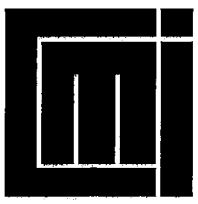
Living with the Commons:
Local Institutions for Natural Resource Management

Are J. Knudsen

R 1995: 2
May 1995



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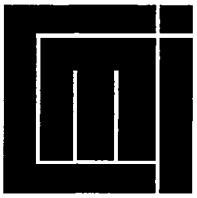

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Reprint: NOK 75 + postage

ISSN 0805-505X

Indexing terms

Institution building
Property rights
Resources management
Shared natural resources

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Preface

The purpose of this report is to present the "state-of-the-art" of research on common property regimes. Hopefully, this report can serve as an introduction to common property theory for non-specialists, as well as being useful to scholars who are engaged in research on common property regimes. In order to aid future research on the subject, the bibliography accompanying the report is available in electronic form to students and researchers.* With the staggering amount of new publications in this field, it has been necessary to limit both the thematic and the geographic coverage. The three themes which have been selected for closer study are coastal fisheries, rangelands management with an emphasis on East African pastoralism, and forestry management. It has been necessary to leave out work on irrigation, even though it clearly is a relevant and important theme (cf. Wade 1988; Coward 1990; Ostrom and Gardner 1993). Regionally, case studies from Africa and Asia have been preferred over material from the rest of the world. This delimitation is deferred to pick up important contributions from the North Atlantic region, including Northern Norway, as well as Oceania, because without them, important theoretical contributions would have been left out. The bibliography accompanying this report is not exhaustive, neither was it intended to be so. There has, however, been a conscious effort to find new, and less well known material in addition to classic material presented elsewhere. The studies selected for inclusion in the report reflect their importance in terms of theory and thematic scope, and whether they bring new points to the debate. Naturally, a short report of this kind cannot do justice to the subtlety of the original works, but can only summarize their main points.

* The bibliography contains 342 entries. A diskette containing the bibliography included in the report is available from CMI for an additional cost of NOK 50 (including postage). The diskette contains the bibliography in three different formats: unformatted text file (ASCII), formatted (WordPerfect 5.1 for DOS) and database file (DataPerfect 2.1). Readers are also advised to consult two excellent bibliographies (Martin 1989, 1992), which provide a number of references to common property regimes throughout the world. They are available directly from Indiana University (USA) on plain paper and diskette. Online searches can also be done using the Internet (WWW: //lib-gopher.lib.indiana.edu).

The preparation of this report was supported by a grant from the Norwegian Research Council to promote aid-related environmental competence ("Miljøkompetanseprogrammet"). This study could not have been completed without help to identify hard-to-find articles and books by CMI library staff, Kari Herland and Hilde Sperrevik. Thanks are also due to editorial assistance from Inger A. Nygaard and to colleagues at CMI — Arild Angelsen, Johan Helland, Eyolf Jul-Larsen and Ussif R. Sumaila — who commented on earlier drafts of the manuscript. Remaining shortcomings, omissions and errors are, of course, my own.

Bergen, May 1995

AJK

1. The "tragedy of the commons": The legacy of Hardin

Introduction

Natural resource management has recently generated much multi-disciplinary research activity. The article which initiated this activity was Garrett Hardin's (1968) essay titled "The Tragedy of the Commons". The essay's prime aim was to discuss a class of social problems which has no technical solution. One such problem, Hardin argued, is the long term effects of unrestrained individual maximizing behaviour on a finite resource base. Hardin proposed that without outside intervention, there was no solution to this dilemma, and coined it "the tragedy of the commons". Hardin had drawn on sources in mathematics, biology and economics to popularize a research theme of great importance: the tension between individual rationality and collective outcomes.[1] Hardin's deceptively simple article has had numerous re-readings, but its legacy is (regardless of whether Hardin was right or wrong) that it provoked research in a theme that is highly relevant to problems in developing and modern countries alike (Kehoane and Ostrom 1995).

Despite the massive critique of Hardin's thesis, and efforts to revise (McCay and Acheson 1987; Berkes et al. 1989), rephrase (McCay 1993; Rose 1986), expand on (Ostrom 1990), or flatly reject his ideas (Berkes 1983), nobody it seems, has been able to dispel the impact the notions contained in Hardin's paper have had. It is perhaps the wide acceptance of the view contained in his essay among managers, bureaucrats and state agencies, which has caused the unending criticism and condemnation of Hardin's work in almost all the new research on common property regimes.

The first concerted effort to challenge the conventional wisdom about the demise of common property regimes, was a conference in 1985 on common property resource management (National Academy Press 1986). The conference proceedings (ibid.) examined common property regimes in a

[1] The study of rationality has of course, long antecedents in the social sciences, cf. Weber's distinction between *Wertrationalität* and *Zweckrationalität* (1987:28 [1922]). A modern classic in the study of collective action is Olson (1965).

variety of settings. At the time, the papers represented an unprecedented wide range of empirical studies, held together by a common analytical framework (the "Oakerson framework"). Many of the papers presented at this conference were published in subsequent years in books and edited volumes by McCay and Acheson (1987), Berkes (1989), Ostrom (1990) and Bromley (1992). These books have in common that they want to revise Hardin's original work. The problem is that little has emerged from this critique, either in the form of a new theory or new analytical approaches, hence there is lack of a coherent theoretical framework. In a review of Elinor Ostrom's (1990) book *Governing the Commons*, Field (1992:356) notes that:

> There is a curious lack of congruence between the material in early and late chapters, which may help explain why no particular compelling theory of collective CPR [common property resources] institutions emerges from these pages.

In a review of another major work on common property regimes, Daniel Bromley's edited volume, *Making the Commons Work* (1992), Lees (1993:106, italics in original) observes that:

> it is a little surprising to read attacks...on positions which claim that common property *inevitably* leads to resource mismanagement and ecological disaster – that is, it is surprising that anyone today would hold such a position, and that anyone would find it worth the time to refute it. ...On the other hand, the occasional insistence on the intrinsic value of common property to people and their communities in this collection sounds somewhat romantic and often unnecessarily defensive.

The effect of this has been that though there appears to be a considerable research activity, original contributions which can move the study of common property regimes beyond a critique of Hardin are lacking (Feeny et al. 1990; McKean 1992). Much of the so-called "new" research on common property management tend to repeat criticism which has long been absorbed by the research community (Lees 1993). If Hardin was "wrong", how can we construct new models which are informed by the advances made by social science over the past decades? Before we can answer this question, there is a need for a review of empirical and theoretical contributions to the commons debate. Moreover, there is the question of why common property regimes have commanded scholarly attention across disciplines.

Why do we study common property regimes?

The study of common property regimes has attracted numerous scholars over the last decade. Both political scientists, economists, anthropologists – and we could no doubt extend the list – have joined forces to study "the commons". It is difficult to identify a single reason why disciplines which normally pursue different research agendas, converged to study the commons. The problem Hardin raised was the divergence between individual rationality and collective outcomes, or to put it differently, between micromotives and macrobehaviour (McCay and Acheson 1987:2). Hardin was not the first to bring up this issue, but as he himself acknowledged, it was first formulated in the early 19th century by William Forster Lloyd in his pamphlet "On the Checks to Population" (1977 [1833]). Hardin, however, gave Lloyd's ideas a more general form, saying that there is a fundamental difference in interest between users sharing a resource which, Hardin argued, could not be solved unless they willingly restrained their own freedom of action through "mutual coercion, mutually agreed upon" (1968:1247). Especially Hardin's parable linking rationality with pastoralism attracted scholarly interest. The argument was simple. If a herdsman adds another animal to his fields, the positive gain, or utility for him could be denoted +1. For the other herdsmen sharing the same pasture, the added grazing pressure represents a negative utility which can be denoted –1/n (n = the number of herdsmen). For the individual herdsman, Hardin claimed, the rational response is to add as many animals as possible to his herd. This was a simple and immediately attractive proposition which seemed applicable to a number of situations of shared resource use, and suddenly resources which previously had nothing in common – air, fish, public transport and drinking water – were found to share a singular trait; they were shared resources, or in short, a "commons". Naturally, this opened new areas for comparative research, and to some degree explains why the field has grown so rapidly. The problem of rationality and resource management could be approached empirically in studies of natural resource management; it could be investigated by applying game theory or it could be used to investigate issues in relation to the structure of institutions, human behaviour and choice.

Apart from the theoretical issues in the research on common property regimes, the field has wide ranging *practical* implications and is therefore relevant to development interventions. Keywords in this respect are security, equity, community-based resource management, resource conservation and ecological sustainability (Berkes and Farvar 1989:11ff.). Around the world resources critical to people's livelihood are under pressure (Blakie and Brookfield 1987), and this is not only a threat say, to

East African pastoralists (Graham 1988; Lane 1990), but equally to Saami pastoralists in Northern Norway (Berge et al. 1994; section 3; Bjørklund 1990; Stenseth et al. 1991:ch. 2). In particular, it seems that *institutions* which govern the use of common pool resources are being eroded by diverse forces such as population growth, market integration, urbanization and government interference. In particular, state policies have eroded, or in some cases, actively dismantled traditional institutions without replacing them with functional equivalent institutions within a framework of state resource management.

An important question, then, is whether local level management can be reintroduced or reinstituted as an intermediate form? "Management" is not a very precise term, but could be defined as the "balancing of labour and material inputs to the natural system in order to enhance its carrying capacity and achieve a profitable and sustainable level of production" (Watson 1989:55). Management, according to this definition, has the positive connotation of utilizing a resource in such a way that it continues to benefit its users. At the outset, local management seems to offer an advantage over state management due to lower transaction costs, and at the same time, by keeping a resource open to legitimate users, avoids the alienation that is a consequence of privatization. However, as McGranahan points out: "Advocates of reinvigorated common property institutions must show not only that common property was effective in the past, but that it can be effective in the future" (1991:1285). One of the aims of this report is to look more closely into how institutions change their form and function, and how diverse forces such as population growth, market integration and state intervention influence traditional institutions and alter their legitimacy and relevance. Moreover, this study is particularly concerned with "local institutions" as a possible solution to the high transaction costs associated with state management and the equity problems that arise from privatization (Seabright 1993:125ff.). The term "local institutions" is imprecise. It will be used here to denote institutions which have one or more of the following characteristics: a) govern resource use in a bounded or restricted area (spatial dimension), b) are devised and enforced by social groups (whether indigenous or not), c) are informal, that is, unrecognized by central authorities and not part of statutory law. The term "local institution" as defined here does not, however, imply that an institution must be traditional in the sense that is has been in place for a long time, neither does the term disqualify institutions which are the result of local innovation.

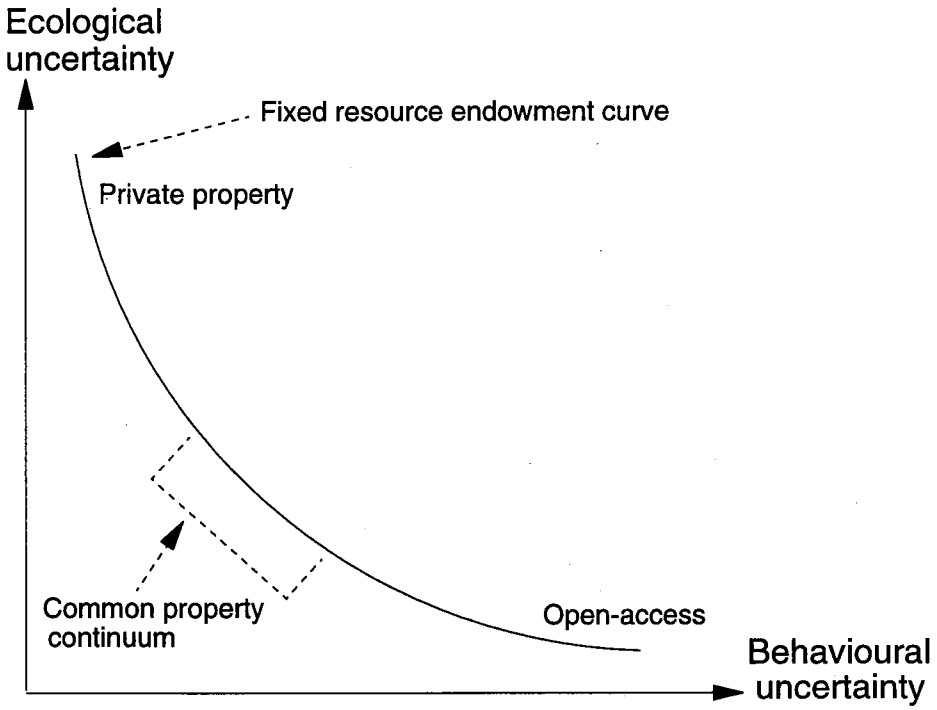
What is meant by "common property"?

Research on common property, the specific class of property relations which concerns us here, has suffered from a lack of accuracy and analytical rigour. Bromley (1989a, 1991:ch. 2) has suggested a conceptual scheme which removes the ambiguity connected to the term "common property resources". First, it is important to keep the terms "resource" and "regime" separate from each other. Property, as Bromley (1991:ch. 1) has pointed out, is a benefit (or income) stream and a property right is a claim to such a benefit stream. Common property is a particular type of property rights, *not* typical of a particular class of natural resources. Despite being analytically ambiguous, the term "common property resources" is still widely used (Berkes 1989; Seabright 1993). Bromley has suggested that "the term *common property resource* is abandoned in favour of the more correct *common property regime*" (1991:2, italics in original).

Bromley distinguishes between four different types of property regimes: state property, private property, common property and non-property regimes (see also, Schlager and Ostrom 1992). The term "non-property regimes" is important because this too, is often interpreted differently. The reason Bromley adopts the term "non-property regimes" is to underline that in a situation where nobody lays claim to a resource (i.e., the benefit stream) we can no longer talk about "property". In much of the literature on the subject, the preferred term is "open-access", that is, entry is unrestricted and the resource is open for all potential users. The problem with the term "open-access" is that researchers have tended to define it differently. Some authors use the term "open-access" as synonymous with "common property". The confusion of these very different situations is usually attributed to Hardin's original work (1968). Among the first to point this out were Ciriacy-Wantrup and Bishop (1975), who argued that Hardin failed to comprehend the difference between shared ownership ("common property") and situations of diffuse or non-existent property rights ("open-access").

Another attempt to clarify the terminology of common property regimes, is Ostrom's (1990) introduction of the term "common pool resources". This term is linked to another way of arriving at a definition of common property, namely by introducing the concepts of "excludability" and "subtractability" (Feeny et al. 1990:3; see also Oakerson 1992). By excludability it is meant that the resource is of such a kind that it is difficult or costly to exclude other potential users. A typical example of this is migratory fish stocks. Subtractability means that one user's harvest subtracts or diminishes other users' gains from the resource. This is typical of most natural resources, but the classic example is pastures where adding

Figure 1
Trade-off between ecological and behavioural uncertainty



Adopted from Wilson and Thompson 1993:312

more animals negatively affects other herdsmen. Ostrom (1990) has suggested the term "common pool resources" for the particular class of property where exclusion is difficult and one user's gain is the other's loss (i.e., the resource is subtractable).

Common pool resources share properties both with the class of resources known to economists as "public goods" and "private goods". Public goods are those goods where one user's use or consumption does not reduce others possibility to consume.[2] Private goods, on the other hand, are goods where one user's consumption reduces what can be consumed by others by the same amount. Unlike pure public goods where exclusion is either difficult or impossible (such as street lighting), common pool resources allow for exclusion, but not to the degree possible in private goods. Runge (1984a:808) distinguishes between private and common property rights in this way: "Property institutions characterized by rights of exclusion are

[2] The original definition of public goods is attributed to Samuelson (1954). In pure public goods there is no rivalry among users ($x = x_1 = x_2 = x_3 ...$). Private goods, on the other hand, can be defined as ($x = x_1 + x_2 + x_3 ...$), i.e., there is rivalry among the users.

often called private property; while those characterized by rights of inclusion are termed public or common property".

The advantages of common property regimes can be seen as a trade-off between ecological uncertainty (for example, erratic rainfall and drought) and behavioural uncertainty: what is the probability that other users will maximize their own benefit? (Figure 1). Private property reduces the behavioural uncertainty — the owner and user is the same person — but gives less protection against ecological uncertainty (Wilson and Thompson 1993). For an open-access situation this is reversed; there is no check on individual action (high behavioural uncertainty), but ecological uncertainty is low (as long as degradation does not occur) because a herdsmen can move his animals to any pasture which offers good grazing.

Defining institutions

This study looks in particular at the role of local institutions in natural resource management: what are institutions and why are they needed? Among the first to argue that institutions are important to understand why common property regimes break down or endure were Ciriacy-Wantrup and Bishop (1975). They developed a conceptual framework for institutional analysis (ibid.:716), and posited three hierarchical levels of decision making systems which they termed the operating level, the institutional level and the policy level. They argued that in non-market economies, informal regulations such as customs and taboos are adequate to achieve sustainable use of resources. After reviewing a selection of European examples, Ciriacy-Wantrup and Bishop conclude that common ownership of resources can function satisfactorily in a market economy too (ibid.:721). What is unclear from Ciriacy-Wantrup and Bishop's article is exactly what role institutions play in the management of common property regimes.

Social scientists working on common property management are quick to put the label "institution" on any condition regulating resource use, but are characteristically vague about how to define the term (cf. Acheson 1989a:358; Askvik 1993:150; Vedeld 1992). Before discussing the role institutions play or should play, we need to clarify what an institution is. There are, broadly speaking, two ways of viewing institutions among social scientists. The first is the "bottom up view" which sees institutions first of all as the outcome, the aggregate of individual action (Ostrom 1986). Here institutional change results from actors changing preferences or changing constraints (opportunity set), what we could term a "voluntaristic" view of institutional change (Askvik 1993:152). The other approach takes a normative perspective, arguing that institutions shape peoples action and

preferences. In this view, changing preferences come about as a result of institutional change, what we could term the "deterministic" position (ibid.).

In a review of the study of institutions, Askvik (ibid.) points to the fact that the term institution refers both to a micro and a macro phenomenon. From the micro perspective institutions are often identified simply as organizations, whereas the macro perspective reserves the term for entities such as "the state" or "the economy" (ibid.:151). Both these strands in the study of institutions would agree that to qualify as an institution requires a degree of permanence as well as independence of the personnel attached to or organized by it. As Askvik points out, an institution may or may not be an organization (and vice versa). North (1990:5) wants to keep the two distinct from each other, and argues that institutions represent — to use a sports analogy — the rules of the game, whereas organizations represent a set of players, a team, working within the framework of these rules towards specific objectives.

This duality in the study of institutions is expressed by Ridell (1982:56) who distinguishes between institutions understood as a normative concept within the social structure, from the more dynamic meaning of institutions referring to the ability of people to assert their collective will to reach some goal vis-à-vis each other and the environment. Similarly, Ostrom (1986:3-4) lists two standard definitions of institutions as either "rules about behaviour, especially about making decisions" or "equivalent to the term 'political structure'". In the same vein as Ostrom, Runge (1984a:807) defines institutions "as a public system of rules that specify certain forms of action as permissable, others as forbidden, and provide for certain penalties and defenses when violations occur". In her book, *How Institutions Think*, Mary Douglas (1986:46) defines institutions simply as "a convention". In contrast to the minimalist definition offered by Douglas, a more comprehensive definition of institutions is given in North (1991:97):

> Institutions are the humanly devised constraints that structure political, economic and social interaction. They consist of both informal constraints (sanctions, taboos, customs, tradition, and codes of conduct), and formal rules (constitutions, laws, property rights).

In another of North's works on institutions (1990:4) he adds that "Institutions may be formal and informal, and they may be created or have evolved through time". This brings us to the second question: why are institutions needed? One of the simplest answers to this question is provided by North (1991:97) who argues that: "Throughout history, institutions have been devised by human beings to create order and reduce

uncertainty in exchange". More specifically, North argues that effective institutions lower transactions costs hence reduce the risk of defection and enable cooperative solutions (ibid.).

To answer the counter-question of why do institutions not evolve, North adopts an explicitly evolutionist perspective (1991:102). In a tribal economy there are strong moral constraints to innovative behaviour and constant struggles for power. This serves to constrain the development of institutions that otherwise could have facilitated trade. At the next level, North discusses bazaar economies in North Africa and the Middle East, which even if they represent a step up the ladder, are still constrained by a lack of uniform price and weight agreements. A third, and further refinement was the caravan trade which moved commodities and cash over long distances, but still was unable to institute formal rules securing the trade and instead had to rely on negotiating informal and temporary agreements based on trust and honour (ibid.:105).

According to North, modern states represent the highest level of institutional complexity. To explain "the interrelationship between the state, property rights, and productivity" (Eggertsson 1990:319), North adopts the terms "technical production frontier" and "structural production frontier". Broadly speaking, the highest level of productive specialization in a society is the technical production frontier, whereas the most effective way of organizing production, including property rights, defines its structural production frontier. Maximum output is secured by bringing these two frontiers as close to each other as possible. North argues that historical evidence shows that states have been unable to accomplish this, which has limited the potential economic output. (For a critique of this view, see Field 1981).

Many social scientists seem to take institutions for granted, thereby avoiding the question of why they exist in the first place. North (1990:6) has proposed that:

> The major role of institutions in a society is to reduce uncertainty by establishing a stable (but not necessarily efficient) structure to human interaction. ... Institutional change is a complicated process because the changes at the margin can be a consequence of changes in rules, in informal constraints and in kinds and effectiveness of enforcement.

Central to North's argument is that effective institutions reduce transaction costs. Only in situations where there are perfect information and zero transaction costs, are there no need for institutions (North 1990:57). Institutions are, in North's view, first of all a means to enable economic transactions. This is, however, only one of many possible approaches to the

study of institutions. The definitions of the term "institution" discussed above imply that the primary aim of an institution is economic (North 1991). However, this is not necessarily the case, and in the following we will review a number of ethnographic studies which reflect the diversity of local institutions for natural resource management. The questions which concern us here are not only what institutions are, but what they do and accomplish, how they are altered or changed and whether institutions can be revived or reinstated.

To summarize, there are two different ways of understanding institutions; either as a micro-level phenomenon which is created by actors for specific ends, or as a macro entity which structure human action. For North, institutions are first of all vehicles which structure economic behaviour, and efficient institutions enhance economic transactions by lowering transaction costs. There is less to be learned from North's work about institutions whose function is not readily identifiable as "economic". This is problematic, because we know that small-scale communities lack the institutional specialization found in modern states (Weiner 1994:591). There is, for example, a wealth of literature on small-scale communities which demonstrate that institutions whose function is not primarily economic, may still have economic implications. Examples of such institutions are religion (Rappaport 1968; Keiser 1991), magic (Fortes 1937), kinship (Brox 1964; Hviding and Baines 1994), village solidarity (Taylor 1987), aspects of social organization such as hierarchy (Park 1992) and age-grade sets (Tvedten 1990).

Analytical approaches to the study of property regimes and collective action

There are number of different analytical approaches to the study of property regimes and collective action. The frequent overlapping of approaches, however, tends to blur their origins. For the sake of clarity, we will review four different approaches to the study of property regimes and collective action. The first approach builds on the seminal work of von Neumann and Morgenstern (1945) where problems of collective action are analyzed from the perspective of games (*game theory*). The second approach is the contribution some economists have made in developing a theory of property rights (*the property rights school*). The third research strand is — broadly speaking — a reaction to the tenets of game theory and the property rights school, and aims to revise Hardin's (1968) hypothesis (*the revisionist approach*). The last and most recent theoretical framework includes

elements such property rights, transaction costs and institutional analysis (*neoinstitutional economics*). Each of these approaches are reviewed in more detail below.

Game theory

The principal use of "games" is to study problems of collective action. A game can be defined as "a situation in which the actions of one person perceptibly affect the welfare of another and vice versa" (Heap et al. 1992:94). When two or more actors share a resource, their choices and behaviour can be modeled as games and used to predict the outcomes of decision making dilemmas. There are two main categories of games; cooperative and non-cooperative games. However, cooperative and non-cooperative games should not be understood as different "classes" of games; rather they denote the outcome of the game under the prevailing set of rules and incentives. In this short review we will look more closely at a) the prisoner's dilemma game, b) Nash-equilibria, c) repeated games, d) the multiperson prisoner's dilemma game and e) the assurance problem.

The most frequently quoted example from game theory is the *prisoner's dilemma* (Wade 1987). In this game, as well as other games of the same type ("game of chicken"), participants lack information about each others choices, and only have the choice to cooperate or defect. The combination of these strategies produces four different payoffs indicated in the matrix (Figure 2, next page). The players cannot communicate with each other, but the outcome of one player's decision affects the result (payoff) of the other's decision. The prisoners may confess that they both took part in the crime ("cooperate"), thus both will receive a short sentence (1, 1). If, on the other hand, one of them confesses and the other does not, one is released while the other gets a long prison term, hence the payoffs (2, –2) and (–2, 2). If neither of them confesses ("defect"), both get a short prison sentence (–1, –1). If this game is played only once, known as a "single-period" game, the dominant, but Pareto-inferior,[3] strategy is for both players to defect (–1, –1).

[3] Pareto efficiency — named after the Italian economist Vilfredo Pareto — is a measure of how efficient resources are allocated. Efficiency in this context means that it is not possible to reallocate resources in such a way as to make at least one of them better off and none of them worse off. In the prisoner's dilemma the Pareto optimal solution is the cooperative outcome (1, 1).

Figure 2
The prisoner's dilemma

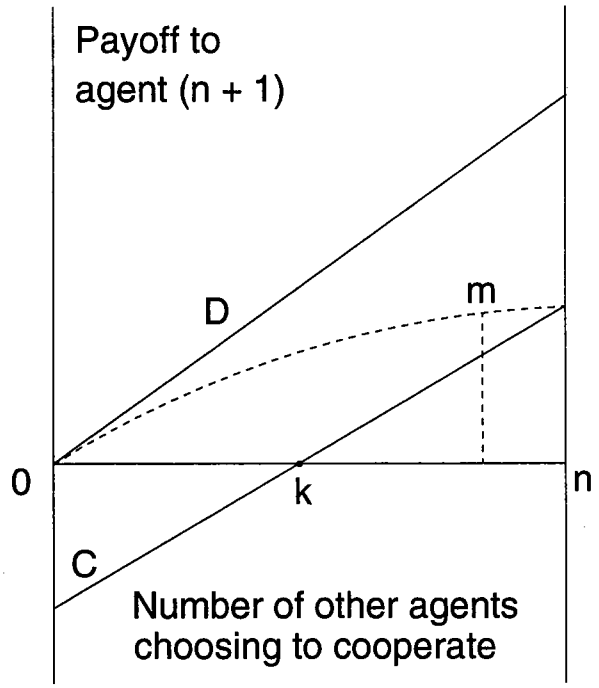
First person	Second person	
	Cooperate	Defect
Cooperate	(1, 1)	(–2, 2)
Defect	(2, –2)	(–1, –1)

The prisoner's dilemma game can also be used to illustrate the seminal contribution made by John Nash (1951) to the development of game theory. Nash demonstrated the existence of an equilibrium point — later known as the *Nash-equilibrium* — which can be defined as "a set of strategies, one for each player, such that given the strategies being played by others, no player can improve on her pay-off by adopting an alternative strategy" (Heap et al. 1992:101). Whereas Pareto optimality only depicts the frontier of the most efficient solutions (which, generally, are unattainable unless players cooperate), Nash-equilibria are points (payoffs) where competing players are most likely to end up, and will have no incentive to move from this point. Nash-equilibria are hence, very important in order to predict where players will end up (their payoff) in a real-world situation. In the prisoner's dilemma game, the non-cooperative pair (–1, –1) is a Nash-equilibrium.

