

GOVERNING THE COMMONS IN PRIVATE FORESTS: INCENTIVE MEASURES AND MULTISCALAR ECOSYSTEM MANAGEMENT

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Introduction

Everybody gets some benefit from the ecosystem services of healthy ecosystems – not least the landowners. The very essential ecosystem processes and functions behind these services, however, typically cross the landownership boundaries. For example, the habitats for wildlife and rare and endangered species, clean water and many recreational (sustainable nature tourism) opportunities can be produced or sustained only at the landscape or regional scale where there can be, in fragmented ownership conditions, many individual landowners (e.g. non-industrial private forests owners, NIPF's) (e.g. Vail & Hultkranz 2000).¹ Speaking about nature management in that kind of circumstances means that individual decisions are sensitive to ecosystem functions, patterns and processes; they influence them and also depend on them. Sustaining the biodiversity is a precondition for the continuity of many ecological processes. Thus it is safer also to plan the conservation and sustainable use of biodiversity holistically on wide spatial scales. Landscape-ecological planning is practised at the moment mostly on state (one owner) owned public lands, but should, according to many ecologists, be practiced also on private lands.

Several ownership regimes are usually connected to the forests simultaneously. Firstly, many communal values of the forest are in the open-access category and therefore in danger of being destroyed. The central material commodities (goods) of the forest are generally in private ownership and thus managed by the landowner.

¹ "Recreational landscapes might be considered common pool resources, subject to reciprocal externalities in the form of short-term congestion and long-term depletion. These adverse effects result from a combination of open access and rivalness in resource use." (Vail & Hultkranz 2000, 224)

However, the state owns some communal values (ecosystem structures and services) by restricting the forest owner's use of land and application of forest management. Citizens typically have many different use rights (usufructs) connected to private forests, e.g. to their use for recreation. An example of this is the Nordic countries' public right of access to nature, irrespective of land ownership.

The purpose of this paper is to serve as preliminary pondering of the issue of what policy means there are to promote co-operation among landowners (and other parties) in ensuring the production of ecosystem services. Then one (usually the state) would not need to intervene very much at all in the matter of the content of present-day land ownership. After all, we can maximise the use of landowners' voluntary action. One means in this context might be a local collective forest management agreement based on a landscape-ecological plan. However, private forest owners have no financial incentive to adopt this kind of collective management because there is usually no market value in forest products that have been jointly produced or sustained.

Comparative institutional approach

Contrary to many other terms used in the economic literature, the term 'property right' is typically defined in varied and inconsistent ways. The associated literature contains many different and often conflicting property right concepts (see Schlager & Ostrom 1992). Besides, the property right concepts applied by economists usually differ from the parallel concepts used by lawyers (Cole and Grossman 2002). Especially the content of property rights quite often seems imprecise. For example, when compared to the ownership of some private goods, such as clothing and dwellings, land ownership usually is much more complicated because natural resources almost always are multifunctional. Problems arise because using the term 'landowner' gives the impression that some persons do have a full ownership to some defined land area, whereas in reality landownership is typically restricted to some of the given land area's characteristics only. Thus, the actual content of property rights in many conditions often is an open question (Hahn 2000).

The impoverishing of the environment and it becoming scarcer, together with technological advancement, are factors, which continuously challenge *status quo* property rights. Bromley (1989, 218) notes the following:

“Changing attitudes about wetlands, about clean air, and about the natural environment in general have led to a number of legislative and judicial actions that alter the prevailing institutional arrangements over natural resources. Presumptive property rights were challenged in the courts, and in legislative halls. This process is never finished.”

With the world around us continuing its technological and social development, new institutional arrangements will also evolve. Property rights are bound to change. Indeed, a significant part of externality policy involves reforming of institutional arrangements and sometimes also the designation of new ones (Schmid 1995). But the so called Property Rights School in economics from the late 1960s and the early 1970s expresses², that the *status quo* is inviolable and if any changes in property rights appear to happen, then the losers should always be compensated.³ But arguments like this deal, of course, with the basic questions involved in all policymaking. Why should those, who are seeking to bring about changes in the *status quo*, eventually buy all these changes? According to some economists, compensation is needed to ensure that the presumed change will be Pareto-safe. However, today’s *status quo* differs from yesterday’s *status quo*. Therefore, the following question easily arises: At what point should this otherwise unlimited reduction eventually be stopped? Change in or the continuity of the *status quo* are normative issues (Boettke 2001). Property rights are the key issue in environmental policy and therefore that policy is always controversial (Bromley 1997).

² Property rights surfaced in the 1960s in mainstream economic discussions as a conservative reaction to the solutions offered by the government and which Pigouvian neoclassical mainstream economists proposed. According to Anderson (1982), the traditional neoclassical paradigm can be considerably improved by bringing into it elements along from property-rights economics, from the public choice approach, and from the Austrian school of economics.

³ Of course, the basic idea of the representatives of this school was an evolutionary one, but they supported first of all the privatization alternative and used the term unattenuated property rights. So they were quite conservative and that is why they can be called libertarians.

In Warren J. Samuels' thinking, what he calls the legal-economic nexus has a very central role (Boettke 2001). The basic idea here is that the assertion that the economy is a function of the government and the government is a function of the economy (or the law is a function of the economy, and the economy, and especially its structure, is a function of law) and that the two spheres are simultaneously and independently determined, rather than being in any way independent or self-determining spheres. Law and economy are jointly produced, not independently given and not merely interacting. The legal-economic nexus is:

"...the social location wherein, on the basis of ideology or material interests, private individuals and businesses attempt to influence the social agenda." (Samuels 1989, 1566)

These actors (the active stakeholders) use the political and/or the juridical system to change the size and the performance of the markets (Hahn 2000). Samuels' analysis of the legal-economic nexus is much more broad-based than modern Law and economics school (and particularly its Chicago variant⁴), which is a relatively young sub-discipline in economics (Biddle et al. 2001). Samuels emphasized the irreversible inclusion of the economic processes to the legal-economic nexus. At the same time, he tries to search for possible ways, how to put the "political" back into political economy (Boettke 2001).

One difficult problem here waiting for a solution is how to evaluate the actual property rights (or property relations) changes. What, for example, is the scientific basis for the claim that some set of institutional arrangements (property right structures) is socially more desirable than some other? Samuels suggests that what is required is a comparative institutional approach to the question at stake. Such analysis

⁴ The determining factor in Chicago approach is the direct application of microeconomics (or price theory) to the legal issues, which means in effect that laws are to be assessed only on the basis of their efficiency properties. The central feature of the Chicago approach is in the application of efficient legislative regulations (Mercurio and Medema 1997). However, not all schools even in the field of Law and Economics place the same weight on the criterion of efficiency. The concept of efficiency as a manifestation of justice or fairness is indeed, what many critics of the Chicago approach hold to be problematic (F.ex Vatn 2001). But despite its Chicago-based premises, Law and Economics is not a homogenous movement in any way, but rather it reflects several traditions, Chicago Law and Economics, Public Choice Theory, American Institutional Law and Economics, Neoinstitutional Law

will serve the twin purposes of deepening our understanding of legal and economic processes and their interrelations and providing a sound basis upon which to base predictions concerning the potential consequences of legal-economic change. This is why there is the need for a comparative institutional approach to legal-economic analysis (Mercurio 2001). This approach consists of describing and analyzing the systematic relationships between: (1) the structure of political-legal-economic institutions; focusing on the property rights, working rules and legal doctrines by which they operate; (2) the conduct or observed behaviour in the light of the incentives (penalties and rewards) created by the structure of institutions, and (3) the consequent economic performance as measured by various performance indicators that give meaning to and shape the character of economic life under these institutions (Medema et al. 1999). The aim of this so-called “structure-conduct-performance – paradigm framework” is then to explain and compare the outcomes that will occur under real, discrete alternative institutional structures. The stages of this analysis are: (1) the constitutional stage of choice; (2) the institutional stage of choice, and (3) the economic impact stage of choice (Mercurio 2001). “Typically the western societies are structured so that the character of life is determined by all four systems of social control; the market sector, the public sector, the communal sector and the open-access sector.” (Mercurio 2001, 231)

But will efficiency always be the most correct evaluation rule to use in such an analysis? Much of the thrust of modern Law and Economics revolves around the application of the efficiency criterion to resolve these issues. But to attempt to determine the rights on the basis of efficiency is circular: efficiency is a function of rights, not the other way round (Medema et al. 1999). As such, there is no unique efficient result to be determined (Biddle et al. 2001).⁵ In analysing changes in

and Economics, the New Haven School, Modern Civic Republicanism and Critical Legal Studies (Mercurio 2001).

