Durkheim and Weber were occupied with property rights, not as a human relation directly to nature, but as the relationship of one individual to other individuals’ relation to the biophysical world. Thus property rights were early in the history of sociology established as social relations that specified rights and duties, and their mutual respect, i.e. their legitimacy, among social actors (Weber 1922). And the origin of property rights as basic requirements for institutions was also traced, to various primordial collectives (Maine 1861), or to the “religious distance to a thing of worship” (Durkheim 1898). But then sociologists tended to forget property rights and leave the analysis of property rights analysis to jurisprudence and economic history. It was not until modern institutional analysis was applied to analysis of management problems related to common property resources that there was renewed interest in the constitutive role of property rights in the evolution of institutions, both in economics, sociology and political science (see e.g. Olson 1965, North 1990). This has resulted in intense work on analyzing property rights in local and “traditional” resource use systems, picking up on Henry Sumner Maine’s 130 year old research program. And it has led to modern refinements in the deconstruction of property rights, thus transforming them from sacred legal inheritance to accessible and operative design principles which can be used in the construction of new institutions for governing the relations of humans to nature (Schlager and Ostrom 1992).

The property rights to the biodiversity of the planet have also received increasing attention during the later years. But most of the effort has been tied to attempts to secure patent rights for the genetic composition of various commercially interesting plants and animal species. This narrow process of contracting for property rights have usually resulted in severe conflicts between multinational corporations and nation states, in particular states with weak legal framework for

protecting its indigenous genetic resources against “gene-mining”. Thus most attention has been directed towards the human use of particular “useful” organisms, be it yeast bacteria, medicinal plants or mushrooms, fish species for aquaculture or mammals for adventure parks. Little attention has been given to the property rights of the living habitat of the diverse biological organisms, where the “ordering of the ecosystem” changes dramatically under human influence, but where also evolution continues towards an open future (Holling and Sanderson 1996). It has been part of the modern heritage to have concern only for the “useful” organisms in the biosphere; the “worthless wildlife” was no-one’s property (*res nullius*). The eradication of “varmint” and predators - and the subsequent loss of biodiversity in the western world can therefore also be seen as a “tragedy of open access”, where the tragedy was accelerated by the state supported bounty programs which opened the harvest far beyond the secret trails of the fur-hunter. As in many other resource governing situations, we thus find that the State has been instrumental in transforming what in many ways functioned as a common property resource, into an open access tragedy, resulting in massive biodiversity loss. However, the tragedy analogy is contested, as a large portion of the population still hold the eradication of predators to be a modern blessing.

It is therefore not surprising, that when “endangered species” treaties and legislation went into effect, it was the same nation-state that assumed property rights to predators. There seemed to be no one else around who would be willing to protect them and save them from extinction, both local governments and provincial governments were in most countries against the “new predator policies” and wanted to fulfill the original goals of the eradication programs. In some cases, like in the US, there were as late as 1996 one branch of the federal administration, the Department of Interior’s U.S. Fish and Wildlife Service (USFWS) that worked towards protecting and reintroducing predators, while another branch, the Department of Interior’s Animal Damage Control program (now known as “Wildlife Services”), worked towards killing predators (Rembert and Motavalli 1998).

A number of predator enhancement programs and reintroduction programs around the world has also been undertaken with the nation state as identifiable owner of the predators, the state have often had to use large public funds to protect them against the local human top predators and to pay for the damage “its” predators do to private livestock. Most environmentalist groups have also lobbied for an active role of the state in the protection of predators as endangered species, only in some cases have such groups (e.g. the U.S. Audubon Society) taken on the role themselves of compensating farmers and ranchers for the loss of livestock to the protected predators. In still fewer cases has predator restoration or reintroduction been undertaken by other organizations than the state department/services. One of the few documented cases is the model program of reintroducing 35 wolves to Central Idaho, which has been run successfully by the Nez Pierce tribe since 1995. A plan for the reintroduction of Grizzly Bears in the large Bitterroot Ecosystem in Western Montana and Central Idaho, carefully constructed by the National Wildlife federation and The Defenders of Wildlife/ROOTS, would put the management of bears in the hands of a politically appointed Citizen Management Committee. But this plan is not yet put to any tests, and is opposed both by the more traditional conservationists and by local politicians and livestock owners in the area (Rembert and Motavalli 1998).

The overall picture is therefore one of a crucial role for the state in specifying property rights to endangered predator species, hitherto specified as state property rights. This is not a new relation, the Scandinavian states already in 1730 had a predator policy, and for hundreds of years

before that, predator furs were important tax objects for kings as well as powerful symbols on shields and flags of the king's supreme powers. And by way of the importance of predators to all aspects of biodiversity, this also means that national states come close to assuming both rights and duties towards the biodiversity in their territories. Nation-states own their wild species and can eradicate them through bounty programs or state poisoning programs, or they can protect them and even reintroduce them to parts of their territories where they formerly have extinguished them. But as we shall see later, the state "ownership of biodiversity" also implies problems that threaten the success of these programs.

To understand the role of the state in maintaining or enhancing biodiversity, it is necessary to analyze closer two crucial aspects of the modern environmental discourse:

- The struggles over the "soul of the state" in environmental matters.
- The implications of the actions of the "agents of the state" in environmental matters.

As the modern nation-state is more an arena for competing interests than a sovereign center of power (Ostrom 1997), the environmental discourse is of particular interest in shaping the environmental strategies of the state. One thesis is that modern environmentalism as a cluster of "movements" is a crucial test of the capacity of modern societies to develop institutions that can provide fair rules in the provision of collective goods (Eder 1996). Here the natural environment is a collective good that is "provided" by the state and the contests over both the nature of the good and the ways of providing it, is a public discourse that in most western countries has been going on since the late 1960s. A recent discourse analysis utilizes frame analysis to deconstruct environmentalism and suggest three cognitive framing devices as useful organizing principles of the modern discourse: *moral responsibility* related to the social world, *empirical objectivity* related to the factual world and *aesthetic judgment* related to the subjective world (Eder 1996). In the ecological communication between environmentalists, livestock owners, hikers, politicians and administrators, these framing devices are then recombined with their social context into "symbolic packages" with an aim to mobilize sufficient communicative resources to become the voice of the collective actor in the public discourse. Three such symbolic packages can easily be identified in the environmentalist discourse (Eder 1996).

- The **conservationist** package of environmentalism, which combines aesthetic judgment and moral responsibility as framing devices to create a symbol of nature as something that must be kept intact against civilization. What is not cultivated must be kept as wilderness, what is not conquered by man, must be conserved as National Parks, thus institutionalizing far into the future the early modern dichotomy of culture and nature.
- The **political ecology** package of environmentalism, which combines empirical objectivity and moral responsibility of either utilitarian or deontological nature as framing devices to create a symbol of nature as primarily a political question. This "realism in green politics" gives the social actors a constructivist role in the political making of a "better nature". The aesthetic framing device is subordinated to the other two devices, but is mainly aimed at the individual human's need for beauty in natural things. Thus this package continues and reproduces the type of modernity associated with the Enlightenment tradition.
- The **fundamentalist** package of environmentalism, which fuses together all the three framing devices to create a symbol of nature which also include humans. Deep ecology is the best

known example of this kind of symbolic package, which claims an intrinsic value of nature to which man has to be subsumed, man is part of nature and can never escape from it (Næss 1989). Thus nature has rights as such and animal species also have rights as such.