There is another lesson to be learned from the prisoner's dilemma game. The tendency to defect is stronger than the desire to cooperate, and if possible, people will try to maximize their own benefit by moving costs on to others. A way to illustrate this is to examine a grazing context. Let us imagine that the users on the outset have agreed to a maximum limit of animals per herdsman ("stinting"). There is in this case a strong incentive to break this limit (defect), which will benefit the violater and be detrimental to those who comply with limit (cooperate). In game theory this strategy is known as "free riding" (Runge 1984b). Those who choose to cooperate will in the long run lose out, a result known as the "sucker's outcome". Thus, to prevent free riding there is a need for incentives (e.g., penalties): where these are lacking the free-rider strategy will be dominant as predicted in the prisoner's dilemma. Another reason for free-rider behaviour is that the users do not pay for the intrinsic productivity of the resource ("resource rent"), for example, the grass grows without graziers' investments. This means that there are no immediate costs involved with increasing the number of animals.[4]

[4] Whereas Hardin (1968) does not mention game theory in his essay, his "tragedy of the commons" parable is premised on the same "non-zero-sum" argument which underpins

Figure 3
Defection and cooperation in a MPD-game



Adopted from Runge 1992:24

If the prisoner's dilemma is played not once, but many times, known as iterated or *repeated games*, there is no dominant strategy (North 1990:13). One of the first who argued in favour of the possibility of cooperation in repeated games, was Robert Axelrod in his thesis *The Evolution of Cooperation* (1984; see also, Axelrod and Hamilton 1981:1393). He showed that in an experimental set-up, "egoists" could cooperate if they adopted the so-called "tit-for-tat strategy" – cooperate the first time and thereafter to do whatever your opponent did the previous time – was always the winning strategy (Badcock 1988). In other words, a tit-for-tat strategy is neither exploitative, nor can it be exploited. Apart from the opening move, if the opponent defects so will you; if he cooperates so will you. By adopting a tit-for-tat strategy, cooperation may emerge spontaneously without state or other external intervention (North 1990:13).

The prisoner's dilemma is a simple game, but it highlights the problem of individual rationality and collective outcomes. A more complex version of this game, is the *multiperson prisoner's dilemma* (MPD). In his analysis of a MPD-game, Runge (1985:369; 1986:626ff.) found that the outcome was dependent on the structure of incentives and the number of persons

the prisoner's dilemma game.

following the rules. If enough players complied with the rules, this "critical mass" of players would also make it advantageous for the rest to comply, hence less coercion would be needed. This is represented by the point k in the figure reproduced above (Figure 3). C and D are two linear payoff curves, and D (defection) lies above C (cooperation) because defection is a strictly dominant strategy. In this example k = *n*/2, which means that when half of the agents choose to cooperate, they will start to reap positive payoffs (see, Runge 1992, for a fuller explanation).

The lesson from Runge's example is that there exists a threshold where voluntary cooperation is preferred over defection. Regardless of the resource in question, the information about choices made by other players is central to actors' own strategies, and of course affects the outcome. This problem – what will be B's response to A's action – is often termed the *assurance problem* (see Brox 1986; Runge 1981). To explain the nature of the assurance problem, we need to make a short detour to the seminal work of Amartya Sen (1967) who clarified the difference between the assurance problem and the isolation paradox. In his analysis of a multi-person non-cooperative game, Sen theorised the following conditions: (a) the players always prefer to do A instead of B, and can only choose either of them; (b) given the choice of everybody doing A and everybody doing B, each player prefers B instead of A. Given these conditions, Sen argued, it follows that: (1) the outcome will be Pareto inferior, (2) there is strict dominance of individual strategies, and (3) there is a need for enforcement (to get people to choose B over A).[5] The rigorous dominance of strategies which are Pareto inferior in this game, Sen termed the "isolation paradox".

To analyze the assurance problem, Sen modified rule (a) in the example above: if everybody chooses B, the individual player will also choose B. If the player has complete assurance that the other will choose B, he will also choose B and no enforcement is necessary. Sen named this the "assurance problem" (ibid.:115). In the assurance problem there is no strictly dominant strategy, and one of the equilibrium points may be Pareto-optimal. Whether the outcome is Pareto-optimal or not (ibid.:122):

> depends on what each individual expects about others action. To get out of the problem all that is necessary is that each individual is assured that others are doing the "right" thing, and then it is in one's own interest also to do the "right" thing. No enforcement is necessary.

[5] In the special case of this example of only two players (N = 2), this multi-person game becomes a case of the prisoner's dilemma (Sen 1967:113).

Whereas the "isolation paradox" is an example of a non-cooperative game, the "assurance problem" on the other hand is a (potentially) cooperative game. Following Sen's original exposition of the assurance problem, Runge (1981:600ff.) analyzes this as a two-person cooperative game without a dominant strategy for either player. Instead of the zero information commonly implied in the framing of the assurance problem, Runge proposes that in a real world situation, an actor will know the strategies of the others with some degree of certainty. In game theoretical models such as the prisoner's dilemma, the options in the game are known to the participants, but they do not know anything about the actual choices made by other players. This drives the outcome of the game towards defection for both parties ("the isolation paradox"). Translated to a grazing context this means that both users will add more animals to their herds until it is no longer rational for each of them to do so (i.e., until they drive the rent from grazing fields to zero). This Pareto-inferior solution can be avoided, Runge claims, because in a typical grazing context, herdsmen can to some degree trust, or be assured, that fellow herdsmen will cooperate. It is in other words a "problem of cooperation, in game-theoretic terms...known as the 'assurance problem'" (ibid.:600). A better way to model a grazing context is, according to Runge, an interdependent model where there is "no dominant strategy for either individual" (ibid.:601). Runge proposes a coordination model where actors choose among a limited set of interdependent choices, which leads to cooperation as the dominant outcome.[6] In a grazing context, Runge claims overgrazing is not caused by free-rider strategy, but rather by interdependent actors who are unable to coordinate and enforce their actions (1986:631). To return briefly to the importance of institutions, the works of Sen (1967) and Runge (1986:630) show that if institutions can provide each player with the assurance that all the others will choose the option which is in everybody's best interest, the outcome will be cooperative behaviour (see also, Larson and Bromley 1990:238-41).

Whereas game theory is acknowledged as an important tool for analyzing strategic behaviour and decision making dilemmas, some will question whether game theoretical applications are advanced enough to portray real-world situations (Bardhan 1993:91; Brox 1986; North 1990:15). Responding to such criticism, newer and more sophisticated dynamic ("evolutionary") models are currently being developed (van Damme 1993; Sumaila n.d.). In a static game such as the single period prisoner's dilemma, the rules and

[6] For a critique of Runge's analysis of the assurance problem, see Palmquist and Pasour (1982).

incentives are fixed, and there is a strict dominance of individual strategy ("defection") which means that the payoff is unchanged ("static equilibrium"). In dynamic (evolutionary) models by contrast, there are no fixed rules, and the payoff is changed as the game proceeds. Players repeatedly try out different strategies, review the results and try alternative strategies, much as real-world strategies seem to be worked out. Regardless of their level of sophistication, game theoretical models have strongly influenced the way we perceive common property dilemmas, and the way we analyze problems of individual rationality and collective outcomes.

The property rights school

Property rights are – in the economic sense – more than just control over assets. The social character of property rights was developed by economists such as Demsetz (1967), Alchian and Demsetz (1973) and Furubotn and Pejovich (1972). Furubotn and Pejovich (ibid.:1139, italics in original) have pointed out that:

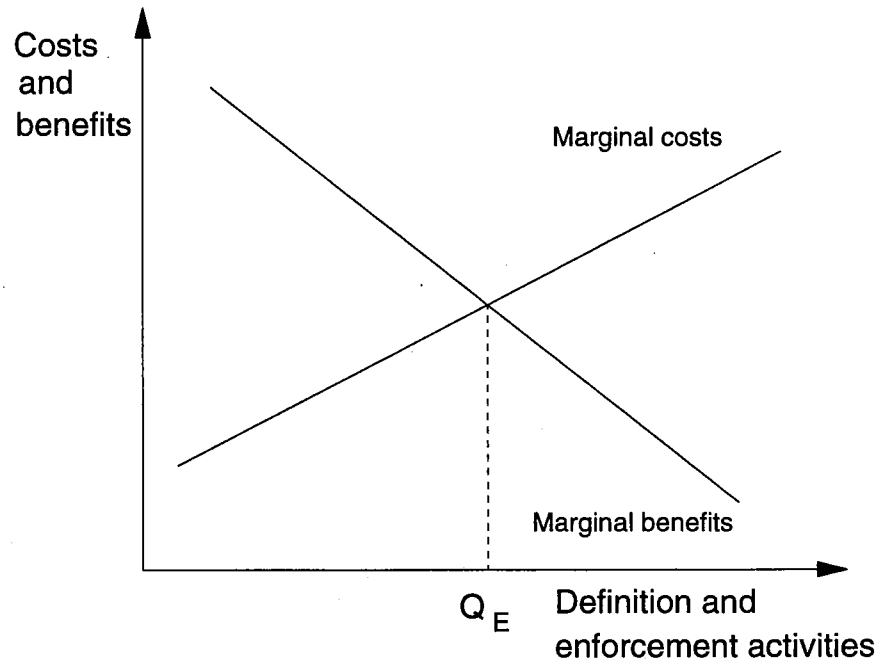
> property rights do not refer to relations between man and things, but, rather, *to the sanctioned behavioral relations among men that arise from the existence of things and pertain to their use.* Property rights assignments specify the norms of behaviour with respect to things that each and every person must observe in his interactions with other persons, or bear the costs for nonobservance.

This approach to the study of property rights developed into what came to be known as the "property rights school", and it is often referred to as the "property rights paradigm" or "the naïve theory of property rights" (Eggertsson 1990:250). To explain the formation of this concept, the property rights school employed the concept of "externalties", a concept attributed to the work of Arthur Pigou (1920). A common definition of externalties is a situation described by Angelsen (1992:11) where:

> a consumer's welfare or a producer's production is affected by variables whose values are chosen by others, without particular attention to the effects on the other actors' welfare or production.

In laymen's terms externalties are situations where A's actions inflict harm (or benefit) on B. Adding another animal to a herd benefits the owner, but for other users of the same pasture, this represents a negative externality. The solution to such problems is, Demsetz (1967) argues, to internalize

Figure 4
Cost and benefits from establishing private property rights



Adopted from Eggertson 1990:253

externalties. This means that the costs of negative externalties should be borne by those who cause them. One way to do this is to privatize resources, another to introduce taxes or fines. Introducing private property rights will cause some externalties to disappear but may also create others. Demsetz (1967:350) argues that: "Property rights develop to internalize externalties when the gains of internalization become larger than the cost of internalization". In other words that the evolution of private property rights takes place "when the benefits of claiming rights exceed the costs of negotiating and enforcing those rights" (Stevenson 1991:67; see also Anderson and Hill 1990). To give an example: If a group of herdsmen decide to close a particular pasture by putting up a fence, they will have to calculate whether the time spent and money used to build a fence and control trespassers, is worth the gain over the present arrangement with losses due to illegal grazing (Anderson and Hill 1975).

This argument can be presented in graphic form (Figure 4), and the figure shows the inverse relationship between the costs of exclusion (marginal costs) and the profits (marginal benefits). The point of intersection between the curves, Q_E, is the equilibrium point showing the level of exclusion activity. Introducing cheap barbed wire (Anderson and Hill 1975), will shift the marginal cost function down, which in turn, will

increase the exclusion activity. Similarly, if the value of the resource increases, the marginal benefit curve will move outwards, thus exclusion activity increases (Eggertsson 1990:253-54). The problem with this "naïve" approach to the formation of property rights, is that it neither takes into consideration free-rider behaviour nor political interest groups (ibid.).[7] To summarize, the property rights approach implicitly or explicitly endorses an evolutionary transition from communal property to private property rights. Its principal deficiency is, as Furubotn and Pejovich (1972:1140) see it, that the property rights approach lacks a theory of the state, thus the focus on property rights becomes incomplete.

The "revisionist" approach

During the last decade, there has been a rapid increase of new research which has as its stated aim to refute Hardin's "tragedy of the commons" hypothesis. This research strand is also a reaction to the property rights school, which claims that private property is better at protecting resources than other property regimes. Rebutting Hardin and the property rights paradigm have become a school of its own, which we could call the "revisionists" (McCay 1993). Though the "revisionists" by no means constitute a uniform group, they represent — on the grounds of their common research agenda — an alternative approach to research on common property regimes. As the term "revise" implies, this is an effort to amend Hardin's thesis, not to replace it with an alternative theory. As Acheson (1989a:375) puts it: "Because of the work of anthropologists, the theory of common-property resources needs to be extended and modified in several ways". The thrust of the revisionist critique has been empirical, that is, to bring forward new evidence that rebuts Hardin's thesis (Berkes 1989; Bromley 1992; McCay and Acheson 1987).

One of the revisionists, James M. Acheson, dismisses the assumption that private property provides a better protection of resources than does common property regimes. Acheson claims that almost "all the basic axioms on which the [Hardin] model is based are flawed" (1989a:375). According to Acheson, the list of flawed axiomatic assumptions include; (1) that common property means the absence of property rights (i.e., open-access); (2) that everywhere there is a level of technical capacity to over-

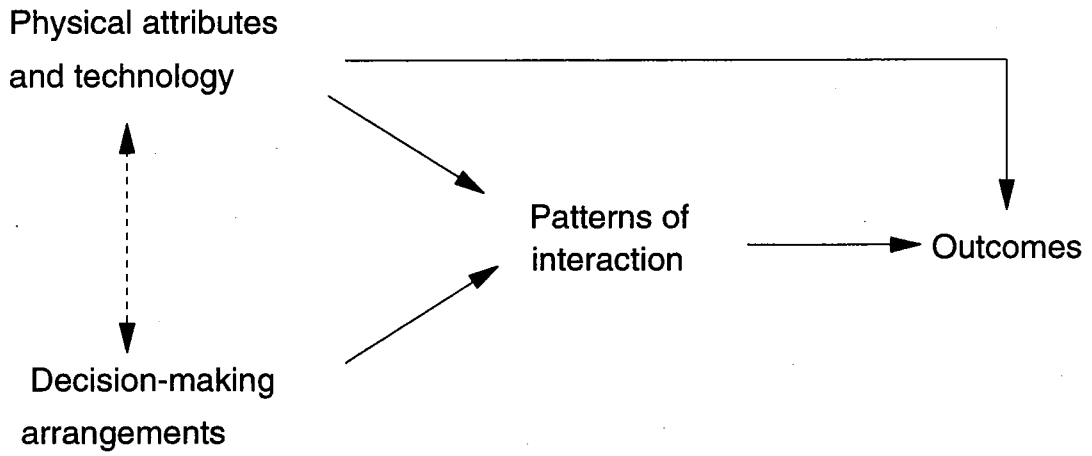
[7] Another application of the "naïve theory of property rights", is North and Thomas' (1977) attempt to explain the first economic revolution — the transition from hunting to agriculture. North and Thomas perceive this shift as the first tangible example of creating property rights through closing the open commons (ibid.:235).

exploit resources; (3) that there is a general inability to craft effective local institutions for resource management; and finally (4) that only private property or government intervention represents a viable solution to resource management. The contribution of anthropologists to the study of common property regimes has essentially been to revise common property theory on the grounds that it does not account for the persistence of a number of communal arrangements, and that it conflates common property and situations of open-access (McCay and Acheson 1987). In other words, overuse of resources is not caused by the breakdown of "common property", but includes situations where there are no property rights, hence no effective management of resources ("open-access").

As already mentioned, a wish to revise Hardin's thesis is more evident among this group than the intent to put forward an alternative theory or research program. It is indicative, perhaps, that instead of new theory, there has been an effort among researchers to present their results within a common framework, known as the "Oakerson framework" (Oakerson 1992). First presented to a workshop on common property management in 1985 (Oakerson 1986), the Oakerson framework remains in wide use – despite occasional criticism (Cousins 1993). Oakerson considers the interaction between four factors: physical and technological attributes, decision making arrangements, patterns of interaction, and outcomes (Figure 5). The physical and technological attributes represent characteristics of the resource itself such as jointness, indivisibility and exclusion. Perfect "jointness" means that the resource is a "pure public good", in other words one person's use does not detract from the use of others (Samuelson 1954). Indivisibility refers to whether the resource is divisible or not, and exclusion to whether potential users can exclude other claimants from using the resource.

The second aspect, decision making, refers to "who decides what in relation to whom" (ibid.:456), whereas patterns of interaction refers to the range of possible strategies available to actors. Actors may heed by the rules or choose to free ride. Outcomes refers to distribution, equity, and other measures of institutional efficiency. The strength of Oakerson's framework is as an heuristic tool which "can be used to analyze common property problems whatever their particular resource or facility" (1986:14). Further, it allows for a case-by-case analysis and that it organizes features which are shared among different common property regimes. Its weakness is that to only to a limited degree does it contribute to theory; in particular it does not explain why property regimes remain unchanged over time, or why one property regime is replaced by another. To do that, it seems, a more comprehensive theory of institutional change is needed.

Figure 5
The Oakerson framework



The institutional approach: Neoinstitutional economics

In this study we are particularly interested in the role of institutions and how they are related to property rights, economic behaviour and collective action. The institutional approach to comparative economic analysis has its roots in the economic historian Karl Polanyi's classic work, *The Great Transformation* (1944). Though the work of Polanyi has faded from mainstream interest, it has been taken up again by North (1977) and Halperin (1984). Halperin claims that even though institutions were important to Polanyi's theories, he never attempted to define the term: "In all of his writing, Polanyi made clear that institutions were the key units of economic analysis, but he never provided an unambiguous, succinct definition of the term" (ibid.:250). There is a definite link between Polanyi's work and the questions of which concern us here: how do we explain the transition from non-market to market exchange, a shift which seems to be premised on a move from communal to private property regimes?

The most recent, and perhaps most ambitious, attempt to work out a theory of institutional change is found within neoinstitutional economics. Put simply, neoinstitutional economics use the traditional neoclassical method of rational individual actors to study institutions, and is concerned

with how and why property rights and institutions change. More specifically, neoinstitutional economics is concerned with a) how institutions affect individual choice, and b) how institutions change. Since it reflects the objective of this study, it deserves a broader presentation than the other approaches which have been described. The following outline of neoinstitutional economics builds on the work of Douglass North (1985, 1990, 1991) and Thràinn Eggertsson (1990). The innovative part of the approach advocated by North and Eggertsson merges property rights theory with a consideration of transaction costs within a framework of institutions.

The foundations of neoinstitutional economics are the ordering or routinization of action (institutions), the costs of exchange (transaction costs), and human motivation and behaviour (rational choice). We have already discussed how North perceived institutions as essentially malleable and a result of human agency, as well as the links his work has to that of Karl Polanyi. Polanyi argued that there were three different "transactional modes": reciprocity, redistribution and market exchange. In his re-reading of Polanyi, North (1977) tries to salvage the neoclassical assumption of maximising behaviour, at the same time as he criticizes Polyani for being unable to explain why one transactional mode was replaced by another. To understand this, North contends, we need to introduce transaction-costs analysis in combination with a theory of the state (ibid.:715).

Despite the fact that the term transaction costs is widely used, it is difficult to agree on a clear-cut definition of the term. North defines it simply as the "costs of defining and enforcing property rights" (1977:710). The term was originally developed by Ronald Coase in his ground-breaking work on "the firm". In his article, "The Nature of the Firm", Coase (1937:394) asked the deceptively simple question: given the benefits of large firms, why are there any market transactions outside firms at all: "Why is not all production carried out by one big firm?" The answer is, Coase argued, the additional costs of organising extra transactions which serve to limit the potential size and efficiency of firms (ibid.:396). Coase developed what came to be known as the "Coase theorem" in more detail later (1960) in order to discuss the scenario (implied in neoclassical economics) of a situation of zero transaction costs. If transaction costs were not included into the equation, Coase argued, the most efficient solution giving rise to the maximum income would predominate and that this would be independent of the initial distribution of property rights (North 1990:93). In a review of the property rights approach, Libecap (1986:228) argues that when transaction costs are high, the initial distribution of property rights becomes very important. Likewise, North argues that low or non-existent transaction costs are rare, and this explains why inefficient institutional

arrangements persist (1990:93). In the same vein as North, Bromley (1989b:181) argues that transaction costs are never zero, not the least when one considers that "transacting with future generations is infinitely costly".

The third important part of neoinstitutional economics is what motivates people's actions within institutions. In neoclassical economics, the behavioral assumptions rest on "rational choice theory". This analytical perspective takes as an *a priori* condition that actors maximize self-interest in a consistent manner. Though North obviously finds this too constricting, he is not clear on where his approach differs from rational choice theory, except that it assumes that people do not always act in self-interest and may also be motivated by an element of altruism. To North, the purpose of institutions is to channel individual action by penalizing choices which have negative outcomes for the collective. North (ibid.) has stressed the role informal rules and constraints play in order to regulate behaviour, but even if North modifies the extreme "*homo economicus*" concept, he retains the basic features of rational choice theory.

Induced institutional innovation?

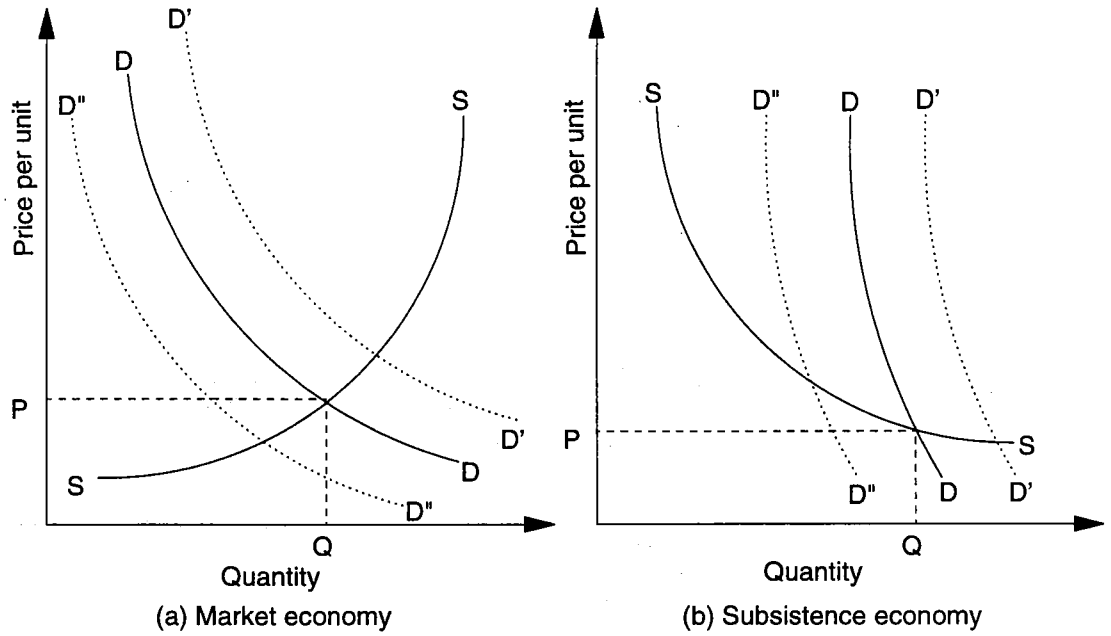
Where do institutions "belong" in economic analysis? Are they exogenous or endogenous? This important point is discussed by Richard Grabowski (1988), who points to some problems in the way institutional change is treated in neoinstitutional economics. Grabowski notes that whereas neoclassical economics conventionally has assumed that institutions are *exogenous*, neoinstitutional economics as presented by Douglass North (especially in his earlier works), makes institutional change *endogenous* by viewing change from the point of actors' choices ("rational choice theory"). According to North and other neoinstitutionalists, institutional innovation is a result of actors' changing preferences (or changing constraints) within a cost-benefit framework. For institutional innovation to occur, either the costs of changing it must be reduced or alternatively, the benefits increased (ibid.:386). Grabowski provides a critique of this argument, by pointing out the inconsistencies this position suffers from. The norms and traditions which shape actors preferences and hence, their perceptions of costs and benefits, must, *a priori*, be a part of their constitution as actors. This means that this part of their cultural make-up as actors, cannot be made endogenous. To escape this epistemological problem, such factors have to be made external to the model. This leads to further problems, because the neoinstitutional approach can now only explain change in what is termed "secondary institutions" (such as acts and choices) but not in the primary processes that motivate action (ibid.:388).

Secondly, for the theory of induced institutional change to hold, actors must be assured that they will benefit from such change. Introducing lessons from game theory, Grabowski (ibid.:388) argues that this would be consistent with the "assurance game", but not a "prisoner's dilemma" type of situation where outside enforcement is necessary. Thus, induced institutional innovation may hold in the first case, but not in the latter. The reason why an assurance game situation often seems to be prevalent – and hence North's model of institutional change valid – is because people tend to share a common ideology which serves to constrain the diversity of moral and ethical judgments. This minimizes enforcement costs, and enhances institutional stability. Rapid social change, however, tends to promote ideological diversity, which means that enforcement costs rise steeply and explains why institutional collapse seems to be a feature of such periods. In the latter case, argues Grabowski (ibid.:390), neo-institutional economics is unable to explain such change because of "the increased importance of enforcement costs and our inability to understand them". Grabowski's critique of induced institutional innovation, suggests that neoinstitutional economics is not a panacea which has solved all epistemological problems related to institutional change and innovation. There is also the question whether "rational choice theory" can account for other forms of rationality, including variations which are culturally constituted (Peters 1993:1072ff.).

Rationality and intentionality

Economic rationality is important to most, if not all, discussions on common property regimes. We have previously discussed the problem of individual versus collective rationality, exemplified by Hardin's allegory "the tragedy of the commons". Another problem of rationality concerns how to account for economic rationality which cannot be explained by formal economic theory. To some extent, this problem reiterates the old substantivist (i.e., institutionalist) versus formalist (i.e., neoclassical) positions, which disagreed on whether formal economic models could be used to explain "primitive" economies (Dowling 1979). However, the concept of economic rationality (Rutz 1977) is in theory more general and less restricting than commonly believed. In short, economic rationality may be defined as *consistent* behaviour or choice in order to fulfil or achieve certain aims. In principle, the aims can be anything, but in practice and in applied economic models in general they tend to be limited to material goals. Typically, household analysis assumes utility maximizing behaviour, where utility comes from two sources – leisure and consumption. Thus, the

Figure 6
Supply and demand in market and subsistence economies



Adopted from Dowling 1979

formalization and quantification used in economic analysis often limits the types of economic rationality studied. One example which has been commonly used to illustrate the difference between the simple supply-demand model for an atomistic market (Figure 6a), and the more wider concept of economic rationality (and possibly also other conceptual models of behaviour) is the economist A. V. Chayanov's (1986) work on Russian farmers. Using neoclassical economics and extensive data on household consumption and production patterns, Chayanov concluded that Russian farmers reduced their effort when their returns on effort increased, in other words, if prices increased, they sold less (Figure 6b). To explain this "perverse market reaction", one need to take into account "that they operate[d] with their own system of economic rationality, based on satisfaction of family needs (that is, marginal utility) and the drudgery of labor" (Netting 1993:299). The Russian farmers described by Chayanov, retained a subsistence oriented rationale typical of peasant economies, even if they as farmers were part of a fully market-integrated agricultural sector. This reaction is difficult to explain by the simple (and commonly applied) economic model of a profit-maximizing production unit. Extending the analysis, as Chayanov himself did, to also consider the consumption aspect of the household, could explain the economic behaviour found by

Chayanov. (Similar examples of a peasant economic behaviour have also been noted among fishermen, cf. Firth 1966; Faris 1977).

