

**2000**

## **PRIVATE AND COMMON PROPERTY RIGHTS**

**Elinor Ostrom**

*Arthur F. Bentley Professor of Political Science; Co-director, Workshop in Political Theory and Policy Analysis, and Center for the Study of Institutions, Population, and Environmental Change, Indiana University*

© Copyright 1999 Elinor Ostrom

### **Abstract**

The relative advantages of private property and common property for the efficiency, equity, and sustainability of natural resource use patterns have been debated in legal and economic literatures for several centuries. The debate has been clouded by a troika of confusions that relate to the difference between (1) common property and open-access regimes, (2) common-pool resources and common property regimes, and (3) a resource system and the flow of resource units. A property right is an enforceable authority to undertake particular actions in specific domains. The rights of access, withdrawal, management, exclusion and alienation can be separately assigned to different individuals as well as being viewed as a cumulative scale moving from the minimal right of access through possessing full ownership rights. All of these rights may be held by single individuals or by collectivities. Some attributes of common-pool resources are conducive to the use of communal proprietorship or ownership and others are conducive to individual rights to withdrawal, management, exclusion and alienation. Many of the lessons learned from the operation of communal property regimes related to natural resource systems are theoretically relevant to the understanding of a wide diversity of property regimes that are extensively used in modern societies.

*JEL classification:* K1, Q2, H4, D7

*Keywords:* Common Property, Private Property, Common-pool Resources, Governance

### **1. Introduction**

The issue of the relationship between private property and common property has engaged both legal and economic scholars in a long series of controversies over the meaning, the sequence of development, and the superiority of private vs. common property. The issues debated relate to the

efficiency, equity and sustainability of private property as contrasted to common property. The scholarship in both professions has been characterized by formulations that are adopted by each generation of scholars without much effort to examine their foundations or to test them by empirical research. Both have their doctrinal aspects. And, the dominant view in both disciplines has been that private property is clearly superior to common property. Many scholars think of contemporary examples of common property as remnants of the past, likely to disappear as we enter the twenty-first century (see Atran, 1986, 1993). Recent research, however, has challenged the presumption that private property is necessarily superior to common property.

## 2. The Legal Debate over Private vs. Common Property

Prior to the publication in 1861 of *Ancient Law* by the distinguished English jurist, Henry Sumner Maine, the accepted view among Western jurists was that the origin of the concept of property in ancient times was the occupation of land by a single proprietor and his family (Grossi, 1981). Further, the superiority of individual property holdings was so well accepted in the legal literature of the early nineteenth century that the possibility of other forms of property existing on the European continent threatened juridical views about the origins of social order. Maine drew not only on his own extensive research in India but also on the work of Georg Ludwig von Maurer (1854, 1856) on the primitive Germanic village communities, the Mark, and of the pioneering work of William Blackstone (1766). Maine concluded that: 'it is more than likely that joint-ownership, and not separate ownership, is the really archaic institution, and that the forms of property that will afford us instruction will be those that are associated with the rights of families and of groups of kindred' (Maine, [1861] 1963, p. 252). This set off a flurry of publications challenging and supporting his conclusion (see extensive bibliographic citations in Grossi, 1981). The great debate had much more than academic importance, as major political struggles continued throughout the nineteenth century over the status of the many remaining forms of common property on the European continent. A legal and political belief system that saw the origin of property itself in the efforts of individual proprietors to occupy land gave the landed proprietor a special role in society. These beliefs helped to justify the passage of legislation to eliminate collective landholding rights and to authorize enclosures and the takeover of communal properties by individual proprietors.

The meaning of private property in comparison to common property remains a contested issue in modern legal scholarship. Ellickson, Rose and

Ackerman (1995), for example, start their recent textbook on property law with a first chapter devoted to 'The Debate over Private Property'. The second chapter addresses 'The Problem of the Commons'. In the latter chapter, they include parts of the famous article by Hardin (1968) on 'The Tragedy of the Commons', but then ask students the following questions: 'Private property is often said to avert the tragedy of the commons. But does it? Who enforces property limitations? Does another kind of "commons" problem lurk in the organization and maintenance of a property regime?' (Ellickson, Rose and Ackerman, 1995, p. 141). In an earlier volume, Rose (1994, p. 37) points to the 'kicker' in a sharp distinction between private and common property when she stresses that a private-property *regime* as a system 'has the same structure as a common property' (see also Epstein, 1979, 1985, and Dukeminier and Krier, 1993).

### 3. The Economic Debate over Private vs. Common Property

Economists tend to view common property institutions as having a longer history than private-property institutions and to explain the growth of modern, Western societies in part as the result of changing from common property to private property (North and Thomas, 1976; North, Anderson, and Hill, 1983). Private property is considered by most economists to be an essential ingredient in economic development due to the incentives associated with diverse kinds of property relationships (see, for example, Welch, 1983). A farmer who owns his own labor, land and other factor inputs, for example, is likely to see a direct relationship between investments and the level of benefit achieved over the long term. A farmer who belongs to an agricultural production cooperative, on the other hand, may see only a loose connection between personal contributions and benefits. The more individuals in a society whose work is only loosely connected to their benefits, the more pervasive an attitude of free riding can become. If everyone tends to free ride on the work of others, overall economic productivity will be low.