Many complex combinations of these symbolic packagings are used in the environmentalist discourse, and with highly varied ideological foundations (see. e.g. Bookchin 1997). But for our purpose here, these three simpler analytical categories are useful for explaining the outcomes of the struggle for the “soul of the state” in environmental matters. With increasing competition in the marketplace of public discourse, both the conservationist packaging, the fundamentalist packaging and environmentalism as protest-movement have increasingly been struggling for survival. They have in most advanced modern societies lost their distinctiveness as the general “greening” of these societies has progressed, including the “greening” of business, insurance, technology, public administration and professional schools. The environmental discourse is therefore increasingly becoming an ecological discourse where there is widespread consensus of the importance of “ecological thinking” as a collective concern (Eder 1996). Thus the struggle over the “soul of the state” is no longer for or against concern for the environment, but over which ecological policy to carry out and how to distribute the benefits and the costs of providing the collective good of a natural environment which can be used and enjoyed by “everybody”. Thus the environmentalist package called political ecology is assuming increased importance within the different environmentalist positions and is becoming a central post-industrialist paradigm.

As most western countries have established Ministries of Environment or other environment services based on conservationist packaging from the 1970s, questions of political ecology do not always fit into the present administrative structure. Now, both the increasing scarcity of nature, its more significant character of collective good and the distributive aspects of providing it, make political ecology the pursuit of a multitude of departments and agencies, as well as local and regional government. Questions related to protection or development of land or sea areas, and the protection of species or cultural landscapes has thus become part of ordinary political activity for a large number of people. Political ecology is becoming a question of which alternative ecology societies want and is thus entering the stage of ordinary political processes. The total relations of humans to nature that characterize “deep ecology”, might still have significance for the reorganization of self and identity of modern citizens, but the inclusion of political ecology in the body of mainstream politics makes the position of deep ecology more marginal in the overall environmental discourse. In conclusion therefore, it seems like the human rationalization and disenchantment of the world, now armed with the newest evolutionary ecosystem knowledge, continues to be as strong an agent of social change as it was at the beginning of the century (Weber 1922). And since this corresponds quite well with inherited bureaucratic routines and patterns of thought in the modern state, and is much more convenient than messy protest actions, political ecology easily catches the “soul of the state”. The rationality of a resilient society through the protection and enhancement of biodiversity is therefore well suited to become a new doctrine for modern states. According to some observers, we are therefore entering the age of post-environmentalism (Eder 1996). But as we have discussed at length above, the problem of how to govern biodiversity with the citizens of these modern states still remains to be solved.

Some indications of how the rationality of biodiversity works in social situations can be drawn from the actions of the “agents of the state” in environmental matters. These are to an increasing degree field ecologists who have been trained during the last two decades and who thus have witnessed a remarkable accumulation of knowledge in the field of evolutionary biology and ecology during the last two decades. From the initial work of biologists and conservationists like Aldo Leopold, Charles S. Elton, Rachel Carson and David Ehrenfeld, a new discipline of “conservation biology” was formalized, trying to unite ecology and evolutionary biology - with a mission to conserve biological diversity. To a large extent the discipline was founded as a marriage of natural science and nonhumanistic values (Ehrenfeld 1981). This new discipline played a crucial role in establishing the political concept of biodiversity, notably through the 1986 U.S. National Forum on BioDiversity and the U.N. Global Biodiversity Strategy at the Rio Earth Summit (Tacaks 1996). But the primary objective of most biologists was still the loss of biodiversity through the loss of species; the intrinsic value of biodiversity could thus be used as an argument for protection of particular species. This was particularly pronounced in the temperate regions where a species approach to the conservation of biodiversity still is defended, while in oceanic and tropical terrestrial systems, the direct management for biodiversity is now seen an advantage as it allows for a broad range of conservation goals and take into account political and ecological uncertainties (Franklin 1993, Murphree 1993, KWS 1994). On the whole therefore, evolutionary biology and the launch of the biodiversity concept has taken the issues in current biological discourse from the struggle for endangered species to the larger discourse of biodiversity of ecoprocesses, ecosystems and habitats with a high degree of connectedness between these. It has thus also extended natural science into realms of politics, economics, ethics and religion and provided a humanistic - or even anthropocentric rationale for conservation that the conservation biologists might find uncomfortable.

But once created, keystone concepts like biodiversity take on a life of their own, especially when faced with real-life situations where application and modification is necessary. New values are also crafted on to popular concepts; the Rio Summit did for instance link Cultural Diversity closely to biodiversity, where particular indigenous groups were portrayed as “the true guardians of biodiversity”. While some advocates of cultural diversity denounce such links and describe biodiversity advocates as «imperialist ecofascists» who are insensitive to the real need of indigenous peoples. A more interesting case for our purpose here is the development of “restoration ecology” where destroyed or “oversimplified” habitats are enriched by way of human interventions. This is increasingly done by increasing the variety of species, both plants, insects and animals to build up complex plant and animal communities. Early on it was believed that introducing elements of wilderness into the human landscape would secure the stability of the ecosystem communities. This diversity-stability hypotheses was used by conservationists as scientific justification for total protection of habitat, even the most “useless” of species had a direct purpose in contributing to stability. Later scientific advances has disproved the simple diversity-stability hypothesis, in open systems with opportunist organisms there will never be stability - or ecological balance. But the ecological dynamics in the form of cycles will to some degree be more dampened by each other the more cycles that are at work in a particular ecological system (Holling 1996). It is the interplay of the ecological dynamics of these cycles and the social processes of political ecology which is the most challenging field of environmental studies today.

A basically uncertain dampening effect from a multitude of cycles is the major benefit of biodiversity, both in the managing of wilderness like National Parks, of cultivated landscapes like forests, fields and pastures, and in the restoration of diverse landscapes and habitats. Thus restoration ecology becomes even more complex and because of the dynamic character of ecosystem functions, it becomes fundamentally more uncertain. This requires in turn more scientific monitoring, synthesizing of field data and modifying new interventions, and yields job opportunities for young ecologists. Thus social and political actions to restore ecosystems are increasingly dependent on scientific ecology to provide the scientific facts to govern the restoration and enhancement. And to an increasing degree the ecological uncertainty requires the helping hand of more trained young ecologist to carry out the tasks. In this important field therefore, evolutionary biology as a scientific discipline assume control over its former object of study, evolution itself. Some fundamental scientific question thus arises, not only the previous question of which ecology is desirable, but also of which evolution is desirable (Turchin 1977). In this respect, some of the original objectives of conservation ecologists for introducing the biodiversity concept are turned around; Biodiversity has its own ways, it is now moving from a goal to be achieved to a tool to be employed to reach other goals.

