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Environmental protection in the theory of commons

Abstract:

The modern and largely academic and urban initiated concern with environmental protection of landscapes, species, watersheds, biodiversity, ecosystem-services etc. are framed by a language suggesting that the main concern is the protection and preservation of precarious resources of common interests for mankind.

Thus the values deserving the attention of environmental protection seem to be very different from the concerns shaping the evolution of traditional commons: the control of access to and extraction of resources seen as limited but essential for the survival of local communities.

The paper will explore the theoretical differences and similarities of the two types of interests driving the concern for preserving values. It will be suggested that a basic difference lies in the distinction between values where there is rivalry in appropriation and values where there is non-rivalry. It will further be argued that in designing new institutions for managing protected areas, an understanding of traditional commons and how the new values to be protected are different from and interact with the old values will be important to achieve sustainability of resource use within the protected areas.

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Introduction

The modern largely academic and urban initiated concern with environmental protection of landscapes, species, watersheds, biodiversity, ecosystem-services etc. are framed by a language suggesting that the main concern is the protection and preservation of precarious resources of common interests for mankind. Thus the values deserving the attention of environmental protection seem to be very different from the concerns shaping the evolution of traditional commons: the control of access to and extraction of resources seen as limited but essential for the survival of local communities.

With a few notable exceptions (e.g. Bromley 1991 and Yandle 1997) environmental protection and management of common resources are not discussed together. The economic theory of environmental problems and policies is usually discussed as a problem of allocating responsibility for externalities (Baumol and Oates 1988, Devlin and Grafton 1998, Sandmo 2000). The environmental problem is described as consisting of the misuse of a resource currently being in the public domain with open access. The solution is seen to be either imposition of appropriate taxes for matching the use of the resource to its capacity, or it is seen as a problem of privatization, to allocate private property rights to the resource in order to achieve the internalization of externalities. However, in recent treatments of “Environmental Economics and Policy” (e.g. Kolstad 2000, Tietenberg 2001) the discussion of property rights is expanded to common property and property rights have become a central concept in the discussion.

The legal discussions of environmental protection are more concerned with balancing rights and duties, but have a very noticeable emphasis on the manufacturing of products¹. Its modern form originates with the need to control toxic and hazardous waste, but have come to encompass all sorts of public interventions to protect bits and pieces of our natural environment, including the much older tradition of protecting particular wilderness areas (Buck 1996, Weale et al. 2000). Other approaches to the environment-society relations including studies of the cultural and material processes involved (Beck 1986, Murphy 1994, Smith (ed.) 1999) would seem to be even further from the theory of the commons.

The present paper will argue that the current theory of commons might easily be expanded to environmental goods and services. This will facilitate the discussion of the interactions and interdependencies between the resources of the traditional commons and the goods and services that are the goal of environmental protection. For the present discussion we will talk about old and new commons.

¹ “The cycle of resources from extraction to recovery is a natural one, but the law’s approach to it is curious. Law generally uses a light hand as resources are taken out of the environment. It uses a heavy hand as resources are manufactured into products.” concludes Breen (1993:70).

Old and new commons

The old commons of North-Western Europe, whether conceived of as lands or rights, are remnants of the pre-medieval land use system where significant use rights were held jointly by the local population and managed by their customs². Access to and use of the commons were significant additions to the outcome of privately held lands, often yielding goods it would be difficult or unprofitable to provide on privately held lands. The landscapes that grew out of this system by way of privatisation, particular usages, and diversification of control are today highly valued and considered both precarious and in need of protection. Today we can see the old commons as highly sophisticated forms of property rights with a social and political dynamic very different from what we might call ordinary individual private property.

One important fact needs to be emphasised from the start of this discussion: there is every reason to suppose that a particular landscape (seen as a culturally and socially delimited area) may hold several and possibly all the mentioned goods and services, old as well as new. There is nothing remarkable in this except that it means many special interest groups have to co-exist within the same landscape, and that every interest group wants its special interests safeguarded. Those with interests in the old resources are protected by property rights. Those concerned with the new resources have turned to the state to get regulations protecting their interests. The remarkable thing is that they often have gotten, at least partly, such special regulations, and without much consideration of possible interactions and interdependencies there might be among the various resources of the area.

A situation with multiple stakeholders within a common area have since medieval times and until the dominium plenum tradition of property rights became dominant been handled as if the group with the highest interest in a particular resource had been awarded property rights to it, and access to legal remedies to sort out the points of conflict among the groups. Unifying the property rights to the resources within fixed boundaries internalised a lot of conflicts leaving only the externalities suffered by neighbours and the questions of justice in relations to those excluded from the land.