⁵ Many institutionalists emphasise that efficiency is not unique and therefore it cannot determine the setting of rights. Here, the starting point is in the observation that prices, costs, outputs, risk, incomes, wealth, etc., are determined by the structures of the rights existing in society. A specific cohort of prices, costs, outputs, etc., and thereby a specific efficient allocation of resources, is connected to each specific structure of rights. Thus, there does not exist a unique efficient solution. Instead, there is an internal normative element present in efficiency-based decision-making (Mercurio & Medema 1997). This can also be referred to as such a problem of the Coasean school as is associated with Coase's normative enterprise. It is Coase, who proposes that we should choose our social organisations to be such that we at the same time minimise social costs. But the proposal concerning minimising of social costs cannot in any way help society decide how fundamental institutions are to be chosen because the

property rights, it may well be that we have to broaden the concept of efficiency itself (or redefine it) to a significant degree or supplement it with some other concepts or criteria. Thus, if the evaluation of the alternatives should not be done solely in terms of economic efficiency, then we have to use other performance indicators that will, in the aggregate, tell us something of the total character of economic life. One clear objective for social rules (institutional arrangements) is their capability to diminish social conflicts and that is why those rules should not only be efficient but also fair and just (Hahn 2000). There are at least the following six performance indicators (Mercurio 2001):

- Efficiency
- Distributional equity
- The impact on the rule of law/legal order/continuity
- Freedom to/freedom from
- Macroeconomic indicators and inputs and outputs
- Ecological integrity (changes within the affected ecosystems dramatically alter or destroy the full suite of the structures and functions that these systems provide, thereby inevitably causing costs to society in both the short and the long term)

The state has an extremely central role to play here because laws do not entitle people to rights because they exist in advance; instead, they entitle people to rights because the state is their sponsor. The ethical/political choices made by the state are unavoidable when it tries to find some solutions to externality problems. The state or public power (government) defines who will eventually have the right to act and also to have the right to receive some benefits and who should bear the costs.

Were property rights clearly and fully determined, individual decision-makers would, according to the theory, take into account all the consequences of their decisions. If property rights are unclear or distorted, then the kind of a human activity, which

costs and benefits, on which analysis depends, will be realised only after those rights have already been applied in practice. Thus there is a tension between Coase's normative approach and his comparative institutionalistic approach: the former requires that a version exists of the latter. Samuels and Medema (1997) refer to this as being a circularity problem.

weakens the prevalent environmental state, confronts no feedback mechanisms and could then dictate or encourage the parties responsible for particular environmental destruction not to carry all the costs caused by their activities. In the language of property relations, it is usually said that present resource users have a privileged role when compared to the interests of those, who are taking care of biological resources and their preservation. This means that the resource users are free from paying any attention to the costs that they are imposing on others through their activities. In the context of the prevailing order, those who are caring for biological resources, for example the environmentalists, have no rights. For Ronald Coase (1988, 1992), property rights are as much an important issue as the product itself and that is why he recommends that in economic analyses property rights should be seen as production factors. If the whole problem is seen in this way, it would probably be far more easier to understand that also the right to pollute or destroy biodiversity (a property right) should be treated as a production factor.

Looking to the future so, that large biodiversity rates will be preserved, claims to direct serious attention to that kind of institutional arrangements, where participators successfully manage the complex resource system over long time periods. The absence of full determination of property rights means also that it is very unclear, who can claim to themselves the userights. But the full determination of property rights is seldom possible in the context of the natural environment. It is difficult, if not impossible, to determine well-determined property rights in the case of such “public goods” as the atmosphere, the climate or some perpetually moving fish population (Hanna et al. 1996). It is especially difficult to develop property rights for the various aspects of biodiversity. Markets cannot be efficient suppliers of biodiversity because it is difficult and very expensive to exclude those who will not pay. In many cases it would not even be desirable to allow any one single unit (an economic agent) to own some of the key aspects of complex biological systems. Whatever organization or group of people will encounter a set of difficult problems if it tries to govern and manage a complex and multi-product resource system, which benefit streams are maturing with many different stages. Besides, complete ownership of a resource by a unit also presupposes the full power to control the access for the use of that resource and it thus also includes the possibility to keep the resource either in private use or partially or to totally destroy it. Therefore, one economic agent’s full ownership of a

biodiversity resource would easily include also the right to destroy parts of it as well as the capacity to increase it. Thus it can be asked, what would then happen, if one juridical person alone did have full ownership to some relatively large land area or landscape.

It can be said that property rights are never fully determined because all exchangeable physical commodities have many different attributes, which are not well determined. It follows from this then that one of the biggest problems is that those property right regimes, under which the natural resources are managed at present, do not determine all the possible claims to the full area of goods and services offered by ecosystems. After all, the property rights systems related to land have historically focused on securing the commodity production felt to have been valuable in each period of time, and this has happened at the expense of many, often unknown, indirect uses for natural ecosystems. There are also cases in history where requirements related to tangible commodity values are easily set above the values of less tangible ecosystem services (Hanna 1996). At the same time, the short-term values of a human system are emphasised at the expense of the long-term effects of the natural system.

Accordingly, property regimes have failed in the past and they continue to fail in the future when short-term profits are sought in the context of cultural and fast technological change, high absolute population growth, increasing per capita demand, and non-adaptive government policies. However, society's development is eventually dependent on the limited capacity of the ecosystems to offer essential natural resources and ecosystem goods and services. At the same time, it has appeared to be increasingly clear that economic development depends on the institutions, which conserve and sustain environmental carrying capacity and resilience. When the aim is to secure the human wellbeing, there is a very urgent need to begin to design institutions, which will safeguard the dynamic capacity of our natural environment. Property regimes are critical institutions in this respect (Hanna et al. 1996). They link society with nature. Knowledge about how property right regimes, as important institution types, are working in relation to humans and their use of natural environment, is critical when enforcing and designing efficient (and sustainable) environmental management and conservation practices. Without solutions to the property rights problem, environmental problems will remain to be resolved.

Society's response to the challenge caused by these problems is in such institutions as beliefs, norms, preferential connections, property rights, agencies, and so on. This is why new suggestions, not only about new kind of taxation or effluent rights, but also about new international conventions and agencies and changes to property rights have been recently formulated (Weisbuch 2000). But quite often national and international policy has failed to take into account the importance of well-defined property right regimes. Hanna (1999) observes that many biodiversity problems have their roots in the institutional environment. Failure to deal with problems concerning biodiversity is leading to unsuitable institutions and to continuous ecological simplification. Two things are, according to Hanna, deeply characteristic of environmental problems: uncertainty and lack of co-operation. Good institutions help to define and defend our moral obligations to nature, our fellow citizens and future generations. According to Sagoff (1994), this is welfare in an ethically meaningful way.

Appropriate, well-designed and well-functioning property regimes compliant with ecological systems are scale-specific, which is an essential, but not a sufficient, precondition for sustainability (Costanza et al. 1996). To be dependent only on small-scale organizations for managing biological resources is not perhaps an efficient way to regulate them, because many of these resources cover very extensive scales. On the other hand, the system approach seems to be gradually replacing the view according to which resources can be dealt with as discrete entities isolated from the rest of the ecosystem and social system. The long-term aims of resource uses should then be defined. These aims should reflect not only the owner's objectives in the management level but also the sustainability objectives on a more general social level. The various property right regimes should be provided with defined clear frontiers or scales, and within these regimes the rights should be completely defined; especially the community and the legitimate users should be defined. Transaction costs are important when designing any special property right regime and they will vary according to the coordination scale.

One of the biggest obstacles to the protection of ecosystems, their wise use and good management is that we human beings do not notice or otherwise undervalue the functions and services of these systems (Farnsworth et al. 1981). People are

undervaluing the opportunity costs of ecosystem conversion because they undervalue the ecosystem services. According to Salzman (1998, 498): “If future scientific research can credibly connect specific actions with the reduced delivery of services, it could open the door to legal challenges against environmentally harmful actions now immune because of lack of proximate causation.” From a sustainable use perspective then, the challenge is to develop flexible and adaptable institutions in tune with ecosystem dynamics and ecosystem services (Prichard et al. 2000). We can probably speak about the management of ecosystem services.