The divergence between individual and collective rationality is a central problem in social theory. An extensive treatment of the problem is Mancur Olson's book, *The Logic of Collective Action* (1965). He argues that the larger the group in question, the smaller the chance that institutional measures can secure an optimal amount of collective good (ibid.:35). In fact "*rational, self-interested individuals will not act to achieve their common or group interests*" (ibid.:2, italics in original). As discussed earlier, this is the paradoxical outcome of the prisoner's dilemma game.

Another question which is linked to the problem of economic rationality, is the role of intentionality.[8] Does resource management need to be the result of an intentional strategy for regulating production and consumption, or is it enough that aspects of the ecology, social organization or "culture" serve such ends, whether conscious or not? A classic study which illustrates the problem of intentionality, is Roy Rappaport's (1968) study from the New Guinea highlands. Rappaport applied ecosystem theory and cybernetics to the study of ecology, ritual and religion. He contended that among the Maring, an isolated hill tribe, a ritual cycle of feast giving, pig slaughtering, warfare and agricultural production together formed a self-regulating system (ibid.:4). In his original study, Rappaport argued that the resulting homeostasis was an unintentional outcome of the system itself (ibid.:321), and distinguished between economic rationality and what he termed "ecological rationality" (ibid.:307). Rappaport's study has been controversial and its conclusions debated. Rappaport himself saw his work as a reaction to the crude functionalist bias in anthropology by integrating ecology and culture in a cybernetic system (ibid.:vii; see also Rappaport 1979:43-95). His critics, however, argued that Rappaport's study was typical of a functionalist approach, because he did not account for the origins of institutions. Instead, institutions were treated as given, and fulfilling specific functions (Gross 1983:165).

Many contemporary studies of resource management, implicitly or explicitly, seem to return to a functionalistic perspective.[9] They assume that local institutions are a result of the conscious effort of individuals and groups to manage their resources. This may seem unproblematic, but in

[8] Intentional economic rationality can be defined as "a system of consciously elaborated and applied social rules for the optimum attainment of a set of objectives" (Godelier 1988:41).

[9] See, Acheson (1975, 1988); Berkes (1985a); Hviding and Jul-Larsen (1993); McCay and Acheson (1987).

fact, is not. For instance, how should we interpret the custom of using cows to pay bride wealth requirements? Its intended outcome is to secure wives, argues Dombrowski (1993), but its unintentional outcome is serving to reduce herds, thereby avoiding overstocking. Dombrowski (ibid.:27) claims that particularly in small-herd dynamics in East Africa, cows used as bride price payments account for ten to twenty per cent of herd fluctuations. Simulating the role of cows as bride price in a time series of 50 years, Dombrowski feels confident that the custom of exchanging cows as bride wealth, reduces herd fluctuations and the threat of herd failure to close to zero, as well as ensures rapid restocking of herds through the exchange of young and fertile animals (ibid.:46).

Another way to study the problem of rationality is through laboratory experiments (Gardner et al. 1990:350). In a simulation study devised by Erling Moxnes (1993), participants were asked to play the part of an owner of a small fishing fleet. According to Moxnes, when over-harvesting was noticed by the players, they reduced their effort too little to prevent further overfishing. In this experimental set-up, the total quantity of fish was fixed, and the challenge was to control the fishing effort in such a way that profits were maximized without violating long term sustainability. Moxnes' main interest is in the cognitive aspect of decision making. Based on this experiment, he argues that the reason for the high level of failure (overcapitalization), was that the players were psychologically inclined to be overambitious and preferred short term benefits over sustainability in the long term. On more general level, Moxnes' experiment reflects the fact that success in fisheries is not only related "to the ability to catch fish, but to the ability to handle and invest the money generated" (Acheson 1981:292).

The problem which is raised in Moxnes' study, is the relationship between time and peoples' strategies. We have previously discussed "time" as a variable in connection with game theory, and how players' strategies reflect the time frame of the game (single period games, finitely repeated games or infinitely repeated games). The time factor is of crucial importance to people's strategies, and people have to consider whether they will gain or lose from choosing future yield over present benefit. To make a decision about this, they need to calculate the present value of a future yield. The scientific study of this problem is known as "discounting" (Angelsen 1991; Angelsen et al. 1994:56; Ostrom 1990:34). Discounting is necessary in analyses of real economic behaviour because people put less weight on future costs and benefits than present ones. The discount rate can be defined as the extra benefit people would require to postpone a benefit for one year (alternatively: how much they require to bear a cost now instead of delaying it by one year). Because of the uneven distribution of

costs and benefits over time, the discount rate may be the single most important factor in resource users decision making.

A low discount rate means that future yield is preferable to present income or benefit. Alternatively, a high discount rate favours present benefit over future yield. Whereas people in general will not be able to undertake a strictly scientific estimate of the discount rate, they will consider their present needs against what they perceive as future benefits. Nevertheless, the concept of discounting is useful in order to understand why it may be profitable to either preserve or empty a resource. In the case where the natural growth of a resource is lower than the discount rate, it can be economically rational to empty the resource now.[10] However, not all studies of economic rationality would agree that discounting is a key to understand economic behaviour. Economic rationality is also linked to probability (Quinn 1978). For example, what is the probability that a future benefit can be reaped at all? It seems that the risk of other prospective users extracting a resource will have the same effect on decision making as a higher discount rate, and will favour short term, myopic decisions ("use it or lose it"). This is often referred to as "risk discounting".

Traditional, customary or indigenous? The problem of authenticity

In the discussion of institutions the terms "traditional", "customary" and "indigenous" are frequently used to specify the type of institution, or management system in question, but rarely is there an attempt to qualify their meaning or substantiate their content.[11] "Traditional" used in connection with "management", for example, is generally taken to mean not only a situation characterized by sustainable use and equal access to resources, but an equitably sharing of benefit as well. "Traditional" also has the connotation of being "old" and implicitly, legitimate and well adapted to available resources and to the situation of the users in question. For the same reasons, the terms "customary" and "indigenous" are seldom defined, and often used interchangeably. "Indigenous", as in "indigenous institutions", is frequently, and without any kind of substantiation, taken to imply that the institution is old, local in origin and promotes equity.
There are dangers involved in the indiscriminate use of terms such as

[10] For a theoretical discussion of the interests of present generations against future ones, see Bromley (1989b).

[11] For an example of the indiscriminate use of the term "traditional", see Niamir (1991).

traditional, customary and indigenous, because they may give a stamp of authenticity to a management system which is either quite recent, or has undergone considerable change. Anthropologists, amongst others, have become increasingly aware of the fact that what is glossed as "traditional", "customary" or "indigenous" may hide a series of complex shifts and amalgamations in the organization of rights and duties (Fortmann 1990). In addition to the problem of misinterpretation on the part of the researchers, fixing labels of this kind can be employed in order to strengthen claims to ownership, or to lay claim to existing practices. An example of this can be found in Johannes' (1982:260) discussion of traditional conservation methods in Oceania, where:

> Written records of traditional fishing boundaries often do not exist, and it is not surprising under the circumstances to find that villagers will invent "traditional" fishing rights if there are advantages to be gained by doing so.

That a system of ownership or management is "traditional", can in other words be used to validate claims to resources.

Another term which is frequently used, but seldom questioned and scrutinized, is the word "communal" (Shackleton 1993). Researchers tend to forget that "communal property" may be glossing over what is in fact a series of shifts in tenure, rights and legislation. To illustrate the complexities of such a case, Pauline Peters has analyzed the history behind the formation of the "communal lands" of Botswana (1984, 1987). Peters claims that "the communal tenures so disfavored by the colonialists were in a very real sense created by them" (1987:181). The emergence of communal lands was made possible by transforming the complex property rights to land of the Tswana kingdom into "tribal" land by colonial authorities. Over time tribal land came to imply "communal land" in the sense that it was claimed neither by the state nor by individual leaseholders. In the early post-colonial period the term "tribal" was officially substituted by "communal" in government parlance. In the meantime, however, a lot of changes had taken place. In the period since the introduction of boreholes, from the 1930s and onwards, the grazing lands had in fact slowly changed to enclosures whereby borehole owners and their dependants claimed ownership to the area surrounding boreholes. Originally the drilling of boreholes was regulated through "tribal committees" (ibid.:184) which later became "borehole syndicates". This did not only imply a change of name, but continued the process of creating exclusive ownership to boreholes and the surrounding pastures. Over time the control

over enclosures around boreholes became tighter, and members of syndicates prevented would-be users from entering. Dominated by rich and powerful cattle owners, borehole syndicates were appropriating what officially, were still regarded as "communal lands". Peters' point is that if we accept "commons" or "communal property" labels and take them at face value, we are unintentionally denying their historic specific context and the contested meanings associated with them (1984:40ff.). Moreover, we would be unable to grasp what management and ownership really were like, and how they relate to the present day situation. We should also bear in mind that in Botswana, and probably in other African colonial states as well, there was a "colonial ideological antipathy to communal property systems" (1987:180). The story related in great detail by Peters has some consequences for the common mistake of equating communal ownership with equity. As we will see next, some studies explicitly link common property regimes with stratification.

Along similar lines as Peters, Angela Cheater (1990) analyzes the origins of "communal" land tenure in Zimbabwe (see also Cousins 1992). Her main point is that the "communal" lands never were communal. She traces the reformulations of the past ("mythogenesis") which transformed private property rights into the present-day authorized version of Zimbabwe's communal lands. Cheater claims that first among the many who helped establish the myth of communal lands in Zimbabwe, were the anthropologists who failed to investigate the historical foundations of property rights (ibid.:203). The idea of a pre-colonial time when communalism reigned was an integral part of the reformulation of Zimbabwe's history which neglected "three and a half decades of the legalised sale of 'communal' arable [land] and grazing rights" (ibid.:194). As Cheater notes, it is important to keep in mind that history is malleable, and tends to be altered and reformulated. The methodological problem Cheater raises, is linked with our willingness to present what we believe is the "native's point of view", and the danger this poses for misinterpreting the past. Moreover, Cheater's study underlines the importance of including the state in the study of the property rights, and it is to this discussion we will now turn.

The state, hierarchy and common property

Durrenberger and Pálsson (1987a) have argued that common property regimes only make sense in conjunction with stratification, arguing that in "truly egalitarian societies...common property has no meaning" (ibid.:371). The authors take this argument even further, claiming that the regulation of

common property is "a phenomenon of stratified societies organized as states" and that the "forms of production in which a tragedy of the commons can develop are societies organized as states" (ibid.:372). The view that stratification is an inherent feature of common property regimes receives strong support from Thomas Park (1992:94) who argues that stratification and hierarchy are central to successful common property regimes. Park dismisses the assumptions of equal access and equal rights, often implicit in the call for common property management. In Park's subtle analysis of flood recession agriculture in the Senegal Basin valley, he shows that this form of agriculture lays the foundation of hierarchy and that common property is a rational way to deal with the chaotic character of river flooding. Each year when the river receded, there was a reallocation of agricultural land, and the available agricultural plots (a common pool resource) were distributed among groups of rights holders. The groups were hierarchically organized on the basis of genealogical position (core lineage members against peripheral members) and also included outsiders who could lease land in sharecropping contracts. For Park (ibid.:96) this implies that the flood recession type of agriculture:

> is based neither on equal rights or duties nor on simple diversions between those with rights and those without them. It is a model of common property where hierarchy and inequality are fundamental.

Park concludes that (ibid.):

> One of the basic claims of this paper is that common property in the flood recession case is intrinsically hierarchical and does not involve individuals having equal rights.

If Park is correct, this means that the idealist or populist view of common property as a means to achieve equity (in the sense of equal access to resources), is premised on a too restricted interpretation of case material, and is countered by scrutinising historical studies.

Another example of the importance of stratification and hierarchy in the successful management of common property regimes, is Gilles et al.'s (1992) study from the High Atlas mountains in Morocco. They describe the Oukaimedene *agdal*, which is a high mountain pasture controlled by an indigenous range management system with fixed opening and closing

dates.[12] Used by two tribally organized Berber groups, parts of the *agdal* are irrigated and consist of hay meadows which due to their remoteness, have not become privatized. The reason that the two tribal groups (Ourika and Rhiraya) cooperate in managing the *agdal* is that they stand a better chance of protecting it against rival groups. Though in principle all households share collective usufruct rights to the Oukaimedene *agdal*, there is in fact a hierarchical rights structure where some have senior, or full rights, and can use the pasture for a longer time, as well as being allowed to graze their animals at any location. In addition, they have the privilege of charging fees from other users. Those who enjoy such senior rights do so because they claim descent from a local saint. Furthermore, the ethnic divisions within the tribal groups translate into differential access to springs and hay meadows. Rights are not extended to all, and those who are denied access have the right to dispute it by bringing their case before a local council (*jmaa*). Moreover, there are informal arrangements where outsiders may use the *agdal* against offering reciprocal grazing in another location. In addition to formal regulations such as levying fines, the *agdal* is believed to be the land of a saint, and hence protected by spirits who will harm those who break rules concerning its use (ibid.:241). The finely meshed system of rights and privileges should not, say Gilles et al., be interpreted primarily as a conservation measure. The reason for the success of the Oukaimedene *agdal* was not only that entry was restricted, but that the internal social stratification was used to establish a hierarchy of different user rights. In addition to social stratification, the Oukaimedene *agdal* was also protected by its remoteness, meaning that not all legitimate users were able to enjoy their rights and privileges.

History and the origins of common property regimes

One of the problems we have in assessing how common property regimes and institutions came about, is the restricted time frame we adopt in analyzing them. To show some of the insights which can be gained if we adopt a historical (diachronic) perspective, we will turn next to Arne Kalland's studies of Japanese fishing villages (1984, 1990, 1991)[13] and secondly, to Robert Netting's (1972, 1981) studies of the commons in a

[12] The Moroccan *agdal* is related to the *hima* system which is found throughout the Middle East and where land was protected by customary law for specified periods or seasons (Shoup 1992).

[13] For an account of the present day Japanese coastal fisheries, see Ruddle (1989).

Swiss village. Kalland describes the system of sea tenure in Fukuoka Domain in the northern part of Kyūshū during the Tokugawa period (1603-1867). Ownership of both land and coastal waters was regarded as a part of the feudal estate, and the privilege of fishing was granted to registered coastal villages (*ura*) at the discretion of the feudal rulers. Fishing rights were clearly delimited, and specified which types of equipment were allowed. Villages enjoying fishing privileges had to pay tithes as well as perform various types of corvée labour. The stretch of sea immediately outside a village was normally granted as its exclusive fishing territory. In addition, adjacent areas further out at sea, were often shared or "common" fishing territories (*iriai*), used jointly with neighbouring villages according to rules specifying who could fish where and with which types of gear. It is important to note that not everybody in a fishing village enjoyed rights to fishing. Such rights tended to be appropriated by village leaders and other influential people. In addition to formally recognized fishing grounds, there were sanctuaries where fishing was prohibited (1984:31). Because the strict territorial divisions reflected imperial command rather a logical distribution of fish stocks, villages granted each other informal rights of "guest fishing" according to specific inter-village agreements (Kalland 1991). By the end of the Tokugawa period, more efficient fishing methods emerged, and the pressure increased to privatize fishing grounds and beaches needed for drag netting (i.e., seining).

Netting (1981, 1993:34ff.) traces the history of Törbel, an isolated Swiss mountain village. He shows that as early as in 1224, the local peasants were granted collective user-rights to areas which at the time belonged to the church. In return for this privilege they agreed to pay a fixed annual rent in grain and cash as well as to supply fighting men when required. The community acting as a corporate group subleased these rights to individual villagers. If a non-citizen i.e., a man not belonging to the village, bought land there, he did not automatically acquire the right to use the communal pastures and forest. Moreover, those who sold their property in the village lost their rights in the communal lands and the privileges that went with them. In other words, the community (*Gemeinde*) enforced strict rules of exclusion through restricting community membership. Additionally, community members themselves devised a number of clear-cut rules regarding duties and privileges concerning the use of communal pastures (*Alpen*) and village forest (1981:61ff.). Communal ownership to pastures and forest coexisted in Törbel with tight private ownership to agricultural land.

The co-existence of private and communal property regimes (though not limited to these two cases) is very interesting. First of all it reminds us not

to confuse the issue by asking whether there are either private or communal arrangements. The reason that the communal arrangements persisted in Törbel, in addition to village endogamy (men and women married within the village) which discouraged outsiders from settling in the village, was the very low population growth. Villagers never purposely tried to limit population growth (Netting 1981:226), but female fertility was low due to high age upon first marriage and birth-spacing. After about 1850, migration rather than low fertility kept the population in check.

There are striking similarities in these two cases as well as important differences. In the case described by Kalland, property rights were vested with the feudal lords, and fishing villages were granted usufruct rights against payment of taxes. Whereas fishing villages brokered informal deals of guest fishing in each others' fishing territories (Kalland 1991), the size and extent of fishing territories as well as the right to their use were granted at the discretion of the feudal rulers. Any opposition was severely punished, and in one instance described by Kalland (1984), two village leaders were executed because they kept quarrelling over who had the right to use a stretch of the beach used for landing fish. In the case described by Netting, villagers themselves took the initiative to lease land, upon which they later devised strict rights, duties and privileges. Communal and private property arrangements co-existed, but unlike Kalland's Fukuoka example, duties and privileges were instituted through local consensus, not by any outside authority.

What are the lessons to be learned from these cases? Netting's case study shows that institutions for the management of common property regimes were instituted as early as the 13th century and were continually improved and elaborated. Secondly, it demonstrates that strict rules of exclusion can be devised and enforced by social groups. Netting's study has in this respect become the favourite example of those who wish to revise Hardin's thesis (Ostrom 1990). A fundamental question in the research on common property regimes is what promotes privatization. In Fukuoka, communal arrangements were gradually privatized, especially in the more capital intensive fisheries. During the Meiji era (1868-1912), which followed the Tokugawa period, the process of privatization was for the most part a result of the various governments' wish to increase the total catch (Kalland 1990:195). In order to accomplish this, they abolished the traditional "sea-tenure system..[which had]..inhibited food production, both by closing the sea for all but fishing villages and by restrictive licensing policies" (ibid.:194). In Törbel, by contrast, the commons remained virtually unchanged until World War II, and did not become privatized.

Two competing hypotheses have been advanced to account for the stability of common property regimes such as those found in Törbel.[14] The first hypothesis maintains that common property regimes persist because the inherent productivity of the resources is too low to create an economic surplus which is needed for a transition towards private property (Bromley 1992:5; Runge 1992). The second hypothesis is based on the assumption that common property regimes reduce uncertainty and give greater overall benefits to its users than private property regimes (Eggertsson 1993:46). The two hypotheses represent different theoretical vantage points. The first assumes that private property regimes are more efficient than common property regimes (Demsetz 1967), hence looks for obstacles to privatization. The second hypothesis on the other hand, takes into account both labour costs and uncertainty (Runge 1986:625), and maintains that common property regimes safeguard users against calamities, as well as increasing a household's labour pool by instituting services such as communal water guards or forest stewards (Netting 1981:42-69). Consequently, in order to understand the economics of the formation of property rights, it is necessary to consider both biological productivity and the costs and benefits which accrue from joint use (or harvest) of a resource. This brings us back to the origins of the commons debate, and it is to this we will turn in the next chapter.

[14] For another study of a long enduring common property regime, see Eggertsson (1992).

2. Common property theory: Lessons from fisheries economics

Introduction

In the previous chapter, we reviewed some of the theoretical contributions to the study of common property regimes. To understand the origin of the field of study itself, however, we need to turn our attention to where it all began, namely fisheries economics. The insights provided by fisheries economics – in particular what is now known as "common property theory" – have provided the theoretical foundations of the interrelationship between harvest and returns in the utilization of renewable natural resources. Compared to other types of renewable natural resources, the marine commons is the prototypal example of the problems associated with common property regimes. Migratory fish stocks do not observe international boundaries, and this makes the exclusion of potential users difficult, but as newer studies have demonstrated, not impossible. The problem of exclusion becomes more manageable where fishing takes place in enclosed stretches of the sea, such as fjords, bays or lagoons. The work of anthropologists and biologists has led to new insights into the commercial fisheries operations in the North Atlantic (Acheson 1988; Andersen and Wadel 1972; Andersen 1979; Jentoft 1991) and the Near East (Berkes 1986, 1992). Newer and promising studies focus on artisanal fisheries in Oceania (Hviding and Baines 1992, 1994; Johannes 1978, 1982; Ruddle and Akimichi 1984), West Africa (Jul-Larsen 1994; Lawson and Robinson 1983; Tvedten 1990; Tvedten and Hersoug 1992) and South-East Asia (Kalland 1984, 1991). In particular, these studies contribute to the growing research on customary marine tenure (Ruddle et al. 1992) as well as research on informal management systems such as territoriality (Acheson 1975, 1987) and guest fishing (Kalland 1991; Levieil and Orlove 1990). In the course of this chapter we will look more closely at the role of fishery cooperatives (Berkes 1986), and how artisanal fisheries articulate with market and non-market exchange (Tvedten 1990).

Common property theory

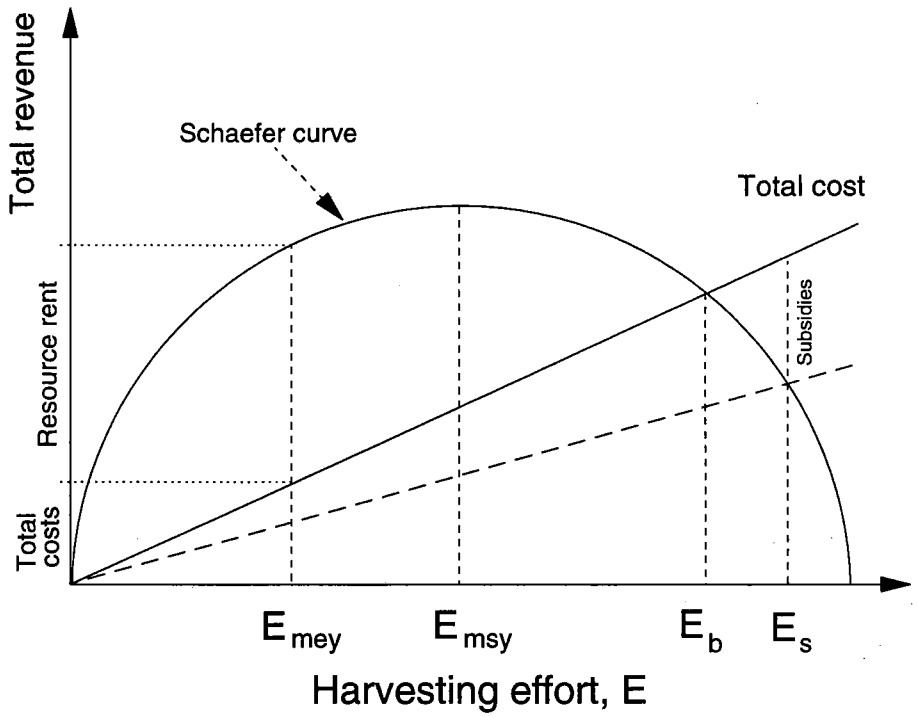
The economic theory of common property regimes originated in the field of fisheries. The classic work is the Danish economist Jens Warming's (1911) article "On Rent of Fishing Grounds" ["Om 'Grundrente' af Fiskegrunde"] which discusses the problems of regulating fishing effort. Warming proposed that given two fishing grounds of different quality, the fishing effort could be controlled by introducing what he termed a "resource rent" (*grunnrente*).[1] The state could regulate fisheries by adding a resource tax to the most productive of the two fishing grounds, thereby equalizing the fishing effort (see also, Andersen 1983). Despite Warming's pioneering effort, economists did not take up this lead. This changed in 1954, when Howard Scott Gordon's paper laid the foundation of what was later termed "common property theory". To analyze the interrelation between harvest and returns, Gordon (1954) added an effort curve to the Schaefer curve which depicts the natural growth function of a single fish species (Schaefer 1954). There are a number of extensive treatments of Gordon's model (Brox 1990; Grima and Berkes 1989; Hersoug 1992; Stenseth 1991; Townsend and Wilson 1987), therefore a short recapitulation of its basic features will suffice (Figure 7).

The two axes denote fishing effort, and returns (or yield) respectively. The point where there is maximum returns on effort, is known as "maximum economic yield" (E_{mey}), and at this point the "economic rent" or "resource rent" is maximized.[2] The resource rent can be defined as "a surplus value over and above the opportunity costs for all factors of production" (Grima and Berkes 1989:45). As more fishermen join to harvest the resource (or more time is spent at sea), the total catch increases to the point of "maximum sustainable yield" (E_{msy}). This is depicted by the high point of the Schaefer curve, and is a biological measure of the largest possible catch size without depleting fish stocks. Note, however, that all points along the Schaefer curve represent a sustainable yield (Charles 1994). Beyond the maximum sustainable yield, the returns diminish to the point of intersection between the total cost curve and the Schaefer curve,

[1] In present day terminology, what Warming discussed is known as "differential rent".

[2] It is important to be aware that fishing effort which maximizes economic rent (E_{mey}) may, under certain circumstances, drive fish stocks to extinction (Clark 1973, see also Charles 1994). In the special case where the discount rate is zero, the E_{mey} is equal to the maximum "net present value" (NPV). If the biological growth rate of a species — Clark used whales as an example — is smaller than current interest rates on capital (money in the bank) it can be economically rational (that is, maximize the NPV) to hunt whales to extinction and bank the net revenue.

Figure 7
The Gordon model



the "break even point" (E_b). At this point there is no economic rent to the participants ("rent dissipation"); in other words, they do not make any profit. If effort continues to rise beyond the break-even or equilibrium point, new entrants will lose money if they are not aided by subsidies. The problem with subsidizing fisheries is also predicted by the model – it will shift the total cost curve downwards and add to overfishing of the resource (E_s).[3] The problem with fisheries (and common property regimes in general), Gordon argued, is that fishermen do not pay for the reproduction of fish, hence no "rent" is being incurred by those who harvest the resource. This means that it is tempting to maximize fishing effort through more intensive fishing and by investing in more efficient gear ("overcapitalization"). Gordon's model is premised on the following points: There are no limits to the number of new entrants ("open-access"), and fishing effort is only constrained by the threat of diminishing returns. The resource itself is neither protected by formal nor informal rules, in other words it is open for all potential users (open-access, *res nullius*).

[3] It is important to note that Gordon's model represents different long-term bio-economic equilibria.

A year after Gordon's article appeared, Anthony Scott (1955) set out to revise two features of Gordon's model. First, Scott claimed, Gordon's model failed to distinguish between efficiency in the short and long run. In the short run "there is little difference between the efficiency of common and of private property" (ibid.:117). Secondly, Scott argued that Gordon had not taken into account the diminishing returns linked to the fishery operation itself and not only to decreasing fish stocks. The only reason fisheries in Gordon's model approached the equilibrium point, E_b, was that the density of the fish population itself decreased, hence there was no incentive to stop fishing before the total cost equalled the profits from landing fish. This approach is deficient, says Scott: "In the short run, fishermen do not expand their catch indefinitely because they *do* experience increasing costs in attempting to increase their landings" (ibid.:120, italics in original).

The work of Gordon has been severely criticised, especially by anthropologists who see Gordon's model refuted by a number of examples of successful local management of fisheries (McCay and Acheson 1987). Moreover, the theory has been criticized on the grounds that it does not take into account that there are culturally defined checks and balances which reduce harvesting effort. Others, such as Brox (1990) sees this critique as misconstrued, arguing that Gordon's model is analytical, a theory, not a model of the world. More importantly, Brox points to the trivial fact that in those cases where Gordon's model is proven wrong, "*the assumptions of the model are not satisfied*" (ibid.:229, italics in original).