But the simple situation was of course too good to last. New problems appeared as new, environmental goods and services were “discovered”. Instead of the multiplexity of property rights relations of the old commons, a separate sphere of environmental regulations was created, either ignoring old property rights or consciously overruling them. Today the fight is about the relative standing of the different regulations. Which bureaucracy is best able to promote its interests?

However, the societal dynamic threatening the old landscapes are often associated with the powers inherent in the recently established dominium plenum private property regime. As urban society has matured and learned more about the goods and

² In English jurisprudence rights of common were said to be rights to remove something of material value from lands owned by somebody else. These rights were called “profits-à-prendre” rights and had to be appurtenant to the commoner’s land. See Lawson and Rudden 1982, and Simpson 1986. Exactly the same definition will cover what in Norway is called “commons” (allmenning). But for the theoretical discussion and for the empirical realities around the world this definition is too restricted. For the purposes here a commons is any area where a suitably delimited group of people, the commoners, have legitimate rights to harvest of its resources or goods.

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services provided by natural ecosystems in their various stages, a new concern about their management has emerged. The goods and services provided by nature and valued by urban society are in some ways very different from the goods and services valued by the owners of the old style commons. But in other ways they are similar. Today’s management concerns are the same: sustainability of resources and distribution of the benefits.

Comparing resources of old and new commons

Table 1 below gives examples of resources found in the traditional commons and resources in need of environmental protection.

Table 1

Examples of resources, goods and services, identified with traditional commons and environmental protection

Resources of traditional commons	Environmental goods and services
<ul style="list-style-type: none"> • Timber, Pasture • Game, Fish • Windfalls, Dead Wood • Shrubs, Herbs, Fruits, Resin • Fungi, Vines, Lichen, and Epiphytes • Insects, Honey • Peat, Soil, • Minerals³ (clay, sand, gravel, stones) • Water • ... 	<ul style="list-style-type: none"> • Environment as sink for pollution (including carbon sequestration) • Recreation (landscapes as settings for non-work activities, routes for transition) • Museum landscapes (protected areas⁴ with scientific values, landscapes of historic interest⁵) • Symbolic values (landscape elements as vessels for local and national cultural identities, heritage sites) • Biodiversity (ecosystems, species, genes, information and existence values) • Watershed protection (flood control, fresh water supply) • Disaster mitigation (land slides and avalanches) • Local soil and climate management (soil erosion, wind chill, water runoff, air quality) • ...

³ In Norway the allocation of rights to metals and minerals with a specific weight of 5 and above (with a few exceptions) are independent of land ownership as determined by special legislation: Act on mining of 30 June 1972 no 70.

⁴ IUCN promotes 6 Protected Area management categories. Recreation is included in the categories. However, it is interesting to note the absence of items like historical monuments or symbolic significance of landscapes or elements associated with landscapes. Presumably this is taken care of by the World Heritage Committee (see note below). The 6 categories are:

- **Strict Nature Reserve/Wilderness Area:** protected area managed mainly for science or wilderness protection
 - Strict Nature Reserve: protected area managed mainly for science
 - Wilderness Area: protected area managed mainly for wilderness protection
- **National Park:** protected area managed mainly for ecosystem protection and recreation
- **Natural Monument:** protected area managed mainly for conservation of specific natural features
- **Habitat/Species Management Area:** protected area managed mainly for conservation through management intervention

We can simplify the table a bit by focusing on the kind of motivations that sustains human activity within the landscape on the one hand, and, on the other, what level of human activity is required to maintain the landscape.

Table 2

Types of goods and services according to human goals and level of human activity within the same landscape

	Landscape require sustained human activity	Landscape require almost no human activity
Landscape produces for export	<u>Agricultural area</u> Agriculture, forestry, other extractive activity	<u>Protected areas type I</u> Ecosystem services, sink for pollution
Landscape produces for consumption	<u>Recreation area:</u> Recreation (all types) Museum functions, heritage symbols, scientific knowledge, experience of biodiversity	<u>Protected areas type II:</u> Existence values: wilderness, ecosystems, biodiversity

In this table the resources of traditional commons all fall within the group where the landscape requires sustained human activity and products in principle can be exported. The new environmental goods and services are of three different types.