Ecosystem functions are connected to each other and are systemic, and they themselves sustain diversity. They are principally non-linear in their causal relations and they manifest many stable states and discontinuous behaviour in time and space. And ultimately there are limits to their resilience. Their connections are often multi-scalar in time and space. Consequently they have quite deep public good characteristics, which means that there will be difficulties in limiting property rights, which is why the externalities are permanent. The transformation costs are too high for any private property rights to be created. An ecosystem is a common good. All activities affect some others (Vatn 2000). The main challenge is to design institutions and property rights regimes that are in tune with ecosystem functions and the goods and services generated by them (Costanza and Folke 1996). For example, forest management, which does not take into account the ecosystem processes, can lead to the destruction of these processes and then eventually to some ill ecosystem state, which can be described by decreased state of complexity. In landscape ecology, biodiversity management and conservation are seen as an organic part of the broader landscape heterogeneity. The idea of ecological integrity (and/or health) as a performance indicator is intended to convey the notion of congruence with ecological systems. In the simplest of terms, it addresses the question: Do the legal-economic institutions and the policy initiatives and/or legal changes that emanate therefrom enhance or reduce a nation state’s congruence with its ecological systems, that is to say, do they enhance or undermine the ecological integrity (and/or health) of a nation’s natural environment? (Mercuro 2001)

When is common property really common property?

The neoclassical approach seems to assert that property rights rules are determined by human nature and constant values. However, in reality it seems that rules defining property rights should not only reflect human nature and values (which are changing), but also at least technologies and institutions (Reynolds 1985). Consequently, the ownership of land and of the related natural resources must be understood as being part of a broader institutional structure of society. In other words, property regimes constitute a social structure and therefore cannot be seen as being separate from the society in which they occur; both the ecological and social context should be taken into account (Bromley 1998). However, it is often thought that property regimes are separate from the local culture. It is, for example, assumed that there exists only one possible (universal) property right structure, which should exist all over the world, as if it had some inherent characteristics. According to Bromley (1998), economists do not for some reason want to admit that ownership regimes can and do demonstrate an equally great deal of variation between different cultures as do all the other social arrangements. According to Bromley (1998), just as there cannot be “right” cultures there also cannot be any “right” property rights either.

Any specific type of property rights regime alone cannot be a solution to the problems of resource destruction and overuse (Hanna and Munasinghe 1995). Indeed, the evidence indicates that resource-use institutions should be made more diverse, not less diverse, than they are at present. After early suggestions had been made about privatization as the only solution to environmental problems, the very rapidly expanding research began to criticise the idea of private property as being the only solution to resource problems. The property right regimes should not appear as two opposite types but as combinations of a broader spectrum, from open access to private property (Bromley 1991).

But the dominant view regarding this question has for many years been that private property rights include some unbeatable qualities in relation to other potential property regimes such as the common property regime. Because of this unbeatability many writers such as Demsetz (1967) and Hardin (1968) have emphasised the

performance of private ownership. On the other hand, opposition to this view has emerged partly because it has been recognized that the problem of the lower value assets is leading to the exhaustion or extinction of the renewable resources under a private ownership (Clark 1973, Beaumont & Walker 1996). In his whaling example, Clark (1973) expressed that also the very careful management practised by an informed private owner can lead to the destruction of a living resource if the owner's time-preference rate is higher than the time rate of resource growth (Lerch 1998). The owners of private property are both willing to resort to and capable of overuse, which can lead to the extinction of their resources if only the price is right and if there will be other opportunities in the future. In this case, it might be economically optimal to deplete the resource instead of using it in any sustainable way (Feeny et al. 1990).

Property regimes cover a large and diverse spectrum, differing according to the character of the ownership (in other words, private, common, state and different hybrids), according to the owner's rights and duties, and according to the place of control. An important subject of discussion in this respect deals with the connection between property arrangements and the possibilities for long-term resource sustainability. This is why the issue at stake is a significant problem connected to institutional design, to the creative solving of the conflicts in society. Institutions such as property-rights agreements should, indeed, be seen as variables of economic policy.

The "tragedy of open access" is connected to the open-access regime (Cole 1999, Ostrom 1999). The question is then about resources, which are owned by nobody (*res nullius*). Open-access regimes allow individuals or some groups to use scarce resources without needing to take into account those others, who are also using the same resources. In an open-access condition, there is no property right, instead the first user's rule works; first user is able to get benefits from the resource's benefit stream. Open-access condition is then a state where there is no law. Everybody's access is nobody's property. Most environmental problems are connected to this kind of property regime, which approaches the open-access condition. There is an open access condition, when the management or authority system is missing or broken. The authority's purpose is to use and enforce a set of action norms for the users or others who are interested in the natural resource in question. The solution to many

environmental problems begins usually by focusing attention to the problems caused by an open-access regime.

According to Hardin (1968), the users of the common property resources (as he called them) are locked to a state of tension between individual and collective action. When the individual does not take into account the costs their decisions are causing to others, then the resource will be overused. Collective action would probably then yield a more efficient resource use (Anderies 2000). But there are difficulties in attaining any collective action inside one user group. This is why the most often suggested solution to this problem is either central command focusing on the resource users or the privatization of the resource. Hardin thought that resource destruction is inevitable for as long as the common property has been converted into private property or some public regulation of the users is organized. Hardin recognized especially two general solutions: private firms and socialism (public control). Privatization usually offers incentives for reasonable utilization of the resource.⁶ If the owner has property rights to the resource, and if those rights are exchangeable, both the costs and benefits are allocated to the same owner and they are then reflected in the market prices, giving to the owner the corresponding incentives to refrain from the destructive uses. However, these incentives are not necessarily consistent with sustainable use.

One of the first economists to deal with the question of common property was Kapp (1950). For him, common property was not a problem at all, but instead it was a type of use: "... jealously regulated by habits and institutional restrictions imposed by customs" (Kapp 1970, 112). But some years later, Gordon (1954) and Scott (1955) recognized that common property is a problem when governing the fish populations. Everybody's property is nobody's property. From these two ideas of common property, the problem view, according to which common property is identified as

⁶ Indeed, some economists have considered that private-property regime to be the only form on which an appropriate way to manage natural resources can be based (Alchian and Demsetz 1973, Barzel 1989, Demsetz 1967, Furubotn and Pejovich 1974). This is the origin of the term Free Market Environmentalism (Anderson and Leal 1991). Free market environmentalists believe that privatization, or complete determination of private ownership to environmental commodities, will do away with both environmental market failures and the misdirected attempts by the state to remedy these failures. In principle, all environmental problems can be eliminated by creating totally comprehensive private property rights. Thus their argument is a logical extension to the thoughts of Demsetz (1967).

everybody's property and missing property has reached more popularity among the economists (Dasgupta and Heal 1979, Fisher 1981, Dasgupta 1982). But Ciriacy-Wantrup and Bishop (1975) presented a more strict description of the common property concept. Still the economists like Howe (1979), Tietenberg (1984) and Hartwick and Olewiler (1986) did systematically make the mistake by confusing the common property for the open access. Many economists have understood wrongly the problems and language connected to common property. Firstly, they confuse common property with open and unrestricted access. Secondly, they explain the disappearing of common property to be an inevitable effect of economic rationality. According to this view, communal property systems are increasing the transaction costs by creating the so-called "free rider" problem. Property right structures, which also include the right to exclude those who do not pay, is doing away with both of these sources of high transaction costs. The social effects from the identification the owners of a right can also have some allocative influences. The most important impact of the changing institutional arrangements can well be the effects of reorganization on the transaction costs. Resources are put to their most productive uses (Alchian and Demsetz 1973). In communal rights, an implicit instability can become especially acute when changes in technology or in demands are making a communally-owned resource more valuable than it was before. Such changes easily bring with them some harmful and beneficial effects. This process is based on Adam Smith's concept of self-interest, but it is clearly an incorrect interpretation of his writings (Aquilera-Klink 1994).⁷

When common property really is common property, it should exist as an institution (Ciriacy-Wantrup and Bishop 1975, Feeny et al. 1990). This property type differs totally from private property, public property or non-property.

At the other end of the spectrum from the frontier lies the commons. A commons, res communes, is community property, owned and controlled by community members.