Despite frequent criticism, Gordon's model remains widely used in deciding fishing effort and planning government regulation of fisheries. Gordon's theory is based on the notion that actors will increase their effort as long as it is profitable to do so. To hinder overfishing and over-capitalization it is necessary to limit effort, either by limiting the number of fishing vessels through a licensing system (restricted entry), restricting harvest (quotas), outlaw certain types of gear (gear restrictions),[4] or as Warming suggested as early as in 1911, by imposing a resource tax on harvesting (taxation) (see also, Pontecorvo and Vartdal 1967). All these options for state regulation of the fishery have been tried, often with mixed results.

Whereas restriction on types of gear and fish quotas are generally favoured by commercial fishermen, there is a tradition going back to the work of Gordon, which favours the introduction of private property rights

[4] An example is the Danish seine which was outlawed in the Lofoten cod-fisheries (Jentoft and Kristoffersen 1990).

in fish stocks and the enclosure of the marine commons (Pontecorvo 1988). In the light of the recent collapse of a series of important regional fisheries (cf. McGoodwin 1991; CERES 1993, on the unexpected collapse of the cod-fisheries in Newfoundland),[5] privatization has become more popular, and is advocated by some as the ultimate solution to the problems of overfishing. Keen (1983), amongst others, has argued that limited entry has, overall, not been successful, and that the solution to the problem of overfishing is privatization of fish stocks. This view has in some circles become a favoured strategy for solving the problems of overfishing. The key concept is the term "individual tradeable quotas" (ITQ) (Eggertsson 1990:268). Management by ITQ means that every vessel owner is given an individual quota (either in tonnes or as a percentage of the total allowable catch). In principle this quota is tradeable, meaning that the owner of the vessel can either sell the rights to the quota or choose to fish it himself (Toftum 1993:101). Tradeable quotas need not be linked to vessels, but can likewise be assigned to single registered fishermen, groups of fishermen or companies. As a management regime, ITQ marks a shift from a system based on rights and entitlements towards a system based on private ownership (ibid.:102). Researchers who oppose the move towards ITQ, warn that "closing the commons, will open the tragedy" (Maurstad 1992, in Brox 1993). Others see ITQ as an efficient management system, which will contribute to conservation because the owner can fish his quota when he deems it most profitable, or if he wishes, can opt to sell it.

Fishery cooperatives

Whereas fishery cooperatives are often suggested as a solution to the problems of organizing fishermen (Jentoft 1986:353), cooperatives are rarely successful (Bailey and Jentoft 1990:342). Discussing the merits of fishery cooperatives in the Caribbean, Sandersen and Jentoft (1993) find that they only organize a minority of the local fishermen and do not succeed as economic enterprises. An exception to the rule is Bonnie McCay's (1980) description of a fishermen's cooperative in the New York Bight region, USA. McCay describes the cooperative's rigorous regulation of membership: only retirement and death make room for new members.

[5] Another, and quite recent critique of quota regulations is concerned with the accuracy with which fish stocks can be predicted. More specifically, the question is whether the fishery biology represented in Gordon's model by the Schaefer curve, can be used to predict the size of fish stocks. An alternative interpretation of wildlife fluctuations has been advanced by "chaos theory" (Worster 1990).

There is a strict enforcement of quota regulations, which despite smaller fluctuations in response to expected prices, cannot surpass a self-imposed weekly maximum quota ("dock limit"). This example, claims McCay (ibid.:36), demonstrates that "highly individualistic, competitive commercial fishermen of the North Atlantic are capable of cooperating in order to create, enforce, and maintain viable systems of fisheries management".

In a detailed study of fishery cooperatives in Turkey, Fikret Berkes (1986, 1992) analyzes traits of the individual cooperatives and the informal rules which govern them. The areas which Berkes studied were (the number of registered fishermen in brackets): Çamlik lagoon (103), Taşucu (150), Alanya (100), Bodrum (305) and Bay of Izmir (1850). Among the first three, all or the majority of the registered fishermen were organized in one cooperative which was identical to the user group. Among the two latter, cooperatives were either lacking (Bodrum), or there were a number of smaller cooperatives (Bay of Izmir). Only the three smallest areas with less than 150 registered fishermen, showed a relative stability in absolute catch, in catch/effort ratio and the number of fishermen and vessels. They were therefore deemed to be "successful" compared to the two largest where overfishing and overcapitalization were evident (ibid.:167). The Alanya case represents an interesting example of informal regulations. The Alanya fishermen had devised a lottery system where each vessel drew a number which corresponded to a fishing spot. The spot marked the boat's starting position when the fishing season began. From September to May the boats made daily shifts eastward from their assigned starting spot, which gave all vessels an equal chance at the best fishing sites.

Without going into the technicalities of the different locations, the important question is why local management seemed to be successful in the first three cases, but not in the latter, Bodrum and Bay of Izmir. In these two areas, the overall catch remained unchanged, but the catch per unit of effort declined (1992:167). In Bodrum, there were six different user groups, but no active cooperatives. In the Bay of Izmir, there was a total of six cooperatives, but these had been unsuccessful in finding cooperative solutions and enlist the support of all fishermen. It simply was "beyond their power" (1986:226) to agree on how to manage the fishery, and the presence of cooperatives alone was not sufficient to ensure sustainable management. The success of the smaller ones — Çamlik lagoon, Taşucu and Alanya — Berkes (ibid.:227) attributed to:

> the existence of traditions and institutional arrangements such as cooperatives [which] no doubt reduces the cost of organizing local management systems and facilitates the formation and survival of user-

> group organizations. One pattern that emerges from the three success cases is the use of extra-local authority, such as the cooperative charter and the local mayor or gendarme.

The central point here is "cost," but Berkes does not add to this the concept of "transaction costs" which could have given new insight into the successes and failures he describes. Transaction costs are, as defined previously, the "costs of defining and enforcing property rights" (North 1977:710). By utilizing government institutions to control the fishery, the costs of policing are moved from the members of the cooperative onto the state. Lowering the transaction costs of the management regime, is surely important to its success. Berkes study corroborates the work of Olson (1965) who argued that the larger the group, the less likely it is that individuals and the collective will have similar interests. Besides, as Berkes himself notes, the management system devised by Alanya fishermen confirms that cooperation may evolve spontaneously, without external intervention (Axelrod 1984).

Berkes notes that much of the literature on maritime anthropology tends to argue that traditions, as well as fishermen's detailed local knowledge are important in explaining successful fisheries. However, the three successful cooperatives do not support either of these hypothesis. In Alanya and Taşucu less than 50 per cent of the cooperative members could be termed traditional fishermen (1986:226). In the Çamlik lagoon, says Berkes, there are hardly any "traditional" fishermen – almost all of them took up fishing after 1974. "These examples", claims Berkes (ibid.:226):

> do not negate the importance of traditional knowledge and institutions, but show that their existence is not an essential precondition for a successful fishery.

Another important point is that the Alanya cooperative only organizes about half of the fishermen. The cooperative functions first of all to legitimize decisions about the fishing system which have been reached in an informal forum, in this case the local coffee house which serves as a hang-out for fishermen (ibid.:226).

Regulations in fisheries are inherently problematic, and reflect not only the problem of organizing fishermen but that of shifting government policies as well. This is the point McCay (1978) makes in her description of the problems in the cod fisheries around Fogo Island, off the coast of Newfoundland. Traditionally, fishermen survived occasional ebbs in the cod fishery by their engagement in long-term credit arrangements involving local merchants and wholesalers. Whereas credit arrangements fostered long

term viability, they limited fishermen's bargaining power vis-à-vis local traders. Fogo islanders, as well as the rest of the fishermen in outports of Newfoundland, therefore remained a rural proletariat (Brox 1972). After some poor cod seasons in the mid-1960s, people "diversified" by going on government welfare, shifted to paid jobs onshore or turned to lobster and salmon fisheries. By the end of the 1960s, the government introduced subsidized longliners to boost local fisheries. The local responses during this period varied from signing up for work on longliners, emigrating to the mainland or leaving the fisheries. After a short boom in the fisheries in the years 1969-71, catches and profit declined rapidly during the period 1972-1975. Overcapitalization finally led to resource depletion, resembling Hardin's "tragedy of the commons" (ibid.:416). As McCay shows, intensification was not promoted by fishermen themselves, but was the result of a government sponsored program aimed at increasing the profitability of fishing by introducing larger and more efficient boats. (Similar points are advanced by Durrenberger (1994:81) in order to explain overfishing among shrimpers in the Mississippi, USA.)

Economic rationality and markets

As Gordon (1954) rightly identified, the enduring problem in the commercial fishery sector is overcapitalization (or overcapacity), and successful fishermen must in addition to catching fish, also be good at managing capital (Acheson 1989:292). Harvesting fish with modern gear is capital intensive, and heavy investments are in turn an incentive to increase fishing effort, leading, ultimately, to overfishing. In the literature of fishery, there is a tendency to juxtapose the capital intensive fishery sector with what is termed "artisanal fishery" or the "artisanal sector". Artisanal fisheries may be defined as small-scale fisheries, using simple gear and primarily exploiting inshore or coastal fishery resources. Most often, only a smaller part of the catch is marketed and the rest bartered or consumed locally (Tvedten and Hersoug 1992:11). The interesting question is under which circumstances will artisanal fisheries become commercial enterprises, in other words, to what degree are artisanal fisheries preadapted to capital intensive, commercial production methods?

One way to approach the transition from a non-market to a market economy, Dahl (1988) argues, is by employing the Marxian distinction between "use-value" (non-market exchange) and "exchange-value" (market exchange). With the absence of markets (and exchange-value) there is less

incentive to exchange goods for alternative commodities.[6] However, as is often the case, a market and a non-market sector co-exist, hence the distinction between "goods" and "commodities" become less well defined than Dahl implies. For instance some of the catch may be used in an exchange of gifts in the domestic sphere, but the rest sold in the market.

An example of this can be found in Inge Tvedten's (1990) study of fishermen in the Bijagòs archipelago, off the coast of Guinea-Bissau. The Bijagò are artisanal fishermen who use traps, lines, gill nets and more lately, beach-seine and drift nets. The fishery is based on canoes, but only about one fifth of the canoes are outfitted with an outboard motor. Though the Bijagò Islands have increasingly been drawn into the national economy, there has only been a negligible commercialization of the fishery. The reason is, according to Tvedten, to be found in the age-grade institution, where men who aspire to a higher age-grade, must invest goods and money as ceremonial contributions (*grandessa*). This means that surplus produce is reinvested in the age-grade institution, rather than in the fishery itself. In fact, ceremonial contributions may account for 50 to 75 per cent of household expenditures (ibid.:128).[7]

The case discussed by Tvedten is an interesting example of the problem of how to classify institutions which inadvertently preserve resources. From Tvedten's description it seems that there were no institutional measures among the Bijagò fishermen aimed at regulating fishing effort. However, by reserving a large proportion of the catch for ceremonial exchange, less surplus was available to modernize the fishery. In response to the stagnant fishery, many younger fishermen retreated to subsistence production or left the fishery. The limited capitalization of the Bijagò fishery represents an analytical problem. Should it be interpreted as an example of successful local management – whether intentional or not – or should it be treated as a problem for the development of the artisanal fishery sector? The Bijagò case seems to fit with Lees' (1993:109) observation that "disincentives, while protecting the pool of common property resources, also curb individual entrepreneurship, investment, experimentation, and innovation".[8]

[6] The terms *goods* and *commodities* have their origins in two distinct traditions within economics. The latter belongs to the commodity-theory paradigm of the 19th century formulated by Smith, Ricardo and Marx among others. The first belongs to the theory-of-goods paradigm whose 19th century origins was developed by modern theorists such as Samuelson and Friedman. Central concepts in the theory-of-goods approach is utility (a consumer's subjective preferences) and scarcity (Gregory 1994:912ff.).

[7] For a different interpretation of the stagnant economy among the Bijagòs, see Bækgaard and Overballe (1992:187ff.).

[8] For a discussion of institutional innovation, see Moberg and Dyer (1994).

We may take this argument a step further. Some attribute sustainable resource management to pre-modernity and to the absence of a market. Breakdown of traditional institutions is supposed to happen when the "hidden hand" of market forces transforms the traditional sector. In the case described by Tvedten it is obvious that the Bijagò fishermen were part of a modern, and fully integrated market sector, but that their consumption pattern hindered an adequate investment of surplus in the fishery. In this sense, the situation described by Tvedten resembled the system of "dual-economy" found in Newfoundland (Brox 1972). Brox argued that Newfoundland fishermen were part of a fully monetized and market integrated fishery sector, but due to the low price of fish, used fish for domestic consumption instead of selling it, thereby avoiding conversion losses. The fishery therefore remained a "backward sector", divided into a small commercial sector and a disproportionately large subsistence sector (see also, McCay 1978:406ff.).

Some of the arguments put forward by Tvedten become of particular interest when compared to the development of the migrant canoe fisheries in West Africa which are characterized by a dramatic technological development and market integration (Chauveau 1991). An interesting case study of this development is that of the Béninois Popo fishermen in Pointe-Noire, Congo (Jul-Larsen 1994). This study reveals how the development of a highly commercialised drift-net fishery must be seen in association with the emergence of new internal institutions connected to their status as migrants. The new commercial fishery evolved without any internal regulations as to resource access. However, it shows that the same internal institutions which facilitated the development towards increased market integration also are effectively utilized by the community leadership to reduce the recruitment of new drift-net fishermen to Pointe-Noire (Jul-Larsen 1994). Besides demonstrating the variation which at present exists in West African canoe fisheries, the cases of the Bijagò and the Popo also demonstrate how internal institutions in the fishing communities in various ways serve to regulate fishing effort. This view is supported by Lawson and Robinson (1983), who in a review of artisanal fisheries in West Africa, argued that in spite of the huge catch potential in artisanal fisheries, overfishing is not a problem. The authors attribute this to the persistence of traditional institutions, such as the "Chief Fisherman" found in many West African countries (ibid.:287). The function of the "Chief Fisherman" was primarily ceremonial, but did in some cases contribute to the organization of the seine net fishing.

Customary marine tenure

The study of "customary marine tenure" grew out of the dissatisfaction with economic models for understanding fishery management. Whereas researchers tend to agree that there are systems of local resource management, there is no consensus on what their prime function was. Were they devised to protect the resource, or were they primarily a way to distribute catch among legitimate users?

Based on material from four Micronesian atolls, Dahl (1988) proposes that the characteristics of functioning marine tenure systems are "resource scarcity; the ability to define resource boundaries; group/territorial identification; the type of technology used to exploit the resource; and economic structure of society" (ibid.:40). The scarcity concept builds on the assumption that people will only seek to manage resources which are considered to be scarce. One way to create resource boundaries is to assign a section of the sea to a particular user group ("territoriality"), or alternatively to limit harvest and consumption of some marine organisms to a stratum of the population, for example people of high rank. The question remains, however, whether this is done in order to protect the resource or is a response to the hierarchical social organization.

In a study from New Guinea, Carrier (1987:144) argues in favour of the latter. He describes how the Ponam islanders limited entry through elaborate rights vested with lineages, but this was not done to contribute to conservation. "We cannot assume", claims Carrier, "that limited entry in Melanesian fishing societies plays a role in the conservation of marine resources" (ibid.:164). The prime aim of these elaborate rights was resource allocation – who gets the fish – not conservation. Carrier contends that the Ponam's notions about species ecology differ significantly from Western ecological science. What is needed, says Carrier, "is careful examination of the ways people understand their environments and the ways that ownership works in specific cultural and ecological settings" (ibid.:164).

In contrast to Carrier's analysis, Hviding and Jul-Larsen (1993) describe how elaborate rights and restrictions are conserving fish stocks as well as other marine resources. In their review of artisanal fisheries in the tropics, the authors argue that the reason for this not being immediately obvious to Western trained scientists, is that such knowledge is either cast in the local idiom and not in the language of a Western ecology discourse, or that regulation mechanisms are the indirect results of local relations of power between individuals and groups. Hviding and Jul-Larsen believe that in many instances developing countries could increase the effectiveness of fisheries management by making better use of such regulating institutions by integrating them into federal legislation and the practices of fishery

administration. Hviding and Jul-Larsen argue that local mechanisms of resource regulation, in spite of their shortcomings, often prove far more effective than any management regime implemented and controlled by the state. Hviding and Jul-Larsen do not, however, discuss the feasibility of this approach in a situation where the state and local managers compete for control and ownership of marine resources. Moreover, they take a very restricted view of the problems facing tropical fisheries. According to Hviding and Jul-Larsen (ibid.:2ff.) there are two ways of perceiving fisheries: the wrong one which equates common property with open-access, and the right one which is concerned with eliciting and understanding local modes of resource management which are often deeply embedded in local culture and cosmology. To buttress this view, much of the argument hinges on Hviding's case studies from the Morovo lagoon (Solomon Islands).

With the importance of the Morovo case to Hviding and Jul-Larsen's argument, it can be useful to look at it more closely. In a recent collaborative article Ruddle, Hviding and Johannes (Ruddle et al. 1992) give a detailed picture of customary marine tenure in the Morovo lagoon. Local residents perceive the lagoon and the coastal mangrove forest as an "integrated corporate estate" (*puava*). They distinguish between people living (or who used to live) in the inland forest, "bush people", and those who reside on the coast. The coastal dwellers hold more elaborate and defined rights to the sea and reefs than bush people. Rights are held by corporate descent groups (*butubutu*) which have specific rights to parts of the lagoon as well as the adjoining coastal landscape. The descent groups within a single butubutu who reside permanently in the corporate estate are recognized as the true "guardians" of the estate, and have a greater say (*nginira*) in their management than those who only have rights of use (*hinoho*) (Hviding and Baines 1994:20). The bush people are allowed to fish in the lagoon for their own subsistence needs, but these rights can be reduced or suspended according to the availability of fish. When a commercial fishery project was established in Morovo, the descent groups controlling the lagoon responded by tightening their control of fishing reefs by excluding bush groups that had traditionally been allowed to fish for their own subsistence needs (Ruddle et al. 1992:257). The potential for increased earnings which the project represented, promoted a process of exclusion by alienating a former user group. On the whole, the authors acknowledge that Morovo may be a unique example of customary marine tenure, and concede that claims about the general prevalence of similar well adapted and robust management systems are "romantic and uncritical" (ibid.:263). In fact, Morovo may well be an exception to the rule in the Solomon Islands (see, Meltzoff and LiPuma 1986a).

The example of the Morovo lagoon shows a very fine subdivision of fishing rights. Johannes (1981) has argued that in Melanesia, fishing rights are often so finely dispersed that when the fishery becomes commercialized it is unable to adapt, resulting in a conflict among fishermen. Rebutting this view, Cordell argues that Melanesian sea tenure cannot be judged by how well it adapts to a "Western cultural overlay" (1984:309). Instead of imposing a Western type of management, ill-fitted to local conditions, he advocates a development of fisheries which builds on the "unwritten laws of the sea embedded in the cooperative social foundation of customary sea tenure" (ibid.:322). This may be taken to imply that customary marine tenure always provides for sustainable management. This is, however, a point where researchers disagree.

A native ecology: Fact or fiction?

Whether indigenous people have an innate ecological sense or are in a peculiar way pre-adapted to an ecologically sustainable harvesting system is debatable. Despite their advocacy for customary marine tenure, Ruddle et al. (1992) concede that exaggerated claims to an indigenous environmental ethic have backlashed, causing some researchers to focus on the unsustainable and unsound practices in Oceania. One of the better known critiques of the claims to widespread customary marine tenure throughout Oceania is Polunin's (1984) discussion of case material from Indonesia and New Guinea. Reviewing a number of old and contemporary sources, Polunin remains unconvinced that well defined rights in the sea were a result of conscious resource management. Polunin argues that they were more likely a result of infighting between villages and a convenient way to create well-defined boundaries. Another possible explanation is that resources were not valuable enough (compared to the costs of enforcement) to warrant the development of property rights (ibid.:272). For regions such as the western coasts of Sumatra, Kalimantan and Sulawesi, Polunin finds no historical evidence that there ever were traditions for managing marine resources. Polunin concedes, however, that they may have existed earlier but broke down for unknown reasons (see also, Baines 1989).

Johannes (1978, 1982) has brought to the fore cases from Oceania where local management is radically transformed or has broken down. He also questions the assumption that local resource management everywhere is guided by an environmental ethic (1982:260). Examples such as "dynamiting of reef fish, although illegal, is widespread in Western Samoa" and "Solomon islanders harvested porpoises primarily for their teeth, letting much of the meat rot" throws doubts on claims of a uniform and innate

ecological sense (Johannes 1978:355). Johannes believes that "environmentally destructive practices coexisted, as in most societies, with efforts to conserve natural resources" (ibid.:355). Whereas Baines (1991) quotes examples of the reassertion of communal property rights in the Solomon Islands, Johannes (1978:358-359) takes a more negative view of the reintroduction of traditional fishing rights in Oceania:

> In addition to the resistance of some colonial governments to the institution or reinstatement of such laws, the islanders themselves are sometimes unsympathetic to such a move. Now accustomed to unlimited entry on the fishing grounds and motivated in their patterns of resource use by a money economy, many fishermen fear the short-term inconvenience and economic dislocation attending the reintroduction of reef and lagoon tenure.

Outside Oceania, an area where native ecology and environmental ethics have been closely studied, is in the circumpolar region. A recent addition to this research topic is Freeman and Carbyn's (1988) edited volume on "traditional knowledge" (see also, Brokensha and Werner 1980). The main purpose of the volume is to discuss "traditional management systems..[and] ..in particular, the role of traditional communal property institutions in their management" (Berkes, in Freeman and Carbyn 1988:7). The essays aim at discussing the "philosophical underpinnings" of traditional management among various Arctic peoples (Cree, Inuit, Saami etc.). Overall, the editors claim, there is a native ecological knowledge and an environmental ethic limiting exploitation, and that this offers an alternative to Western science (ibid.:6). It could be invoked against these studies that they entail a very sympathetic reading of native ecological knowledge and practice.[9] The authors argue that native peoples in the Arctic have an innate ecological sense, which we as Westerners should acknowledge and emulate. For this reason we could have expected more emphasis on examples such as wasting of walrus and narwhale meat (ibid.:35) which seems to contradict such claims. In fact, some have claimed "that Northern Native peoples have *no* tradition of restraint of harvesting effort" (ibid.:19, italics in original), whereas others would argue that hunting practices (such as "trap lines") do contribute to preserve breeding stock (Berkes 1981, in Acheson 1989a).

To explain instances which seem to contradict the Freeman and Carbyn's argument we are left with two contending hypotheses: either native peoples'

[9] See also Ellen (1993) and Sillitoe (1993), who question the claim to an indigenous environmental ethic among forest dwellers and shifting cultivators in Indonesia and Papua New Guinea respectively.

traditional ecological sense has been eroded, or this sense was never as strong as the authors claim, but was a result of the absence of a market, rather than cognitive and moral imperatives. The first hypothesis (that there was an environmental ethic), is implicitly or explicitly found in many works on natural resource management but rarely questioned (McCay and Acheson 1987:12ff.). The examples just cited, indicate that the willingness on the part of the researchers to embrace claims to an indigenous environmental ethic may, at times, make it difficult to arrive at a disinterested and objective opinion of their merits.

Informal and formal regulations in fisheries

Fisheries' management is often characterized both by informal or formal regulations (Jentoft 1985:327). Informal regulations may be defined as rules, restrictions and privileges based on private agreements among fishermen, and hence unrecognized by law. Formal regulations are laws, legislation and regulations defined by the state and enforced either alongside informal regulations ("co-management") or without considering informal regulations. As such, co-management combines formal and informal rules and, ideally, the state and local users have an equal say in the management of the resource. Co-management is often suggested as a way to resolve conflicts over management between state and local communities.[10] Some authors advance co-management as an alternative theory of resource management, but as Sandersen (n.d.) notes, it is more adequately understood as a pragmatic principle in the design of management regimes. The advocacy for co-management as a management tool, should not be used to conceal the fact that in many cases the state is reluctant to share control over natural resources, hence unwilling to adopt co-management regimes (Pinkerton 1992). Conflicts over who has the right to manage resources is not restricted to the state versus local communities by may also pit nation states against each other (Meltzoff and LiPuma 1986b). Other possible lines of conflict are between different groups exploiting overlapping territories (Acheson 1987), between legitimate ("traditional") users and new user groups (Miller and van Maanen 1979) and between users of old and new technology (Goodlad 1972; Jentoft and Kristoffersen 1989). To solve such conflicts, there is a tendency among fishermen to seek informal, local level solutions, which may range from

[10] See, Acheson (1989b); Jentoft (1989); Jentoft and Kristoffersen (1989); Pinkerton (1989); Sagdahl (1992); Sandersen (1993); Sandersen and Jentoft (1993); Vásquez Léon (1994).

unwritten rules and customs to more encompassing systems of local resource management. In order to identify such informal regulations, one needs to complement the study of the fishery as an *economic system* (Gordon's "common property theory") with an approach that focuses on the culture of fishing, viewing it as a *socio-cultural system.*[11] Whereas the economic approach focuses on the relationship between fish ("prey") and fishermen ("predator"), the socio-cultural approach focuses on the relations of fishermen vis-à-vis each other. An example of the latter approach to understand fishermen's strategies is Andersen's (1972, 1979b:324ff.) studies of the tactics of Newfoundland trawler skippers. The skippers tended to conceal the size of their catch, their current position, or occasionally, deliberately misinformed nearby vessels by directing them to a bad fishing site. The motivation for this non-cooperative behaviour[12] among skippers, and the tendency to deceive competitors, is a wish to keep information about good fishing sites secret. Thus, skippers tend to conceal information about good fishing spots in order to secure the long term catch for each vessel. Secrecy can in this case be viewed as a management system in itself, which serves to limit exploitation. The net effect of this is, however, that the total catch is lower than if fishermen had cooperated (see also, Sandler and Sterbenz 1990 on the link between harvest and uncertainty).

Another example of elaborate informal regulations in fisheries, is Levieil and Orlove's (1990) study of fishing territories in Lake Titicaca, which straddles the border between Peru and Bolivia. Levieil and Orlove studied more than 150 villages along the shoreline and found that there were clearly delimited territories whose integrity was strictly preserved. Overall, individual territories included the stretch of sea immediately outside villages and extended outwards beyond the economically important beds of totora reeds. Outsiders caught fishing or illegally cutting totora were verbally abused and risked having their fishing gear taken away from them. Rumour also had it that some were beaten to death (ibid.:370). However, the effectiveness of the exclusion of outsiders was related to the ease of surveilling territories. The informal regulation of strictly defined territories had so far not been influenced by the fact that the government opposed them. The limited presence of the government's Coast Guard meant that they played only a nominal role in controlling fisheries in the lake. Despite

[11] See, Acheson (1981); Andersen (1979a); Andersen and Wadel (1972); Hersoug et al. (1993); Smith (1977).

[12] For this reason game theory (non-cooperative games) seems to be better at explaining fishermen's behaviour, than actors' behaviour in other common property contexts (Sumaila 1994).

the strict territoriality, there was a tradition for granting outsiders the privilege of guest fishing in the lake. This could involve the extension of temporary use rights, or systems of temporary lease whereby leaseholders paid part of their catch in return for enjoying this privilege. More durable rights of guest fishing were granted to close kin, or to persons with whom they shared important fictive kinship ties such as coparenthood (*compadrazgo*).