Increasingly, more of the modern state's agents are young, trained ecologists rather than foresters and agricultural extension workers. Their field operations are highly visible to local communities and their members. Whether they introduce new predator insects to save a forest from attacks by bugs, or track wolverines with radiocollars, it speaks of spectacular scientific achievements. Seeing the laboratory experiment moved to their own forest is a powerful symbol of a modernity which community members want to be part of, even indigenous people want to be modern in that respect. In most western countries, the important "wilderness" areas are now closely monitored by state field biologists and ecologists: Virtually all the protected large predators, e.g. wolf, bear and wolverine have radiocollars and are radiotracked continuously. All offspring are registered and in most cases examined, weighed, vaccinated and earmarked. Lynx is tracked on snow from the air and their litters are registered. This is done mostly for scientific and stock management reasons, in order to gather data about their behavior, their preying habits and their reproduction success or failure. Thus the ecosystem functions of growing numbers of predators can be monitored and explained. But the research methods can also be used to protect the "state predators" against private human predators; the radiocollars have certain "death functions" that can aid the criminal investigations in case of illegal killing of an endangered specie (McNamee 1997). In most countries the radio-tracking of predators are done by field ecologists or their assistants, and the data of their whereabouts are kept secret from the local people and livestock owners in the area. The rationale for this is that in most predator reconstruction areas the conflict level is so high that any leak of information about the predator's whereabouts is considered a risk to them. Sheep-owners and reindeer owners on the other hand claim that such updated information would be of great help to them in making their herding operations more efficient. However, the state field ecologist and the state wildlife managers do not trust these arguments and claim that the livestock owners real intent is to use this information to kill the protected predators.

The sociology of field ecologists in rural communities is easy to understand, both their protective attitude, their feeling of property rights to "their" predators and their sense of mission in the service of biodiversity. And the sociology of resource dependent rural communities is even easier to understand. Here the symbols of state supremacy that the state's agents are displaying

are all too visible for the members of the local community, the collared and eartagged predators tracked by hi-tech equipment and methods out of bounds to local members of the community. This is the core of the “environmental backlash”, which in many regions in the world is not about the local peoples opposition to predators and enhanced biological diversity, but opposition to the image of the state as it appears through its agents (Sørli 1998). The success of the Nez Pierce tribe in Idaho in its reintroduction of wolves is partly ascribed to the absence of federal interference in local affairs. According to Ed Bangs, the coordinator of the USFWS wolf recovery program: “ if you remove the fed, you remove a lot of the anger” (Rembert and Motavalli 1998).

But in the long run a more powerful symbol might be the radiocollar itself. A collared wolf or bear is no longer the archetype of the wild nature, it is the strongest symbol of a rationalized and disenchanting nature, where humans are in complete control of ecosystem processes like predation levels and reproduction rates. Even the rationales increasingly used in the biodiversity debate: the usefulness of every cog and wheel in the ecological machinery, map out a rational role for predators. Their role is to keep wild herbivores in good demographic shape and good health and condition their flock structure and grazing behavior in accordance with what they were selected for. This was the rationale for reintroducing wolves in Yellowstone Greater Ecosystem, which was widely accepted by modern citizens. Thus predators become useful, not useless, in the terms of modern rationality. And with the right scientific input and appropriate technology they can most probably carry out the wildlife management tasks more efficiently and at a much lower cost than human wildlife managers and hunters can ever achieve. The predators work hard for their food, some of them all year round. This argument could even be taken to the field of open range livestock management, where a pack of wolves could be more efficient managers of a pasture than overstocking and disorganized livestock owners, thus avoiding the “tragedy of the commons” altogether (Hardin 1998).

But even if this “rational” picture of the formerly mysterious predator was not the one conservation ecologists wanted to promote, it has increasingly through their mission for biodiversity become part of the Socialized Nature for present generations. According to Ulrich Beck, this is an irreversible process, once you put the radiocollar on the wolf; there is no return to a re-enchanting nature (Beck 1994). Thus the biodiversity argument also carries in it the transformation of Nature into Explained Environment, as a concept which is no longer in opposition to Human Power (Giddens 1994). Some conservation biologists will object to this interpretation and seek to remove the collars from the wolves, delete them from the list of endangered and protected species and promote ordinary hunting of the still mysterious wolves as a management tool. But is already too late, the collared and humanly dominated predator has already entered the modern mind.

The man-made wolf: reintroduced, radiocollared, vaccinated and protected, might therefore become the symbolic vehicle for a necessary devolution of biodiversity management from the level of the nation state to the community level. In western countries, Community Based Wildlife Conservation Programs (or Communal Areas Management Program for Indigenous Resources - CAMPFIRE) can never be successful as long as the nation state is managing the top predators. But now the field ecology methods and their rationales, already developed by the agents of the state, can enable local communities to track and monitor its own “community predators” who are doing a useful job for the community wildlife. Empowered with the new electronic information of the exact whereabouts of predators, the community herders can also herd more efficiently and choose the right night fold for their sheep. And empowered with good

predator behaviour data, the livestock owners can also choose the right kinds of livestock with optimal predator escape properties relative to their economic profitability. A social contract of preventive herding and restraint from killing useful predators as against ecologists' co-operation and information on their whereabouts is not very difficult to strike at the local community level. To the extent that devolution is dependent on credible technology and trust between governing levels, the scientific and technological advances in field ecology has increased the possibilities for modern local management and enhancement of biodiversity. The remaining question is whether the institutional conditions are just as favorable for a reversal of the environmental backlash?

State predators and private sheep

Endangered wild species have for 100 years been an important part of the international environmental discourse. As mentioned, this is now institutionalized in a number of conventions and treaties, among them the Bern-convention, the Biodiversity Convention and the Washington convention (CITES). In most of the countries that have ratified these conventions, parliaments have passed legislation that protects endangered plants and animals and have stiff sentences for the willful killing of endangered species. Almost without exception, the responsibility for protecting endangered species is placed at the national level, usually with a government agency heavily influenced by professional wildlife biologists.

But also the health and life of domesticated animals is protected by international conventions like the European Convention for the protection of Animals kept for farming Purposes (European Council), and by national legislation regulating animal health and welfare. In addition there are international conventions that protect the material basis for the culture and economic life of indigenous peoples and tribal peoples in independent countries, like ILO-convention no. 169. Many of these local and indigenous groups live off hunting and trapping of wild animals, some of which could be on the list of endangered or threatened species. And many of these depend on the herding of livestock that is prone to predators - also on the list of endangered species. Although the sheep and the goats as well as cattle and reindeer are private property, the responsibility for research and development of animal husbandry is vested in state institutions, usually dominated by veterinarians, geneticists and agronomists.

Taken together, these international environmental obligations places responsibility on the states that ratifies the conventions to protect both endangered wild animals and their natural habitats, to protect domesticated animals kept for farming purposes and to protect the material base for the culture of indigenous peoples. In the case of endangered species of predators, this places the modern state in a number of difficult dilemmas that, if not handled properly, can undermine the legitimacy of both national and international environmental policies. Predators, like bears, wolves, lynx and wolverines are in their natural state opportunists who kill the most easily accessible prey. Among these are often sheep and reindeer kept by farmers in small and economically vulnerable mountain communities and by indigenous peoples who rely on pastoralism as the material base both for their economic and cultural life. And we have seen how the state-induced modernization of animal husbandry has made this increasingly more predator-prone. It is then quite obvious that it is a serious dilemma for the modern state to protect the domesticated animals and the local and indigenous communities from the same predators as it is also protecting, in many cases from angry sheep farmers and reindeer herders who want to exterminate predators. And at first glance there seems to be no simple, rational solution to such

dilemmas. The impotence of many modern states in providing workable and legitimate solutions to these problems also have the effect of pitting the urban and the rural part of the environmental movement against each other as antagonists. And unresolved dilemmas like these leads to the growth of anti-environmental political factions, which is also a facet of the “environmental backlash”.