⁷ The so-called "tragedy of the commons" is more accurately expressed as the "tragedy of a methodological individualism". The term "tragedy of the commons" is in fact based to that kind of mistaken interpretation of the concept self-interest, which already was included in Adam Smith's works. According to Aquilera-Klink the term sympathy in a way Smith was using it, is more close to solidarity or cooperation. Hardin fails to make any distinction between non-property and common property. According to Hardin the beginning of the problem is in individual economic rationality, which is based to self-interest instead of it were more correct to say, that is based in an absurd way to think that self-interest is a basic condition for economic rationality (Aquilera-Klink 1994).

Resources managed under common property regimes are controlled by the group of co-owners who have rights and duties with respect to resource use... Frontiers and commons as the two ends of resource-use spectrum are ideal types. Along the spectrum of resource use are many real-life permutations. The six components of institutional capital outlined ... could be developed into a number of alternative management structures which would more closely approach the common idea. There is no single management approach appropriate for all contexts. (Hanna 1997)

Only few will disagree with the view that open access condition can result in resource misuse. But there was a very fast jump from the idea of restricted access to the idea of creating private property rights to resources (McCay 1996).

"...open-access describes a situation in which no property rights are specified, i.e. neither limitations for access nor use are given. In addition to that, another state, the limited user open-access situation, is created in which the amount of users is indeed limited and has access to the resource. However, there are no rules within the group of users concerning the right to use the resource. There is a limitation to access the resource but none to use it. This is the state that Hardin (1968) described in his essay "Tragedy of the Commons" which advanced to a paradigm in economics. Common property, which does not fail, is characterized by a clearly defined group of users and by obligatory rules and limitations that regulate the use of a resource within the group. This form of common property is capable of avoiding exploitation, which is linked to the absence of property rights, and does not necessarily have to have a tragic ending. Misunderstandings (in particular as to historic types of common property) have been caused by the vague use of definitions that hold out obstinately within economic theory. As a matter of fact, this is a tragedy of "open-access" rather than a "tragedy of the commons." The solution to this tragedy can be both private and common property. This result in the division of the terms open-access and common property. It is not possible to decide a priori which institutional arrangement is to be preferred. This decision has to be made for each individual case and the transaction cost have to be taken into consideration respectively. It is interesting to see that Demsetz' view of Labrador-Indian fur trade is not an example of the transformation of common into private property but rather a change from an open-access situation to common property which does not fail." (Lerch 1998, 287)

The arguments favouring private property are confusing open-access with common property behaviour (Ciriacy-Wantrup and Bishop 1975). In fact, stable and non-destructive common property regimes have actually been at work for a long time among indigenous people. Thus it can be said that the tragedy of the commons is an inappropriate metaphor. The literature on common property includes a large number of case studies describing the success of communal management of fish populations, forests, grazing lands, water and many other resources. The aim in doing these case studies was to repress Hardin's myth of the universal tragedy of the commons. Today, we know that under certain conditions the collective management of natural resources can be both possible and sustainable. Local communities often have the capability to organize and manage local resources efficiently. In spite of the assumptions of many common property analysers, these communal property arrangements have remained in effect. The complexity of communities in the past, and at present, have independently sustained and applied communal agreements when managing and governing common property resources. Their constancy is no historical accident; these contracts have been based on resource knowledge and cultural norms, which have developed and which have been tested over time.

That which is still missing is a unified theory for explaining these successes or failures. Elinor Ostrom (1990) in her well-known book "Governing the Commons" has presented some principles, and after the publishing of that book many researchers have meticulously collected the data needed to test the validity of these principles. Ostrom's first objective was to answer the question: How it is possible that some people can organize themselves to govern and manage common-pool resources and others cannot? Ostrom's principal approach was inductive; by going through many empirical studies, she examines the empirical forms and theoretical views on how common-pool resources can be collectively managed. Further, she sets out to define some design principles characteristic of successful common-pool resources as well as the external factors, which can weaken or broaden the capability of individuals to use and govern common-pool resources. Ostrom (1995) presented a set of seven design principles characterizing most of those institutions, which can successfully manage common pool resources (Anderies 2000). She also commented on the importance of the underlying assumptions connected to human behaviour, i.e. humans as self-

interested, norm-free, short-term utility maximizers versus beings being able to define and accept social norms and co-operation. Ostrom wishes that she could still stay within the individualistic paradigm, which is why she classifies her discussion about collective action as individually rational action (Field 1992). The correlating principles with successful common property management function as useful indicators, but still they do not reveal those causal processes, which lead to these correlations. If the underlying mechanisms are not known, it is not possible to define the area of the necessary principles. Using these devices, it is very difficult to design rules preventing the destruction of a common-property resource, because in many cases these rules have evolved over very long time periods. They can be extremely complicated and they cannot be the results from any conscious design. She intends to address the question of how common-pool institutions work and survive without having to answer the question about the economic efficiency of different property-rights institutions (Field 1992).

When defining the area where communal ownership is functioning best of all, empirical studies have covered many factors: relatively small groups with shared needs and norms; clear borders to resource management; stable groups and relatively low enforcement costs. Some results can be found from the common-property literature about the confrontation between ecological and social systems. Often, the resource users are not a mixture of independent individuals; instead, they are in connection with each other through some formal and informal institutions, and they are able to communicate and change the incentive structures. Historically, the use of common-property resources has not been free for all (open-access) instead in a periods of fast changes. The regime of resource management most often regulates the ways of using the resource. In the case of a local informal regime, the resource-use behaviour of individuals is often transmitted by different social controls and sanctions. The prevalence of a community is an important but not a sufficient condition to resolving the problems. There are some design principles, which could be used to predict the success of common-property institutions. There are many feedback loops in most nature-society systems, which include some uses of common property resources (Folke and Berkes 1995). Many of the principles to be derived from local common cases are applicable also to international cases.

An obvious challenge to economists is to bring to the common-property research the elements of organisational and collective decisions. We should study the common organizations, the collectives, which offer public (or collective) goods. It is problematic if the prevalent models of the collective economic choice cannot offer necessary justifications for this work. Of course, there can be no comprehensive theory in existence. Instead, there are small pieces everywhere; game theory, public choice, theory of clubs, oligopolistic models, transactions costs and theories of the firm, which weight the collective character of the decisions made. But although these models can offer insights into the different aspects of the problem, they can still be too abstract to function in the integrated richness of the real world. It may be that these simply lack some key elements such as the importance of development paths (history) and the strength of the political and social identifications. However, it can still make sense to see what might be achieved by broadening the standard models of common property with the elements of collective choice (Field 1990). Game theory is seen as a good means to understand the strategic character of the collective action and when expecting the effects of institutional changes. In that is is not examined individual behaviour as such but it is also taken into account that individuals are forced to take into account always the possible future behaviour of other people.

The interest in game theory increased very rapidly in the 1990s when the popularity of evolutionary economics grew. This was also the time when some degree of restriction was accepted in to the conditions for rationality. In game theory, a significant area of growth is that of games, where players are heterogeneous in some way, economically or socio-culturally. Game theory can be seen to be a connecting means in developing dialogue between theorists and empiricists. Game theory offers means to create hypothesis about the causal links between individuals' strategic choices, and the institutional influences of these choices, i.e. hypotheses, which the empiricists working in the field can then test. Such analyses can eventually produce concrete predictions about how different kinds of resource types, new technologies to utilize and institutional settings are forming the strategies of the players. But it must, however, be quite sensitive to the issue that the underlying assumptions of the standard game theory do not necessarily apply very well to the examination of common-property questions. This is why some of these assumptions must be revised (see Ruttan 2000, Wilson, D. 2000, and Wilson, R.K. 2000).

The main questions are the following: When should the individual engage in co-operation? When should a person be selfish in an ongoing interaction with another person? What are the conditions whereby co-operation emerges in the world of egoists without any central authority? Thomas Hobbes was of the opinion that co-operation does not develop at all without a central authority and consequently strong government or public power is necessary. Today, nations are interacting with each other without central authority. This is why the claims for the emergence of co-operation have relevance for the central questions in international policy. Furthermore, the logic of communal property can be applied to global resources. Here it is more difficult to hinder the strategy. The aim is to develop a theory of co-operation, which can be used to find that what is necessary for co-operation to emerge. The basic problem is that the endeavour to self-interest by everybody is leading to bad end result for everybody. There are representations for this such as the famous prisoner's dilemma game and for example Tit-for-Tat strategy for a repeated game that came out of Axelrod's (1984) computer tournaments (Gifford 1999).