Private-property rights, however, cannot simply emerge spontaneously from a common property system. Private-property rights depend upon the existence and enforcement of a set of rules that define who has a right to undertake which activities on their own initiative and how the returns from that activity will be allocated (V. Ostrom, 1989). In other words, rules and rulers are required to establish, monitor and enforce a property system. While some rules generate incentives that greatly increase the welfare of most participants in an economy, there are always individuals who resist changes because of benefits they receive from a prior system or propose

changes that particularly benefit themselves. Rulers may also receive substantial returns from making rules that benefit some to the detriment of others. Thus, rent-seeking behavior is expected on the part of both entrepreneurs and rulers.

Common property regimes are, therefore, presumed by many economists to be inefficient. There are three sources of inefficiency. One is rent dissipation, because no one owns the products of a resource until they are captured, and everyone engages in an unproductive race to capture these products before others do (Knight, 1924; Gordon, 1954; Scott, 1955; Schaefer, 1957; Cheung, 1970; C. Clark, 1976, 1980; Dasgupta and Heal, 1979). The second is the high transaction and enforcement costs expected if communal owners were to try to devise rules to reduce the externalities of their mutual overuse (Demsetz, 1967; Coase, 1960). The third is low productivity, because no one has an incentive to work hard in order to increase their private returns (North, 1990; Yang, 1987). Common property regimes are presumably retained by rulers who do not understand the enhancement in overall economic welfare that will result from a change to private property or who are supported by those who benefit from these 'archaic' regimes. A common policy prescription is articulated by R. Smith (1981, p. 467) when he states that 'the only way to avoid the tragedy of the commons in natural resources and wildlife is to end the common property system by creating a system of private property rights'.

#### 4. Confusions that Generate Misunderstanding

The debate about the relative merits of private and common property has been clouded by a troika of confusions that hinder scholarly communication. Different meanings are assigned to terms without clarifying how multiple aspects relate to one another. The source of confusion relates to the differences between (1) common property and open-access regimes, (2) common-pool resources and common property regimes, and (3) a resource system and the flow of resource units. All three sources of confusion reduce clarity in assigning meaning to terms and retard theoretical and empirical progress.

##### *The Confusion between Common Property and Open-Access Regimes*

In a now classic article, Ciriacy-Wantrup and Bishop (1975) clearly demarked the difference between property regimes that are *open access*, where no one has the legal right to exclude anyone from using a resource, from *common property*, where the members of a clearly demarked group have a legal right to exclude nonmembers of that group from using a

resource (see also Bromley, 1991a, 1992b). Open-access regimes (*res nullius*) - including the classic cases of the open seas and the atmosphere - have long been considered in legal doctrine as involving no limits on who is authorized to use a resource. If anyone can use a resource, no one has an incentive to conserve their use or to invest in improvements. If such a resource generates highly valued products, then one can expect that the lack of rules regarding authorized use will lead to misuse and overconsumption. Some local grazing areas, inshore fisheries and forests are effectively open-access resources, but many fewer than presumed in the literature.

Some open-access regimes lack effective rules defining property rights by default (Dales, 1968). Either the resources affected by these open-access regimes are not contained within a nation-state or no entity has successfully laid claim to legitimate ownership. Other open-access regimes are the consequence of conscious public policies to guarantee the access of all citizens to the use of a resource within a political jurisdiction. The concept of *jus publicum* applies to their formal status, but effectively these resources are open access. The state governments of Oregon and Washington intervened in the early twentieth century to prevent local salmon fishermen from devising rules that would have limited entry and established harvesting limits (Higgs, 1982, 1996). Fishing unions along the US coastal areas tried to organize inshore fisheries so as to limit entry and establish harvesting limits during the 1950s. Even though their efforts could not have had a serious impact on prices due to the presence of an active international market for fish, the fishing unions were prosecuted by the US Department of Justice and found in violation of the Sherman Antitrust Act (Johnson and Libecap, 1982). Thus, US inshore fisheries have effectively been open-access resources during much of the twentieth century as a result of governmental action to prevent local fishing groups from establishing forms of common property regimes within those political jurisdictions. In more recent times, however, both the national and state governments have reversed their prior stands and have actively sought ways of creating forms of co-management in inshore fisheries (see Pinkerton 1992, 1994; J. Wilson, 1995).

A third type of open-access regime results from the ineffective exclusion of nonowners by the entity assigned formal rights of ownership. In many developing countries, the earlier confusion between open-access and common property regimes paradoxically led to an increase in the number and extent of local resources that are effectively open access. Common property regimes controlling access and harvesting from local streams, forests, grazing areas, and inshore fisheries had evolved over long periods of time in all parts of the world, but were rarely given formal status in the legal codes of newly independent countries.