The Maine lobster fishery

One of the most carefully analyzed examples of elaborate informal regulations in commercial fisheries is James Acheson's studies of Maine lobstermen, in the northeastern corner of USA (1975, 1987, 1988). The lobster fishery off the coast of Maine is an inshore trap fishery. The informal regulations of the lobster fisheries are connected to stretches of sea where different user groups have exclusive rights to fishing. The social foundation of this territorial division of the coastline is "harbour gangs". A harbour gang is a loosely knit group of fishermen belonging to the same village or area, and access to fishing depends on being recruited into a harbour gang. Criteria of membership are first of all to be a native of the area, but persistent outsiders may become members if they can handle the initial harassment. Boat crews belonging to a harbour gang defend their fishing territories against intruders using verbal abuse and insults, but if the trespassing continues, resort to destroying traps or cutting the rope used to secure them. Repeated trespassing of territorial boundaries may provoke "cut wars" between opposing harbour gangs (Acheson 1988:74). Sanctions not only restrain outsiders: fishermen who are given to over-fishing ("hogs") are sanctioned by other members of the harbour gang. Disagreements between harbour gangs are frequent since fishing territories tend to overlap, and with the exception of inshore areas, they are sometimes poorly defined (Acheson 1979:262ff.). Acheson identifies two types of territories: "nucleated" and "perimeter-defended" areas (1988:79). In the nucleated areas there is an inverse relationship between the severity of the sanctions and the distance from the harbour: intruders close to the harbour are severely sanctioned, whereas at the outer fringes there is a greater acceptance of mixed fishing between adjacent territories. In the second category, perimeter-defended areas, the willingness to sanction trespassing is very strong regardless of where it occurs. The perimeter-defended response is common to harbour gangs on the islands off the coast, whereas nucleated defence of territories is more common to mainland harbour gangs. The reason is, according to Acheson, that on islands recruitment to harbour

Figure 8
Nucleated vs. perimeter-defended areas

	Nucleated	Perimeter
No. of lobsters caught	3169	6180
No. of lobsters caught/trap hauled	0.31	0.51
Mean kg. of lobsters caught/trap hauled	0.36	0.55
Mean weight of lobsters (in kg.)	0.53	0.64

Source: Acheson 1989:206

gangs is very strict, hence it makes sense to keep outsiders prying for lobsters out. On the mainland, however, recruitment to harbour gangs is easier, hence they are more lenient in defending their territories. Naturally, there is "no sense in incurring the cost of defending strict boundaries if anyone can join the harbor gang" (ibid.:80). There is a positive correlation between the degree of territoriality and catch size. The perimeter-defended areas have larger overall catches and catches per unit of effort than nucleated-defended territories (Figure 8). However, harvesting effort does not reflect the unit price of lobster (Acheson 1985:113). Instead, harvesting effort is correlated with the availability of lobster. Fishermen intensify their fishing effort during the months when lobster is abundant, even if this coincides with the period of low prices. Acheson's analysis bears out the rationality of this response by showing that fishermen earn four times more during a day's fishing when the price is at the annual low, compared to when it is at its annual peak (ibid.:114). The income among fishermen also reflects personal skill,[13] and successful lobstermen ("highliners") have considerably higher income than unsuccessful ones ("dubs") (Acheson 1988:52ff; see also, Smith 1974:376).

[13] The question of fishing skill has stirred up a heated debate among those who argue that skill is a statistically significant factor in determining fishing success (Barth 1981; Thorlindsson 1988; Bjarnason and Thorlindsson 1993) and those who claim that the importance of skill is a "folk model" which is not supported by analyses of catch statistics (Pálsson 1993; Pálsson and Durrenberger 1982, 1990).

Limits to informal regulations

The case of the Maine lobster is perhaps the most frequently quoted example of successful local management, and the role played by informal regulations in managing the fishery. Many of those who quote Acheson as an example of successful informal regulations in fisheries (Ruddle et al. 1992:268), fail to acknowledge that after about 1970 there was a gradual shift in the management of the lobster fishery, something Acheson describes in detail in his monograph *The Lobster Gangs of Maine* (1988). By the end of the 1970s there was a gradual transformation of the lobster fisheries, with early signs of overfishing. The Maine lobster fishery was from the start only nominally controlled by the state and the fishermen resented state intervention. The state of Maine passed its first law on the protection of berried lobsters in 1872, and in 1874 a legal minimum size was specified, as well as fixed closing periods when fishing was outlawed (Acheson 1998:5). This meagre set of formal regulations remained in place until the 1970s. Throughout the 1970s, a number of new restrictions were proposed to limit harvesting, but none of them received enough support to be passed as bills. For many years, however, fishermen had enforced a minimum size of lobster. Whereas entry to the fishery was restricted informally through recruitment to a harbour gang, the formal regulation of registered fishermen only required getting a state licence, which until 1987, everybody could purchase for a nominal fee (ibid.:89). That there were no limits to the number of traps per fisherman, compounded the problem. Fishermen invested in more expensive vessels and more efficient gear, and had to increase their fishing effort to pay the bills. By increasing their effort — more traps and more time at sea — at the same time as the ranks of fishermen swelled, the net returns became so low that many fishermen were forced out of the industry.[14] There was widespread dissatisfaction with the way the fishery decayed (1988:136), but it seems that fishermen were unable to do anything about it, since offenders were not breaking any rules, merely exploiting the freedom to fish as much and hard as possible (cf. Miller and van Maanen 1979).

Overcoming their previous suspicion of government regulations, by 1986 more than 90 per cent of the fishermen favoured a maximum limit to the number of fishing licences and the number of traps (ibid.:137). In the proposal for new legislation which should regulate the lobster fisheries, the state and the lobstermen agreed on raising the minimum legal size of lobsters, as well as to continue to protect proven breeding stock by marking

[14] For an account of the declining lobster fisheries off the coast of Namibia, see Moorsom (1984:17-20).

their tail. Marking berried lobsters and returning them to the sea, was traditionally a part of the informal protection of the breeding stock, and this was now adopted as part of the formal legislation. The management of lobster fishing was approaching what is termed "co-management" (Acheson 1989b).

The material presented in great detail by Acheson is a case where a small number of formal regulations coexisted with informal regulations of recruitment to harbour gangs and a territorial division of fishing areas. Those who see in this case material only the success of a local management system are neglecting the limitations of informal regulations which became evident during the 1980s. The problems of overcapitalization and overcapacity forced fishermen to change their initial hostility towards government intervention and to accept the necessity of formal regulations. To explain this change, the concept of "transaction costs" (North 1977:710), gives added insights into the process: the costs of keeping the traditional (pre-1970) system became larger than the potential benefits from a new co-management regime (Acheson 1989b). Unable to agree on how to control the fishery through informal means themselves, fishermen turned to the state for help, and in the process, transferred the costs of policing and punishing breaches of regulations onto the state.

Summing up the Maine lobstering experience and its relevance for "common property theory", Acheson (1988:142ff.) concludes that it confirms the role property rights play for the conservation of resources, but does not support those who think communal property is the same as "open-access". Whereas local institutions for a long time were able to prevent a tragedy of the commons situation, in the end the Maine lobster fishery collapsed, not because entry was not restricted — it was — but because individual fishermen were free to increase their fishing effort. In this sense, it followed the implied logic of Gordon's (1954) "common property theory". Is, then, the Maine lobster industry a case in support of local management of resources? The answer depends on which period we choose to analyze. Without doubt, the informal framework based on territoriality did work properly until the 1970s. However, in the period which followed, the informal arrangements lacked the enforcement capability needed to restrain the escalating capitalization and overfishing.

The foundations of "territoriality" among fishermen

Territoriality is commonly found both in commercial and artisanal fisheries, but its effectiveness as a management tool varies. Territoriality as an informal management system needs to backed by sanctions and penalties.

When this is the case, territoriality establishes some degree of property rights to a resource, by reserving it, either permanently or seasonally, for a single group of users. As an informal management tool, territoriality is often used as evidence that local management is better than formal regulations.[15] However, both the concept of territoriality and its role in limiting fishing effort have been debated. The argument which is implicit in Acheson's (1988:ch. 4) description of the Maine lobster fisheries is that the informal management regime, the particular type of sea tenure known as "territoriality", was a result of the nature of the fishery itself (cf. Dyson-Hudson and Smith 1978; Ingold 1986:ch. 6, for a theoretical discussion of territoriality). Territoriality emerged because it was a solution at the break-even point between the costs of exclusion and the economic benefits from restricted entry. This view is supported by Platteau (1992) who argues that the reason communal arrangements tend to survive a commercialization of fisheries, is that the costs involved in establishing private property rights are prohibitively large. (This argument is typical of the way of reasoning in the theoretical approach known as the "property rights paradigm" reviewed earlier.) As a result, the fishery in general, and the artisanal sector in particular, are dominated by alternative institutions and characterized by informal, local arrangements.

This point is taken up by Durrenberger and Pálsson (1987b) who argue that the survival of common property regimes (in fisheries) is not linked to the costs and benefits of exclusion *per se*, but a management regime favoured under a domestic (or household) mode of production. They posit a link between tenure systems and the economic organization of the fishery, arguing that the "management practices we have reviewed...are best conceived as consequences of the form of household production, as against capitalist production" (ibid.:519). In other words, Durrenberger and Pálsson reverse Acheson's (ibid.) argument about the foundations of territoriality (see above). Durrenberger and Pálsson claim that in those cases where the fishery is communally organized, this is a result of inherent limitations in the economic organization of the fishery (i.e., the domestic mode of production), and not because fishermen are inclined to favour communal arrangements *per se*. It follows from the same argument that Durrenberger and Pálsson explain the demise of communal arrangements as a result of a shift from a "household" to a "capitalistic [mode of] production" (ibid.:519).

[15] For a discussion of fishermen's responses to formal regulations and a review of "enforcement and avoidance theories", see Vásquez Léon (1994).

The second of Durrenberger and Pálsson's claims concerns the concept of property rights itself. They argue that there is a difference of "form" between fishing rights such as those found in Japan, which were sanctioned by the feudal rulers (see above on Japanese fisheries) and the Maine lobstermen whose property rights were informal, hence not recognized by the state. To treat these two examples as being similar is, claim Durrenberger and Pálsson, "simply to confuse the issue of what property is. It is not the same phenomenon if the state protects a claim to ownership and if one has to protect it himself" (ibid.:517). It seems that Durrenberger and Pálsson lose track of their own argument here. To recapitulate, the meaning of "property" is the right to lay claim to the benefit stream from a resource (Bromley 1991). Property rights might be defined according to national or federal law, or in some cases, ownership to a resource is acknowledged to belong to the community (or user groups) by way of their long-standing residence in the area, or because of the importance of the resource to local people. In legal terms this distinction in property rights is known as *de jure* and *de facto* (Schlager and Ostrom 1992:254). The latin term *de jure* means "rightful, by right", whereas *de facto* means "existing in fact, whether by right or not". In a number of cases of conflict between the state and local communities over resources this distinction will be exploited by the parties to validate their claims to ownership. It is apparent that the Maine lobstermen acknowledged that legally, fish as well as lobster, were state property (*de jure*), but what mattered was how local groups (without state interference) defended their rights and privileges vis-à-vis each other. In this sense the "harbour gangs" appropriated the benefit stream of the resource, and in this sense this is their "property" (*de facto*). Property relations do not, as claimed by Durrenberger and Pálsson (ibid.:517), have to enter "the state-defined system of differential access to resources in law" to be regarded as property. However, Durrenberger and Pálsson are right in arguing that there is a tendency among researchers to accept that "any form of restriction of access represents ownership" (ibid.:517). Moreover, their observation that the concept of ownership has tended to be extended "beyond its useful range of meaning" receives some support from Berkes (1985b). In his study of the Great Lakes fishery in Canada, Berkes found that commercial fishermen agreed to zones to be used exclusively by specific types of gear, as well as operated under harvest quotas allocated to various groups of fishermen. Berkes was reluctant however, to label this "property rights", and instead suggested the term "limited property rights".

Communal control of resources?

Whereas it is an established fact that informal and formal regulations often co-exist in fisheries, there are few studies on the origins and history of informal regulations. Moreover, studies of informal regulations, tend to advocate more local control. An interesting study because it confronts this advocacy for more local control with resources, is Lawrence Taylor's (1987) study of a fishing community in the Gaelic-speaking western part of Ireland. Taylor questions whether "community rights" are a romantic notion which appeals to social scientists, or a universal type of rights common to all functioning systems of common property management.[16] The villagers had *de facto* rights to the salmon fisheries in the Donegal Bay estuary but the *de jure* rights were shared between the Irish government and a Gaelic non-profit organization, the Gael-Linn, which bought the fishing rights in the late 1950s. The fishing in the estuary and upstream in the river was illegal, but widespread due to the lack of government control.[17]

Fishing in the river was organized by a local system where boats took turns at fishing upstream with a purse seine. The fishermen uniformly explained this as being very old cooperative system, hence legitimate and immutable. Most likely, claims Taylor, the rotational system is more recent in origin, and the fishermen's version of the past is at odds with reports and historical records which tell of endemic strife, clashes and lawsuits among fishermen (ibid.:298). The interesting part is that the collective memory of fishermen now locates the origins of the management system firmly in a distant past, hence makes it immutable. Attempts to change the system, and especially to buy back the rights of fishing, a suggestion made by a well-meaning local priest, was vehemently opposed. People believed that if the salmon fishery was to become their *de jure* property, it would turn them against each other. In the ensuing fight among villagers, a local man disclosed to Taylor, "the river would run red with blood" (ibid.:291). Why did the villagers not want to take formal control of the fishery? To answer this question one needs to consider the history of resource management in Gaelic villages.

Until the early 19th century the Gaelic villages had functioned as local territorial units (*clachan*), which held collective rights in the surrounding resources. Whereas the property relations have changed, the *clachan* now

[16] For a critique of the "local community" concept, see Barth (1992).

[17] For a very interesting study of the organization of illegal fishing and avoidance strategies among Mexican shrimpers, see Vásquez Léon (1994).

survives as a communal ideal, where people have reciprocal obligations to help each other (ibid.:294). Moreover, since villagers had historically been denied rights to the salmon fishery, they had seen it as their privilege to poach. This traditionally united villagers against the feudal owners of the river during the 19th century, and in modern times, the bailiffs and agents representing the Gael-Linn and the government in Dublin (ibid.:295). As long as the enforcement of regulations lay outside the community, fishing (or poaching) did not challenge communal ideals. If, on the other hand, the rights to the fishery were bought back, as suggested by the local priest, villagers would end up policing each other – a horrifying thought in a close knit community. As a villager put it; "if I saw that man down pooching [sic] and he's my cousin...I couldn't tell him to stop. We're all too close here" (ibid.:303). Trying to reinstate the corporate nature of resource ownership by buying back the legal entitlement to the fishery would, argues Taylor, militate against the egalitarian ethos of the village, and only by not owning "the resource in common are villagers able to cooperate" (ibid.:304). On a more general level, Taylor offers this example as a warning against introducing a system based on contractual agreements [cf. Tönnies' *Gesellschaft*] in a setting which predominantly is defined by status and egalitarianism typical of the community [*Gemeinschaft*].

To extend the argument made by Taylor on the link between community organization and distribution of rights, we end up finally with a Norwegian example. In a comparative study of inheritance and residence patterns in two North Norwegian villages, Brox (1964) has discussed how property rights were shaped by traits of the local ecology. The two villages examined by Brox were alike in most ways, but in one of them there was a limited number of profitable salmon fishing sites. Salmon was caught using fixed nets (*kilenot*) placed close to the shore. To ensure that the rights to salmon fishing remained un-partitioned – a necessity for it to remain economically profitable – inheritance rules favoured the youngest son ("ultimogeniture") and denied rights of inheritance to older brothers as well as sisters. Whereas older brothers were granted a part of the landed estate, girls neither inherited land nor shares in the salmon fishery (ibid.:40). The older brothers in the family could, if they wished, still continue co-residence with their younger brother and to function as a single household after partitioning the estate. However, since they knew that they could not expect to make a living from their meagre inheritance, they usually preferred to marry early and to establish their own household. Girls who were denied all rights of inheritance, opted to marry out of the village. Census material shows that in the case of women, there was close to 100 per cent village exogamy. The reason for this marriage strategy was, claims

Brox, that it solved the moral dilemma that girls were denied their part of the parent's estate. When they took up residence elsewhere, there was no reason to outright deny them their right of inheritance, since they would have been unable to take advantage of it anyway. The unintentional costs of excluding women from inheritance, was a demographic stagnation which would ultimately have led to the demise of the village itself. Not a single girl born in the village stayed to raise a family there, and during the period from 1900 to 1950 the population rose from 70 to just 76! In the other village studied by Brox, there was no salmon fishing, so partible inheritance was the norm, and the girls also married and settled in the hamlet. There, during the same period, the population more than doubled. Whereas most studies focus on the adaptive potential of indigenous resource management, we have in the case presented by Brox seen an example where exclusion of women from rights in the valuable salmon fishery led to village out-marriage ("exogamy"), and in the long run, to demographic stagnation. It is here also possible to draw the lines back the Netting's (1981) Swiss example, where frequent celibacy and high age upon marriage led to a very low population growth. Inheritance rules entitled all siblings to an equal share of their parents' landed estate (partible inheritance), hence many children would promote fragmentation of agricultural land. Netting argues that people did not consciously try to limit population growth (ibid.:226), but the tradition for late marriages and celibacy reduced the number of children and, hence, slowed the process of fragmentation.

Both Netting and Brox's studies are particularly instructive because they incorporate fields such as local ecology, social organization and property rights, which are often mistakenly treated as analytically independent. It is also possible to draw lines between Brox's study and Taylor's (1987) perceptive observation of the tensions which are inherent in an egalitarian ethos. As Brox points out, the denial of inheritance rights to girls was not openly acknowledged since it was at odds with community ideals. Instead, this moral dilemma was concealed and under-communicated through the practice of girls to marry elsewhere, meaning that they could neither consummate their share of landed property nor fishing rights.

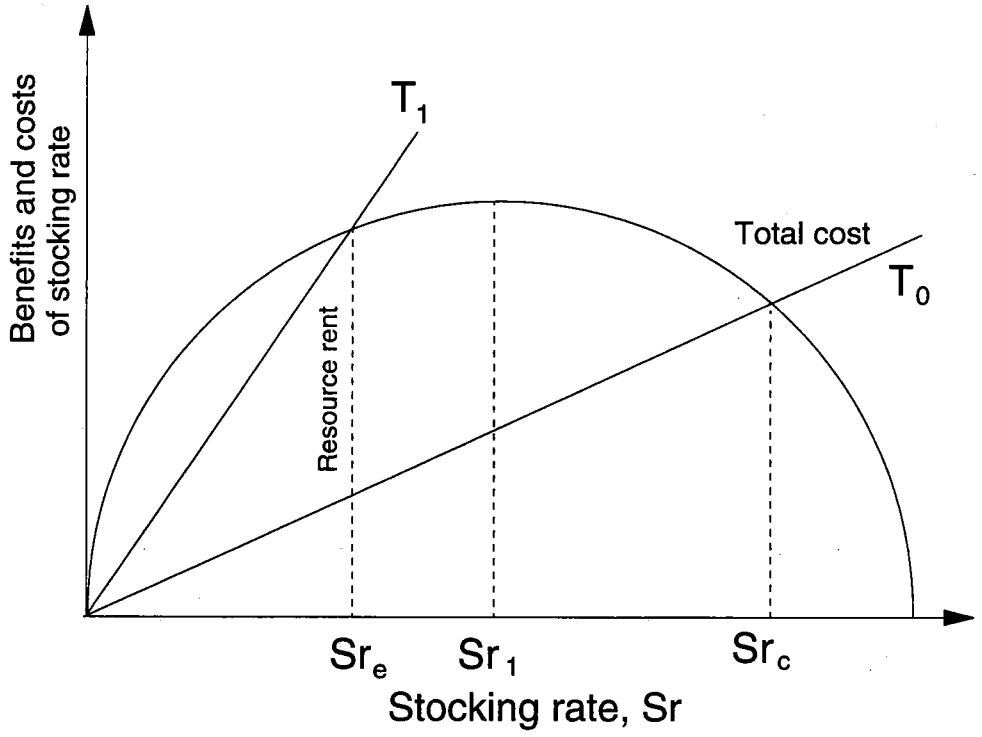
3. The pastoral dilemma: Ecological crisis or rational herdsmen?

Introduction

Garrett Hardin's essay in the journal *Science* (1968) has been as important to the study of pastoralism as was Gordon's (1954) seminal work on the economics of fisheries. Though Hardin barely mentions pastoralism, it is the idea that private herds on common lands will lead to overstocking that most people remember. There was a clear resonance between the ideas contained in Hardin's paper and what at the time was the general view of African pastoralism. Another reason for this biased interpretation of Hardin, is perhaps that it provided a simple explanation of why pastoralists often find themselves in a situation of acute stress. Regrettably, the negative stereotype of pastoralism implied by "the tragedy of the commons" parable, was supported by range ecologists and economists who argued that pastoralism was ecologically wasteful and maladaptive (Picardi and Seifert 1976). Few, it seems, bothered to take notice of a growing number of more sophisticated and complex analyses of pastoral adaptations (Gilles and Jamtgaard 1981).

Numerous studies of pastoralists adopt an economic view of pastoralism, analyzing it as a "pastoral system of production". The study of pastoralism is therefore (apart from fisheries) the field where the ideas of Hardin and Gordon have been most influential (Gilles 1982:219). Authors such as Sommerville and Kerr (1988) and Simpson and Sullivan (1984) propagate the idea that rangelands should be privatized, and buttress this view with data showing that livestock production is higher in group ranches than among free-ranging animals. Simpson and Sullivan (ibid.) argue that cattle production in Sub-Saharan Africa is constrained by common property arrangements, and that without privatization, breed improvement programmes will never succeed. They believe that the high symbolic value attached to animals and the practice of using cows as a store of wealth, means that cattle production never will reach its productive potential (ibid.:67). The authors blame overgrazing on common property management, and portray seasonal movements from one ecological zone to the next as dysfunctional (ibid.:66). Moreover, Sommerville and Kerr argue

Figure 9
The Gordon model applied to pastoralism



that pastoralism is ecologically maladaptive, and that there is a "common property problem facing pastoral Africa" (ibid.:145), hence, assume *a priori* that common ownership is the root of the problem. To bolster this interpretation, Somerville and Kerr apply Gordon's model, with some modifications, to pastoralism (Figure 9). The stocking rate curve is now a function of the total plant production and Sr_1 is the maximum sustainable stocking rate. One way to limit the number of animals is to charge taxes, which will move the cost curve from T_0 to T_1. This will shift the stocking rate from the point Sr_c to Sr_e which in this example is equal to the maximum economic yield. Other options suggested by Sommerville and Kerr are the introduction of quotas (i.e., a maximum number of animals which can use a resource) or to privatize land in the form of a fenced ranch or cattle posts (i.e., an enclosed communal pasture). Despite the wealth of new and detailed information on pastoral adaptations at their disposal, Sommerville and Kerr advanced a model of pastoralism which reproduced the essentials of Gordon's (1954) original work, almost twenty-five years earlier.

Some muddles in the models: Implications of the new range ecology

For many years anthropologists working among pastoral peoples had argued that the negative stereotype of pastoral range management was wrong (Gilles and Jamtgaard 1981; Livingstone 1986; Niamir 1991; Picardi and Seifert 1976). As long as the hard science "evidence" was lacking, however, few paid attention to anthropologists' criticism of the prevailing view of pastoral adaptations. A major change in the perception of pastoralism in Africa's drylands, was provoked by the publication of James Ellis and David Swift's (1988) article: "Stability of African Pastoral Ecosystems" which analyzed the links between ecology and livestock fluctuations among the Ngisonyoka pastoralists in the Turkana district of Kenya. In their paper, Ellis and Swift verified that indigenous range management techniques were ecologically sound and better adapted to local conditions than had been acknowledged. Re-interpreting range ecology data, Ellis and Swift offered a new way of understanding the ecology of Africa's drylands (see also, Behnke 1992; Behnke and Scoones 1992; Scoones 1994).[1] They distinguished between two different categories: "equilibrium" and "non-equilibrium" ecosystems (ibid.:453ff.). In non-equilibrium ecosystems, low and erratic rainfall is the dominant ecologic variable. This means that destocking of herds will not necessarily result in a rejuvenation of soil and plant cover. In non-equilibrium areas they suggested that livestock numbers should be allowed to fluctuate in line with indigenous management practices. Following the seminal work of Ellis and Swift, Behnke (1994:10, italics added) has argued that in non-equilibrium areas:

> the harshness and unpredictability of the environment reinforce rather than diminish the need for pastoralists to maintain *institutions which regulate access to natural resources and the intensity of their use.*

In equilibrium areas, by contrast, rainfall is higher and more regular, hence a stable livestock population is more desirable, but it must be kept below the estimated carrying capacity (Vedeld 1992:31). The new interpretation of ecological data provided by Ellis and Swift (ibid.) made it easier to argue in favour of a local management model. It has also led to a timely reevaluation of indigenous managements systems, which earlier had been discredited as wasteful and maladaptive.

[1] Earlier, range ecologists such as Pratt and Gwynne (1977) had criticized pastoralists for contributing to desertification, by keeping 50 to 100 per cent more animals than that needed for subsistence requirements (see also, Fratkin and Roth 1990).

However, a continuing problem is that state policies often run counter to indigenous management practices, a problem which is especially problematic during times of drought. Scoones (1992) discusses the problem of obtrusive state policies in relation to coping strategies among pastoralists in Southern Zimbabwe. Scoones claims that in non-equilibrium areas, "opportunistic" herding, that is, separating the herd in small units which are moved frequently, is normally enough to ward off large herd losses during times of drought. The incentive to sell animals is low during a drought because the market quickly becomes saturated, pushing the prices down. For this reason, pastoralists prefer to keep their animals rather than to purchase new ones after the drought when prices rise steeply. Scoones found that during extreme and prolonged drought, territorial boundaries between neighbouring groups, which normally are impermeable, break down because local level institutions are unable to deal with the massive movement of animals. Despite this, Scoones argues, in all but extreme droughts, local measures such as cattle loaning and opportunistic herding are adequate to prevent large herd losses. Instead of supporting traditional coping strategies, the policy of the Zimbabwean government has been to contain pastoralists and their livestock within their territorial boundaries and request them to destock herds at a time of low prices. This has contributed to undermine pastoralists' ability to cope with severe drought and to survive once the drought is over (ibid.:312).[2]

The demise of traditional institutions

Whereas it might be important to reconstitute common property regimes, it does not necessarily follow that the best way to do this is through revoking traditional institutions. Is, for example, the advocacy for local solutions premised on an outmoded belief in what could be termed "The Golden Age of traditional authority"? (Fortmann 1986:73). Lawry (1990:407) is concerned about the weakening of local institutions in Sub-Saharan Africa, and is not convinced that local institutions are capable of managing resources, because modernization:

> has reduced incentives for individuals to participate in localized collective arrangements, has undercut the economic viability of common property institutions, and has reduced the political legitimacy of local management

[2] In a study of the impacts of drought upon Ariaal pastoralists in Kenya, Fratkin and Roth (1990) argue that post-drought studies show that the gap between rich and poor households increases.

> authorities. ... Local institutions, weakened by far-reaching economic changes, are unlikely to engender support at the local level for imposition of intensive controls, especially where there is little precedent for direct regulation.

Despite such cautionary remarks, there is as Helland (1993:15) points out, a "recent trend in pastoral development [which] celebrates the virtues of traditional management systems; environmental problems in the rangelands are believed to be related to the decline and/or collapse of these traditional systems". If this analysis is correct, it would seem that revoking traditional institutions would be the right strategy in order to recreate the former system of local resource management. The question is to what degree this is possible.

In a review of a pastoral development project in Mali, Trond Vedeld (1993, see also Shanmugnaratman et al. 1992) discusses the problem of institution building. Vedeld argues that project staff deemed it unrealistic to revoke traditional institutions, and instead, it was decided to organize pastoralists through the formation of pastoral associations which where granted formal rights to land and water. According to Vedeld, none of the pastoral associations which were formed functioned well. In the exceptional cases where pastoral associations did function, membership in the association corresponded to social groups circumscribed by traditional access to water and pastures. Despite the problems encountered, Vedeld argues that the Mali program should have tried to incorporate more elements of traditional institutions into the new institutional framework. According to Vedeld, a particularly distressing problem was that at the same time as new institutions were created, state policies dismantled customary institutions which had similar or overlapping functions.