But Hardin's argument overlooks the important role of institutional agreements, which offer the regulation of the use and possibilities for exclusion. It also overlooks the cultural factors. In order to understand the results, we have to know the character of the resource in question, the area of the decision-making arrangements, including the property-rights regime, and the character of the interaction between users and regulators. Complicated interactions are an important feature and commons models should take these interactions into account. A new interest to communal property arrangements may be connected to the revised interest shown towards grass-roots democracy, public participation and local planning. But communities already using resources are no longer so isolated as they were earlier and resources may have many concurrent uses. Divided governance or state regulation together with the users' self-management can then be a working alternative. This kind of a common management can be capitalized to the local knowledge and to the long-term interest of the users, offering co-ordination of all relevant uses and users over wide geographic spatial areas with potentially lower transactions costs.

Communal ownership (common property) is defined as a character where individual users own some higher incentive to act together with each other when practising their individualistic strategies, and it is usually limited in some way and regulated by the group of individuals or organizations enforcing access and use. These incentives are often connected to such aspects as the economies of scale in common property management when compared to individual management (Adger & Luttrell 2000). This is why common property can be compared to private or state property or to open-access. Common property management regimes are a set of institutional arrangements defining the conditions to access to those benefits to be got from the collectively used resources.

The success of common-property resource management cannot be guaranteed, however (Adger & Luttrell 2000). Most common-property resources are not pure public goods, which are non-rival in consumption. Instead, they are decreasing in number. Every user decreases the availability of that resource to others. Then common-property resources, often referred to as common-pool resources, can be used in an unsustainable way when their use rates exceed the rates of renewal. But there is one principle defined by Ostrom (1990) for successful communal management and that is to set clear limits to the resource itself and the users entitled to use them. The state has a role in the management of these resources and in enforcing the legal framework for their use: there can be a difference between *de facto* and *de jure* property rights. It is clear that *de jure* rights are not a necessary condition for the existence of sustainable resource use, but the legal framework for property rights can be used to enhance security and stability among resource users. Thus the central questions concerning the property rights to natural resource use in general focus on the structure of the rights and benefit sharing and the role of the state in offering a framework consistent with their existence or traditional management (Adger and Luttrell 2000).

One view defending private property rights is that of individuals having through a natural right an inviolable property right to their work. If they, by their own work, improve the land, then they can acquire an inviolable right to that land. Any kind of governmental action weakening the value of that part of land is so-called 'taking', which should be compensated. This view is based on John Locke's philosophy,

according to which landownership justified in this way was developed as an argument against tyrannical governments.⁸ But there have always been strong opinions, supporting by research among indigenous people, which preceded private property and this is why common property is the natural state, not private property (Riha 2000). According to the Hohfeldian school of thought, property rights are always tripartite in character, involving relationships between individuals with respect to the things owned, which defines the conflicting parties and the resolving power or the state. According to Bromley, the idea of rights includes legal, rhetoric and moral components, and his view is that the environment represents the moral area. There are always broad moral question connected to natural environment. This is why property rights form the essence of environmental policy.

Theories on property rights provide systematic explanations of how and why property is created and allocated. Property theories can account for dynamics: why and how property rights change as well as justifications for change. When land is privatized, it often creates an institutional context that entitles the owner to disrupt the contribution of such land to ecosystem processes and services. This is potentially harmful to all commons users (Haddad 2003). According to Hanna (1996), a basic characteristic of an efficient property regime is its context specificity, i.e. the use of property rights to resolve resource problems is always context-dependent and consequently no one special regulatory alternative or regulatory policy is suitable in connection with a world of nature subject to powerful variation (Steelman and Wallace 2001). Research has revealed that one property rights regime alone cannot resolve the problem of destruction and overuse of natural resources always and everywhere. Indeed, we have to bear in mind that we live in an ecosystemic context in which especially the concept of private property can ultimately be applied with certain constraints and in which economic systems are open and constitute a part of the broader political and

⁸ It is possible to see that the origin of many present-day ideas concerning property rights are taking shape based on the political philosophies of Hobbes and especially of Locke, and especially on latter's idea of natural rights to property as a counter-reaction to the then typical concept of God-given rights of monarchs to be despots (Dragun 1999). Hobbes and Locke developed their theories to justify the independence of the human being, which was something that had not existed before. The new radical perspective of rights came to be known under the name natural rights (Dragun 1999). According to Hargrove (1989), the worst consequence of Locke's property theory is the amoral and asocial attitude, which evolved from it. Locke's argument has encouraged landowners to behave in an asocial manner and to demand that they have not moral obligation to protect and to conserve nature nor to look after other members of their community, who are influenced by the measures taken by them on their lands.

institutional system, which in turn is connected to the ecological system. This means that those concepts, which work in a closed system, fail to do so in an open system and in a given economic and ecological relationships there is no one right or partial solution. This being so, the concept of common property is much more than what merely applying it in the management of natural resources tells us. It can be the foundation (but not the universal one) for all ecosystem management. According to Aguilera-Klink (1994), common property has a promising future as an institution. “It is not tragedy,” as Hardin (1968) once said.

Ecological property rights in democratic society

Changing social values combined with developments in ecological sciences, environmental and ecological economics, law, and other fields have led to the identification and justification of new claims for public intervention in private land-use decisions and for reconsideration of existing uses of public lands (Ask and Carlsson 2000). One expression of these new claims, i.e. ecosystem management, calls for an active human role in the preservation of biodiversity, complexity, resilience, productivity, and sustainability of human used lands. Ecosystem management adopts a landscape-level perspective on land management. But the extent to which ecosystem management is justified in terms of the existing rights of landowners and public-land users is still a contested issue.

What can be said about property rights when the necessity to sustain the ecosystem functions and the processes is known? The main challenge then is to develop such institutions and property rights regimes as are compatible with ecosystem functions and the goods and services they offer. The Free Environmentalism movements (the Wise Use Movement and the Property Rights Movement) argue that existing property rights associated with land ownership and use are substantial (see Jacobs 1998). Therefore, all new ecosystem-management regulations impose unfair and possibly illegal burdens on landowners and also public land users. But still we have to keep in mind, that we are living in ecosystemic context, where it is possible to apply the idea of private property only within certain limitations. This is why Aguilera-Klink (1994) says that the concept of common property provides the basis for all ecosystem management. When the question is of ecosystem management or sustainable use, the

resource-use institutions should be made more diverse, not less diverse, than they are at present, the interactions between the natural and social systems should be made to correspond more to the feedback obtained from the natural system, management systems should be made more flexible and adaptable, and property regimes should be made flexible, adaptive, diverse, and capable of self-renewal (Berkes 1996). The dependence of property regimes of socio-economic factors also indicates that simple solutions, which are being advocated by the supporters of privatization or state control, are not optimal in all socio-economic environments, and that local or communal management can also offer an 'efficient' management regime in many socio-economic environments (Kant 2000).

Legal, political and/or ethical reasons as a base for property rights changes in relation to sustainable development and the sustainable management of natural resources are addressed in papers by Hanna et al. (1996) and Dragun (1999). Hahn (2000) applies discourse ethics, rights-based consequentialism and multi-objective analysis to these issues. According to him, the principal meaning of non-reductionist welfare economics of institutions is to understand what rights and property rights are, how they emerge, and how they can be changed in democratic society (Hahn 2000). In general terms, the property rights institutions are part of the "cultural capital" by means of which societies transform "natural capital", or resource and ecological services, to man-made capital, or produced production factors. Cultural capital can be defined to refer to all those means and instruments by which social systems can adapt to their natural environment and actively change it. It also includes values and ethics. Man-made capital is made when natural and cultural capital are combined. Natural capital is usually used under particular institutions, attitudes and technology. The sustainable use of natural capital can be based on property-rights regimes capable of responding to feedback from natural capital. We are now seeking mechanisms connecting social and ecological systems to their resilience and sustainability (Folke and Berkes 1995).

The difficult question here is about how adaptability and resilience can be embodied in institutions so that they are capable of responding to those processes, which secure the resilience of ecosystems. The task then is how to make the institutional arrangements more diverse, not less. The variety of applied legislative framework

frames would, indeed, bring significant flexibility to the use and management of natural resources and ecosystems and thus help us to deal with high uncertainty and to cope with it. Multiple, flexible and dynamic legal orders are able to better respond to all uncertainties and changes than legal orders bound to static property regimes (Meinzen-Dick & Pradhan 2001). The ecological settings, which are revealing large variety, need property regimes facilitating rapid and low-cost adapting to new circumstances (Bromley 1998). Sustainability presupposes that human social systems and property regimes are connected to wider ecosystems of which they are a part (Costanza and Folke 1996).