As concern for the protection of natural resources mounted during the 1960s, many developing countries nationalized all land and water resources that had not yet been recorded as private property. The institutional arrangements that local users had devised to limit entry and use lost their legal standing, but the national governments lacked monetary resources and personnel to monitor the use of these resources effectively. Thus, resources that had been under a *de facto* common property regime enforced by local users were converted to a *de jure* government-property regime, but reverted to a *de facto* open-access regime. When resources that were previously controlled by local participants have been nationalized, state control has usually proved to be less effective and efficient than control by those directly affected, if not disastrous in its consequences (Curtis, 1991; Hilton, 1992; Panayotou and Ashton, 1992; Ascher, 1995). The harmful effects of nationalizing forests that had earlier been governed by local user-groups have been well documented for Thailand (Feeny, 1988), Niger (Thomson, 1977; Thomson, Feeny and Oakerson, 1992), Nepal (Arnold and Campbell, 1986; Messerschmidt, 1986), and India (Gadgil and Iyer, 1989; Jodha, 1990, 1996). Similar results have occurred in regard to inshore fisheries taken over by state or national agencies from local control by the inshore fishermen themselves (Cordell and McKean, 1992; Cruz, 1986; Dasgupta, 1982; Higgs, 1996; Panayotou, 1982; Pinkerton, 1989).

*The Confusion between a Resource System and a Property Regime*

The problems resulting from confusing open-access regimes with common property regimes are particularly difficult to overcome due to a second terminological problem. The term 'common property resource' is frequently used to describe a type of economic good that is better referred to as a 'common-pool resource'. All common-pool resources share two attributes of importance for economic activities: (1) it is costly to exclude individuals from using the good either through physical barriers or legal instruments and (2) the benefits consumed by one individual subtract from the benefits available to others (Ostrom and Ostrom, 1977b; E. Ostrom, Gardner, and Walker, 1994). Recognizing a class of goods that shares these two attributes enables scholars to identify the core theoretical problems facing individuals whenever more than one individual or group utilizes such resources for an extended period of time. Using 'property' in the term used to refer to a type of good, reinforces the impression that goods sharing these attributes tend everywhere to share the same property regime.

Common-pool resources share with public goods the difficulty of developing physical or institutional means of excluding beneficiaries. Unless means are devised to keep nonauthorized users from benefiting, the strong temptation to free ride on the efforts of others will lead to a suboptimal

investment in improving the resource, monitoring use, and sanctioning rule-breaking behavior. Second, the products or resource units from common-pool resources share with private goods the attribute that one person's consumption subtracts from the quantity available to others. Thus, common-pool resources are subject to problems of congestion, overuse and potential destruction unless harvesting or use limits are devised and enforced. In addition to sharing these two attributes, particular common-pool resources differ on many other attributes that affect their economic usefulness including their size, shape and productivity and the value, timing and regularity of the resource units produced.

Common-pool resources may be owned by national, regional, or local governments; by communal groups; by private individuals or corporations; or used as open access resources by whomever can gain access. Each of the broad types of property regimes has different sets of advantages and disadvantages, but at times may rely upon similar operational rules regarding access and use of a resource (Feeny et al., 1990). Examples exist of both successful and unsuccessful efforts to govern and manage common-pool resources by governments, communal groups, cooperatives, voluntary associations, and private individuals or firms (Bromley et al., 1992; K. Singh, 1994; K. Singh and Ballabh, 1996). Thus, as discussed below, there is no automatic association of common-pool resources with common property regimes - *or, with any other particular type of property regime*. Further, common property arrangements are essentially share contracts (Lueck, 1994; Eggertsson, 1990, 1992, 1993a, 1993b) and, as such, face similar problems of potential opportunistic behavior and moral hazard problems.

#### *The Confusion between the Resource and the Flow of Resource Units*

Common-pool resources are composed of resource systems and a flow of resource units or benefits from these systems (Blomquist and Ostrom, 1985). The resource system (or alternatively, the stock or the facility) is what generates a flow of resource units or benefits over time (Lueck, 1995). Examples of typical common-pool resource systems include lakes, rivers, irrigation systems, groundwater basins, forests, fishery stocks and grazing areas. Common-pool resources may also be facilities that are constructed for joint use, such as mainframe computers and the Internet. The resource units or benefits from a common-pool resource include water, timber, medicinal plants, fish, fodder, central processing units, and connection time. Devising property regimes that effectively allow sustainable use of a common-pool resource requires rules that limit access to the resource system and other rules that limit the amount, timing, and technology used to withdraw diverse resource units from the resource system.