Of major relevance in an institutional analysis of governing biodiversity, is also the political reality mentioned above, that for the past 200 years and until the 1970s, the states themselves have been promoting the eradication of predators (“varmint”) through various incentive systems and state agencies. Behind both the Norwegian state-induced bounty systems of 1730 and the more officious U.S. Division of Predator and Rodent Control in the 20th century (Dunlap 1988), there is a coherent pattern of thought that places responsibility on the state for the enhancement of nature for the benefit of humans. This enhancement meant creating a coherent pattern of thought related to “destruction of worthless wildlife” and promotion of “beneficial wildlife” and human cultivation and pasture for domesticated animals. Such a pattern of thought is definitely modern in its origin, spearheaded by the Enlightenment in the 17th. Century and entrenched by the enclosure movement and the privatization of rural Europe in the 19th. Century. To depict private sheep-owner’s, reindeer owner’s and cattle rancher’s urge to kill off predators as traditional values and sentiments is therefore incorrect; it is at most a cultural survival of early modern state policies and its corresponding institutionalization.

And what make the predator policies of the 20th century state even more precarious is, as we have mentioned earlier, the long term and heavy involvement of the state in the modernization of animal husbandry. This was conditioned by a predator-free environment in which improved breeds could grow more meat faster and yield more milk and not waste energy on horns and defensive behavior. We have also seen how a predator-free environment allowed more offspring per mother animal and more efficient grazing in abundant mountain pastures as strict flock behavior was no longer essential for survival. A number of these modernizing efforts in animal husbandry are so heavily institutionalized in government departments, research programs and professional associations that they have tended to go on long after the environment has changed and predators have returned to the pastures. Even after the Endangered Species legislation has protected predators for over 20 years, the economic efficiency norms for yields in animal husbandry and farm support programs, and the slaughterweight-price brackets do not reflect the changing environmental conditions for open pasture management. Also the extensification and growth in herd sizes have continued, so that for instance the number of sheep on summer-pasture in Norway has grown from 1,7 million in 1974 to 2,5 million in 1995. Until recently, also the herd sizes and total numbers of reindeer have grown. With this simultaneous growth in open pasture livestock as well as in predator stocks, it is obvious that encounters between livestock and predators will increase. Thus the number of sheep in “predator prone herds” increased from 9% in 1993 to 14% in 1995. After 20 years of protection of endangered species of predators, the sheep farmer and Sami reindeer owner are therefore caught even deeper in what we have called the “modernity trap”. There is hardly any “traditional” knowledge left of predator-proof ways of pastoralism that can be turned to and the state protected predators are blocking the way for a continuation of the past 100 years of state-initiated modernization of the animal husbandry. This breeds frustration and antagonism towards both predators and state agencies.

Most states acknowledge that the conflict level between environmentalists and livestock owners is too high in a number of areas of predator reconstruction. This is the case both in

Germany, Austria and Italy where wolves are returning, in Switzerland where lynx is reintroduced, in Northern Scandinavia where bears, wolves, wolverine and lynx are restored, and in USA where wolves are reintroduced into the greater ecosystem of national parks (Kvaalen 1997, McNamee 1997). But because the property rights related to the new concepts of ecological resilience are still largely unspecified below the national level and the rights and duties related to maintaining or increasing biodiversity are not allocated, most of these states are also unable to solve such fundamental conflicts. A fundamental question, which we shall return to later, is whether ecological resilience is best regarded as a public property and thus the prerogative of the nation state, or as a common property for a limited group of heterogeneous users, e.g. nature watchers, hikers, livestock owners, loggers and hunters, who then have to work out and enforce a way to govern this resource. But for most states, when they are unable to solve such fundamental conflicts, they employ the second best strategy, which is to “dampen the conflicts”.

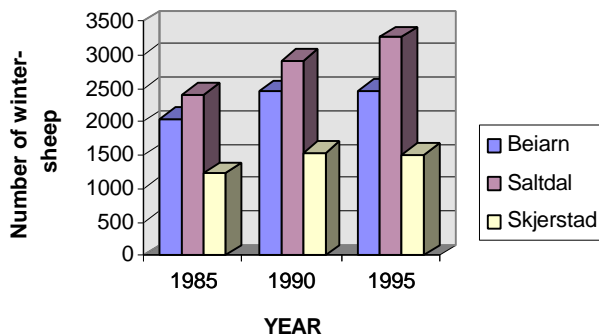
Norway has recently revised its official predatory policies and we shall here use Norway as an example of the inability of a modern state to solve problems that by many are seen as typical postmodernist problems as they seem to transcend the conventional rationalization of the modern age (Bauman 1992). By others these problems are seen as typical post-environmentalist problems, as they do not easily lend themselves to conventional environmentalism in the form of a collective mobilization for a cause, but rather restructures the public discourse into a “political ecology” - a public debate of what kind of ecology is desirable (Eder 1996). Norway is an example of the latter. In 1992 Norway entered a new amendment to its constitution, whereby “Everyone has the right to an Environment that secures Health and to a Nature whose Productivity and Diversity is maintained” (§110b). Thus biodiversity is constitutionally guaranteed as a specific right for humans (both present and future generations) to enjoy a diverse nature. But the actual governing of one crucial aspect of biodiversity - its predator resources - is much less clear cut, as it consists of a mixture of legal measures, territorial differentiation and negotiated compensatory arrangements. There is no specific Endangered Species Act, but the general wildlife law is protecting all wild animals, unless it is specifically opened for hunting or trapping in the law itself. Individual predators can thus be killed if caught “red handed” in the act of attacking someone’s livestock - and then only by the owner of the livestock (§11). An individual predator can also be allowed to be killed if it can be demonstrated that it does repeatedly kill livestock, i.e. is a “malicious predator” (§12). These punitive measures (called “damage controls”) are strictly administered and the “permit to kill” is restricted to a specific individual predator, to certain pastures and for a limited time period. A clever predator, although a culprit, might thus escape from its own execution and become a free and protected predator again. Wolves, bears and wolverines, are endangered species and before damage control measures are allowed, it is compulsory to try out a number of preventive measures, like sedating and moving the predator, move the reindeer to another area, gather the sheep in night pens, terminate the summer pasture or to post herders and/or watch-dogs. These often require evaluations where biological and ecological concerns are opposed to husbandry operating concerns or private economy concerns.

Regulatory hunting is also allowed in the law, this is done by license-hunting for wolverine and by quota-hunting for lynx ((§ 9,12 and 35). In both cases the purpose is to reduce the stock of predators in order to lower the predation pressure on livestock, especially in areas outside the primary living areas for the particular species of predator. A precondition for such hunting is that the stock of predators is generally healthy and that there are reported incidents of predation in the area. A quota would specify the age and sex of the animals that can be hunted, thus adding to the

modern “management of the rebuilt predator stocks” .The hunting season is generally short (2-4 months) and the quotas are seldom filled, from 1993 to 1997 only 271 out of the allowed 350 lynx (77%) and 30 out of the allowed 51 (58%) wolverines were killed. By administratively adjusting the generosity of the damage controls and the extent of regulatory hunting, the wildlife department can to some extent differentiate the management of predators according to predation levels, winter pasture conditions (reindeer) - and political sentiments in the affected rural communities.