The different objectives of ecosystems lead to different expectations about what should be sustained in a sustainable way, who can have claims to ecosystem services, and how to control the ecosystem use. Management should take place on scales consistent with the natural limits of ecological systems, especially the management of the entire watershed areas should be supported. Property regimes should perform all functions connected to restricting, co-ordination and response. The way they perform these functions is sensitive to transaction costs, co-ordination costs, information collecting, monitoring and enforcement (Hanna 1996). With many landowners in landscape, optimal management cannot be guaranteed without any external intervention. But the economies of configuration can make the intervention very difficult as they claim that all work should be done in the whole landscape and not only in individual stands alone (Gottfried et al. 1996).

A conceptual basis for property rights changes is then built. It includes the definitions of rights, research of the forces behind the changes, and in-depth discussion about the ethical basis of those changes. Socially desired (“efficient”) institutional arrangement manages economic conflicts constructively and has a reasonable ethical base (Hahn 2000). According to Haddad (2001), any given property rights theory has to contain at least the following elements: legitimacy of the property rights, description of the elements subjected to property rights, and an explanation of the dynamics of the property rights; i.e. how property rights change with time. The special theory of ecological property rights represents these elements in that it, first of all, explains how these elements are appropriate for natural resources, and secondly how the terms and concepts used in ecology should be used as aids in this context.

Marc Tool (1979, 293) describes a progressive institutional change as a change, which “provides for the continuity of human life and to nonindividuous recreation of community through the instrumental use of knowledge.” It offers the criteria for choosing among a set of alternative institutional arrangements, when the purpose is to reach true progress in the problem solving processes of the society. Thus the theory of institutional change is reaching a double meaning: it offers an explanation about the institutional change process and at the same time expresses the social value criteria, which are more suitable for the planning of the process (Bush 1987). When society broadens its understanding about the function of natural systems, in an endeavour to evaluate the effects of legal changes and public policy to natural resources and to the environment, matters such as ecological integrity or health should be included in the all covering evaluation of institutional change (Mercurio 2001). The changes in ecosystems caused by humans are dramatically changing or destroying the structures and functions of these systems and thereby inevitably causing costs to society both in the short and long term (Mercurio 2001).

Using the ecosystem concept presupposes a new way to organize the human relationship with nature. This is why the ecosystem approach presupposes a fundamental change to rights and obligations in land use (Geisler and Bedford 1998). Ecosystem management produces many benefits to society and eventually in a contextual reality always especially to landowners themselves. In the long run, every landowner is dependent on the conditions in their neighbourhood areas. Landowners depend on the nutrient, energy and information flows from these areas.

“Thinking like a mountain”

Aldo Leopold's famous “land ethic” is the single most significant factor at the back of the recent reassessments of the management of natural resources. Leopold in his time learned that direct and hard-handed interference with natural systems causes harm not only to them but also to mankind. This is why sound strategies in environmental management respect natural processes. According to Leopold, membership in the land community is the foremost reason for humans respecting these processes. Leopold himself was among the first foresters to graduate from the School of Forestry of Yale

University, which is why he at first supported the so-called Wise Use School in natural resource policy and, like Gifford Pinchot, he also supported the ideology of the scientific management of the natural resources. However, his thoughts evolved rapidly in the direction of respect for the harmonious dynamics of ecological processes. After the 1920s, Leopold's interest focused on rural landscapes, while many other contemporary conservationists directed their attention to wilderness areas (Norton 1988).

Leopold combined, in practice, both the use value tradition of natural resources and the Muirian tradition of respecting nature spiritually and ethically. Leopold's classical essay "Land Ethic", included in his posthumously published work "*A Sand County Almanac*" (1949), is probably the single most referenced source in current environmental philosophy literature. Leopold's land ethic has also become the mainstream of a nature and environmental philosophy, and his impact continues to gather force. According to Leopold, we should always examine entire ecological systems instead of attempting to manage their separate parts.

Leopold emphasised the significance of an integrated systemic approach in environmental management as the appropriate means of connecting a complexity of human objectives to the potentials offered by the multi-level and complex system that an environment is. This interpretation of land ethic is related to the metaphor used by Leopold, i.e. "*thinking like a mountain*", which embodies the idea of both the temporal and spatial multi-scalar mutual dependence of systems. If the components of a natural system are managed without paying attention to the interconnections prevailing between them, e.g. material and energy flows, then the manager has not learned to think like a mountain. Indeed, Leopold committed himself to contextual, i.e. situation-specific thinking, according to which every management problem has to be examined in two ways: as a separate cell and as a cell in its own context. The context can be thought of as changing and developing within its own time frame. The mountain must think more slowly than the hunter, and the human being responsible for the management of the environment must think like a mountain when managing the interaction between game animals and hunters. Leopold's contextual model underscore complexity and the ability of ecological processes to self-organise. As the consequence of the violent changes that take place in their subsystems, a system that

loses its complexity is ill. Leopold used a lot of his time to find ecologically-argued criteria for ecosystem health.

The ecological literature of the 1980s included a new and promising theoretical approach. Allen and Starr (1982) demonstrated a general system theory for ecologists in 1982 giving it the name 'hierarchy theory' and soon after O'Neill et al. (1986) used this kind of a hierarchy theory as a foundation for a new conceptualization of ecosystems (also Allen and Hoekstra 1992, Norton 1995). Norton and Ulanowicz (1992) have applied this approach to biodiversity policy. The hierarchy theory is, as said, based on the general system theory. It has remarkable similarity with Aldo Leopold's community model and his contextualist nature management approach. But it is a model more exact than Leopold's land concept, which for Leopold was a system changing more slowly and assembled from numerous, more rapidly changing parts (Norton 1990, 1996). The central assumption in the hierarchy theory is that a system composed of subsystems, which change faster than the main system, changes slower than the subsystems (Costanza and Patten 1995). In this contextual approach to environmental management, attention is focused not only on an individual activity but also on the trends launched by the activity (Norton 1996). The trend problem emerges when people everywhere have started to act according to same model.⁹ Even though most individual decisions are targeted on small scales, a hierarchical model focuses attention not only on the effects of these decisions on small scales, but also on their cumulative effects on wide scales (Norton and Toman 1997). Wider scales impose the restrictions and the possibilities, which actors are having to confront on smaller, and thereby also faster, levels (Norton and Toman 1997). The basic idea in ecological hierarchy theory is in that comprehending any given complex system depends on being able to appreciate its constraints at spatio-temporal levels above and below it.

⁹ No one and the same silvicultural system and set of instructions is feasible as such even in sites of the same type because socio-ecological values vary according to the context of the site (Bockstael 1996). Were people everywhere to try to achieve only a single value, e.g. maximum monetary yield, this would still lead only to the simplification of ecological processes. Technology enables people's possibilities to create trends to which extensive natural systems with their slow capacity to change do not have time to adapt. The trend problem arises when people everywhere begin to operate according to the same model.

In recent years, the criticism targeted at the prevailing silviculture, for instance, has underscored the view according to which the ecological and social effects of the weakening of forest ecosystems always depend on their scale. Consequently, the view according to which the ecological and social consequences of impaired forest ecosystems always depend on the scale of the measures has become more marked. Indeed, effects should no longer be studied merely in the case of individual sites or stands, but especially on the landscape or regional level. How forest patches and ecosystems are assembled in the landscape, e.g. as a consequence of fragmentation, has significant consequences on how they should be managed. The fitting of management solutions always to appropriate scales is an essential aspect in achieving conservation and sustainable-use objectives. The significance of a broader spatial scale is then important to management of the environment. Particularly the management of biodiversity on too small a scale can work against its purpose. Usually all kinds of diversity should be assessed on a broad geographical scale. Ecological processes are seldom restricted to administrative and ownership boundaries. However, the realisation of management in compliance with a broader scale often requires difficult-to-accomplish co-ordination over administrative and ownership boundaries (Gottfried et al. 1996). Furthermore, the ecological processes operating on the landscape scale give rise to fresh doubts about the ability of the market mechanism to allocate enough land among the various uses and values because of economies of configuration (market failure on the landscape scale) (Gottfried et al. 1996).¹⁰ Still more, well-functioning ecosystems are in themselves valuable resources, and on a large scale they are irreplaceable (Toman & Ashton 1996).