## 5. Property as Bundles of Rights

A property right is an enforceable authority to undertake particular actions in a specific domain (Commons, 1968). Property rights define actions that individuals can take in relation to other individuals regarding some 'thing'. If one individual has a right, someone else has a commensurate duty to observe that right. Schlager and Ostrom (1992) identify five property rights that are most relevant for the use of common-pool resources, including access, withdrawal, management, exclusion, and alienation. These are defined as:

**Access:** The right to enter a defined physical area and enjoy nonsubtractive benefits (for example, hike, canoe, sit in the sun).

**Withdrawal:** The right to obtain resource units or products of a resource system (for example, catch fish, divert water).

**Management:** The right to regulate internal use patterns and transform the resource by making improvements.

**Exclusion:** The right to determine who will have access rights and withdrawal rights, and how those rights may be transferred.

**Alienation:** The right to sell or lease management and exclusion rights (Schlager and Ostrom, 1992).

In much of the economics literature, private property is defined as equivalent to alienation. Property-rights systems that do not contain the right of alienation are considered to be ill-defined. Further, they are presumed to lead to inefficiency since property-rights holders cannot trade their interest in an improved resource system for other resources, nor can someone who has a more efficient use of a resource system purchase that system in whole or in part (Demsetz, 1967). Consequently, it is assumed that property-rights systems that include the right to alienation will be transferred to their highest valued use. Larson and Bromley (1990) challenge this commonly held view and show that much more information must be known about the specific values of a large number of parameters before judgements can be made concerning the efficiency of a particular type of property right.

Instead of focusing on one right, it is more useful to define five classes of property-rights holders as shown in Table 1. In this view, individuals or collectivities may hold well-defined property rights that include or do not include all five of the rights defined above. This approach separates the question of whether a particular right is well-defined from the question of the effect of having a particular set of rights. 'Authorized entrants' include most recreational users of national parks who purchase an operational right to enter and enjoy the natural beauty of the park, but do not have a right to harvest forest products. Those who have both entry and withdrawal use-right



units are 'authorized users'. The presence or absence of constraints upon the timing, technology used, purpose of use and quantity of resource units harvested are determined by operational rules devised by those holding the collective-choice rights (or authority) of management and exclusion. The operational rights of entry and use may be finely divided into quite specific 'tenure niches' (Bruce, 1995) that vary by season, by use, by technology, and by space. Tenure niches may overlap when one set of users owns the right to harvest fruits from trees, another set of users owns the right to the timber in these trees, and the trees may be located on land owned by still others (Bruce, Fortmann and Nhira, 1993). Operational rules may allow authorized users to transfer access and withdrawal rights either temporarily through a rental agreement, or permanently when these rights are assigned or sold to others (see Adasiak, 1979, for a description of the rights of authorized users of the Alaskan salmon and herring fisheries).

**Table 1**  
**Bundles of Rights Associated with Positions**

	Owner	Proprietor	Claimant	Authorized User	Auth. Entrant
Access	X	X	X	X	X
Withdrawal	X	X	X	X	
Management	X	X	X	X	
Exclusion	X	X			
Alienation	X				

*Source:* E. Ostrom and Schlager (1996, p. 133).

'Claimants' possess the operational rights of access and withdrawal plus a collective-choice right of managing a resource that includes decisions concerning the construction and maintenance of facilities and the authority to devise limits on withdrawal rights. The net fishers of Jambudwip, India, for example, annually regulate the positioning of nets so as to avoid interference, but do not have the right to determine who may fish along the coast (Raychaudhuri, 1980). Fishing territories are a frequent form of property for indigenous, inshore fishers (Durrenberger and Palsson, 1987).

Farmers on large-scale government irrigation systems frequently devise rotation schemes for allocating water on a branch canal (Benjamin et al., 1994).

'Proprietors' hold the same rights as claimants with the addition of the right to determine who may access and harvest from a resource. Most of the property systems that are called 'common property' regimes involve participants who are proprietors and have four of the above rights, but do not possess the right to sell their management and exclusion rights even though they most frequently have the right to bequeath it to members of their family and to earn income from the resource (see Berkes, 1989; Bromley et al., 1992; K. Martin, 1979; McCay and Acheson, 1987).

Empirical studies have found that some proprietors have sufficient rights to make decisions that promote long-term investment and harvesting from a resource. Place and Hazell (1993) conducted surveys in Ghana, Kenya, and Rwanda to ascertain if indigenous land-right systems were a constraint on agricultural productivity. They found that having the rights of a proprietor as contrasted to an owner in these settings did not affect investment decisions and productivity. Other studies conducted in Africa (Migot-Adholla et al., 1991; Bruce and Migot-Adholla, 1994) also found little difference in productivity, investment levels, or access to credit. In densely settled regions, however, proprietorship over agricultural land may not be sufficient (Feder et al. 1988; Feder and Feeny, 1991; Anderson and Lueck, 1992). As land is densely settled, the absence of a title reduces the options for farmers to sell their land and reap a return on this asset. Further, without a title, farmers lack collateral to obtain credit to invest more intensively in the productive potential of their land (see Alston, Libecap and Schneider, 1996). Thus, a key finding from an overview of many studies is that no type of property-rights regime works equivalently in all types of settings. For private-property systems in land to make a difference in productivity gains, one probably needs (1) a somewhat dense population so competition for use is present and (2) the existence of effective markets related to credit, inputs, and the sale of commodities (see further discussion in Section 7). In a series of studies of inshore fisheries, self-organized irrigation systems, forest user groups and groundwater institutions, proprietors tended to develop strict boundary rules to exclude noncontributors; established authority rules to allocate withdrawal rights; devised methods for monitoring conformance; and used graduated sanctions against those who do not conform to these rules (Agrawal, 1994; Blomquist, 1992; Schlager, 1994; Tang, 1994; Lam, 1998).