But predators cannot be confined to the limited size of National Parks; both their hunting strategies and their territory-formation instincts demands much larger areas. Thus Norway in 1992 introduced a zoning measure in the form of a new territorial category called “core areas for predators” (primary living areas) in order to be able to differentiate the management of each of the large predators. So far, “core areas” of considerable size are established for bears and wolverine, lynx have healthy stocks in most areas and are efficiently managed by quotas, while wolves are still too scarce to warrant their own “core area”. Inside the “core areas” the predators shall enjoy a stronger protection than outside, and inside the core areas the potential for contact between livestock and predators shall be reduced also by changes in animal husbandry of sheep and reindeer (St.meld. nr. 35 - 1996-97). However, it is only predators in these areas that can be given differential treatment by the wildlife department - with bases in the wildlife laws, otherwise the areas are like any other area in the country. The principle of different protection levels in different territories is acknowledged by the Norwegian Parliament, which is the only elected body with powers in relation to biodiversity. But the areas themselves are only administratively designated and delineated, their borders are not decided by any legislature and the have no different legal status from that of other areas. Thus the pasture rights in these areas are not revoked or bought off, and in fact the number of sheep has increased in many “core areas”. In the three major “sheep-municipalities” in the “predator core-areas” in Salten (Nordland Province), the number of winter-sheep has increased by 20-35% in the period 1985-1995, compared to an average national increase of only 5% (Figure 3.).

Fig. 3: Growth in number of winter-sheep in "predator core areas" in municipalities in Salten



Source: Stortingsmelding nr. 35 1996-97

The private decisions that lead to increased sheep numbers are complex decisions that involve both operational convenience, investments and other sunk costs, income combination opportunities and government support programs. But at the same time as sheep numbers have grown, it is admitted that “modern” animal husbandry has become increasingly more difficult in these areas with strict predator protection. These are however perceived as “collective problems” that are handled through the Farmers’ Associations in negotiations with the state and by lobbying members of parliament (Blekesaune and Stræte 1997). “Modern” animal husbandry has also become more difficult outside the “predator core areas”. Despite the size of these areas, endangered species of predators wander outside these and have to be protected there as well, thus disrupting the whole idea of differential management model. This sums up to an institutional ambiguity that deepens the conflict and adds to the frustration of both sheep farmers and wildlife biologists. In the parliament a small majority in 1997 decided to continue the administration of predators by “core areas”, while a large minority wanted to abolish them as inefficient institutions (Innst. S. nr. 301 - 1996-97).

Because the “new” ecological policy related to predators is perceived as a public policy with a detrimental effect on privately owned livestock, a policy of compensations for predator-killed livestock has been in effect since the protection of predators started. This has been a rather cautiously managed compensation program, as the criteria for documentation of predator killing has been strict in order to weed out “background mortality from natural causes”. Still, only 15% of the compensations are for documented predator-kills by clearly identifiable cadaver, the rest is to livestock deaths with a “high probability” of predator involvement. There has also been a tacit reluctance in the administration towards generous compensations that could act as incentives to speculative herd expansion in predator areas and carelessness in the tending of animals. Thus the compensation has been restricted to the slaughter value plus the breeding value for certain categories of animals. Still the public expenditures on predator-kill compensations have soared in later years and parliament has had great difficulties in budgeting the “predation damage” correctly. The number of compensations for killed sheep rose from 10.938 in 1992 to 23.650 in 1996, the number of reindeer compensations rose from 2.185 to 8.335 in the same period (St.meld. nr. 35 (1996-97)). Altogether 40 mill NOK (\$5,5 mill.) is paid in predator compensations annually, this covers about 60% of the applications from livestock owners.

An additional problem is the bureaucratic problem where the compensation decision have to be a subjective evaluation under difficult conditions, where applicant and administrator often have sharply opposed views, both on what actually might have occurred in the pasture and on crucial issues in ecological policy. The wildlife administration therefore wants more specific, “objective” and detailed rules which can protect the individual officer against charges of arbitrariness (St.meld. nr. 35 1996-97). Livestock owners have complained that compensation was “too little and too late” and that all the extra paper work connected to documentation of predator-kills and applications for compensation, was not fully compensated. And livestock owners claim that their goal is not to make a living from compensations, they are fundamentally against raising sheep in order to feed bears, wolverines and lynx, even if they are paid for it. Therefore, their solution, to kill predators, will be much cheaper for the taxpayer. And the Parliament, impotent in addressing the underlying constitutional dilemma between rights and duties related to maintaining and enhancing biodiversity, was only able to decide on increases in the compensations to cover all costs, including consequences for breedstock, loss of weight from predator disturbance and additional labor spent on guarding, herding, search for preyed livestock

and documentation/application for compensation. In addition, Parliament has also decided that wildlife legislation in the future shall include the right to full compensation for livestock damage done by protected predators, and from all secondary consequences thereof (Innst. S. nr. 301 - 1996-97). Thus we find that 250 years of state initiated predator eradication programs and 60 years of state supported modernization of sheep and reindeer ranching in a predator free-environment results in large public expenditures to cover all private costs of “return to the natural state”. With a continued unmanaged growth in numbers of private sheep in “predator core areas” and an unchecked additional growth in state predators due to rural depopulation, reforestation and a dramatic growth in wild herbivores, such a rights based compensation system can become a very expensive way to maintain biodiversity, although an easy way out for legislatures. In fact, a postmodern opportunity of raising sheep and reindeer in order to feed expanding predator stocks that can re-enchant the mountains and forests for the expanding European adventure tourist industry, might despite all claims of the contrary, become an attractive way of making a rural living. But as we shall see, that is a far cry from the fundamental objective of maintaining biodiversity in order to increase ecological resilience.

Aware of the inherent dangers from the “wrong” incentives of generous compensation scheme, the wildlife department has made great efforts to make compensations for predator-kills conditional. In the “predator core areas” the government (the wildlife department and the agricultural department together) proposed that compensations should be made more dependent on the willingness of livestock owners to employ preventive measures and to transform their operations into a less predator-prone animal husbandry. This was considered crucial as Norway had the highest loss of livestock per living lynx, wolverine, bear and wolf in its territory in a comparison of 11 European countries. The main reason for this poor performance was the development of the most “modern” sheep ranching in Europe, where unflocking sheep are allowed to graze unherded and untended in mountainous and forested areas. For reindeer herding, which utilizes all-year pastures, there is widespread agreement on the preventive measures mentioned above. They are to keep the reindeer in the best possible physical shape through ecologically sound stocking and herding strategies relative to the carrying capacity of the most crucial pastures. Strong reindeer in an efficiently structured herd in open mountainous landscape is not particularly prone to predators. Only in some areas with a high proportion of mountain forest cover will it be necessary with an intensification of reindeer husbandry; with smaller herds, lower degree of mechanization, higher degree of domestication and more efficient and directional herding (St.meld. nr. 35 1996-97). For sheep, however, the situation is much more difficult, as the “modernity trap” makes the sheep farmers unable, or unwilling, to transform their extensive ranching system into more intensively herded operations. The government proposed a large number of measures to make sheep farming in “predator core areas” less predator prone. They were all based on a continuation of the zoning management model; outside the core areas, extensive sheep ranching could continue as before (St.meld. nr. 35 1996-97). Among the proposed means were:

- reduction in number of sheep on pastures in “predator core areas”
- intensive and directional herding of sheep, with both herders and herding dogs in “predator core areas”
- managed pastures use with fencing and special night folds in “predator core areas”

- enforcement of standard criteria for required intensity of monitoring of sheep as a condition for compensation for predator-kills in “predator core areas”
- transfer to other, more predator-resistant breeds of sheep, goats or milk sheep in “predator core areas”
- transfer to other productions than sheep husbandry, e.g. milk cows, in “predator core areas”
- transfer to predator-free pastures for parts of the grazing season, or earlier gathering of sheep from summer pastures (especially in wolverine prone pastures)
- changes in production cycle, i.e. early lamming and early slaughter to avoid heavy autumn predation of bear and wolverine in “predator core areas”
- technical protection like nylon necklaces, predator repellents etc. (especially in lynx prone pastures)
- eradication of predators in animal husbandry areas outside the “predator core areas”
- strict regulation of predator stocks in “buffer zones between “predator core areas” and non-predator areas.