Looking a bit closer at the resources of agricultural areas and protected areas of type I (where the products of the landscape can be exported) we can note the following characteristics:

- In general the goods derived from these resources are subtractable (private or CPR goods).
- In a commons the right to enjoy the traditional goods are independent of ownership of the ground. This does not preclude that the commoners may own the ground themselves. But also the right to enjoy ecosystem services (or suffer environmental pollution) is independent of the property rights to the ecosystem.
- The problems of equitable distribution of the goods and of ecological sustainability of the resources are the main management problems.

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- **Protected Landscape/Seascape:** protected area managed mainly for landscape/seascape conservation and recreation
 - **Managed Resource Protected Area:** protected area managed mainly for the sustainable use of natural ecosystems

Source: IUCN 1994 “Guidelines for Protected Area Management Categories”, IUCN Publications, Cambridge.

⁵ The Convention Concerning the Protection of the World Cultural and Natural Heritage was adopted by the General Conference of UNESCO in 1972. The goal of the Convention is to identify and protect the world's natural and cultural heritage considered to be of "outstanding universal value". The Convention creates a list of sites, "the World Heritage List", made up of **natural, cultural, and mixed sites and cultural landscapes**.

(see <<http://www.iucn.org/themes/wcpa/wheritage/wheritageindex.htm>>)

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If we take a look at recreation areas and protected areas of type II (where the goods produced by the landscape cannot be exported) we see that there are important differences in characteristics.

- The environmental goods and services of these types are non-subtractable (public or club goods).
- Rights to enjoy these goods are independent of ownership of ground. This does not preclude that the state (or other public bodies) may own the ground over which policy is instituted. If private bodies own the ground, the environmental policy will introduce outside interests in the management of private lands where such interests have not existed. The multiplexity of particular stakeholder interests in the management of lands is reintroduced.
- The main management problem is to get compliance with regulations, including the adaptation of the stakeholders in the traditional commons.

To investigate this further we shall look to the theory of the commons for analytical concepts.

Theories of the Commons

Property rights give rules of behaviour, rules of how non-owners shall behave relative to owners, and how owners shall behave relative to non-owners. Property rights can be distinguished from other rights in that they give the holder the maximum of security of tenure and legitimacy of possession a society can afford. In many societies this maximum protection is rather small scale and local, based on customary rules and practice and not enforced by state authorities. Individuals, and collective as well as the state can legitimately hold property rights to valuable goods and services.

The theory of commons tries to explain why collectives rather than individuals or the state hold property rights to natural resources and goods. Thus the key point of entry is the group of people holding rights together as a group. Some of the main problems discussed are “Why do they hold as a group and not individually? How is it possible to hold as a group without destroying the resource? (The tragedy of the commons) Do groups manage resources better or worse than individuals? Such questions lead into some of the core problems of social science: the problems of motivation, the problems of cooperation or collective action, the problems of self-governance, and of good governance.

It is a moot point whether there is one theory of the commons. At present it seems best to describe the situation as several more general theories applied to the problem of governing the use of resources that are or could have been held in common (meaning resources that are, or ought to be enjoyed by several people rather than only one). I will not be able to go far into the theory of the commons here, but I will discuss briefly the following elements:

- elements describing aspects of nature in terms of their capability of motivating human action: their value or values (a typology of goods),
- elements describing the modes of human action (theory of collective action, degree of interdependence (cooperation-conflict), characteristic social dilemmas (game theory)), and
- elements describing the outcomes of the actions in terms of feedback to the motivational system and the system of action (unintended consequences, externalities), including a moral and ethical evaluation of the outcomes.

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To some extent these elements are interlinked and needs to be discussed together.

Types of goods

The values and goals seen in nature can be reinterpreted in terms of the kinds of goods perceived to inhere in land and renewable resources. These goods can usefully be described as being of four types: private goods, common pool goods, club goods, and public goods.

Table 3 A Typology of Goods

Resource is	Appropriators/ users are:	
	Excludable	Non-excludable
Subtractable	PRIVATE	COMMON POOL
Non-subtractable	CLUB ⁶	PUBLIC

Source: adapted from Vincent Ostrom and Elinor Ostrom 1977.

A resource is subtractable if harvesting or appropriating from the resource by one owner/ stakeholder diminishes the amount available for another. The use of “private” and “public” as labels of goods should not be confounded with the same labels used about stakeholders. Used about goods they are labels used to denote analytical characteristics of a good important for the collective action problems experienced by stakeholders wanting to coordinate their goals. Assuming open access to a common pool resource or free entry or exit from a club, one important implication following from the typology is a distinction between two types of appropriator generated externalities affecting other stakeholders. They are most clearly seen in common pool resources with open access and club resources with unrestricted entry and exit.