'Owners' possess the right of alienation - the right to transfer a good in any way the owner wishes that does not harm the physical attributes or uses of other owners - in addition to the bundle of rights held by a proprietor. An individual, a private corporation, a government, or a communal group may possess full ownership rights to any kind of good including a common-pool

resource (Montias, 1976; Dahl and Lindblom, 1963). The rights of owners, however, are never absolute. Even private owners have responsibilities not to generate particular kinds of harms for others (Demsetz, 1967).

What should be obvious by now is that the world of property rights is far more complex than simply government, private and common property. These terms better reflect the status and organization of the holder of a particular right than the bundle of property rights held. All of the above rights can be held by single individuals or by collectivities. Some communal fishing systems grant their members all five of the above rights, including the right of alienation (Miller, 1989). Members in these communal fishing systems have full ownership rights. Similarly, farmer-managed irrigation systems in Nepal, the Philippines and Spain have established transferable shares to the systems. Access, withdrawal, voting and maintenance responsibilities are allocated by the amount of shares owned (Maass and Anderson, 1986; E. Martin, 1986; Martin and Yoder, 1983a, 1983b, 1983c; Siy, 1982). On the other hand, some proposals to 'privatize' inshore fisheries through the devise of an Individual Transferable Quota (ITQ), allocate transferable use rights to authorized fishers but do not allocate rights related to the management of the fisheries, the determination of who is a participant, nor the transfer of management and exclusion rights. Thus, proposals to establish ITQ systems, which are frequently referred to as forms of 'privatization', do not involve full ownership.

The next two sections are devoted to a discussion of the attributes of common-pool resources that are conducive to communal proprietorship or communal ownership as contrasted to individual ownership. Groups of individuals are considered to share communal property rights when they have formed an organization that exercises at least the collective-choice rights of management and exclusion in relationship to some defined resource system and the resource units produced by that system. In other words, all communal groups have established some means of governing themselves in relationship to a resource (E. Ostrom, 1990). Where communal groups are full owners, members of the group have the further right to sell their access, use, exclusion and management rights to others, subject in many systems to the approval of the other members of the group. Some communal proprietorships are formally organized and recognized by legal authorities as having a corporate existence that entails the right to sue and be sued, the right to hold financial assets in a common bank account, and to make decisions that are binding on members. Other communal proprietorships are less formally organized and may exercise *de facto* property rights that may or may not be supported by legal authorities if challenged by nonmembers. Obviously, such groups hold less well-defined bundles of property rights than those who are secure in their *de jure* rights even though the latter may

not hold the complete set of property rights defined as full ownership. In other words, well-defined and secure property rights may not involve the right to alienation.

#### **6. Attributes of Common-Pool Resources Conducive to the Use of Communal Proprietorship or Ownership**

Even though all common-pool resources share the difficulty of devising methods to achieve exclusion and the subtractability of resource units, the variability of common-pool resources is immense in regard to other attributes that affect the incentives of resource users and the likelihood of achieving outcomes that approach optimality. Further, whether it is difficult or costly to develop physical or institutional means to exclude nonbeneficiaries depends both on the availability and cost of technical and institutional solutions to the problem of exclusion and the relationship of the cost of these solutions to the expected benefits of achieving exclusion from a particular resource.

Let us start initially with a discussion of land as a resource system. Where population density is extremely low, land is abundant, and land generates a rich diversity of plant and animal products without much husbandry, the expected costs of establishing and defending boundaries to a parcel of land of any size may be greater than the expected benefits of enclosure (Demsetz, 1967; Feeny, 1993). Settlers moving into a new terrain characterized by high risk due to danger from others, from a harsh environment, or from lack of appropriate knowledge, may decide to develop one large, common parcel prior to any divisions into smaller parcels (Ellickson, 1993). Once land becomes scarce, conflict over who has the rights to invest in improvements and reap the results of their efforts can lead individuals to want to enclose land through fencing or institutional means to protect their investments. There are tradeoffs in costs to be considered, however. The more land included within one enclosure, the lower the costs of defending all the boundaries, but the higher the costs of regulating the use of the enclosed parcel.