An illustration of the problems involved with revoking traditional institutions in a modern setting is Louise Fortmann's (1986) examination of the role of local institutions in modern development planning in Botswana. The institution in question was the *kgotla* which originally was a tribal public assembly in the old Tswana kingdom (see also, Gulbrandsen 1984; Wynne 1993). At the time of Fortmann's research, the *kgotla* was changing rapidly and had to share decision-making authority with government institutions. Moreover, it was caught up in factional politics, meaning that in some villages meetings were not called. Fortmann argues that traditional institutions are important in order to confer legitimacy to new projects or interventions, but they should not be given the full responsibility for implementing them, a task they rarely are equipped for.

In another case of institutional change, Jean Ensminger (1990) analyzes the transition from local management to state governance of resources among the pastoral Orma of northeastern Kenya. From 1960 and onwards the Orma were gradually sedentarized, and at the same time they were alienated from vast tracts of land which were used to create game reserves and irrigation schemes. Sedentarization and population growth meant that the Orma started to exclude nomadic pastoralists from using areas around their villages. After the Sahelian droughts from 1968 to 1974, sedentarization rose and consequently the restrictions on grazing were tightened. At this point, elders who until then had mediated disputes, relinquished their control to the state. In order to explain this change Ensminger makes a number of interesting points. First, the council of elders had serious problems with arriving at consensual decisions in the new environment, and they often had to literally buy compliance from those who were unwilling to support the majority view (ibid.:670). Secondly, economic diversification meant that young men took up new trades and left pastoralism. This in turn meant that elder men lost the privilege of controlling younger men. Independent young men were able to circumvent marriage proscriptions (clan exogamy), thereby eroding the power of elders who formerly had been in the position to control arranged marriages. In the end, the council of elders felt that more could be achieved by yielding control to the state. The state was not dependent upon consensus decisions and majority votes could be backed by force.

Central to Ensminger's analysis is the fact that Orma elders willingly gave up their control of resource management. The devolution of local power was a result of socio-economic change which placed heavy burdens on traditional institutions and made state management the only realistic alternative. For our purpose, this is the most interesting part of Ensminger's analysis, and testifies to the fact that attempts to "empower" or "enable" traditional institutions sometimes can be motivated by wishful thinking rather than careful analysis. The theoretical underpinnings of Ensminger's analysis is neoinstitutional economics, and she makes use of a transaction cost perspective to show the dramatic rise in costs of enforcing decisions, thus it is not the rules which have changed but the environment for their enforcement.

In a later article on the Orma (Ensminger and Rutten 1991), the analysis is strongly influenced by neoinstitutional economics and critical of the work of "tragedy theorists" and neo-Marxists. According to Ensminger and Rutten (ibid.), the strength of neoinstitutional economics is that it analyzes institutional change as a political process in which people quarrel, struggle and disagree. Property rights will therefore necessarily reflect changes in

the relative strength of groups and individuals. In the case of the Orma, the gradual shift from communal to private property rights was made possible by having the state subsidize enforcement (see also, Ensminger 1992).[3]

Returning to this report's concern with local institutions as a possible solution to the high transaction costs associated with state management and the equity problems that arise from privatization, the case presented by Ensminger shows that local level management of resources are abandoned due to rising transaction costs. This runs counter to our initial hypothesis that local level management is preferable to state management because of lower transaction costs. Low transaction costs used to be a feature of local enforcement, but with increased pressure on local resources as well as general socio-economic change, this is no longer the case. Ensminger (1990) explains the devolution of local control as the result of a collapse of a local institution where decision making was based on hierarchy (through the authority of the elders) but lacked the legitimacy for penalizing offenders which made coercion impossible.

The consequences of the devolution of traditional authority for resource management has also been raised by Nek Buzdar (1984) in his study of changing range management techniques among Baluch nomads in Pakistan. Traditionally, the Baluch chieftains were dependent on support from their tribe to remain in office. With growing state presence, however, the chieftains source of legitimacy shifted from the tribe to that of a state representative. The chieftains were now free to neglect tribal law and in particular were free to disregard rules that governed pasture use and animal husbandry. At the time of Buzdar's fieldwork, indigenous institutions for range management had been weakened, but a few Baluch still practised a system which involved closing important rangelands during the summer months, thus allowing the pastures to regenerate. Comparing rangelands under traditional management by the tribe with rangelands without effective control, Buzdar found that the average closing period in the traditional areas was three months but only ten days in the non-traditional ones. Responding to increased food insecurity, overstocking was evident both in rangelands under traditional management and those left without such control. However, the mean overstocking (per forage acre) was about six animals in non-traditional areas and only one animal in the traditional ones. This, concludes Buzdar, is evidence that "institutional changes may have contributed to the general decline in rangeland productivity" (ibid.:15). It also shows that the gradual demise of a traditional political institution (i.e.,

[3] For a critique of Ensminger's use of neoinstitutional economics, see Rigby (1994).

the chieftainship) weakened indigenous range management techniques and contributed to overstocking of animals.

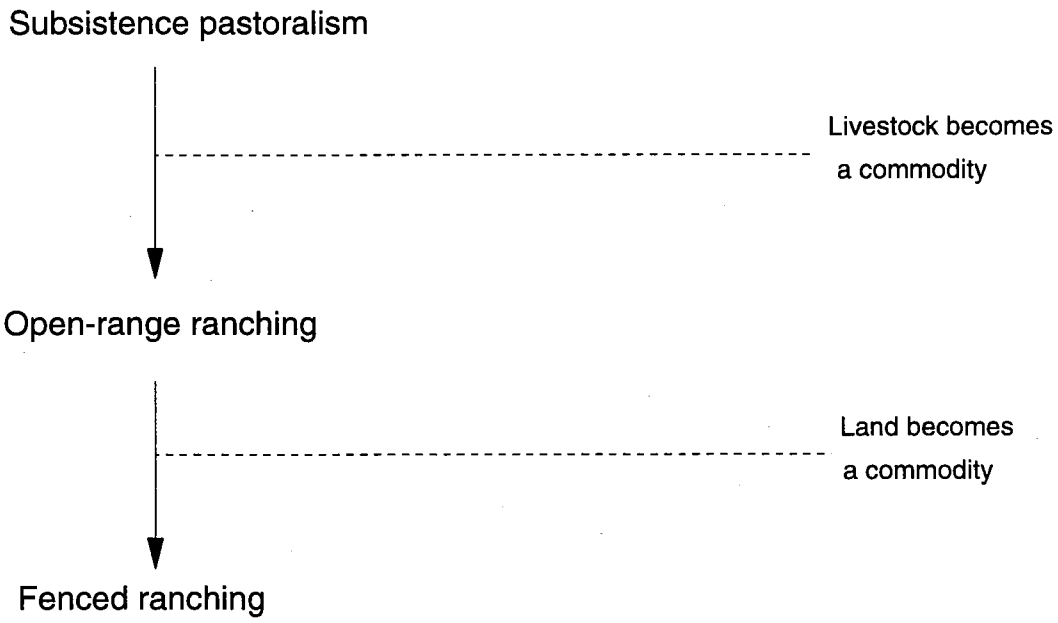
Closing the commons: Enclosures and group ranches

The practice of fencing parts of rangelands in order to create zones for exclusive use ("enclosures"), represents a significant shift from the traditional open-range pastoralism found in Africa. Roy Behnke (1985) argues that spontaneous range enclosures in Darfur in Southern Sudan, represent a process towards private control over rangelands (ibid.:2). Behnke discusses the formation of range enclosures in two adjacent zones, termed A and B respectively. Zone A was primarily used to produce animal fodder, while zone B was inhabited by farmers and transient nomads who spent parts of the wet season in zone B. Under open-range conditions, farmers in zone B allowed traditional grazing by pastoralists during the wet season. Used by both sedentary farmers and nomads, zone B was heavily grazed, a situation which was aggravated by periodic droughts. To reduce the grazing pressure farmers fenced part of the rangelands thereby excluding the nomads from their seasonal use of the zone (ibid.:18). Range enclosures were also found in zone A, spurred by the high value of animal fodder, and hence, the high value of land. The fencing of plots in zone A, was to some degree consistent with former practices, which allowed fencing of land which was particularly valuable. In zone B, by contrast, enclosures were initiated by a development project and backed by local authorities and policed by armed patrols. Serving to exclude nomads travelling through the zone, the enclosures were supported by the sedentary farmers who profited from the development (ibid.:21). Unlike most scholars working with pastoralists in Africa's arid lands, Behnke views enclosures as a positive development which aids conservation by protecting pockets of rangelands in heavily grazed areas.

Behnke's argument concerning privatization of communal land in Darfur,[4] is supported by Lawry (1990:412) who argues that resource scarcity will not necessarily favour common property regimes "but lead individual users to attempt to enclose the commons for private use". In this respect, both Lawry and Behnke agree that when resources become scarce, the subsequent increase in value will promote enforcement through regulations. In other words, as hypothesized by property rights theory,

[4] Behnke has made similar arguments about range enclosures in central Somalia (1988), but here points to how a lack of fencing material slows the formation of enclosures.

Figure 10
Stages in the transformation of pastoralism



"property rights are instituted when the costs associated with a lack of property are smaller than the gains to be had from establishing property rights" (Acheson 1989b:374).

Intensification of land use and commercialization of pastoralism tends to take place in a two-stage process (Figure 10). First livestock is raised for the purpose of selling, and secondly, land is made a commodity by fencing it. More often than not, commercialization of pastoralism is the result of state policies rather than a result of local initiative. In a study of the formation of Maasai group ranches, John Galaty (1992) discusses the government's piecemeal privatization of Maasai rangelands. Traditionally, says Galaty, the Maasai community held resources in common, i.e., they were managed by the local homestead. Territorial groups (*olosho*) could close pastures for specific periods of time but these enclosures never developed into exclusive zones. During times of drought herds could be moved freely between various rangelands controlled by the local territorial group. Livestock development projects which began in the 1960s, had by the 1970s changed this pattern by demarcating land and vesting private land title with Group Ranches (ibid.:27). Initially, the Maasai favoured the formation of group ranches, because it was believed to secure land rights for the Maasai community. For its part, the government hoped that by

creating group ranches the long term effect would be the introduction of market mechanisms and for land to be bought by the bidders most adept at utilizing them effectively. In the 1980s, the next step towards privatization involved abolishing group ranches, by distributing land among their members. In response to the privatization of land many Maasai chose to sell it, rather than as planned, to adopt sustainable husbandry practices. Due to the low agricultural potential of much of the land as well as immediate cash needs, the Maasai sold land, primarily to Kikuyu's who instead of using it for farming used it as collateral to obtain bank credits. In the future, hypothesizes Galaty, land as a pure commodity may be used for exchange rather than use. Moreover, the investment in livestock gradually changed into specialized meat production ("ranching"). However, we simply do not know, says Galaty, whether this was caused by the privatization of land, or if the Maasai suddenly realized the profits to be made from such transactions. In conclusion, Galaty laments the "scandalous process by which Maasai rangeland is subjected to privatization, individualization and loss" (ibid.:38). Galaty's concern is reflected by Gilles (1982:216) who argues that: "Over the past 35 years there have been scores of programmes designed to modernise pastoral livestock productions systems. Virtually all of these have failed". As Gilles points out, in order to solve the problems, there is a need to strengthen features of traditional pastoral systems such as mobility, restricted use of critical resources and indigenous information systems.

Overstocking and herd growth: The "cattle complex"

The first concerns about overstocking of animals in African pastoralism are often attributed to Herskovits (1926), who coined the term "cattle complex". In recent years the conventional wisdom of overstocking and impending crisis among African pastoralists have been refuted (Ellis and Swift 1988). Yet the controversy persists between those who see pastoralism as a successful adaptation to a marginal environment and those who think overstocking and overgrazing will lead to a disaster (Helland 1990:169).

Let us start with the problem of herd growth which many argue is not only unavoidable, but intrinsic to pastoral husbandry (Helland 1990, 1993). The problem with much of the work on African pastoralism is – if Ellis and Swift (1988) are right – that the conventional range ecology has failed to understand the dynamics behind livestock fluctuations in the arid and semi arid lands. Thus, short term overstocking is a conscious and rational response to a high degree of uncertainty in the non-equilibrium zones (cf.

Western and Finch 1980, on the Maasai). One of the first attempts to analyze the dynamics of herd fluctuations among sub-Saharan pastoralists was Haaland's (1977) study of Toposa pastoralists in Southern Sudan. Haaland argued that for pure pastoralists, a growing human population means an increasing number of livestock. After a while, overstocking and reduction of profit per animal will contribute to increased consumption of livestock, and which over time leads to sedentarization of marginal households. In turn, a smaller number of animals and more available rangeland will cause livestock numbers to rise again. In sum, this functions as a homeostatic system and causes the herd size to fluctuate around the carrying capacity.[5] The other scenario examined by Haaland is the case where agro-pastoralists, who combine animal husbandry and agriculture, face similar conditions. Haaland argues that in the event of overstocking, agro-pastoralists will not increase their consumption but subsist on agricultural products, hence herds will continue to grow. Eventually the large herds will cause severe overgrazing, leading to catastrophic loss of animals, a pattern known as "boom and bust cycles". This perspective is taken up again by Helland (1990, 1993) who focuses on the propensity for rapid animal growth, but in the same vein as Haaland, argues that epidemics and droughts will intervene to decimate herds long before an active management of the herds is needed, thereby averting a "tragedy of the commons" situation.

That growth in pastoral herds is mainly constrained by environmental factors is supported by J. Terrence McCabe's (1990) study among another East African pastoral group, the Ngisonyoka Turkana in Northwestern Kenya. As a purely pastoral group living exclusively from herding, the Turkana share rights of access to pastures with other groups living within their territorial boundaries. A large part of their potential herding areas are, however, not used due to fear of raiding from neighbouring groups and also of cattle disease (ibid.:90). McCabe's main point is that the herd size

[5] The origin of this argument is to be found in Fredrik Barth's (1980a [1964]) study of Basseri nomads in Iran, where Barth claimed, overstocking of animals was restrained by processes of sedentarization among non-viable pastoral households. A refutation of Barth's hypothesis has been launched by Tim Ingold (1988:212ff.) who argues that Barth's argument is tautological because it does not differentiate between pastoralists' depletion of their animal herds because of their need for food and the periodic overgrazing of pastures due to overstocking. Ingold concludes that if Barth's argument about sendentarization as a homeostatic mechanism was correct, this would imply that "the growth of animal numbers were *generated* by the growth of human numbers. This, manifestly, cannot be the case" (ibid.:217). (Interested readers should refer to Ingold's original text for a more detailed version of his complex argument).

fluctuates around a mean value, mainly due to "environmental constraints" such as disease, drought and raiding. To corroborate this view, McCabe uses data from another East African location, the Ngorongoro Conservation Area (ibid.:97). These data show that livestock numbers have remained stable for large periods of time, while the human population increased during the same time-span (McCabe et al. 1992:357).

In an excellent article, Roy Behnke (1994) dismisses the relevance of the herd growth discussion. This debate is, claims Behnke (1994:14, italics added):

> irrelevant as a practical guide to rangeland policy, since pastoralists almost universally consider private herd accumulation to be desirable, do not recognise any moral imperative to limit personal livestock wealth, and *have not created institutions which force this limitation upon group members.*

Even if herd owners strive to increase their herds, says Behnke, they "do not appear to do so for the reasons (or primarily for the reasons) Hardin gives, under the conditions he posits, or with the results he predicts" (ibid.:16). Instead, Behnke (ibid.:20-21) argues:

> the intensity of resource use is not controlled by enlightened self restraint (the 'stinting' advocated by Runge, 1981), external coercion (the state intervention recommended by Hardin, 1968) or the maximisation of economic rent (private property as extolled by Gordon, 1954). It is regulated instead by a process whereby actors internalise both rental benefits and transaction costs, in an attempt to hold resources as openly as their productive interests will permit and as exclusively as is tactically feasible.

There is, hence, little evidence that institutions whose principal function is to constrain herd growth is common among East African pastoralists. Instead, overstocking was regulated by ecological constraints and the shedding of non-viable units through sedentarization. This, however, only applies to pure pastoralists, and not to those who combine pastoralism and agriculture (Haaland 1977). It is also important to keep apart restrictions on access ("limited entry") which are quite common, from institutional checks on livestock numbers, which it seems, are rare (Helland 1993:3). This means that whereas some pastoral groups do limit access to pastures, they do not prevent legitimate users from increasing their herds, hence the "tragedy of the commons" argument may still be valid (ibid.).

Do institutions conserve?

The debate of institutions among pastoralists in Sub-Saharan Africa does not so much concern whether there are institutions or not, but what their prime functions are. The main question is the degree to which traditional institutions are explicitly concerned with resource management, and to what extent institutions contribute to conservation. Helland (1993:173) argues that "we rarely find institutions in pastoral societies which explicitly regulate the use of communal pastures at sustainable levels". Other researchers working with East African pastoralists agree that conservation was not the primary goal of traditional institutions (Little and Brokensha 1987), but argue that more research is needed to establish the extent to which institutions contributed to conservation. Little and Brokensha (ibid.:196-197) argue that:

> While there have been several excellent field studies of pastoral systems of East Africa, few have systematically examined the organisation of grazing and the tenure systems that affect it. Critical details of rules determining access to grazing and water, as well as of institutions for regulation, are lacking.

An example of a critical reflection on the role institutions play is Helland's (1993) analysis of the form and function of institutions among the Borana in Southern Sudan. East African pastoralists, says Helland, tend to place more emphasis on managing water than pastures (1978:80; 1980:40). Among the Borana regulations are first of all linked to access to water wells, not to pastures (Helland 1982).[6] However, Helland stresses that one should not think of "the wells and the organisation of water usage as a natural resources management system" (1993:18). Helland argues that if there is something such as resource management at all, it is an epiphenomenon caused by actors pursuing other goals (ibid.). Helland argues that among the Borana, one does not find institutions whose prime function is resource management, and that the alleged "local institutions" for resource management are bureaucratic artifacts. This particularly concerns the concept of *madda* which Helland describes as a weakly defined unit with a water source as its center but which Ethiopian development policies elevated into a fully fledged resource management system. The *madda* had, maintains Helland, neither the authority to restrict

[6] Managing water in the way described here does not, however, seem to be common to all Borana. Hogg (1990:25) reports that the Isiolo Borana of Northern Kenya lacks clearly defined rights in water.

access to wells nor pastures associated with the well. The reason is that such restrictions goes against the *aada* – "the Borana way" – which is the pervasive ethos regulating all aspects of Borana social life. The only institution which may have played a role in managing resources among the Borana is the clan-based political system (*gosa*). In recent times there has been a gradual weakening of the *aada* and a trend towards restricting the free access to the commons. In particular this has encouraged the formation of range enclosures as well as the establishment of small agricultural plots in selected rangelands.

There seems, however, to be regional variations to the pattern described by Helland, even within the same tribal group. Baxter (1970) discusses the system of water and pasture management among the Borana living in Kenya. Here water wells are controlled by elder men, usually the same men who took the initiative to dig them. Once in place, wells can be used by all members belonging to the homestead (*worra*), which among the Borana is the elemental social unit. Though the Borana do not manage pastures in an explicit sense, they organize herding and husbandry in such a way as to prevent catastrophic herd losses. The most common strategies are extensive herding, and the distribution of parts of their livestock among networks of relatives and friends.

Moving to another East African pastoral group, Daniel Stiles (1992) describes land-use management among the Gabbra which are found both in the Marsabit region of Northern Kenya, as well as in Southern Ethiopia. In a similar fashion as their Borana neighbours, the Gabbra practise a strict regulation of water resources. Wells and boreholes are owned by the clan or group who dug it. The use of a well is managed by a tribal elder who is recognized as the "father of the well" (*Abba Ella*). A consequence of the many new wells has been that the water table has dropped, something people are aware of but lack means to prevent (ibid.:46). The Gabbra live solely from their animals and do not practice agriculture. With the importance of livestock to the Gabbra they need to have access to networks which extend beyond relatives in the main camp and the scattered satellite camps. In addition to brother-in-laws who pool their livestock and labour resources, they may join members belonging to the same "phratry" (a phratry is a group of clans related by common descent or historical alliance) to form a cluster of households who collectively manage their herds. As is common to many pastoral groups in Africa, the Gabbra attach special importance to the bond between a boy and his maternal uncle. The boy will initially herd his uncle's livestock, whereas the uncle in due time will help his nephew to start his own herd. When it is needed they will also lend each other animals. Close inter-clan links are maintained by

exchanging wives, an institution which creates kinship links that can be utilized when needed. Finally, the Gabbra practice a generalized system of long-term lending (*dabaree*) of each others animals. In addition to a complex web of animal loans, the Gabbra's herd management system is intertwined with religious sanctions, pertaining particularly to camels, that animal which is most important to their survival (ibid.:50). Among the Gabbra we find a complex system of institutional measures which reduce the risk and enhance the viability of livestock herding.

Though institutions which regulate grazing are rare in East Africa, Peter Little's (1983, 1985) studies show that institutions explicitly concerned with pasture management have, until recently, been in place among the Il Chamus in Northern Kenya. Little's (1983, 1985; Little and Brokensha 1987) studies show that during the dry season the Il Chamus practised a system of restricted grazing (*olokeri*). Men between 18 and 30 years belonged to a particular age-grade (*il murran*) which was in charge of policing the areas restricted to grazing. The *olokeri* system was controlled by a council of elders (*lamaal*) which imposed fines on those who breached regulations. Since 1958, however, the *olokeri* system has only been enforced for two or three years (Little 1985:139). At present, grazing decisions are taken by individuals, and the *olokeri* system is no longer contributing to range regulation. The factors which have affected the Il Chamus' traditional decision-making are changes in wealth distribution, new market linkages and increased demographic pressure (Little and Brokensha 1987:195).

In a survey among the Il Chamus inquiring into why the *olokeri* system disappeared, 24 per cent answered that rainfall declined, 19 per cent said they did not know and 12 per cent that there had been a general decline in traditions and the role of groups such as the *il murran* age-grade and the elders (Little 1985:140). Little's own hypotheses for the demise of the *olokeri* institution is that population growth increased the pressure in the central pasture areas, and that the authority of government sub-chiefs increased at the expense of the council of elders (ibid.:141). As Little notes: "When local political structures are changed, tenure and resource management institutions are often affected" (ibid.:142). Additionally, men belonging to the *il murran* age-grade leave to take up wage employment. Two other developments in Baringo added to the problems: the presence of absentee herd owners using the area for specialized livestock production ("ranching") and the pressure from neighbouring pastoral groups. In self-defence, the Il Chamus now favour "government sponsored group ranches as a way of protecting their territorial integrity" (ibid.:146). The drive

towards privatization did not solve any problems, but led instead to a situation where the Il Chamus lost control of local resources.[7]

Historical changes in pastoral adaptations

As a rule, analyses of pastoral adaptations tend to focus on immediate and present day concerns, in particular overstocking, desertification and destitution. Analyses of African pastoralists from an historical perspective are rare. We have already referred to contemporary studies of the Il Chamus in Northern Kenya (Little 1983, 1985; Little and Brokensha 1987), and here we will return to the same group again, but this time in a historical study by David Anderson (1988) covering the period 1840-1980. Though Little (1985) alludes to the complex history of the Il Chamus, the overall presentation stresses their contemporary pastoral adaptation. For the reader, it is easy to infer from this that the Il Chamus have always been pastoralists: Anderson's study shows that this is incorrect. From 1840 until the present the Il Chamus passed through a series of adaptational changes: from irrigated agriculture during drought periods, to a pastoral adaptation during periods of sufficient rainfall. Throughout this period they hosted temporarily sedentarized Maasai neighbours as agricultural tenants. When ecological conditions permitted, tenants left to take up pastoralism again, which in turn would be followed by the Il Chamus too. After a severe famine in 1882, which was later followed by a flood that destroyed much of their irrigation works, the Il Chamus gradually gave up irrigated agriculture. This process gained momentum after ca. 1900, when the colonial administrators shielded the Il Chamus from their hostile cattle raiding neighbours such as the Pokot, Tugen and Maasai. In 1917, another flash flood destroyed what was left of the Il Chamus canal networks, and dealt a final blow to their irrigated agriculture. From 1920 to 1980 the Il Chamus were gradually turned into full-time pastoralists, but still reverted to cultivation if conditions necessitated. The droughts and occasional food shortages during the 1920s and 1930s, made the colonial authorities anxious to develop an alternative food production among the Il Chamus, hoping that this would serve to decrease the size of their herds. This led to the introduction of a large government sponsored irrigation scheme which was

[7] In another article from Baringo, Little (1983), discusses the links between grain consumption and herd sizes. The conventional wisdom is that increased grain production will encourage destocking of herds. Rebutting this view, Little argues that increased grain production can be exchanged into livestock, which in turn means that there no longer is a need to sell livestock to purchase grain.

initiated in the early 1950s. Instead of employing the Il Chamus, which by now were regarded as pastoralists, the project employed other groups without any knowledge of irrigated agriculture. The few Il Chamus employed under the scheme continued their high off-scheme involvement with pastoralism (ibid.:258).

If we compare the studies by Little (1983, 1985) with that by Anderson (ibid.), it is apparent that our understanding of pastoral adaptations may be unduly influenced by the time frame of our analyses.[8] In this particular case, Anderson has shown that the there is considerable fluidity in the Il Chamus pastoral adaptation: they are not "pure" pastoralists, though they may appear to be so at this particular point in time. For example, the council of elders (*lamaal*) which Little terms a "pastoral institution" was equally concerned with the distribution of water. Moreover, the Il Chamus' resource management strategies are not wholly "indigenous" in the sense that they reflect only the Il Chamus' relation to the environment. Instead, the Il Chamus has been influenced by their relations to surrounding groups, and in particular have responded to shifting colonial policies since the turn of the century.

In contrast to the political independence which many attribute to pastoralism, East African pastoralists since colonial times have been subject to external control. This in many cases has also influenced their resource management strategies (Anderson 1988). As pointed out in the beginning of this chapter, present-day pastoralists continue to suffer from misguided development policies, and ill-advised development interventions — destocking, privatization, and sedentarization — which have reduced their ability to cope with periodic droughts and disasters. Moreover, the failure to grasp indigenous range management techniques has helped to disseminate Hardin's "tragedy of the commons" parable. This problem is not unique to pastoralism but is also a feature of forest management: who is to blame for the rapid deforestation in South Asia, the state's forest policies or rural villagers? This will be the topic of the next chapter.

[8] The importance of adopting a longer time frame in our studies is also stressed by Hogg (1990). He argues that to understand the tightening of rules and increased competition for pastures among the Isiolo Borana in Kenya, one has to consider the large influx of Somalian pastoralists since the late 1960s.

4. The disappearing forests: Failed policies or local mismanagement?

Introduction

With the increasing demand for firewood, building materials and cultivatable land in Third World countries, it is not surprising that forests are dwindling. Whereas many have been alarmed by rapid depletion of tropical rainforests (Colchester and Lohman 1993), there has been less popular and scholarly interest in the fate of forests in South Asia and Africa. This is unfortunate, because these forests are both important local resources as well as being commodities in great demand. Maintaining forest-cover has several positive ecological effects and serves to stabilize slopes, reduces soil-loss and subsequent siltation of rivers and water reservoirs, as well as form habitats important for preserving biodiversity. Despite the importance of forest, there has been little research into how property rights regimes and tenure influence the incentives for protecting forest (Fortmann and Bruce 1998:1ff.). Due to the paucity of material on forestry from South Asia, this chapter is expanded by a short case study of forestry from Pakistan.