An activity generates an externality if there is a material consequence for stakeholders not taking part in the activities generating the consequence. In common pool resources the externality is of the queuing type (first come, first served). Queuing causes competition among appropriators and distribution problems between those first in the queue and those last, but does not affect the utility of the good appropriated. Management has to consider the equity in the assignment of slots in the queue in relation to the finite volume of the flow of resource units.

In club goods the externality is caused by the last stakeholder to enter or exit the club and will through a crowding (or thinning) process affect the utility of the good for all members of the club (the last drop causing the overflow or the last tread to break causing the collapse). This type of externality produces distribution problems in relation to non-members and causes threshold effects in the utility of the good. Management can preserve the utility of the good by setting the number of club members to something under the threshold (if overuse is the problem) or over the threshold (if the service level depends on a certain minimum number). But also equity problems between members and non-members have to be addressed. Positive externalities from the preservation of some club good, such as watershed protection

⁶ “A club is a voluntary group deriving mutual benefit from sharing one or more of the following: Production costs, the members’ characteristics (e.g. members’ scholarly activities in learned societies), or a good characterized by excludable benefits” (Cornes and Sandler 1986:24) To this last item I would add to “excludable “but non-rival” benefits”. Thus not all clubs need to be based on club goods in the sense used here. But all club goods can give occasion for the creation of a self-governed club just as common pool goods can give occasion for a self-governed commons.

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and preservation of biodiversity are often considered public goods. Distributional and management challenges arise from the discrepancy between costs borne by resource managers and the benefits enjoyed by others (“free riders”).

Applied to landscapes the concepts of rivalry/ non-rivalry for benefits and exclusion/ non-exclusion of beneficiary gives us for types goods generated by means of the landscape:

	Appropriator or producer necessary (beneficiary excludable)	Appropriator or producer not necessary (beneficiary non-excludable)
Rivalry for benefits (subtractable)	Landscape produces goods or services for export by sustained human activity	Landscape produces goods or services for export without human activity
Non-rivalry for benefits (non-subtractable)	Landscape produces goods or services for local consumption by sustained human activity	Landscape produces goods or services for local consumption without human activity

Based on the classification of goods it would seem reasonable to conclude that there ought to be systematic differences among the 4 types of land use areas labelled

- Agricultural area: mostly private goods: (agriculture, forestry, other extractive activity)
- Recreation area: (mostly club goods: all types recreation, landscapes used for information or experiences: museum, heritage, scientific knowledge, experiences of biodiversity)
- Protected areas type I: mostly common pool goods (ecosystem services, sink for pollution)
- Protected areas type II: mostly public goods (elements of nature with existence value: wilderness, ecosystems, biodiversity)

Applying the concepts to environmental goods and services

Real world goods such as pasture, wildlife, timber, landscapes providing recreation, environmental services, or biodiversity will usually be a mixture of the various types of analytical goods, and thus the property rights to the resource need to solve the particular mix of externality problems found in each case. Problems of exclusion and subtractability, as well as the characteristics of externalities, are shaped in profound ways by the technology used in the appropriation of the good. The particular consequences of using a resource depend not only on the institutions but also on the available technology, including knowledge about how to transform resources into something more desirable.

Stopping/ limiting toxic emissions

While a clean environment can be considered a public good, toxic emissions to the environment from a point source can be considered a common pool resource (of negative value: a bad). It is difficult or impossible to exclude “consumers” individually from suffering the bad. The bad is also additive (analogue to

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subtractable) in the sense that it becomes worse with increasing deposits of pollution. This is so whether there is only one actor polluting or it is decided by several individuals in uncoordinated actions. Usually it is assumed that there is a threshold for how much pollution the environment can handle by itself (variable by substance and ecosystem). If too many stakeholders put too much pollution into the environment the negative impact will escalate and propagate down the queue from the point of emission. Thus those closest to the head of the queue will be worst hit by the pollution.

Protecting/ enhancing ecosystem services

Ecosystem services such as protection against floods, soil erosion, avalanches, and land slides can be considered club resources (of positive value). It may difficult but not impossible to exclude consumers individually from enjoying the benefits of such services. The benefits themselves, however, are non-subtractable. Often such benefits are maintained by one or more individuals refraining from removing material benefits like forest cover or water. If the maintenance of the environmental capacity to provide services is jeopardised, the bad that follows will be a common pool bad similar to the toxic emission. Usually it is assumed that there are thresholds for forest cover and water tables below which there is a rapidly increasing probability of catastrophic reorganisation of the environment with repercussions propagating along the queue from the point of reorganisation.