The decision to enclose need not be taken in one step from an open-access terrain to a series of private plots owned exclusively by single families (Field, 1984, 1985, 1989; Ellickson, 1993). The benefits of enclosing land depend on the scale of productive activity involved. For some agricultural activities, as discussed below, there may be considerable benefits associated with smaller parcels fully owned by a family enterprise. For other activities, the benefits may not be substantial. Moving all the way to private plots is an efficient move when the expected marginal returns from enclosing numerous plots exceed the expected marginal costs of defending a

much more extended system of boundaries and the reduced transaction costs of making decisions about use patterns (Nugent and Sanchez, 1995).

In a classic study of the diversity of property-rights systems used for many centuries by Swiss peasants, Netting (1976, 1981) observed that the same individuals fully divided their agricultural land into separate family-owned parcels, but that grazing lands located on the Alpine hillsides were organized into communal property systems. In these mountain valleys, the *same* individuals used different property-rights systems side-by-side for multiple centuries. Each local community had considerable autonomy to change local rules, so there was no problem of someone else imposing an inefficient set of rules on them. Netting argued that attributes of the resource affected which property-rights systems were most likely for diverse purposes. Netting identified five attributes that he considered to be most conducive to the development of communal property rights:

1. low value of production per unit of area;
2. high variance in the availability of resource units on any one parcel;
3. low returns from intensification of investment;
4. substantial economies of scale by utilizing a large area; and
5. substantial economies of scale in building infrastructures to utilize the large area.

Steep land where rainfall is scattered may not be suitable for most agricultural purposes, but can be excellent land for pasture and forests if aggregated into sufficiently large parcels. By developing communal property rights to large parcels of such land, those who are members of the community are able to share environmental risks due to the unpredictability of rain-induced growth of grasses within any smaller region. Further, herding and processing of milk products is subject to substantial economies of scale. If individual families develop means to share these reduced costs, all can save substantially. Building the appropriate roads, retaining walls and processing facilities may also be done more economically if these efforts are shared.

While the Swiss peasants were able to devote these harsh lands to productive activities, they had to invest time and effort in the development of rules that would reduce the incentives to overgraze and would ensure that investments in shared infrastructure were maintained over time. In many Swiss villages, rights to common pasturage were distributed according to the number of cows that could be carried over the winter using hay supplies produced on the owners' private parcels. In all cases, the village determined who would be allowed to use, the specific access and withdrawal rights to be used, how investment and maintenance costs were to be shared, and how the annual returns from common processing activities were to be shared. All of

these systems included at least village proprietorship rights, but some Swiss villages developed full ownership rights by incorporating and authorizing the buying and selling of shares (usually with the approval of the village). Netting's findings are strongly supported by studies of mountain villages in Japan, where thousands of rural villages have held communal property rights to extensive forests and grazing areas located in the steep mountainous regions located above their private agricultural plots (McKean, 1982, 1992a, 1992b). Similar systems have existed in Norway for centuries (Örebech, 1993; Sandberg 1993).

The importance of sharing risk is stressed in other theoretical and empirical studies of communal proprietorships (Antilla and Torp, 1996; Gupta, 1986, Nugent and Sanchez, 1993). Unpredictability and risk are increased in systems where resource units are mobile and where storage facilities, such as dams, do not exist (Schlager, Blomquist and Tang, 1994). Institutional facilities for sharing risk, such as formal insurance systems or institutionalized mechanisms for reciprocal obligations in times of plenty, also affect the kinds of property-rights systems that individuals can devise. When no physical or institutional mechanisms exist for sharing risk, communal property arrangements may enable individuals to adopt productive activities not feasible under individual property rights. A recent study has demonstrated that the variance in the productivity of land over space - due largely to the variance in rainfall from year to year - is strongly associated with the size of communally held parcels allocated to grazing in the Sudan (Nugent and Sanchez, 1995). Ellickson (1993) compares the types of environmental and personal security risks faced by new settlers in New England, in Bermuda, and in Utah to explain the variance in the speed of converting jointly held land to individually held land in each of these settlements.

A consistent finding across many studies of communal property-rights systems is that these systems do not exist in isolation and are usually used in conjunction with individual ownership. In most irrigation systems that are built and managed by the farmers themselves, for example, each farmer owns his or her own plot(s) while participating as a joint proprietor or owner in a communally organized irrigation system (Coward, 1980; Sengupta, 1991, 1993; Tang, 1992; Vincent, 1995; Wade, 1992). Water is allocated to individual participants using a variety of individually tailored rules, but those irrigation systems that have survived for long periods of time tend to allocate water and responsibilities for joint costs using a similar metric - frequently the amount of land owned by a farmer (E. Ostrom, 1990, 1992). In other words, benefits are roughly proportional to the costs of investing and maintaining the system itself.