Taken together, these proposals amount to a full restructuring of animal husbandry in “predator core areas”, with a fundamental intensification and domestication as a guiding principle. Research on predator resistance in small livestock have started after a long delay. There has even been organized contests between various sheep-breeds to decide the most predator-robust sheep - a contest that was won by the “Wild Sheep” brand (Nationen 1998). And some eager farmers do undertake experiment with new breeds and new husbandry techniques. But the crucial question is whether this is regarded as a return to more traditional and labor intensive husbandry practices, or whether it can be regarded as a further “modernization” of agriculture - towards an ecologically adapted animal husbandry. For sheep-farmers and their associations, most of these proposals are perceived as only costly images of a return to more primitive forms of animal husbandry. For them the modern solution is still to eradicate predators and the last 250 years of modernization of animal husbandry is perceived as an irreversible process. Despite the importance of preventive measures and structural changes in animal husbandry for the long-term solution to the predator/livestock dilemmas, the Norwegian Parliament did not manage to make policies on this issue. The only reference they have to the extensive section on this in the government proposal is the following:

“The majority of the committee, all except for the members of the Labor Party, is opposed to the financing of preventive measures through the yearly negotiated agricultural support agreements between the state and the agriculture/reindeer associations. It is not correct that the livestock industries shall be burdened with the costs of the predator-policy that is decided by the state. The majority therefore asks that all expenses for preventive measures that are consequences of the current predator policy, is to be financed over the budget of the Ministry of Environment (Wildlife Department)”.

Since 1992, the budget for “preventive measures against predator damage” has increased from 7 mill. NOK to 20 mill NOK, with a more and more even distribution between the Wildlife Department and the Agriculture Department (10+10 mill in 1998). This ensured the cooperation with the agricultural extension services in face of the desired restructuring of animal husbandry in “predator core areas”. In the absence of all other policy directions on preventive measures to limit

predation of livestock and thereby limit compensations, this signal from parliament now makes it the responsibility of the Wildlife Department alone to obtain budgets and carry out the restructuring of the livestock industry in the “predator core areas”. Without the direct access to the agricultural extension services, and all the supporting institutions surrounding agriculture and livestock, the Wildlife department will not be as efficient in its restructuring efforts as the continued joint undertaking would have been. With the fundamental skepticism among sheep-farmers to both the Wildlife department and to any idea of “returning to old fashioned herding”, this policy change will run the risk of slowing down the necessary structural and institutional changes and maintain the high compensation expenditures for a long time. And the policy missed an opportunity to constitute fundamentally new institutions for governing human relations to nature, an issue we shall return to towards the end of this paper.

A recent analysis of the Norwegian “Predator Discourse” (Blekesaune and Stræte, 1997), sees the struggles over Norwegian predator policies as a battle between 4 different “management ideologies:

Two “expert-oriented” ideologies:

- an agrotechnocratic industrial ideology based on private enterprise, and
- a field ecologists’ management ideology based on public management responsibility

Two “egalitarian” ideologies:

- a liberalistic, free enterprise ideology based on private property and the management rights of livestock owners to areas where they have pasture rights, and
- an ecophilosophical ideology based on a common management responsibility for our common genetic resources.

The logic of the discourse is that proponents of these ideologies argue against each other in order to catch as much public attention as possible, and that this decides the outcome of the discourse. Thus the “expert” ideologies have the ear of the administration, while the “egalitarian” ideologies have the ear of the Parliament and local government in the rural areas. The Department of Agriculture, which used to be dominated by the agrotechnical industrial ideology has joined the field ecologists’ management ideology, while large part of the extension services and the decentralized agricultural administration are still proponents of agrotechnocratic solutions to most problems (Blekesaune and Stræte, 1997).

The analysis is interesting, but it misses some crucial points about the dynamic character of the interplay between ecological processes and public opinion processes, made in the earlier sections. Crucial among these are the trust and the reputation of the agents that shall implement the structural changes among private livestock owners that their principals wants. As traditional knowledge of livestock herding strategies in predator prone pastures have died out as a consequence of the lengthy modernization process, the livestock owner must be convinced that the experts’ preventive measures give the expected effect. Government subsidies are not sufficient, maybe not even necessary in this kind of evolutionary process. In modernized agriculture it is above all the quality of the agrotechnical and biological knowledge itself that decides success and failure, not the degree of public attention of its accompanying ideology. And despite the prominent place of preventive measures in government documents, few of them were proven in similar ecological settings and few of them has had any significant acceptance and

success. Apart from the transfer to dairy cattle and the removal of sheep from pasture in early autumn, most proposed operational changes cannot yet demonstrate significant effect and profitability. More scientific and experimental work, involving sheep farmers themselves, need to be done in order to demonstrate convincingly effective herding systems, effective technical protective measures and real predator-resistant breeds of sheep to reluctant livestock owners. In addition it is necessary to develop supporting institutions for advice and profitable marketing of “predator friendly products”, which would otherwise lose in the competition against the more meaty lambs marketed from areas outside the “predator core areas”.

Modernization of agriculture seems to be irreversible, with no traditional past to turn to. More resilient animal husbandry therefore means further modernization of livestock operations, but a modernization with a fundamentally different content. But unless massive biological, ecological and agrotechnical research effort is supplied by the state for the adaptation of such preventive measures in predator prone areas, the one modern solution to the predator problem will be an increasing separation of predators and livestock, in line with conservationists ideas of human relations to nature. This might again affect basic ecological dynamic processes, in the form of rural depopulation, reforestation of cultural landscapes, growth in certain species of wild herbivores and subsequent growth in stock of predators and further expansion of these outside the “predator core areas”. This would support a postmodern view of nature; That even with strict state - or community control of predators, a relaxation of human control over nature in the form of less physical settlements, less cultivation, less grazing and less varmint hunting, causes nature to take back its own control over nature. This is what is often called the re-enchantment and re-spiritualization of nature (Bauman 1992).

Towards local self governance of biodiversity

Can these experiences from the Norwegian Predator policy debate be of some help in a general discussion of the institutional foundations for governing biodiversity and aid us in understanding the institutional consequences of recent advances in evolutionary biology and ecosystems research? We have shown the difficult dilemmas a state encounters when it takes on obligations to the international community of maintaining biodiversity in its territory. And we have shown how many local communities in the modern world are prevented or not able to apply traditional ecological knowledge and eco-practices evolved over centuries - as the case still is in many developing countries (Berkes, Folke and Gadgil 1995). With the help of both science and the state, 250 years of modernization have involved them in practices of agriculture, animal husbandry, fishing and aquaculture that reduce biodiversity and weakens resilience. This means that most modernization results seem irreversible to local community members and they easily find themselves in a “modernity trap” when a continuation of this rationalization process is constrained by modern national or international environmental policies.