Decisions made by people always cause such changes to the ecosystems as have effect over time and place, and the ultimate result is a new landscape configuration (Bockstael 1996). The important thing is to note the dependence of ecosystem conditions on the various scales. The conditions promoting the existence of the benefit streams of a special site depend on the conditions prevailing at the other sites and on

¹⁰ “The configuration of land is one of the major contributors to the quality of life. For all these reasons, economists are becoming more interested in land use and its spatial distribution. From the landscape ecology perspective, the spatial arrangement of land uses is the starting point of many modeling approaches... Individuals will also value patterns of land use surrounding a property. Patterns are

the matrix formed of the entire set of interactive conditions defining the ecosystem's health at the landscape level and regional level (Toman & Ashton 1996). Habitats consist of patches contained by the matrix. Population dynamics between the patches depend on a number of things, including patch size and quality and on gene exchange between patches, i.e. the configuration of the patches. Consequently, no one and the same system or set of silvicultural treatments or regulations can work even in all sites or stands, even of the same type, over an entire vast area due to the great variation in both ecological limitations and socio-economic values.

Indeed, we must begin to examine ecosystems from the hierarchical point of view paying particular attention to scale and scope. Secondly, we must study the spatial, temporal, thermodynamic and information aspects (dynamics) of these systems. This we must do within such a behavioural context that is both emergent and catastrophic. In other words, we must note that ecosystems are dynamic, not deterministic, that they always involve unpredictability. It is only by observing that the essence of ecosystems is self-organisation and that our duty is to maintain these processes of self-organisation that we can guarantee a sustainable niche in the biosphere also for our own species. According to Schneider and Kay (1994), a damaged ecosystem, when left on its own, has the capacity to renew itself if it has access to the information necessary for recovery, this being biodiversity, and if the context for the used information, this being the biophysical environment, has not been dramatically changed (see also Kay & Schneider 1995).

The issues of scale became important to ecologists once they became interested in landscape ecology, which became highly popular in North America in the 1980s and which studies the relationship between ecological processes and spatial structures (Naveh and Lieberman 1994). In landscape ecology, the landscape's spatial, temporal and functional heterogeneity and the management difficulties are connected to scales.¹¹ One important element recognized in landscape ecology is connectivity. This has led to new views about the effects of natural and artificial corridors and barriers to

characterised by different housing densities, different amounts and placements of open space.” (Geoghegan et al. 1997, 252)

¹¹ Landscape ecologists think in terms of mosaics of natural and human-managed patches, concepts that relate to the diversity and fragmentation of the surrounding landscape... landscape pattern is an

metapopulation demography and genetics. The environments are heterogenous and they should be managed as such (Naveh 1994). The so-called 'ecosystem management' approach (Boyce and Haney 1997), or more clearly said the 'ecosystem approach' (Gibson 2000 et al.), has developed gradually from landscape ecology. In extreme cases, one can speak of even the eco-regional approach in which the ecosystem is no longer a mere abstract concept, but instead a clearly definable place, an actual geographical unit (Yaffee 1999). Because of these kinds of reasons, there has been a gradual shift taking place in the management of natural resources, away from the simplified resource-specific approach (single species or single biological resource management) towards a more integrated, holistic approach, whose objective is to preserve entire sustainable systems (Knight & Bates 1995). The shift towards holism is probably the most significant trend in current environmental management (Yaffee 1999). In other words, management focusing on a single species, i.e. an individual biological resource, may even be deemed impossible because ultimately species exist only as part of their ecosystem (e.g. Hanna 1999).

But given a world of permanent uncertainty, people certainly cannot know how to reach an environmentally sustainable economy. One promising strategy is to choose adaptive management, which looks at the use of nature as experiments, and includes the possibility of constant learning. Policies are experiments from which we could and should learn (Lee 1993). The central aim of adaptive management is to design such institutions and procedures as would enable the creation of an experimental approach to policy. Natural environment is then understood as an iterative and continuing task. This emerging paradigm of environmental management developed by C.S. Holling and others in the late 1970s, provides the scientific and philosophical framework for this activist and empirical agenda (Holling 1978, Walters 1986, Lee 1993, Gunderson et al. 1995). Adaptive management is, above all, experimental management. Also, Costanza et al. (2000) write about the sustainable governance and adaptive management of environmental assets.

In adaptive management, decision-makers should acknowledge uncertainty and continuously gather and integrate information, with the goal of adaptive improvement.

integrative measure of an ecosystem's ability to provide habitat, prevent environmental degradation,

According to Norton and Steinemann (2001), the basic approaches of adaptive managers are as follows: a) experimentalism; adaptive managers emphasise experimentalism within a dynamic system, recognizing that an ongoing search of knowledge is necessary to set and achieve environmental goals; b) multi-scalar analysis; adaptive managers model and monitor natural systems on multiple scales of space and time; c) place sensitivity; adaptive managers adopt local places, understood as humanly occupied geographic places, as the perspective from which multi-scalar management orients. The object of efforts at evaluation in an adaptive management context should be various feasible development paths. Development paths can be judged according to multiple criteria.

According to Norton (2002):

“Recognizing the dynamic and unpredictable character of ecological processes, adaptive managers expect surprises, and yet strive to design methods and manipulations of environmental systems that reduce this uncertainty through directed management practices. As a consequence, social institutions engaged in and affected by the management process must be structured in a manner that promote flexible, iterative process through which citizens can learn about the dynamics of the natural world as they voice and revise their values and goals in light on increasing information and evidence.”

Ecosystem management, and especially adaptive management (Walters 1986), always concentrates on dynamic processes crossing boundaries. However, the corresponding need to work across boundaries, which is associated with this state of affairs, easily runs up against prevailing concepts of property. Then the problem is especially that of how ecological objectives can be made to correspond to actual ecosystem management. Increasing interdependence among landowners, and the regulation of private property following from it, has actually, in recent times, increased people's interest in policies offering landowners positive incentives to co-operate in the management of ecosystems (Gottfried et al. 1996, Swallow 1996). Management in an ecosystem context means that decisions are sensitive to ecosystem functions, patterns,

and support other natural processes.” (Geoghegan et al. 1997, 252)

and processes. The goal is a set of desired future conditions, and not a set of outputs such as timber volumes or wildlife numbers. Instead, outputs are produced in the process of managing the ecosystem in the direction of a desired future condition.

An ecosystem-based approach to management is relatively simple to pursue in areas where forest ownership is dominated by a limited number of public and/private agencies or organizations. Some forested landscapes are, however, composed of numerous, small, private ownerships. How might an ecosystem-based approach to management be applied to such a complex puzzle of individual and often independent ownerships? By applying the idea of property being a distributable bundle of rights, the state can defend the taking into use of such conservation easements as distribute ownership among several parties and thereby promote the possibility to begin to work on the entire landscape scale at the same time (Hurley et al. 2002).

New forms of collective management or some kinds of coalitions need to be sought out, enabling the parties concerned to benefit at least in the very long term.¹² Collective control is far from easy; instead, it is often highly unpleasant, but it is the price to be paid for the impairment of natural resources. In the words of McKean (1996, 232), it is the price we pay for living on a small planet. The present is the time to begin to encourage landowners to voluntary co-operation by increasing the sense of responsibility divided among them. Study of institutions in this context is a matter not to be neglected. Among other things, institutions include the social norms and codes and other informal limitations of human activity, and formal legislation as well. Ruttan (1998) emphasises the importance of the creation of preconditions for institutional innovations. Consequently, it is obvious that we must gradually start paying more attention than hitherto to changing institutions, e.g. those related to property rights, if we are also to solve the environmental problems falling upon us and if we are to promote sustainable development.

¹² “One can argue that the good of protecting the commons of future generations of users is a good that is expressed and representable at the level of community; as an ecologist might say, it emerges at the level of multi-generational interactions of populations of species, including but not limited to the human species. This ‘ecological-scaled’ value is not, on this view defeasible into individual values. It exists on a different level and a different temporal and spatial scale. The tragedy occurs, on this view, because it posits individual, selfish decision-makers in a context in which each of their interests causes them to act in a way that destroys a higher-level value that emerges only on a multi-generational, communal scale... public goods have an irreducible communal or social aspect...” (Norton & Minter 2002)

Cross-boundary coordination

Recent advances in the areas of conservation biology, landscape ecology, and ecosystem science suggest that there is a need to consider the management of forests at a broader spatial scale than individual parcel or ownership (Rickenbach et al. 1998, Kittredge & Rickenbach 2002).¹³ For example, a landscape perspective, rather than a forest stand perspective, is considered important in understanding processes like population dynamics and natural disturbances, and further to detect structures of importance for preserving species diversity. The benefits of a landscape perspective relate to the point that questions about a detail, the stand, could be resolved by information about the context, the landscape. Managing individual parcels of land will neither adequately preserve ecosystem functions, nor the human systems that depend on them. Certain societal benefits such as water, wildlife habitat, and outdoor recreation (tourism) require healthy or fully functioning ecosystems. Many of these functions occur irrespective of political or property boundaries (e.g. habitat, hydrologic cycle, pollination, regeneration, disturbance).