Further, formally recognized communal systems are usually nested into a series of governance units that complement the organizational skills and

knowledge of those involved in making collective-choice decisions in smaller units (O. Johnson, 1972). Since the Middle Ages, most of the Alpine systems in both Switzerland and Italy have been nested in a series of self-governing communities that respectively governed villages, valleys, and federations of valleys (Merlo, 1989). In modern times, cantonal authorities in Switzerland have assumed an added responsibility to make periodic, careful monitoring visits to each alp on a rotating basis and to provide professional assessments and recommendations to local villages, thereby greatly enhancing the quality of knowledge and information about the sustainability of these resources (Glaser, 1987).

Contrary to the expectation that communal property systems lacking the right to alienate ownership shares are markedly less efficient than property-rights systems involving full ownership, substantial evidence exists that many communal proprietorships effectively solve a wide diversity of local problems with relatively low transaction costs (Gaffney, 1992; Hanna and Munasinghe, 1995a, 1995c; Kaul, 1996; Sandberg, 1993, 1996a, 1996b; Wilson, 1995). Obtaining valid and reliable measures of outputs and costs for a large number of property-rights systems covering similar activities in matched environmental settings is extremely difficult. In regard to irrigation, a series of careful studies of the performance of communal proprietorship systems as contrasted to government-owned and managed systems, clearly demonstrates the higher productivity of the communal systems controlling for relevant variables (Tang, 1992; Benjamin et al., 1994; E. Ostrom, 1996; Lam, 1998). Schlager's (1990) studies of inshore fisheries demonstrate that fishers who have clearly defined proprietorship are able to solve difficult assignment problems and assign the use of space and technology so as to increase both the efficiency and equity of their systems. James Wilson's (1995) studies also demonstrate that communal proprietorship systems are more efficient than frequently thought.

Performance of communal property-rights systems varies substantially, however, as do the performance of all property-rights systems. Some communal systems fail or limp along at the margin of effectiveness just as private firms fail or barely hang on to profitability over long periods of time. In addition to the environmental variables discussed above that are conducive in the first place to the use of communal proprietorship or ownership, the following variables related to the attributes of participants are conducive to their selection of norms, rules, and property rights that enhance the performance of communal property-rights systems (E. Ostrom, 1993):

1. Accurate information about the condition of the resource and expected flow of benefits and costs is available at low cost to the participants (Blomquist, 1992; Gilles and Jamtgaard, 1981).

2. Participants share a common understanding about the potential benefits and risks associated with the continuance of the status quo as contrasted with changes in norms and rules that they could feasibly adopt (E. Ostrom, 1990; Sethi and Somanathan, 1996).
3. Participants share generalized norms of reciprocity and trust that can be used as initial social capital (Cordell and McKean, 1992).
4. The group using the resource is relatively stable (Seabright, 1993).
5. Participants plan to live and work in the same area for a long time (and in some cases, expect their offspring to live there as well) and, thus, do not heavily discount the future (Grima and Berkes, 1989).
6. Participants use collective-choice rules that fall between the extremes of unanimity or control by a few (or even bare majority) and, thus, avoid high transaction or high deprivation costs (E. Ostrom, 1990).
7. Participants can develop relatively accurate and low-cost monitoring and sanctioning arrangements (Berkes, 1992).

Many of these variables are, in turn, affected by the type of larger regime in which users are embedded. If the larger regime recognizes the legitimacy of communal systems, and is facilitative of local self-organization by providing accurate information about natural resource systems, providing arenas in which participants can engage in discovery and conflict-resolution processes, and providing mechanisms to back up local monitoring and sanctioning efforts, the probability of participants adapting more effective rules over time is higher than in regimes that ignore resource problems or presume that all decisions about governance and management need to be made by central authorities.

Two additional variables - the size of a group and its homogeneity - have been noted as conducive to the initial organization of communal resources and to their successful performance over time (Kanbur, 1991; Libecap, 1989a, 1989b; E. Ostrom, 1992). As more research has been conducted, however, it is obvious that much more theoretical and empirical work is needed since both variables appear to have complex effects. Changing the size of a group, for example, always involves changing some of the other variables likely to affect the performance of a system. Increasing the size of a group is likely to be associated with at least the following changes: (1) an increase in the transaction costs of reaching agreements; (2) a reduction of the burden borne by each participant for meeting joint costs such as guarding a system, and maintenance; and (3) an increase in the amount of assets held by the group that could be used in times of emergency. Libecap (1995) found that it was particularly hard to get agreements to oil unitization with groups greater than four. Blomquist (1992), on the other hand, documents processes conducted in the shadow of an equity court that involved up to 750 participants in agreeing to common rules to allocate



rights to withdraw water from groundwater basins in southern California. The processes took a relatively long period of time, but they have now also survived with little administrative costs for half a century. Agrawal (1996) has shown that communal forestry institutions in India that are moderate in size are more likely to reduce overharvesting than are smaller groups because they tend to utilize a higher level of guarding than smaller groups.