Protecting/ enhancing recreational, symbolic, and information values:

Landscapes providing recreation are club resources. For recreation you have to enter the landscape to enjoy it, hence exclusion is possible even if difficult. The enjoyment is not subtractable. However, it is subject to crowding. With increasing crowding above some threshold the enjoyment tend to become increasingly diminished. The discomfort is experienced uniformly throughout the club (except for individual variations in tolerance of crowding).

Landscapes giving symbolic values (heritage sites) or scientific information values (biodiversity) are basically public goods as long as their existence values are emphasised. A resource such as knowledge is non-subtractable and there is no rivalry in its consumption unless patent legislation introduces such rivalry. By awarding patent rights to some piece of information about the genetic diversity the public goods character of the information is transformed into a private good. If one has to visit a particular locality to enjoy the information or symbolic value vested in the landscape it becomes a club good similar to recreation.

Comment

It is interesting to note that environmental goods and services can be seen as club goods as long as they are maintained, but that they transform into common pool bads if the service or good is not provided any more. This means that the theory of commons will be interesting for pollution management. Cleaning up an environment entails the collective action problems studied in the theory of commons. Maintaining the desired environmental level of non-pollution entails the problems encountered in maintaining a club. For ecosystem services depending on the non-usage or stunted usage of traditional resources such as forests or water, the collective action problems of common pool resources are present in the “production” of the goods and services. The specific persons or groups holding rights to these resources bear the cost. It would seem reasonable that their forgone income were compensated. But since the

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benefits of the resulting ecosystem goods and services have the character of a club good, the costs of production has to be covered in ways avoiding the possibilities for free-riding this entails.

This link between traditional resources (water, forest) and the ecosystem services is of general interest. Also recreation and biodiversity will depend heavily on how traditional resources are utilized. The interdependence of many of the goods and services of different types is in one sense obvious. But is it acknowledged by the legislation? And where it is acknowledged, how is it dealt with?

Norwegian legislation on environmental goods and services

In Norway the act establishing our “Nature Police” defines its area of competence to be the following acts

- on out door life (Act of 28 June 1957 no 16)
- on nature protection (Act of 19 June 1970 no 63)
- on motorized traffic (Act of 10 June 1977 no 82)
- on cultural heritage (Act of 9 June 1978 no 50)
- on wildlife (Act of 29 May 1981 no 38)
- on salmon and fresh water fisheries (Act of 15 May 1992 no 47)
- on pollution (Act of 13 March 1981 no 6) to the extent the Ministry decides

These acts can be classified as concerning

- Recreation areas (out door life, motorized traffic)
- Protected areas type I (pollution)
- Protected areas type II (nature protection, cultural heritage)
- Agricultural areas (wildlife, salmon and fresh water fisheries)

It should be noted that the nature police do not have any authority on issues like biodiversity, watershed protection, disaster mitigation, and local soil and climate management.

For biodiversity as such there is no legislation (except Acts on biotechnology in medicine and gene technology). However, a government committee is working towards a proposal for a more general legislation on biodiversity protection. Property rights to and usage of watersheds are regulated by older legislation (particularly Act of 14 Dec 1917 no 17 on regulations of rivers, and Act of 15 Mar 1940 on rivers). This legislation is primarily to clarify property rights and regulate the development of hydroelectric power, but performs some tasks needed for more general watershed protection (act on rivers §101-103 on protection against land slides into rivers, and §104-124 on protection of third party interests against damage). Rules for protection against land slides and avalanches are primarily found in the act on forestry and forest protection (Act of 21 May 1965 §32-33). Considerations of disaster mitigation, and local soil and climate management may at least theoretically be included in the local municipal planning but recreation has a larger role (Act on planning and building of 14 June 1985 no 77, §2, §17-2, §20-4). In general it seems that legislation on ecosystem services so far has been a fairly peripheral subject in Norway.

Looking more closely at the legislation on protecting nature and cultural heritage they are in many ways similar. Both can lead to protective regulations of small areas of

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particular interest or value. Both acts prohibit any work or activity that may cause changes to the landscape or damage valuable artefacts or elements of the landscape. The act on nature protection can in addition also protect larger areas by means of particular area regulations (National Park, Landscape Protection Area). The strongest protection (National Park) is assumed to apply only to land owned by the state. If protective measures apply to private lands there are rules about compensations for damages or purchase of the land but restricted to current activities. For cultural heritage the question of ownership is treated thoroughly. The costs of protection are in general assumed to be taken on by the landowner. There are no rules about compensation or purchase of the land.