But an ecosystem-based approach to management is complex when the ecosystem is owned or controlled by a large number of individuals. The emphasis on ecosystem health suggests that managers should consider the future condition of forest ecosystems a management goal, rather than material outputs. Such outputs are still produced, but as a result of striving to achieve a future condition. The problem is to coordinate efforts made towards promoting nature conservation among forest owners in a way that is beneficial to all and that can easily be adopted (Ask and Carlsson 2000). However, private landowners have little financial incentive to participate in cooperative management because non-timber outputs are generally non-exclusive and have little or no market value. Moreover, little is known about non-industrial private

¹³ According to Kant. "The boundaries of forest economics will have to be extended ... the economic principles developed by evolutionary, institutional, ecological economics and economists from other new streams of economics, will be the tools to extend these boundaries in appropriate direction." (Kant 2003, 52)

forest (NIPF) landowners' attitudes and preferences toward co-operation. Landowner attitudes must be considered and extension programs designed to reach owners and promote ecosystem sensitive management.

This being so, ecosystem management at the landscape level and sustainable forestry in mixed-ownership landscapes will require some level of cross-boundary coordination or management (Rickenbach & Reed 2002, Klosowski et al. 2001). Recently, some proposals for institutional change through ecosystem-based partnership have been made and prerequisites for successful partnerships have been suggested (Arnold & Long 1993; see also Breckenridge 1995). Also, conservation partnership models (the use of "conservation partners" for the coordinated management of private lands) for co-ordinated management on private lands have been developed to create a sustainable region in harmony by providing technical assistance, natural resource information, and conservation incentives.¹⁴ Factors leading to co-operative success in the management of landscape-level ecosystems involving mixed ownership also have studies and several motivations for these efforts are suggested, such as the threat of regulatory and litigious conflict. Barriers are addressed as well, such as the lack of a common culture (terminology, values, objectives) among stakeholders (Matthew and Long 1993). One way to address these barriers is to use an Agreement to Collaborate that lays out rules, responsibilities, limitations, and desired results. Ranging in formality from non-binding to contract, these agreements serve numerous purposes such as alleviating mistrust and facilitating communication.

Sample's (1994) work discusses the use of co-operative strategies based on partnerships with private industrial landowners to meet ecosystem management goals on forestlands. The author identifies and discusses several characteristics that should be included in order for these arrangements to succeed, such as voluntary involvement, mutual goals, and economic incentives. The article presents several partnership approaches: incentive-based, which includes publicly funded financial incentives to non-industrial private landowners and opportunities to reduce or offset federal income taxes paid by landowners. The second category, information-based, includes formal,

¹⁴ There are "Crucial issues that highlight the importance of reflexive, discursively determined, context-specific, institutional arrangement for sustainable development policy process... Learning is

public recognition of landowners' conservation efforts and education and technical assistance to private landowners. This study examines voluntary, non-regulatory approaches to cross-boundary co-ordination for ecosystem management.

A case study made by Rickenbach and Reed (2002) identified three themes – stewardship ethic, property rights amid uncertainty, and action orientation – that were most salient among landowners when deciding to participate. According to these authors, landowners seemed uninterested in formal, contractual means of co-operation with other owners, however, and future extension programming should focus on short-term, informal levels of co-operation, and voluntary incentive programs designed to promote long-term protection and co-operation with adjoining owners on the ecosystem scale. They studied especially landowners' sensitivity to the small-scale ecological aspects of their property that might otherwise go unnoticed and hence be possibly lost or damaged; their sensitivity to the broader landscape level, beyond the boundaries of their specific ownership and their sensitivity to a longer time frame than many owners would otherwise consider. Then they asked what are the landowners willing to do. And based on their interests, what incentives or information can be developed to promote greater landscape-level cooperation (Kline et al. 2000).

Kittridge's and Rickenbach's (2002) model will require interdisciplinary participation of specialists in such fields as municipal government and finance, law, taxation, and planning. Such instruments might include property tax programs that reward ecosystem-sensitive management, and information/education programs for landowners that promote stewardship. According to Jacobson (2002), many factors influence forest landowner management decisions. That study examines landowner decisions regarding participation in ecosystem management activities, such as laying out landscape corridors cutting across their private lands. Landscape corridors are recognized worldwide as being important in biodiversity conservation. For ecosystem management activities to occur in areas dominated by a multitude of small private forest landholdings, landowner participation and co-operation is necessary. Many NIPF owners are deeply concerned about property rights (Stevens et al. 1999).

the product of these communicative partnerships, though which, emerge collectively, agreed strategies

In all, we have to think environmental goods in communitarian terms and then we can see that public goods have an irreducible communal or social aspect. This line of reasoning is to treat normative issues regarding the environment as those requiring co-operative action based on public deliberation, directing attention to fair democratic processes. But the success of common property resource management, however, cannot be guaranteed (Adger & Luttrell 2000). Although common property is no guarantee of prudent ecological practice, one of the ways in which common property institutions are supportive of resilience is through locally adapted practices based on ecological knowledge and understanding (Folke et al. 1998).¹⁵ It has been documented by many cases on linking social and ecological systems, as well as elsewhere, that local-level institutions learn and develop the capacity to respond to environmental feedbacks faster than do centralized agencies. Being “on the ground” they are physically closer to the resources, there is no separation of the user from the manager, and there is more learning-by-doing in accumulating a base of practical ecological knowledge (Davidson-Hunt & Berkes 2000).

Questions to be examined

However, forest owners can be quite prepared in their attitudes for co-operation and trans-boundary co-ordination of forest management. Knowledge regarding these attitudes can be utilised when planning suitable incentives.¹⁶ Indeed, we can ask, for example, for their opinions regarding the following points:

- Should forest owners plan some silvicultural practices together since ecosystems and wildlife environments cross landownership boundaries;
- Do forest owners believe that the decisions made by them independently (independently from other forest owners) influence the state of forest ecosystems on land belonging to other forest owners in neighbouring areas (or

and actions for sustainable development” (Meppem 2000, 58-59)

¹⁵ Borgström Hansson and Wackernagel have a more pessimistic viewpoint: “... under the influence of expert systems and market exchanges, rural people are losing the knowledge of, and attentiveness to, local ecosystem services.” (Borgström Hansson and Wackernagel 1999, 211)

¹⁶ OECD (1999) has recently prepared a handbook on how to plan and implement incentive measures for biodiversity.

vice versa, do the decisions of neighbouring forest owners impact on their forests);

- Should landscape-level and regional-level plans be drawn up as landowners' co-operative efforts or should they be drawn up by officials assisted by experts, i.e. what is the legitimate planning organisations in their opinion;
- Who should be the initiator in communal forestry (Communal forestry merely delimits private forestry, it does not replace it);
- What different co-operative activities can be presented to be implemented;
- Which special ecological viewpoints (e.g. habitats of rare species, ecological corridors, game, wild berries) are of particular interest to forest owners;
- What is the landowner's propensity to the landscape context in which her/his private land property is located (i.e. is she/he interested in the neighbouring forests as an everyperson, as a picker of wild berries, as containing cultural values, as area sustaining the sense of place etc.);
- What is his propensity regarding the future of the forest holding he owns (i.e. how long should the time span be when viewing silviculture);
- What is an appropriate degree of formality in co-operation (binding agreements, quorum of meetings, etc.);
- To what extent could person holding different use rights or usufructs (e.g. everyperson's rights) to privately-owned lands participate in decision-making at landscape and regional level;
- What cost-sharing (levelling out) mechanisms could be applied;
- Should extension organisations begin to offer holistic silvicultural information;
- What would be the biggest obstacles to co-operation;
- What is an appropriate scale of co-operation (not too big and not too small one);

- What social and economic incentives would be needed;
- Is it important to be personally allowed to participate in decisions on plans on landscape level and regional level, or is it enough that one gives his approval to a ready-made plan;
- Would increasing communal decision-making in forestry have positive effects on other forms of communality.

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