The case studies reviewed in this chapter show a great variation in the way forest is perceived and managed by different user groups: agriculturalists remove forest to create arable land, whereas pastoralists want to preserve forest due to its importance as browse to their animals (Barrow 1988). These practices are often incompatible and may lead to conflict. Conflict may also follow in the wake of commercial felling of forest where new cash earnings from sale of timber and timber products increase social tensions and weaken kin solidarity. More specifically, there seems to be a connection between the dismantling of forest commons and the growth of internecine violence.

Another focal point in the study of forest management is the problem of property regimes, and the tension between statutory law and what we might term customary law or customary use rights. Nationalization of forests often leads to unsustainable forestry practices and occasionally to wholesale

destruction of forests, either through dismantling of local institutional control by instituting management practices which are incompatible with traditional tenure or by giving free reign to commercial interests. In a few cases, however, the remoteness and lack of physical infrastructure have reduced the impact of nationalization on forest.

Forest as a common pool resource

We have previously discussed how pastoralism could be fitted into Gordon's (1954) analytical model and the connection between effort and returns in an open-access (non-property) regime (chapter III). Gordon's common property theory may also be modified to include forest. If we imagine a virgin stand of timber (for example a watershed), the growth of trees, and hence the maximum sustainable yield which can be harvested at a given time is determined by the growth rate of the trees. What sets forest apart from fish and livestock, is the very low growth rate of most tree species. A pine tree, for example, may take as much as 150 years to reach maturity. This has two important implications: first, the slow growth rate means that trees for a very long time are susceptible to illegal logging, diseases or natural disasters. For these reasons, it makes sense to maximize the net present value — using a discount rate which is higher than the natural regrowth — which will promote rapid logging (see also Clark 1973).

The long period needed for a tree to reach maturity means that if a tree is planted (or left standing) the benefits are in reality left to future generations. However, the likelihood that the natural growth factor is lower than the discount rate means that a tree is prone to be cut now rather than left for the benefit of future generations. Bromley (1989b:181) discusses this "intertemporal problem" and argues that it represents an example of "asymmetrical externalities" where there is little future generations can do "to ameliorate the detrimental effects of our actions today" (ibid.:182). Secondly, argues Bromley, since "the future is not able to have its interests represented in this matter...this is an instance of a missing market" (ibid.:183). Apart from the biological properties of forest which contribute to its vulnerability as a renewable resource, forest management is suffering from unclear management objectives, a high urban demand for timber and bureaucratic inaptitude. Management is often vested with a low-salaried bureaucratic staff which is inclined to accept bribes. Moreover, poor, rural communities are manipulated by political patrons and intermediaries, to sell timber below its market value (Box 1.)

Box 1
Forest contractors as intermediaries in Pakistan's forestry

Pakistan as a whole has less than four per cent forest cover, consequently forest (*jungal*) is a prized commodity. Areas with natural forest presently make up less than one per cent of the total forest cover and are therefore threatened. Most of Pakistan's pine and cedar forest are found in the North West Frontier Province (NWFP) (Allan 1986, 1987). Due to the colonial legacy of Pakistan there are complex legal issues involved in the regulation of forest (Khattak 1976a, 1976b). The most conflict-ridden management is found in forests which are owned by local communities but managed by the state (*guzara*) (Azhar 1989, 1993). The local owners are entitled to royalties from the sales of timber. The royalties, which range from 60 to 80 per cent of the revenue from the sales of timber, are returned to the local owners.

Currently the timber prices in Pakistan are twice the world average. This means that forest has become a valuable commodity. There are, naturally, a number of vested interests involved in controlling the wealth that stems from forests. Most of the unaccounted for loss of forest in Pakistan is an incremental loss, that is, single trees are cut in a slow process of deforestation. Incremental loss of this kind is usually attributed to subsistence users, who need trees for firewood and as building material. The most serious forest loss is, however, due to deliberate overcutting by forest contractors. This could, however, not have been possible without the cooperation of employees in the Forest Department (FD). The payment of bribes (*baksheesh, sifareesh*) is common in Pakistan, and is naturally also occurring in a setting where a valuable commodity is involved. This fact is acknowledged both in the higher echelons of the FD as well as among forest contractors. Forest contractors are not, however, a uniform group, they can be local entrepreneurs or wealthy patrons who have the financial clout to undertake large felling operations, involving mechanized equipment and hired labour. Whereas popular opinion tend to blame forest contractors for all that is wrong in Pakistan's forest management, some of this is unwarranted. It is loopholes in the forest legislation, in association with weaknesses in the organization of forest harvesting which have allowed the contractors to prosper. Moreover, the presence of forest contractors has long historical antecedents. They have been an integral part of forest harvesting since colonial times, and were also at that time, accused of cutting more trees than they had legally purchased (Tucker 1982:119).

Until 1973 contractors could bid for standing trees and once they got the tender, took charge of both felling *and* marketing operations. Unsurprisingly, this led to widespread over-harvesting. To amend this system it was decided in 1977, to strengthen the FD with the creation of the Forest Development Cooperation (FDC). One of the reasons for the creation of the FDC, was to separate forest management from forest harvesting. By creating the FDC, the government hoped to curb the forest contractors. For a while this was successful. The contractors were now only responsible for cutting the trees and bringing them to the road. The contractors therefore no longer had a vested interest in overcutting. However, by exploiting loopholes in this arrangement the forest contractors were during the 1980s able to regain their old position. (*Continued*)

The main reason for the reemerging problems was that in 1982, the "net-sale system" began to replace the so-called "fixed price system". The problem with the fixed price system was that the rates had not kept pace with the rise in the market price of timber. Under the net-sale system, timber was moved to official timber markets and sold to the highest bidder. With this change, the profits to be reaped from forests increased dramatically.

The way for forest contractors to circumvent the FDC was as simple as it was clever. Instead of dealing directly with the FDC, forest contractors would approach local owners of compartments which would soon be up for harvesting. The contractor could easily find out this by consulting the forest "working plan", an official document which lists when compartments are to be logged and how much is to be extracted. With this knowledge, the contractor approached the local owners offering to buy their forest royalties. For the owners this had the obvious advantage of getting paid on the spot, instead of having to wait until the compartment was to be logged. The contractors generally offered to pay a fixed price, slightly higher than FDC's rates. For example, they offered to pay 60 rupees per cubic feet for cedar, against the FDC's "fixed rate" of 51 rupees. To ensure that villagers agreed to this proposition, the contractor would in advance enlist the support of influential elders, the "white beards" (*spin giris*) and members of local consensual assemblies (*jirga*) by offering them part of the profit. When the compartment comes up for tender, the contractor enters the bidding competition. Since the contractor has already purchased the royalties, he is able to undercut the tenders of all other bidders. The FDC on its side, has to award the tender to the lowest bidder. To hide his identity to the FDC, a contractor will bid on the forest by using the name of one of his relatives or his attorney. The FDC can therefore only with great difficulty find out who is behind a tender bid.

The contractor who has purchased the royalties according to an agreed fixed price, usually around 60 rupees per cubic foot for cedar, will be refunded by the FDC after the FDC has sold the timber according to the "net-sale system", that is the current market price fetched at the timber market. For cedar the net-sale price is currently about four times higher than the fixed price offered to locals. When the revenues from the sale are divided, 40 per cent is government revenue and 60 per cent is refunded to the locals as royalties. Since the contractor has already purchased the royalties, his share of the profit (60 per cent) will be transferred to him through his attorney. The net profit to the contractor is therefore the difference between the costs of purchasing the royalties based on the fixed price system, the costs of logging the compartment and the sum transferred back to him after the timber has been sold according to the net-sale system. In both cases the FDC will get its share of the revenue (40 per cent), but the community members reap only a fraction of what they would have earned, had they decided not to sell their royalties, and opted for the net-sale system directly. However, villagers tend to distrust government officials, hence are suspicious of the net-sale system and instead favour the fixed priced system which is tried and tested. This, then, is one reason why deforestation in Pakistan is rampant, and shows no signs of abating. Rather than being a "tragedy of the commons", the current deforestation in Pakistan could more aptly be described as a "tragedy of the commoners" (McCay 1987:196).

Source: Knudsen, forthcoming

Commoditization of forest and dismantling of village commons

It is commonplace to decry state usurpation of forest management, less common, however, to assess the degree to which local resource management actually contributed to conservation of forest. Based on their comparison of different Pakistani case studies, Dove and Rao (1990, 1992) argue in favour of re-establishing local institutions for resource management. This conclusion builds, in part, on Dove and Rao's analysis of Fredrik Barth's (1980b [1959]) classic study of political systems in Swat, Northern Pakistan. Dove and Rao argue that the periodic reallotment of land (*wesh*), and movement of descent group segments, "*equalized* their impact on the environment" (1992:242). This is, however, unconvincing, especially when the authors' concede that in the Swat case, periodic reallotment in fact hindered planting of trees which could not be harvested within the normal allotment period of five to ten years. Apart from Dove and Rao's general misinterpretation of Barth's Swat ethnography, their neglect of this crucial point can perhaps be attributed to their eagerness to support a local management model.

Whereas local management practices reduced pressure on forest in Pakistan, forest was also preserved due to inaccessibility and lack of market demand. Roads in particular made harvesting of trees easier and opened for commercial exploitation of forest. For a number of rural communities in Northern Pakistan forest is currently the only local commodity which can be sold to alleviate poverty. However, recent studies suggest that the profits from commercial logging have been implicated in the spread of organized feuding. Lincoln Keiser (1986, 1991) has analyzed the spread of feuding in Dir Kohistan (North West Frontier Province). Keiser argues that the new roads which were built opened new tracts of forest for commercial logging which, in turn, led to steeply increased local earnings. Moreover, the new roads put the Kohistani communities within the reach of a proselytizing Islamic sect, the Tablighi Jummaat, which expounded new notions of male honour. The Tablighi Jummaat preached that preserving one's honour (*ghrairat*, *izzat*) was a Muslim virtue, and that attempts to sullen it had to be revenged. Income from logging was therefore invested in automatic weapons, necessary to defend men's honour. Those who were unable to, or unwilling to, defend themselves were dishonoured. The result was institutionalized vengeance (*dushmani*), shifting alliances and blood revenge. The rapid commoditization of forest represented a change from a situation where forest was primarily used for local subsistence needs, to a situation where forest represented huge cash earnings. The commoditization of a village commons contributed to the creation of severe social disruption.

A similar type of development has been described by James Greenberg (1981, 1989), who has analyzed a Mexican case where the change from subsistence production of corn to cash cropping of coffee led to the privatization of land which was formerly a village commons. Greenberg (1981:195) relates how:

> Ideally, all the villagers should have equal access to communal lands. ..[but the]..planting of coffee on communal lands not only reduced the villagers' access to fertile lands (as the best lands were given over to coffee production) on which to plant corn, but forced further crucial reductions in the length of fallow periods as the remaining lands were used more intensively. Because coffee trees may yield for thirty years or more, land planted in coffee became "de facto" private property.

After coffee gained popularity as a cash crop, the privatization of communal land shifted ownership into the hands of the rich, and alienated the community members from their rightful access to land. Kin-solidarity was replaced by distrust, and in a short time homicide spread among the Chatino communities in Oaxaca. Homicide rates reached monstrous proportions, and in the district Greenberg studied ranged from sixteen to twenty-nine times the national average (1989:xi). Greenberg explains the spread of blood revenge first of all as the result of capitalist change and intrusion, involving privatization of what was formerly a village commons.

The case material provided by Keiser and Greenberg provide us with some disturbing empirical findings. First, they point to a causal link between the dismantling of a village commons and the rise of communal violence. Secondly, the commoditization of forest and land respectively, alienated small-holders and introduced huge sums of money into what could be termed "closed corporate communities" (Wolf 1957). This in turn, started a process which replaced the communal ethos with enmity and revenge killings. The studies by Keiser and Greenberg show that communal ideals may, under certain circumstances, break down with the dissolution of communal resources and show the problems faced by local communities in adapting to a situation where a village commons is transformed into a valued commodity. The severity of the social response to such changes, reflects Taylor's claim (1987) that community control with valuable resources can give rise to violence (see chapter II).

When is "communal land" communal?

An example of the tacit change of property rights is Michael Cernea's (1985, 1988, 1989) description of the problems faced by a forest development project in Azad Kashmir (bordering India and Pakistan). The project's main goal was to interest farmers in planting trees, and initially to assist in afforesting 3000 acres of communal land (*shamilaat*) as well as planting certain smaller tracts of private and government land. Whereas forest was normally planted only on government lands, the sociological analysis which was undertaken in preparation for the project concluded that more than 60 per cent of the total cultivated farm land was communal property. Based on this assumption, the project proceeded in 1978 to plant trees on 100 acres of communal land, and in the following year was offered additional 750 acres of communal land (1988:143). The sudden abundance of communal land surprised project leaders, and was much higher than suggested by the pre-feasibility survey. To investigate the matter it was agreed to look more closely into the complexities of forest rights. It was found that villagers recognized three different types of property regimes: state or Crown land (*khalsa*), communal land (*shamilaat*) and private lands registered in the Revenue register (*malkiat*). Looking more closely at the communal land category, the project staff found that there was a discrepancy between its legal (*de jure*) and actual (*de facto*) status. *Shamilaat* land was not as expected communal land any more, but had over the years become appropriated by large landowners. There was in other words, a historical process which had changed *de facto* ownership of *shamilaat* lands. The first step in this process had been the informal partitioning of the *shamilaat* lands by a few families owning adjacent fields (ibid.:145). The next step was a progressive appropriation of the *shamilaat* lands by linking them to ownership of private plots. This made *shamilaats* inheritable as well as opening them to alienation through sale. Officially, however, they kept their status as communal land. Since this meant that they were not registered in the revenue records, they were exempted from taxation. When tax on land was removed in Pakistan in 1974, the appropriators moved swiftly to have the former *shamilaat* lands registered as their private property.

The *shamilaat* plots which were offered to the forest project for planting were in fact private property, and the owners naturally were eager to have their plots planted with trees at the project's expense. The villagers who took advantage of the project's lack of understanding of local tenure were unwilling to repay any of the cost for planting forest on their lands. This group of wealthy villagers did, however, continue to be supportive of the

project, especially since they were not afraid that their rights to land could be threatened by the project. The smaller farmers, however, were more reluctant to participate, since they were afraid that they may lose possession of any land they might offer for afforestation. They were also afraid that they would be denied the right to collect fodder and cut grass for their cattle.

Cernea's example shows that in the case of afforestation projects, and development interventions in general, there is a need for a thorough understanding of the system of local tenure. As such, this example support the findings of Peters (1987) and Cheater (1990) concerning the problems of adequately grasping the process of changing property rights (see chapter I). There is, it seems, often a discrepancy between the cultural constitution of property rights, that is, the normative level, and the changes in peoples' practice which have taken place.

State versus local management of forest

With their common history, India and Pakistan share many of the same problems in managing their forests. In India, forest was originally regulated by the Indian Forest Act of 1878, which divided forest into three different categories; reserved, protected and unclassified (Commander 1986:328). This secured the major part of India's forest for state regulation (reserved), and gave only limited use rights to local inhabitants. The reserved forests suffer both from intense logging made possible by weak and corrupt bureaucrats in the state forest department and widespread illegal logging by tribal (*adivasi*) communities. To remedy this problem, a forest bill was proposed in 1980 which entailed enhancing state powers and thus further marginalize the rights of tribal communities (ibid.:331ff.). So far, the government has been unable to manage state forests and lacks the capacity to control felling by forest dwellers. This institutional deficiency could, argues Commander, be overcome if the state delegated management and control to the villages themselves. Despite the few examples of successfully managed village forests, Commander paints a bleak picture of forest management in India.

In a similar vein as Commander, Jodha (1987, 1991, 1992) has pointed to the general demise of common pool resources in India (see also Arnold and Stewart 1991; Wade 1992). Surveying 82 villages in seven different states, Jodha concludes that since 1950, village commons have on average declined 30 per cent, and in some places the decline is as high as 50 per

cent.[1] Still, villages included in the survey derive from 14 to 23 per cent of their income from common pool resources (Jodha 1991:6). This decline, Jodha argues, has eroded informal management practices and led to overuse of the remaining forest and pastures. Traditional management practices included the provision of watchmen who guarded forest resources, as well as grazing taxes and penalties for violation of regulations (ibid.:7). New institutions such as village councils (*panchayats*) have not been able to safeguard resources in the way the traditional system did. The new councils are ineffective because they can only act on majority decisions. The wealthy landlords who constitute the majority of the councils, have large private land holdings and therefore lack the incentive to manage village commons (ibid.:10). In the few villages where traditional institutions were still functioning, Jodha found that these tended to have fewer occupational changes, less commercialization, less factionalism, lower socio-economic differentiation, and being remote, were more impervious to state regulation.

India's forest management is not, however, just a tale of unending decline, patronage and rural apathy (Mönch and Bandyopadhyay 1986). One of the most publicized events in the history of Indian forest management was the grass roots protest against logging in Gharwal (Uttar Pradesh). In 1976, the Indian government decided reclassify about 10.000 hectares of community forests, and turn them into state (reserved) forests (Sanwal 1989). To challenge this decision, villagers staged a successful rally which later developed into a grass roots movement known by its Sanskrit name *Chipko* ("hug the trees"). Studies of the *Chipko* movement have tended to glorify it, and not fully understood the movement's roots in local history (Guha 1989). Instead of being essentially an environmental movement it is, argues Guha, an example of peasant resistance in defence of forest rights. The history of peasant resistance can be traced back to 1885, when one of the first local rallies against the forest management of the local raja took place. (For historical analyses of the struggle over forest management in British India and the Western Himalayas, see Tucker 1982, 1984, 1988).

The environmental raison d'être of the *Chipko* movement, is based on the teachings of Hindu philosophy. It has been suggested that in India

[1] The gradual decline in common pool resources described by Jodha for India, seems to be common for Sri Lanka too (Bhogahawatte 1986). The three villages surveyed by Bhogawatte, received from 22 to 40 per cent of their income from local common pool resources. The forest is controlled by the government, and felling of trees restricted. Despite such restrictions, villagers fell trees for domestic use as well for sale at urban timber markets. On average, income from timber accounts for 11 per cent of household earnings.

(Chanadrakanth et al. 1990) and Pakistan (Dove and Rao 1990) one should aim to incorporate the religious sanctions inherent in Hinduism and Islam respectively to protect trees. Chandrakanth et al. suggest afforesting land owned by temples and religious institutions where religious sanctions would ensure their protection. An example of this is Gadgil and Vartak (1976) study of sacred groves. Based on field research on India's southwest coast, they concluded that sacred groves in many cases had been the only successful example of protection of forest. Previously, neither timber, fuelwood nor dead leaves could be removed from the groves, but these sanctions had been lifted in many places during the period following India's independence. The groves were believed to be inhabited by guardian deities, and removing forest products would cause the wrath of the spirits. By contrast, groves which were not protected by deities but whose purpose were to secure income for the priests have been destroyed. Still, sacred groves are under attack too and Gadgil and Vartak argue that in order to protect them there is a need for government intervention (ibid.:159).

Effects of nationalizing forests

Many blame the present problems of forest management in Nepal on the devastating impact nationalization of forest in the 1950s had for the local forestry traditions (Messerschmidt 1986; Bromley and Chapagain 1984). Among the Sherpas in highland Nepal there used to be elected village officials who were in charge of protecting local forests. After nationalization, when all forests (except trees on private land) were declared to be state property, they were no longer needed and forest management quickly decayed. It seems, however, that the consequences of nationalization of forest in Nepal is more complex that is often acknowledged.

An example of this is Acharya's (1989) discussion of the effects of the nationalization of forest with reference to the Jirel, a Tibeto-Burman speaking people in highland Nepal (Dolakha district). Acharya traces the historical foundations of the Jirel's present system of rights to forest and rangelands. The historical rights to their lands extend back to the 18th century, when the Jirel were incorporated into the kingdom of Nepal. They were, however, allowed to keep their system of customary land tenure (*kipat*). Whereas commercial forestry was encouraged in the lowland plains (*terai*), strict rules were imposed to prevent felling of hill forests. In the distant hill areas, much of the local control of forest was left to village headmen. To strengthen state control over forest, the new civil government passed the Private Forest Nationalization Act in 1957. Acharya argues that contrary to many researchers who believe this led to full government

control, remote hill dwellers such as the Jirel, were unaware of the Act. Neither did they know about the Forest Act of 1969, which authorized village councils (*panchayats*) to control village forests.

Among the Jirel ownership to forest and pasture are complex. Forest is perceived as consisting of three different resources; the land itself, fodder trees and non-fodder trees. Though the land itself is owned jointly by members of a lineage, fodder-trees are privately owned and sub-divided into species, age and size categories (ibid.:18). Due to the tight communal control of forest, illegal felling of timber is rare, and if it happens, strongly sanctioned. The Jirel communities are plural and include immigrant groups such as Sherpas and Kammis, who unlike the Jirel, were not included in the royal privilege of ownership to forest and rangelands. To accommodate them, the Jirel has granted Sherpas and Kammis various usufruct rights, allowing them for instance, to collect twigs and leaves.

A system of sanctions protects the trees; there is a general ban on cutting green trees, collection of firewood is controlled and areas can be symbolically closed for some activities but open to others. Whereas theft and illegal felling is discouraged it does sometimes occur. Settlement of conflict is preferably made in the village rather than reporting it to the local range office. Adding to the complexity of forest management, the Jirel share complementary usufruct rights with a neighbouring community of ethnic Sherpas. The complex property regimes found among the Jirel, says Acharya, "cannot well be comprehended by lumping them grossly as 'forests' and 'pastures,' or as 'communal,' 'private' or 'state property'" (ibid.:23). As such — and the reason for including it here — the description offered by Acharya shows that the analytical "private" versus "communal" dichotomy fails to account for the complex, interwoven property rights characterizing management of forest and land among the Jirel. More generally, the example underlines the importance of not to treat private, communal and state property regimes in absolute terms, but as analytical approximations which, depending on the context, may need to be further sub-divided.

Local perceptions of forest

Approaching the problem of local forest management from another angle, Bromley and Chapagain (1984) analyze the problems of forest management and collective action in Nepali villages. Bromley and Chapagain interviewed about 140 household heads, presenting them with different scenarios for forest management. Villagers were asked how they would

allocate 100 Nepali rupees in a situation where they could chose to a) keep it to themselves, or b) give it away for the benefit of the communal forest or irrigation. In alternative b), they were told that the government would match their investment rupee by rupee. The answers showed that the average villager would keep circa 51 rupees to himself, and donate 49 rupees to the village for the benefit of the common good. Only 48 respondents (34 per cent) declined to give money to the village. Asking more questions in similar fashion, Bromley and Chapagain concluded that "free riding" was not a dominant strategy among Nepali villagers, and that the current over-exploitation of resources was caused by the centralization of decision making in relation to resource management. Is, however, Bromley and Chapagain's "village against the centre" metaphor supported by adequate data? It is plausible that the nationalization of forests made things worse rather than better, but the hypothetical questions villagers were asked to consider do not give reliable information of whether they were as committed to collective action and supportive of communal forestry as the authors claim.

Opposed to Bromley and Chapagain's claim that Nepalese farmers are interested in village forestry, the conventional wisdom is that Nepalese farmers are reluctant, even uninterested in tree-planting. This point is discussed by Müller-Böker (1991) who has compared the knowledge and evaluation of the environment in two Nepalese locations (Gorkha and Chitwan, Middle Hills). She found that the ethnic Tauru inhabitants in Chitwan had a very strong affinity with their forest, whereas the Gorkha (consisting of many related ethnic groups) did not state any particular affinity with the forest, despite the fact that it was economically important to both groups. Another study by Carter (1992), describes the widespread practice of planting trees on private land in the Middle Hills of Nepal (Dolakha District). Carter interprets this as a response to the overall decline of communal forests. He concedes, however, that the practice of planting trees varies from one household to the next, and is more common among well-to-do households than among poor ones. Similarly Metz (1990) argues that there is a community initiative to protect the remaining forest, and to plant new trees in Western Nepal (Chimkola). Despite recent attempts to conserve forests including, among other things, a ban on firewood and fodder collecting around the village, these measures will not be effective, says Metz, as long as the browsing livestock is not moved out of the remaining forest.

Political links and vested interests

The rapid depletion of forest is not unique to South Asia, but also commonly found in Africa. Freudenberger (1991) describes how the Mbegué forest, one of the few remaining wooded areas in Senegal, was cut in one concerted effort in 1991. The forest which was very important to the ca. 6000 FulBe pastoralists and their livestock was felled to make room for commercial peanut production. The rapid felling of the forest was made possible by close ties between the Mouride brotherhood — an enterprising Islamic movement — and the government. As one of the major Sufi sects in Senegal, the Mouride brotherhood was able to wield its political influence to get the government's approval for turning forested land into arable fields for intensive peanut production. Senegalese authorities were criticized by the World Bank for their role in the felling of the Mbegué forest, but neither took steps to prevent felling of the scattered trees which remained, nor was any action taken to aid the destitute FulBe pastoralists. The case of the Mbegué forest is not a unique example. The Gishwati Preserve in Rwanda, one of the two largest remaining forests in the country, was cut down as part of a World Bank sponsored project meant to support the development of a commercial dairy production among Tutsi pastoralists (Ford 1990:54). These examples show that state management of forest does not necessarily contribute to conservation: on the contrary, state management may serve to increase the political clout of vested interests and stakeholders, and reduce the capability to protect forest.

In Asia as well as Africa, forests are not only threatened by nationalization, but also imperiled by new rural-urban linkages and the demand for firewood in the cities. In a case study from the Bay Region of Somalia, Shepherd (1989; see also, FAO 1993:168) discusses how acacia trees have come under acute pressure from the demand for charcoal in the nearby capital Mogadishu. Due to the demand for charcoal, the government does not want to stop the felling of trees needed for charcoal production (Shepherd 1989:56). The agro-pastoral residents of the Bay region were dependent on trees for housing materials, browse for animals, and used trees to make different agricultural equipment. Prior to 1960 the right to land was defined according to clan membership. With the nationalization of land, clan rights were abolished, and there was no longer any legitimate justification for excluding outsiders such as charcoal producers.

Shepherd's point about nationalization and erosion of traditional management of forest is supported by Dei's (1992) study of the gradual weakening of communal forestry and the decline of tropical rainforest in Ghana. Traditionally, rights of usufruct were secured through the

matrilineage (*abusa*), and all land was initially communal land. Land could not be sold, neither could rightful users be alienated. Wage labour has served to change traditional arrangements and there is a gradual decrease in communal land, and a concomitant increase in private land holdings. At present land rights can also be acquired through tenancy contracts of various types. Trees were considered to be village property, and some species were considered sacred, or were protected through restrictions on felling. With the growth of commercial agriculture in the 1970s, government land-reforms promoted a gradual relaxation of the rules which had governed the use of communal land. This resulted in an increase in the purchase of private land, and a gradual loss of kin-group control. Traditionally, trees growing on communal land could not be felled without user-group consent. The gradual shift to private landholdings, however, left trees without such protection, and they could now be felled at the discretion of the owner. Moreover, the policy of granting multinational companies as well as local firms concessions for commercial logging on state owned lands has contributed to deforestation. Summarizing the changes, Dei (ibid.:84) argues that:

> The transformation of traditional institutional mechanisms and arrangements in property rights (e.g., privatization of communal lands) removed community safeguards protecting the forest and its trees. In some cases, local institutions have been subverted or manipulated by the state, external forces, or even forces from within the community itself for their selfish interests.