The legislation does acknowledge that achieving the purpose of the legislation depends on getting the current users of the land to behave in particular ways. The methods used are different. In the act on protecting the cultural heritage strong prohibitions and threats of punishment is assumed to achieve the results. In the act on nature protection the approach is to pay owners for compliance. Which method works best? Answering that will require another kind of investigation.

Let us return to the elements of the theory of commons.

The theory of collective action in resource management

Collective action refers to the coordination of efforts by two or more individuals. Collective action becomes problematic for a group of people when their actions are interdependent: when one person's reward is dependent on the actions of others. Independent choice in an interdependent situation is called a social dilemma. Thus social dilemmas are situations where what seems to be the best course of action from one stakeholders point of view will, if pursued by all stakeholders, lead to results considered by all to be worse than some of the alternatives requiring cooperation. The exact character of a social dilemma is shaped by value systems, technology and resource characteristics.

In an ecosystem where more than one appropriator has rights of access and withdrawal the collective action problem appears at two levels:

1. First in recognizing the necessity of coordination and regulation of behaviour (thus avoiding free riding behaviour), and
2. Second in agreeing on the rules of regulation, and on the system of monitoring and sanctioning behaviour governed by the rules (thus agreeing on how the transaction costs should be distributed).

Rules and their systems of monitoring are called institutions. Institutions are public goods. Public goods, such as institutions supplying club goods and common pool goods are in simple models of collective action prone to under-supply due to incentives of free riding and inequitable distribution of transaction costs.

The problem of supplying such goods at socially optimal levels has been extensively studied with formal models, experimental studies, and field studies. There is a discrepancy between theoretical predictions of standard models and observations from field studies. Observed levels of cooperation are higher than expected even though less than optimal. Experimental studies confirm this and suggest that the formal models could be improved by including concepts such as “trust”,

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“reputation”, and “reciprocity” (Ostrom 1998). A group with a higher level of trust, stronger norms about reciprocity, and members with better reputations for being trustworthy will more easily overcome social dilemmas and take collective action. The conclusion here is that self-governance of resource use is possible. But the requirement is that information about the resource base is adequate, and the power base of the local institution is seen as secure. This is seen as most easily achieved in a joint management system between local appropriator organizations and the state. The state has to provide reliable information about the ecosystem development and give the local management institution recognition as legitimate.

Linking motivations, actions and outcomes

Analytical studies of the management of natural resources rely on contributions from many disciplines (theories of collective action, theories of neo-institutional economics, theories of the construction of social reality, theories of ecosystem dynamics). Currently they seem to be converging on the study of the creation, maintenance, and transformation of property rights⁷ to explain and understand empirical regularities in the rather frequent failures of natural resources management efforts.

Property rights as a key to improved management

Today it would seem reasonable to conclude that getting property rights right is the key to successful management of resources. If just one lesson is to be taken from recent scholarship on property rights, it must be that successful management can only be achieved if there is a measure of congruence between the rights and duties local communities agree upon and the rights and duties the state tries to enforce. A second lesson is that the law, regulations, and bylaws used must be low cost in their application. Unless people see clearly the benefits of law they will find ways of living outside the law making the management policies that much more costly and difficult - if not impossible - to implement.

Property rights in a complex world

But laws on property rights can never be written from scratch. Each area, landscape, or ecosystem has particular complexities and interactions making it unique. In writing law on property rights, the complexities of the ecosystem, the complexity of the social system and the interaction of characteristics of the two must be taken account of. Linkages and interdependencies among different types of resources are also important. The quality of a resource may depend critically on the dynamic of resource use in neighbouring areas. Appropriate biodiversity measures, soil characteristics, and climate parameters may summarize the complexity of an ecosystem. The locally enforced use rights and customs pertaining to the various components of the ecosystem can summarize relevant complexities of the local social system. Market pressures, technological developments, state sector policies not directly related to resource use, and demographic processes may summarize complexities of the large-scale society. Interactions of ecosystem, local social system, and large-scale society show up in the cultural valuations of components of

⁷ In the Anglo-American world rights and duties in relation to land and resources are for historical reasons usually referred to as tenure rights. Here they will be called property rights. Property rights will also be taken to comprise the customary usufruct rights to resources as well as the statutory rights and duties enforced by state authorities.

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the ecosystem as well as the landscape where the ecosystem is observed. All are relevant to the system of property rights needed for successful management.