But before proceeding further, it is important to understand that the crucial idea of biodiversity is not that predators shall kill sheep. Although there are some theoretical foundations for an ecosystem function for predators in preventing any single specie of herbivores to become too dominating, this can hardly be extended to sheep, which without the help of humans would not have survived the northern winter at all. When humans thus are necessary to help the sheep survive the natural dangers of winter, humans also have a moral obligation to help their private sheep against the natural dangers of predators by herding and guarding. If the strategy of creating

predator-free areas is closed by the state, the alternative strategy of improving the predator resistance of sheep through breeding for faster escapes and better flock affinity, must also be actively promoted and supported by the state, rather than it increasing the budget for a passive compensation scheme for predator killed sheep.

But as mentioned briefly above, the biodiversity principle specifies a rational role for predators, especially for top predators like wolves and bear. That role is to keep a constant check on the wild herbivores, not only on their absolute numbers in relation to available pastures (regulatory role), but also on their demographic composition (selective predation role) and their adaptive behavior in the ecosystem (conditioning role). The predator does this by constantly weeding out weak individuals so that the total herd optimizes its health and its reproductive and defensive properties. And by the continuous presence in the pasture, it maintains a pressure on both individual and flock behavior of the herbivores that is identical to that of the natural selection mechanisms through the evolutionary history. Thus it conditions and disciplines also the behavior of the herbivores (Holling 1994). In this way modern ecology provides a modern rationality for predators; They are well equipped to do part of the operational work in the management of wild herbivores and the wild vegetation that is their pasture, keeping both the grasslands and the grazing areas in good shape for us humans. This job the predators will do more efficiently than any human organization, and in most cases at much lower costs. Provided the human predation on herbivores through managed hunting is not in contradiction with the selection strategies of the predators, the presence of predators have a beneficial effect on wildlife and they can therefore according to these principles act as efficient co-managers together with humans in modern systems of scientifically based wildlife management.

In the Norwegian predator debate, the biodiversity argument has been used by pro-predator organizations in order to establish legitimacy for extensive “predator core areas”. However, this failed, largely because maintenance of biodiversity was presented as something of common interests to the whole society, an abstract construction that few could identify with (Blekesaune and Stræte 1997). On the other hand, the biodiversity argument used in the debate over the re-introduction of wolves to Yellowstone National Park was concentrated on the beneficial effects of top-predators like wolves to the Greater Yellowstone Ecosystem, which was plagued by overgrazing from the unchecked expansion of elk, moose and bison and a proliferation of less efficient predators like coyote (McNamee 1997). This proved to be a much more efficient argument than reference to biodiversity as a general desirable goal. Thus the politically difficult return of the wolves to an area where they have been extinct for 60 years, has been a success. One reason why it is difficult to appeal to the abstract concept of biodiversity directly in the public debate is as shown above that the biodiversity/resilience paradigm is challenging some fundamental patterns of thought characteristic of a number of entrenched institutions of the modern age. As soon as the debate goes beyond the simplistic notion that diversity is a good thing, it therefore stimulates widespread opposition from affected groups of organized interest to most implications of the biodiversity/resilience paradigm.

Studies of how biodiversity is introduced and opposed in public debates on the governing of renewable biological resources, therefore forms a fertile ground for reformulation of some present institutional rationales and investigations into some possible new alternatives for organizing societal relations to nature. There is only room for a short exercise here, but it can serve as an illustration of the analytical potential of these concepts in social science:

In the western world we find that social organizations that are based on either early modern or late modern ideas of human/nature relations have coexisted for a long period and that the continued modernization has not left old patterns of organization behind - they and their accompanying doctrines are all part of the contemporary institutional web:

Thus we still find among many resource users, 17th century ideas of nature as raw and brutish with a need for human management and enhancement, and for a “rationalization” of nature that includes efficient landscaping, vermin control, pest control and the eradication of all competing predators. A number of arguments in the Norwegian predator debate are based on this kind of ideas, notably from farmers, livestock owners and local communities. They claim that the last 250 years of forefathers’ clearing of forests and fields, of settlements that pushed back the edge of wilderness, of pasture enhancement and varmint-control, all this will be wasted if predators are again allowed to roam the forests. From the response in media and in Parliament, such patterns of thought are quite widespread in western populations towards the end of the 20th century.

Thus we still find among many conservationists and urban environmentalists, 20th century ideas of the superiority of an original and untouched nature in ecological balance through succession towards a sustained climax assemblage - based on a notion of a single equilibrium. These arguments have also been frequently used in the Norwegian predator debate, in form of an argument for the intrinsic value of every single species. All species are of equal value in the complex web of life and it is impossible to distinguish between worthless and beneficial wildlife. In a biodiversity perspective they will all prove to be crucial species, it only takes more research effort to reveal their role. It is therefore a need for larger National parks where predators can be protected and live in their natural state and we humans can study how the ecological balances are maintained without the interference of humans.

And thus we also find new ideas originating in the last two decades, which claim that the conservationist’s notion of a unique optimal path to a sustained optimal climax is static and unrealistic and that there are multiple stable states and many alternative paths to the different states. Humans, as adaptive and opportunistic actors, will not have homogeneous responses to disturbances, and have thus around the world set the path for widely different environmental evolutions towards an open future. According to such ideas, environmental change is not continuous and gradual, but both “patchy” and episodic and with destabilizing forces that maintain diversity, resilience and opportunity, and stabilizing forces that maintain productivity and biogeochemical cycles. This necessary interdependency between destabilization and stabilization has been visualized as a general renewal cycle that consists of four ecosystem functions: exploitation and conservation as well as release and reorganization (Holling and Sanderson 1996). These kinds of ideas are also reflected in modern findings that forest fires can be beneficial, that “patchy” cultural landscapes holds a higher biological diversity than uniform “natural” forest and that “refuges” of “wilderness” in a farmed landscape give better disease- and insect resistance than large and uniform farmed fields. Such thoughts, that humans can enhance and utilize biodiversity for their own benefit, e.g. to scientifically fight plant diseases without pesticides, to fight insect attacks on crops with predator insects etc., are also the thoughts at the scientific front in evolutionary ecology. But in the public debate on large predators, these kinds of thought patterns have no attached associations or state bureaucracy to voice their input. And the sciences of associations - sociology and political science - have barely started work on the institutional consequences of the new concepts of biodiversity and resilience as human artifacts.

Both early and late modern ideas of man/nature relationships have been institutionalized in various legal structures and government departments and associations. They are “heavy structures” that are clearly visible both in practical operations and in constitutional debates like parts of the Norwegian Predator debate. With a rich historical and legal “luggage” their institutional foundations can be analyzed:

- In brief, the rural development programs of the last century, which has continued until today in the form of cultivation extension programs, animal improvement programs and forest cultivation programs, are part of a widespread institutionalization of the human urge to enhance nature. Also the institutions of central negotiations between the state and the associations in agriculture and reindeer husbandry have for years been important for shaping the relationships between the rural population and the very nature they are depending on. These early modern ideas of enhancement have, however, been embedded in specialized organizations that have taught enhancement by simplification of ecological relationships and reduction of biodiversity.
- In brief, the institutions supporting the creation of national parks, conservation measures and habitat protection, and all auxiliary institutions connected to the creation of these, are part of an institutionalization of the idea of an untouched nature which strives towards ecological balance. The major environmental organizations and a part of the conservation ecology research community are also part of this institutional family. The creation of larger than national parks - “predator core areas” as management units for intensified protection of predators and reduce contact between predators and livestock are also a logical extension of this institutionalization process. However, this attempt at top-down institutionalization of the sovereignty of nature in large territorial units with people living inside them, naturally feeds counteractions from both these people and from the heavy structures of institutionalized early modern ideas. It is possible that the controversies could have been avoided by negotiated enlargements of bufferzones around existing national parks - in the form of “bio-reserves” (UNESCO 1994), but in many cases the endangered species of predators were not exactly where the existing national parks were.
- In brief, the resilience/biodiversity paradigm is not yet institutionalized in any part of the western world, and there is widespread uncertainty as to what exactly this would imply. Basically an increased resilience against shocks and disturbances, and the long-term survival of the ecosystems which humans are depending on, should be the prime objective for the human governing of resources. This would imply that ecological change is not continuous and predictable, it moves in leaps and bounds and institutions must be able to accommodate fundamental ecological uncertainty. It also means that resources cannot be managed uniformly by fixed carrying capacities for livestock or wild game or by fixed sustainable yields of fish or lumber, this will over time lead to ecosystems that lack resilience and are prone to break-down from disturbances that could otherwise have been absorbed. And as we have mentioned, it also means that human intervention based on scientific knowledge and technology, in fact can strengthen the resilience of the ecosystems by adding diversity to it in the form of plant and tree intercropping, predator insects and birds, rodent and herbivore controlling predators etc. Thus the cyclical fluctuations between the ecosystem functions of “exploitation, conservation,

release and reorganization” are multiplied to such an extent that it gives some appearance of “ecological balance” (Holling and Sanderson 1996). Institutionalizing these ideas would also mean human enhancement of nature, but in contrast to the early modern ideas of enhancement, now by complexifying the ecological relationships and increasing the biological diversity.

One fundamental problem remains before we can discuss the potential for new designs or evolution of institutions for governing biodiversity. That is the question of the role of humans in ecosystem functions and in the process of evolution itself. There are two main positions here, which have been touched on throughout this paper. One is that nature is itself best suited to take care of its own affairs, once we humans leave it alone and protect it from ourselves, it will resume its resilience and evolve towards its own open future. We have termed this “re-enchantment” of nature a postmodern position (Bauman 1992). Another is the position that with 6 billion humans on the planet, we are already the most dominating species ever to have existed. This means that human activities influence the rest of the biosphere to the extent that the biological environment has become totally dominated by humans. And because we depend on the continuation of the biosphere, we have a responsibility to use all the scientific knowledge we have and all the technology we master to maintain or increase its resilience. But still humbly accepting that we do not really know what we are doing. Despite this, this position puts humans as the heads of evolution, which has thus become “cephalized”. It is then up to the total web of living thought - the human sphere of mind (*noosphere*) in which direction they will lead this evolution (de Chardin 1959). Political ecology allows choices both in the direction of simplification and in the direction of complexification of ecological relationships. This position is therefore what can be termed a continuation of the modern position, where rationalization continues, but where the dominating ideas of what is rational keep changing. This position seems at present the one within which appropriate institutions for governing biodiversity can most effectively be discussed.

In broad terms, we can therefore identify two institutional scenarios related to the governance of nature in the modern, hominized world. One is the connected to a simplified nature that has evolved out of the human ideas of rationalization and enhancement of production by eradication of worthless species from the early modern period. The other is connected to a complexified nature that evolves from human ideas from the late modern period - of rationalization and enhancement of resilience by increasing biodiversity.

In the concepts of contemporary ecosystem theory, a **simplified** ecosystem will experience aggravated fluctuations as it moves through the phases of exploitation, conservation, release and reorganization. At some stages large harvests can be made from single resources like cropland, fish, timber, mountain pastures, wildlife etc. At other stages resources “crash” because of disease, attacks by exploiting rodents or insects or because they are overexploited and goes completely out of use until they again are ready for a new release. In terms of institutionalization, numerous attempts at management of sustainable yields for single resources have been tried, most of them by central government departments. Most of these have failed, either because sustainable yields are ecologically impossible for the resource in question, or because the ecological dynamics requires a degree of flexibility and detailed governance which a government bureaucracy cannot gain mastery in. Another form of institutionalization are entrepreneurial models of resource governance, which logically resembles the fundamental model of ecosystem renewal (Holling and Sanderson 1996). This “institution” is well known to opportunist humans through centuries and has been the basis for various “bio-rushes” and resource-mining operations of the past: on the

American bison, on the walrus, on the whales etc. A scientific model for such a social renewal cycle was advocated already by Schumpeter, who saw all collapse as an opportunity for renewal-strategists to reorganize and innovate. Inevitably the epigones will follow the entrepreneurs, institutions will be established to reduce uncertainty and bureaucratic hierarchies will establish themselves and fight for organizational survival, thereby becoming rigid and less responsive to resource dynamics and to the public. The consequence of this is loss of resilience and a greater vulnerability to surprise and crisis; the social organization would thus carry inside it the same logic of embryonic collapse as the modern ecosystem model does. This kind of governance is therefore not long-enduring, it is basically cyclic in its rise and fall, in the same way as monarchies, aristocracies and democracies once were believed to be cyclic occurrences due to the effects of their internal dysfunctions (Machiavelli, 1525).

Still within the concepts of contemporary ecosystem theory, a **complexified** ecosystem will also tend to follow the basic ecosystem phases of exploitation, conservation, release and reorganization. But by human enhancement through increased diversity in the ecosystem, the number of such interconnected renewal cycles multiplies. Thereby they represent “check and balances” on each other and are not allowed to fluctuate so vigorously as they would do in a more simplified ecosystem. This means that the probabilities for the one time bumper harvest or big catch is lower, but so is also the probability for the total crash or disappearance. Thus a complex ecology can, if properly managed, represent both necessary and sufficient conditions for long-enduring social institutions. However, the governing for complexification of an ecosystem, and for running it as “heads of evolution”, places great demands on the human institutional design. For most practical purposes, institutional development for governing resilience/biodiversity would have to be both flexible, adaptive and experimental and take place at scales compatible with the scales of critical ecosystem functions. This means that the level of the state is not a feasible level, neither is the level of the individual farm property. Given the advances in scientific knowledge and the modern monitoring technologies of field ecology, institutions for complex ecosystem governance would therefore have to be worked out at the intermediate levels of municipality and province, depending on the extension of crucial ecosystem functions. But increased local management of biodiversity, e.g. of predator stocks and livestock pastures will also demand technological and institutional solutions that has the confidence of both private livestock owners and community recreational users of nature. Municipalities and Provinces would therefore need extensive help from the state, both from their scientists and from their seed banks and genebanks, where much of the biodiversity is presently stored. And it would need the support of the state, as a democratic and community based application of the biodiversity principle would provoke reactions from both conservationists and their institutions.

The genetic biodiversity resources and the evolutionary mechanisms themselves are basically common property resources, that work best for humans when they are put to work in natural settings. That means not only in the protection of current biodiversity, but also in the enhancement of this biodiversity by actively using the genetic variety stored in genebanks in the practical work of agriculture, animal husbandry, landscape restoration and wildlife management (Takacs 1996). The world wide lessons for governing common property resources, accumulated in culturally diverse local communities through hundreds of years and systematized during the last two decades, can therefore also be used when carving out institutions for complexifying ecology and managing biodiversity (Ostrom 1990). Thus there is an embryonic convergence in the human relations with nature - and our social construction of nature: - from one milestone which is the

early modern attempt to enhance nature -- to another milestone which is the late modern attempts to enhance nature. And the maelstrom is still all about rationalization.

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