Farmers' perceptions of trees

In an overview of communal forest management in the semi-arid and sub-humid areas of Africa, Shepherd (1991) argues that it would be mistaken to treat forestry as separate from farmland management (ibid.:151). This point is supported by Thomson et al.'s (1986) study from the West African Sahel which shows how local forest management was intertwined with farming, and how this delicate balance was offset by the imposition of misguided forest policies. To understand the present problems of forest management in Zinder (Niger), the authors argue, one needs to look at changes occurring during three different stages: the period when trees where relatively abundant (1884-1935), the equilibrium period (1935-1974) and finally, when scarcity was becoming evident (1974-1984). During the earliest period (1884-1935) the ethnic Hausa inhabitants planted and owned privately two species which were valuable as food — baobab and date palms

– as well as a nitrogen fixing tree (*Acacia albida*) which was protected by decree of the Sultan. All other tree species could be used freely by anyone, and since forest was plentiful, people often cut trees to make room for fields.

During the equilibrium period (1935-1974), demand for forest and forest products could still be met, and though farmers were free to fence private plots to protect their trees, they lacked both the incentives as well as proper material (barbed wire). In 1935 the French established their forest service, which took little notice of management traditions at the village level (ibid.:399). The new legislation introduced the concept of state forests, and went on to regulate the use of the most valuable tree species. The law did, however, make provision for customary rights to non-protected species. The contents of the new law was not known to many of the farmers, but traditional tenure did not change much before the strictures of the new law were enforced by appointed forest guards. Those who were fined for cutting trees illegally quickly adopted the strategy of bribing the local forest guards and village informants. Even by the 1960s, however, trees were not considered to be scarce, despite the fact that the new forest code had removed the incentive for planting trees. In many instances farmers destroyed seedlings in their fields. They feared that if they were allowed to grow, the ban on lopping or cutting trees (ibid.:402), would cause the full grown trees to cast a shadow on their fields and therefore reduce their crops. During the third period (1974-1984), people began feel the effects of the misguided forest policy and suffered from the scarcity of wood. The protected *Acacia* species, however, was still fairly common. To remedy the lack of trees, the government promoted the creation of fenced woodlots, but they were not successful because villagers feared that the woodlots would remain government property. Summarizing the development of forest in Niger, Thomson et al. (1986) conclude that the Hausa inhabitants neither had a tradition for, nor the inclination to manage resources as a collective. Given this lack of institutional backing, the costs of setting up and organizing communal forest management became prohibitively large. In this case, it was not local institutions which broke down, but the state's forest policies which did not take into account that it was the relative abundance of trees, rather than careful management which characterized peoples' attitudes towards forest resources.

Furthermore, peoples' attitudes to forest reflect whether forest is important to their adaptation or not. Pastoralists and agriculturalists usually differ in their perception of forest and this becomes particularly acute when they compete for the same territories. In a case study of forests in Africa's montane regions, Ngoufo (1992) describes how the natural forest in the

Bamboutos mountains, a volcanic massif in western Cameroon, has been "almost completely demolished..[through the]..assault of farmers" (ibid.:356). The demise of local forest is, according to Ngoufo, caused by severe conflicts between farmers and pastoralists. Two decades ago the Bamboutos mountains were used exclusively by pastoralists, but the high population density in the foothills, the meagre soils and deficient agricultural techniques, caused agriculturalists to expand into the Bamboutos range from around 1970 and onwards. The result has been a sharpened conflict between the resident pastoralists and the encroaching farmers. To stop the agricultural expansion, the local herdsmen "destroy the enclosures around the farmland and deliberately release their herds into agricultural fields" (ibid.:356). To avenge such incursions the farmers retaliate by "systematically slaughter the animals, poison them, or steal them" (ibid.:356). Despite attempts by the government to mediate in the conflict, the problems have not abated and erosion is high due to overgrazing among pastoralists as well deliberate felling of vast tracts of forest by farmers.

It should be evident from the examples in this chapter that forests in Africa and South Asia are under pressure from diverse vested interests which tend to undermine the sustainability of forest management. Nationalization of forest has not served to protect it, but replaced local management systems with inefficient management plans. As a valuable commodity, the forest can provide income to poor rural communities as well as much needed state revenue. This has removed local and state incentives to protect the forest. State intervention which Hardin (1968) prescribed as the antidote to "the tragedy of the commons", is in this case a part of the problem, not an element in its solution. Is, therefore, Hardin's "hypothesis" refuted? It is to this question we will turn in the final chapter.

5. Conclusions and directions for further research

Introduction

In the previous chapters there have been attempts to give an overview of both various substantive (empirical) and theoretical contributions to the study of property regimes. One problem with a report of this kind, is that the conclusions of such an exercise largely reflect the case studies which have been reviewed. This is, however, not a problem unique to this report, but is a problem encountered by anthologies (Berkes 1989; Bromley 1992) and monographs (Ostrom 1990) which construct arguments and generate hypothesis on the basis of case studies. The selection of case material is, of course, neither totally haphazard, nor does it reflect a hidden agenda or an axe to grind. The selection of articles does, however, reflect some unease with the penchant for reproducing arguments instead of questioning them. Despite a hectic research activity, there is a considerable redundancy in the study of common property regimes, and a tendency to repeat arguments and launch criticisms which have already been absorbed by the research community (Lees 1993). This is regrettable, because it has obscured the need for a fresh look in the nooks and crannies of the field itself to identify new research themes, which may pave the way for a novel research agenda, and a need for restructuring the conventional framing of the "tragedy of the commons" paradigm.

Models of what? Modelling agents and choice

The use of models is central to social science research and theory building. However, one should not confuse "the reality of the model" with "the model of reality" (Jenkins 1992:169). The different game theoretical models which have been reviewed, represent approximations of the complex empirical reality surrounding us (the model of reality), but even though they may seem essentially realistic on their own terms (the reality of the model), should not be confused with reality. Nevertheless, game theory provides an important insight into the problems of collective action, which lie at the heart of the problem of common property management. As such,

the strength of a simple game theoretical model such as the "prisoner's dilemma", lies in its potential as an *analytical model.* That such a model is not empirical, in the sense, can be falsified by empirical observations, do not detract from its utility in research (Brox 1991:ch. 5). The same is true for Gordon's (1954) "common property theory", which provides important insights into the problems concerning harvest, effort and returns in renewable natural resources, and distinguishes between returns of labour and economic rent as well as the problem of rent dissipation (Brox 1990:230).

The study of common property regimes is a field which attracts both political scientists, economists and anthropologists. The field is multi-disciplinary rather than inter-disciplinary, and a prerequisite for the strengthening of the study of common property regimes is a tighter integration between empirical and theoretical analyses. Theory, however, is to a considerable degree the domain of economists, whereas empirical studies — particularly in the field of renewable natural resources — is the domain of the anthropologist.[1] It is symptomatic that "common property theory" is regarded as providing a fundamental insight by economists, but, is almost unanimously rejected by anthropologists (Berkes 1983, 1987). As Brox (1990:228) has pointed out, this is grounded in a failure to distinguish between analytical theories and empirical models. "Common property theory" is neither a natural law nor a hypothesis but a theory. Likewise, the "prisoner's dilemma" is the foundation of a huge and sophisticated sub-field of research among economists and mathematicians. Anthropologists by contrast, have been content with questioning the logic of the prisoner's dilemma (which is inherent in Hardin's argument), and indifferent towards exploring the ramifications of more complex game theoretical models and arguments (Runge 1981, 1986).

What has anthropology's contribution to theory been? Apart from empirically grounded analyses of local management systems (Ruddle et al. 1992), the contribution of anthropology has first of all been the documentation of informal regulations and systems of local resource management among fishermen (Acheson 1987, 1988) and pastoralists (Dombrowski 1993; Stiles 1992). This is of course important in itself. It is a problem, however, that the new empirical findings are generally used only to debate substantive positions, but rarely to use these findings to build new

[1] However, *economic* anthropology has long been an important subfield. For an excellent overview of issues in economic anthropology, see Gregory (1994). Other useful introductions to economic anthropology are Acheson (1989) and Halperin (1982).

or alternative theory.[2] To make any headway, there seems to be a need for an integrated approach, which may include biologists, economists, political scientists and anthropologists. The emerging new paradigm on the ecology of African drylands (Scoones 1994) seems – even though it was initiated by biologists – to be propelled by an interdisciplinary research effort (Ellis and Swift 1988). An obstacle to such an interdisciplinary exercise has been the problem of finding a "language that makes interdisciplinary discourse possible" (Brox 1990:227). A first step in this direction is a willingness to become familiar with modes of analysis and key concepts of related disciplines.

The study of institutions is a field with interdisciplinary qualities, and has a distinguished ancestry both in economics (Eggertsson 1990:10), political science (Shepsle 1989:132) and anthropology (Polanyi 1944). The study of "institutions" is also an attempt to model human behaviour and choice and identify what it is that structures human agency in society and, more fundamentally, why human society is not a Hobbesian anarchy as the logic of the "prisoner's dilemma" would suggest. The concept of institutions is used in order to grasp processes which contribute to change and continuity in social life, and as such, institutions serve primarily as heuristic devices. However, one should be careful with reifying institutions: an institution is not a "thing" or a tangible object (North 1990:107). Instead, institutions are analytical constructs which we employ in order to analyze, and hopefully, explain particular aspects of social life and human behaviour. Institutions are also analytically important in order to connect the micro-level of agents and choice, with the macro-level outcome which broadly, we may term society.

It seems that there is a need to integrate lessons from the field of economics to explain institutional change in general, and the transition from communal to private property rights in particular. The report has discussed the contribution of one approach which offers a theoretical framework for studying institutions, namely neoinstitutional economics (North 1990). Neoinstitutional economics incorporates a theory of property rights (largely borrowed from the "property rights school"), the concept of transaction costs (hailing from Ronald Coase), and a theory of institutions (with the

[2] In a forthcoming book, Baland and Platteau (1994) provide an unprecedented wide range of case studies, but still fall short of integrating these to build new theory. Typically, they conclude that "our game theoretical analysis suggests that problems of the commons are not necessarily well depicted by the classic Prisoner's Dilemma" (ibid.:466). This conclusion is neither surprising, nor innovative, and is typical of the involution which much "new" research on common property regimes suffer from.

roots in the institutionalist approach of Karl Polanyi). Despite the critique of neoinstitutional economics (Field 1981), it remains an approach which offers analytical tools to the study of property regimes, and helps to explain why private property replaces common property regimes or cases where common property regimes persist. However, the problem of explaining institutional change and innovation is still elusive, and there are epistemological problems linked to the notion of "induced institutional innovation" (Grabowski 1988).

Are "local institutions" an alternative?

At the outset of this report we proposed that local institutions for resource management could be an alternative to the high transaction costs incurred by state management and the exclusion of legitimate users that characterize privatization. Based on the different case studies which have been reviewed, it seems that local institutions — under certain conditions — do provide such an alternative. The central problem is to predict under what conditions people will chose to *cooperate* (Axelrod 1984; 1990:11-16). There may be situations where it is rational to cooperate (Runge 1986), but as a rule individual and group interests differ, a problem which increases with group size (Olson 1965). Effective institutions are able to provide the *assurance* that other users will cooperate in the best interest of the collective, and this can be achieved by finding the right balance between incentives, costs[3] and penalties (Kehoane and Ostrom 1995). If enough members ("the critical mass") find that it is to their advantage to cooperate, this will spur the rest to do the same (Runge 1992). However, a variety of factors may affect to what degree institutions are able to provide compliance with informal rules and regulations. During times of rapid social change, enforcement costs rise and may exhaust the communal ethos which ensured group solidarity (Greenberg 1989). In some cases, local institutions lack the legitimacy for penalizing offenders, because they were rooted in an egalitarian ideology which made coercion impossible (Ensminger 1990).

Managing scarce resources mandates, as we have seen, rules of exclusion and inclusion (Ostrom 1990). In many cases, however, a further subdivision of user-rights may be needed. This can be accomplished by a system of graded access, ranging from full rights to limited rights. Instituting graded access rights to a commons may take advantage of inherent systems of

[3] The costs can be detailed as: "cost of intragroup enforcement, cost of extragroup exclusion, cost of decision making, and cost of coordination" (Feeny 1992:272).

stratification in a society to create a hierarchy of user groups (Park 1992). Some groups might enjoy more liberal access than others or have wider rights of resource extraction (Gilles et al. 1992). This suggests that we should avoid the frequent mistake of making common property regimes synonymous with equity when, instead, they often are premised on hierarchy (Park 1992).

The term "institution" is analytically ambiguous and plural, and is often used in a haphazard manner. Hence, the report has emphasized the need for a clearer analytical precision in the use of the terms "institution" and "institutional". Institutions are frequently used to denote very different empirical entities — a custom, a consensual assembly, a cooperative — and it is therefore difficult to generalize on the basis of empirical studies which institutions are durable and which are not. As the reviewed case material shows, many of the durable common property regimes are premised on the effective exclusion of non-right holders (Netting 1981). To summarize the lessons of the reviewed case material, the attributes of robust institutions can be identified as:[4]

- organize a well defined user group which is identified by itself and others by way of its locale, descent, custom etc. (*circumscription*)
- define who can (*inclusion*) and who cannot use the resource (*exclusion*)
- if feasible, establish the extent of territories under group jurisdiction (*resource boundaries*)
- users have long standing, historical claims to the resources (*legitimacy*)
- users share similar traits or identities, or are an interest group (*homogeneity*)
- provide confidence that legitimate user will comply with rules, hence restrains individual maximizing behaviour (*assurance*)
- punish offenders through a graded system of penalties (*sanctions*)
- provide legitimate users with a fair share of the harvest (*equity*)
- are able to avert incursion from other potential user groups, and supervise legitimate users (*monitoring*)
- provide long-term stability by reducing the risk of over-harvesting (*security*)

Naturally, not every institution for natural resource management fulfils all these requirements, but will include some of them. Which of these are most important is difficult to know *a priori* and is a matter of empirical

[4] For a similar overview of design principles, see Ostrom (1990:90).

investigation. It is also difficult to specify under what circumstances local institutions should be rebuilt or not. The case material which has been reviewed points to the need for thorough research before the rebuilding of institutions should be contemplated (Vedeld 1994). There is also a need to warn against reconstructing institutions about which we know little, especially if we do not know what their prime function is. The sympathetic reading of local ecological practice may lead to the conclusion that indigenous peoples everywhere manage resources (Freeman and Carbyn 1988). This is not altogether clear, and instead, we need to question not only whether there is an environmental ethic (Johannes 1982), but if there are local management systems at all (Polunin 1984). Whether people intentionally manage resources also applies to East African pastoralism. It seems that some East African pastoralist groups manage their water resources, which are more critical to their survival than pastures (Helland 1978, 1980), whereas other pastoral groups neither have a tradition for water nor rangelands management. Researchers agree, however, that East African pastoralists have not institutionalized measures aimed at restraining herd growth (Behnke 1994). In order to resolve the question of conservation measures among East African pastoralists, more historically (Anderson 1988) and contemporary (Scoones 1994) grounded research is needed.

It is a problem that research among small-scale communities has often been conducted as if history did not matter. To counter this bias, this report has purposely included historical case studies as a form of "retrospective data collection" (Feeny 1992:273). The adoption of a longer time frame makes it possible to say something about the origins of institutions for common property management, as well as identifying features of enduring common property regimes (Ostrom 1990). The case studies which have been reviewed show a considerable variation; common property regimes could be instituted through the initiative of local right holders (Netting 1981), or could be the result of feudal policies and decrees (Kalland 1984). Moreover, by disregarding historical material, one may distort the interpretation of contemporary adaptations (Anderson 1988). Historical studies have also uncovered the need for a critical reflection when using concepts such as "traditional" and "customary" which may be used to validate claims to resources among user groups (Johannes 1982). The problem of authenticity is also reflected in the use of the term "communal", whose meaning can be transformed and manipulated by colonial (Peters 1987) and post-colonial authorities (Cheater 1990). Recasting and reformulating the past in a mythological hotchpotch of communalism can also can be found among small-scale communities (Taylor 1987).

The "success" or the "tragedy" of the commons?

The two extreme positions of the common property regimes may be termed the "success" and the "tragedy" of the commons respectively (Sandersen n.d.). The "tragedy of the commons" position (Hardin 1968) is theoretically linked to the claim that private property regimes represent the apex of an evolutionary process (Demsetz 1967). The "success of the commons" perspective (McKean 1992), on the other hand, claims that common property regimes are regulated through informal management systems (Berkes et al. 1989), are not free for everybody to use (Ciriacy-Wantrup and Bishop 1975) and are frequently underpinned by local systems of ecological ("traditional") knowledge (Freeman and Carbyn 1988). The contrasting views on common property regimes reflect different analytical vantage points. Anthropologists tend to focus on common property regimes as a *cultural adaption*, a management regime which reflects a communal ethos (Taylor 1987). This perspective is commonly used as an argument in favour of communal property arrangements as a means to achieve equity and sustainability. Opposed to this perspective, economists tend to analyze common property regimes as an *economic system* (Gordon 1954; Scott 1955) – judging common property regimes on the basis of their effectiveness and distributional effects – or as "games" where different scenarios can be modelled mathematically (Runge 1992).

As we have seen, actors' economic behaviour are constrained by *both* economic and cultural factors. The fishery can legitimately be analyzed as an economic system (Gordon 1954), even though case studies show that fishermen's effort level does not always conform to the simple neoclassical supply and demand model (Acheson 1985). Moreover, standard economic models do not normally account for the variety of informal regulations which affect fishing effort such as territoriality (Acheson 1988), information management and secrecy (Andersen 1979b), non-market exchange (Tvedten 1990), self-imposed catch limits (McCay 1980), the internal organization of the fishery operations (Jul-Larsen 1994) and guest fishing (Kalland 1991).

Similarly, pastoralism may be viewed either as a sociological (Helland 1978) or an economic enterprise (Hardin 1968; Sommerville and Kerr 1988). Whereas the focus used to be on a crude version of the former – Herskovits (1926) "cattle complex" parable implied that people had an irrational cultural affinity for cows – more recent (Barth 1980 [1964]; Haaland 1977) and contemporary studies (Behnke 1994; Dombrowski 1993) have tried to combine the cultural and economic aspects of pastoralism and pastoralist economic behaviour. Pastoralists seem to combine a diversity of economic strategies which promote long term viability through, for

example, the building of networks through the strategic lending of animals (Stiles 1992), as well as husbandry strategies which are characterized by deliberate overstocking (Ellis and Swift 1993) and the maximization of herd growth (Behnke 1994; Helland 1990).

The case studies which have been reviewed show that good analyses should aim at incorporating both an economic and a cultural perspective, and focus on why property rights institutions change and how certain traits – biologic, economic or social – promote certain property rights regimes. Factors such as low or sub-maximum productivity, huge exclusion and maintenance costs or high environmental uncertainty (Ellis and Swift 1988), seem, initially, to be elements which favour communal arrangements. This would mean that, for example, African rangelands would be typical for a situation which favours common property regimes. As we have seen, the privatization of rangelands ("enclosures") occurs when the costs of exclusion are lowered, either by the availability of cheap fencing material (Behnke 1985; Anderson and Hill 1975) or the weakening of a pervasive communal ethos (Helland 1993). This type of reasoning conforms to the tenets of the "property rights paradigm" (Demsetz 1967). What is lacking in this particular approach, however, is the role of the state in defining property rights.

The state, stratification and equity

As a number of scholars have pointed out, a theory of property rights is incomplete without a theory of the state (North 1977; Furubotn and Pejovich 1972). The emergence of the modern nation state has fundamentally changed the system of creating and protecting property rights (Eggertsson 1990:319). However, state control with resources is not a modern phenomenon: imperial feudalism in Japan (Kalland 1984, 1991) was instrumental in awarding villages access to coastal fisheries. In Africa, the colonial powers took control of, and altered local systems of land tenure and rangelands management (Anderson 1988; Peters 1984). Modern case studies, however, also point to the possibility that the nation state leaves matters of resource jurisdiction to local user groups (Acheson 1988).

The question has been raised whether the term "property" is analytically linked to the concept of the modern state (Durrenberger and Pálsson 1987a, 1987b). If this is right, it would imply that it is wrong to use the concept "property rights" in situations where there is no state. This, however, does not seem to be a common view: North and Thomas (1977:235) analyze the "neolithic revolution" – the transition from hunting to agriculture – within a framework of property rights theory. North and Thomas perceive this shift

as the first tangible example of creating property rights through closing the open commons.

It has been argued that states are typically unable to provide efficient institutions and appropriate structures of property rights (Eggertsson 1990:320). Moreover, the state is often competing with local communities for the control over resources (Shepherd 1989), and state intervention tends to erode the foundations of local institutions and increase the enforcement costs (Ensminger 1990; Jentoft 1987; McCay 1978). State management of forests seems, in particular, to lack legitimacy and credibility in the eyes of local populations. In many South Asian countries this problem is particulary widespread and has long historical antecedents. Forest legislation reflects the historical usurpation of forest by the colonial powers (Tucker 1982, 1988) and local rajas (Guha 1989). The combination of a high market demand, a slow biological growth rate and bureaucratic failure and corruption means that the forest is particularly susceptible to over-exploitation. Whereas local institutions used to prescribe strict rules for the extraction of timber, commercial interests exploit the need for cash among the rural poor (Guggenheim and Spears 1991). Not only have local institutions broken down in the process of dismantling forest commons (Jodha 1991), but greed and envy have weakened village solidarity and promoted the growth of enmity and revenge (Greenberg 1989; Keiser 1991).

The state and the local communities may, however, choose to cooperate, for example by having state agencies taking over the task of monitoring regulations (Berkes 1986), or by a more fundamental agreement where the state and local institutions share the responsibility of defining and enforcing regulations, a management regime referred to as co-management (Acheson 1989b; Jentoft 1989). Another possibility for the formalization of local resource management, is the institution of cooperatives either through local initiative (Berkes 1986; Jentoft and Kristoffersen 1989; McCay 1980), or government sponsorship (Jentoft 1986). Cooperatives in the form of government sponsored group ranches have been a favoured strategy for turning nomadic pastoralism into commercial beef production (Anderson 1988; Galaty 1992).

This brings us to the consequences of the spread of market forces which tend to promote new standards of value — from use-value to exchange-value — which increase the incentive for profit maximization (Dahl 1988). The introduction of market forces can promote wasteful harvesting methods (Johannes 1978) and ruin indigenous environmental ethics (Riewe and Gamble, in Freeman and Carbyn 1988:35). The impact of market forces may, however, be constrained by culturally constituted systems of non-

market exchange (Tvedten 1990), firm control of exclusion and inclusion vested with corporate descent groups (Hviding and Baines 1994) or through a system of where only citizenship confers legitimate access to local resources (Netting 1981). Local institutions may also be harmed by "predatory elites" (Nicholson 1993:26), which have vested interests in controlling local resources or systematically disadvantage certain groups of society, a problem which in particular affects pastoralists (Freudenberger 1991; Galaty 1992). Misguided development interventions can also be caused by "false design assumptions" (Cernea 1989:9), which may result in resource scarcity due insufficient understanding of local forest management practices (Thomson et al. 1986). Finally, local entrepreneurs may play a crucial role as intermediaries between state agencies and local custodians, thereby facilitating commercial exploitation of forest which erodes traditional conservation measures (Knudsen, forthcoming).

Another problem concerns different responses to the introduction of new technology (Goodlad 1972). This problem is especially relevant to fisheries, where the introduction of more efficient fishing gear may lead to friction between those who invest in modern gear, and those who prefer simpler technology which is more labour intensive (Jentoft and Kristoffersen 1989). The question of adoption of new technology (Moberg and Dyer 1994) is connected to the problem of innovation. Durable management systems may reflect a robust institutional setting (Hviding and Baines 1994), but may alternatively be viewed as an inability to adapt to commercialization (Johannes 1981). This contradiction is so important that it is worth repeating Lees' (1993:109) observation that "disincentives, while protecting the pool of common property resources, also curb individual entrepreneurship, investment, experimentation, and innovation". Lees' point should not be taken lightly: if she is right, there is a need for "rethinking the commons", both as an analytical construct and as an object of study.

Rethinking the commons?

In the beginning of this report it was claimed that research on common property regimes has been stifled by the tendency to refine and re-use familiar and well-worn arguments instead of questioning them (Lees 1993). Instead of a further refinement along existing lines of scholarship, we first need to ask: what is the object of study?

More than a conceptual confusion (Bromley and Cernea 1989), "common property" as an object of study is blurred: Is "common property" a) primarily a behavioural relation between men (Demsetz 1967; Furubotn and Pejovich 1972); b) a question of agents and choice which can be solved

through balancing incentives (e.g., penalties) (Runge 1992); c) foremost a problem of markets (Bromley 1989b) and a question of "getting the prices right" (Nicholson 1993:7); or finally, d) a question of institutions and how institutions structure human action (North 1990)?

The answer is, it seems, that the study of common property regimes needs to integrate all these modes of analysis. Naturally, different theoretical approaches prescribe different solutions to the "tragedy of the commons" problem; state intervention and coercion, privatization, markets and price mechanisms, and institutional design. In this report the emphasis has been on the latter (institutional design) and the question has been raised whether institutions contribute to conservation. In retrospect, it can be argued that this question cannot be answered because it is too general: to answer it, we need to ask a) what is an "institution" (analytically), and b) which social phenomena qualify as an institution (empirically) (North 1991).

The blunt statement of a fisherman: "Boats don't fish, people do" (Miller and van Maanen 1979), may seem a self-evident empirical fact. In the study of institutions, however, the distinction between *objects* and *agents* is often missing. Institutions in themselves do not conserve, but do — according to the voluntaristic (Askvik 1993) view of institutions — reflect processes of human agency. The study of institutions, therefore, cannot progress without a theory of action. Rational choice is a theory of human agency which underpins both neoclassical and neoinstitutional economics (Eggertsson 1993:ch. 1). However, rational choice is not a theoretical panacea for understanding human behaviour. Rationality differs from the vantage point of the individual and that of the collective (Olson 1965). Actors' choices also reflect the time horizon (Angelsen 1991), and, in general, actors seem to be psychologically inclined to prefer short term benefits over sustainability in the long term (Moxnes 1993). Moreover, as game theory has demonstrated, unconstrained actors tend to "free ride" (Runge 1984). Does this mean that Hardin's "heuristic fable" (McEvoy 1988:213) — the tragedy of the commons — was correct after all? As several authors have taken pains to demonstrate, actors are implicated in dense social networks and webs of social relationships, which serve to constrain their individual freedom of action. This is true not only of complex societies in the developing world (Hviding and Baines 1994; Tvedten 1990), but also a feature of modern societies in the West (Acheson 1988; Netting 1981). Besides, cultural proscriptions may hinder commercialization (Johannes 1981), which, generally speaking, is a prerequisite for privatization to occur.

The prospect of integrating the two contesting paradigms of human behaviour – *Homo economicus* and *Homo sociologicus* – are slim and this duality will continue to provoke debate in the social sciences (Heap et al. 1992:71). That Hardin preferred the former over the latter does not imply that he was "wrong". Instead Hardin should be credited for bringing our attention to questions of great importance, simply rebutting or rephrasing his argument brings us nowhere. To advance the study of common property regimes it is necessary to recast old questions, reformulate research designs and refine our analytical tools.

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Garrett Hardin's essay "The Tragedy of the Commons" has for almost three decades stimulated research on common property regimes. This report provides an overview of this research and reviews a selection of empirical and theoretical contributions to the "commons" debate.

Despite the hectic research activity, the report is critical of the tendency to reproduce well-worn arguments instead of questioning them. In order to progress beyond a rebuttal of Hardin, the report calls for an inter-disciplinary approach to the study of common property regimes and advocates an analytical focus on local institutions. In particular, the report discusses those circumstances under which local institutions represent an alternative to state management of renewable natural resources.

Are J. Knudsen is a social anthropologist and research fellow at the Chr. Michelsen Institute. His research interests include natural resource management, economic change and modernization. He is currently working on forest management and entrepreneurship in Northern Pakistan.

ISSN 0805-505X

CHR. MICHELSEN INSTITUTE