Who has rights and duties?

The allocation of rights and duties in relation to particular resources determines whose goals will count by how much in the choice of management goals, the timing and duration of extraction, the application of technology, and the intensity of effort expended to achieve the goals. Thus a management system involves decisions about the beneficiaries, timing, means, and purpose of human interaction with ecological systems. These dimensions of management can be summarized in a single question: “Who will benefit how much for how long and in what ways from which resource(s)?” In answering this question, people perform a series of balancing acts. They assign relative weights to various goods and services, make decisions about the timing and duration of resource use, and determine the distribution of associated benefits and costs. Answering the “who” question will identify who will legitimately be able to withdraw resource units and make decisions about management. That is: it determines who holds property rights over the resources.

Bundles of rights

Property rights can be classified in various ways such as according to type of management decisions involved, according to the management interests of the beneficiary of the resource, and according to management implications of cultural values.

A number of management decision rights can be distinguished: rights of access, rights of extraction, rights to make decisions about access and use, rights to exclude, and rights to alienate the resource. The various rights can be bundled in several ways. An individual, group, or organization may hold all of these rights over a resource as a bundle. Then they are called owners. Removing the right of alienation gives us a proprietor and by successively removing more rights we find authorised claimants, users and entrants (Ostrom and Schlager 1996).

The same decision rights can be defined and bundled in other ways. The land trust is an example of a different way of bundling decision rights into roles. The goal of the trust management is not production per se, but the interests of the beneficiary as outlined in the trust document of the settlor, the one who creates the trust (or as this can be inferred by the courts). The rights are bundled into rights of the trustee, the legal owner, and the rights of the beneficiary, the equitable owner. The trustee holds all the management rights as owner at law. But the rights must be exercised for the benefit of the beneficiary. Thus a trustee can by contract define bundles of rights similar to proprietor, claimant, user, or entrant as the task requires. The role of the beneficiary also includes the rights of the proprietor role but limited by the same document as the trustee: the trustee must see it as beneficial within the definition of the trust.

Besides the various bundles of decision making rights there also are various ways of bundling the resources to which these decision-making rights apply. The most extensive bundling of resources occurs when ownership of the ground implies ownership of everything attached to the ground, embedded below the ground, or flowing over the ground (dominium plenum). Development strategies frequently

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assume that those with rights to the ground also hold rights to all other land-based resources. But rights to resources can be differentiated by resource boundaries and held by a variety of actors. Individuals or groups may hold rights to access an area (e.g., a wildlife area) and extract resources (e.g., hunt game), for example, while a government body often has the authority to make decisions about quantity regulations (e.g., the maximum number of animals killed by hunters each year) at the same time as there may be completely different holders of rights to extract timber, use pasture or collect other non-timber forest products. The individual, group, or organization that holds rights to any given resource units (e.g., game) in an area need not have rights to other resources units in that ecosystem (e.g., grasses, timbers, fruits, flowers, resin, and deadwood). Many systems of rights of common can be seen as efforts to bundle rights to resources with the goal of making farms (or households or other suitably defined economic units) into viable economic enterprises (Berge 2002).

Property rights and stakeholders

In the broad meaning of property rights adopted here one can say that three types of rules contribute to defining the social and economic meaning of a property right:

- Customary bundles of rights and duties of all stakeholders,
- Statutory bundles of rights and duties of owners, and
- Modifications of customary and statutory bundles of rights and duties by
 - Limiting the options of land owners (zoning regulations or land use planning),
 - Directly regulating the behaviour of stakeholders, and
 - Regulating the use of technology.

Property rights in this meaning not only define owners (those with enforceable rights), but more generally “stakeholders” (anyone with a legitimate interest in a resource). Stakeholders without statutory property rights represent a difficulty for many legal systems. They usually do not have legal standing in court proceedings. During the last decades there has been a growing emphasis on citizen participation in the management of the environment (see e.g. the Aarhus Convention of 1998). This has led to new approaches giving standing to stakeholders based on their representation of a general public interest. This process can be viewed as a step towards giving public goods legal protection.

It has proved useful to distinguish three categories of stakeholders

- Private individual
- Private collective (user associations, local communities, NGOs, and business corporations)
- Public state

The importance of the distinction lies in the differences in how goals are decided on and action plans formulated and acted upon. For individual actors, goals emerge through a cultural process. These are acted upon within the constraints posited by established property rights and the incentives of relative prices. Relative price is here seen as a general concept summarizing the relation between effort and benefit. People tend to choose the available action alternative promising the most benefit per unit of effort. Private collective actors are comprised of individuals each with their own goals. The formulation of collective goals as well as action plans is therefore subject to the problems of collective action. But also these actors are subject to the

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constraints of established property rights and the incentives of relative prices. The state is a particularly important stakeholder because it has the power to redefine property rights and relative prices in a variety of ways. The state is often an owner with direct responsibility for large areas. It is always a stakeholder in the sense of representing the public interest in how the various resources are used. In rule-of-law states its position as resource owner is subject to established property rights and procedural rules of law making. In other states the two roles of law maker and resource owner tend to become confounded.

Property rights become an effective part of the activities of stakeholders by some kind of legitimate, public register (cadastres, land registers, local records, even the memory of reputable men and women in public statements). The register will define the objects of ownership and link particular owners with particular objects. The legitimacy of the distribution of rights is furthered in two ways: firstly by the public character of the register, and secondly by established procedures for resolving conflicts about it. A legitimate register of property rights to resources will enable owners to use their resources as a generalized capital asset, and it will lower transaction costs significantly. If the register contradicts the common understanding of the distribution of rights or is not kept up to date, it will be illegitimate. Illegitimate registers undermine tenure security rather than enhance it.

Changing property rights

Property rights define interests and goals tied to the resource. The various stakeholders hold partial and limited views. Often their various goals are conflicting. In such situations the position of owner will have the advantage. Where the rule-of-law obtains, the owner can call upon the power of the state to enforce his or her will against opposing stakeholders. But the specific legal liberties and powers assigned to owners are always in flux. Contestation and renegotiation of property rights are especially notable in political debates, legitimate public decisions, and court proceedings. Political forces shape them and gradually change them. Also local discussions and conflicts among users, such as conflicts over externalities from any particular usage of a resource, feed into these political struggles. Today these struggles usually result in some form of regulation. By issuing regulations about how to use particular resources or how particular technologies can be applied or how particular areas are to be used, public authorities tries to lower the level of conflict, to accommodate the interests of stakeholders who are not owners, and in general to ensure a better overall return from the use of a resource.

This is where property rights meet environmental goods and services.

Changing property rights by means of environmental regulations

The most obvious case of this kind of impact is found in the act on motorized traffic which prohibits the use of motorized vehicles on water courses and in non-arable lands. However, the act provides for a lot of exceptions. But particularly for recreational activities it is difficult to get permission. In some instances this is felt to decrease the value of properties. In other instances such as the successful pursuit of polluters the values of adjacent properties increase. In Norway during the last decade the most notable case of such spill over effects transforming property rights is the re-emergence of large predators. In the areas where bear and wolf have been able to

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establish themselves and where the prohibition of hunting is enforced, the value of sheep farming as an industry has declined noticeably.

Property rights to environmental goods and services

We noted above that while an acceptable level of environmental goods and services were maintained they could be classified as club goods. This means that since all members of the club will enjoy the benefits, the problem of crowding has to be monitored and controlled by membership. A club good differs from a pure public good only by being local in relation to the surrounding social system. Local public goods may be produced and managed by either private or public actors. Public actors will usually be able to cover the cost of production by taxing every member of the club. For private producers of club goods a diversity of mechanisms have been identified (Olson 1965, Cornes and Sandler 1986) usually combinations of membership fees bundled with suitable private goods.

For environmental goods and services the efforts or expenditures required to maintain the level of service will in most cases appear as incomes foregone by not exploiting goods like forest or water. These costs are not evenly distributed. Depending on the distribution of property rights to the traditional resources, the level of conflict around the institution of new public regulations will vary. If the club is to be a private undertaking (a private recreation area) the organisation must either include landowners and other stakeholders or in other ways accommodate their interests to align incentives for maintenance and enjoyment. One would expect that environmental goods and services should be the task of local public actors with powers to tax its constituency.

It was also noted above that the legislation in Norway did not include much on environmental goods and services. But the legislation found pointed to the municipality as the most active agent in securing an acceptable level of enjoyment.

Concluding remarks

At the outset it was assumed that there was a basic difference between values where there is rivalry in appropriation and values where there is non-rivalry. The discussion has basically confirmed this. But perhaps more importantly the discussion has shown that the characteristic of rivalry is not static. It changes with how the context is defined or interpreted. Genetic information may be a public good or it may be a private good depending on the institutional setting. Thresholds in use or enjoyment may also trigger shifts in the character of a good. The club good of a clean environment may at a certain level of pollution become a common pool bad.

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