Group heterogeneity is also multifaceted in its basic causal processes and effects. Groups can differ along many dimensions including their assets, their information, their valuation of final products, their production technologies, their time horizons, their exposure to risk (for example, headenders versus tailenders on irrigation systems), as well as their cultural belief systems. Libecap's (1989b) research on inshore fisheries has shown that when fishers have distinctively different production technologies and skills, all potential rules for sharing withdrawal rights have substantial distributional consequences and are the source of conflict that may not easily be overcome. Libecap and Wiggins' (1984) studies of the prorating of crude oil production reveal an interesting relationship between the levels and type of information available to participants and the likelihood of agreement at various stages in a bargaining process. In the early stages of negotiation, all oil producers share a relatively equal level of ignorance about the relative claims that each might be able to make under private-property arrangements. This is the most likely time for oil unitization agreements to be reached successfully. If agreement is not reached early, each participant gains asymmetric information about their own claims as more and more investment is made in private information. Agreements are unlikely at this stage. If producers then aggressively pump from a common oil pool, all tend to be harmed by the overproduction and are willing late in the process to recognize their joint interests. Libecap's (1995) study of marketing agreements among orange growers also shows a strong negative impact of heterogeneity. The theoretical work of Mancur Olson (1965) on privileged groups, on the other hand, predicts that when some participants have substantial assets and whose interests are aligned with achieving an agreement, such groups are more likely to be organized. The empirical support for this proposition comes more from studies of global commons (Mitchell, 1995; Oye and Maxwell, 1995).

Heterogeneity in the knowledge and acceptance of local common property regimes is likely to lead to their undoing. In frontier regions, new migrants increase the number of people sharing the return from a common-pool resource. Further, migrants are unlikely to recognize the legitimacy of extant, *de facto*, property-rights systems (see Alston, Libecap and Schneider, 1996). Thus, the common agreement necessary for the

sustenance of any property-rights system may rapidly disappear if settlement patterns undergo a rapid change. Similarly, common property systems related to inshore fisheries have also proved to be unstable when trawlers from other locations start to visit on a regular basis without recognizing the *de facto* property rights of local fishers.

### **7. Attributes of Common-Pool Resources Conducive to the Use of Individual Rights to Withdrawal, Management, Exclusion, and Alienation**

The advantage of individual ownership of strictly private goods - where the cost of exclusion is relatively low and one person's consumption is subtractive from what is available to others - is so well established that it does not merit attention here. Industrial and agricultural commodities clearly fit the definition of private goods. Individual rights to exclusion and to transferring control over these goods generate incentives that lead to higher levels of productivity than other forms of property arrangements.

It has frequently been assumed that land also is clearly always a private good and therefore best allocated using market mechanisms based on individual ownership rights. Agricultural land in densely settled regions is usually best allocated by a system of individual property rights. Gaining formal title to land, however, may or may not increase efficiency. Feder et al. (1988) conducted an important econometric study that showed that agricultural land in Thailand without a formal title was worth only one-half to two-thirds of land with a formal title. Further, increasing the security of private-property rights also led to an increased value of the crops produced (between one-tenth and one-fourth higher than those without secure title). More secure titling also provided better access to credit and led to greater investments in improved land productivity (see also Feder and Feeny, 1991). Insecure property rights may lead potential users to arm and engage in violent conflict so as to gain control over land through force or by negotiation to avoid force. Several types of economic losses result from conflict over ownership (Skaperdas and Syropoulos, 1995; Umbeck, 1981a, 1981b).

Title insurance is another mechanism used to reduce the risk of successful challenges to ownership of land. Registering brands is still another technique used to increase the security of ownership over resource units in the form of cattle that may range freely over a large area until there is a communal effort to undertake a round-up. Gaining formal titles is, however, costly. In societies that do not yet have high population densities and where customary rights are still commonly understood and accepted,

formal titling may be an expensive method of increasing the security of a title that is not associated with a sufficiently higher return to be worth the economic investment (see Migot-Adholla et al., 1991). In addition, it should now be clear that the cost of fencing land by physical and/or institutional means is nontrivial and that there are types of land and land uses that may be more efficiently governed by groups of individuals rather than single individuals.

A commonly recommended solution to problems associated with the governance and management of mobile resource units, such as water and fish, is their 'privatization' (Christy, 1973; Clark, 1980). What private ownership usually means in regard to mobile resource units, however, is individual ownership of withdrawal rights. Water rights are normally associated with the allocation of a particular quantity of water per unit of time or the allocation of a right to take water for a particular period of time or at a particular location. Fishing rights are similarly associated with quantity, time, or location. These rights are typically 'withdrawal' rights that are tied to resource units and not to a resource system. In addition to the individual water rights that farmers hold in an irrigation system, they may also jointly own - and, therefore, govern and manage - the irrigation facilities themselves (Tang, 1992). In addition to the quotas or 'fishing units' that individual fishers may own, no one owns the fishing stock and governmental units may exercise various types of management rights in relationship to these stocks (Schlager, 1990). In groundwater basins that have been successfully litigated, individual pumpers own a defined quantity of water that they can produce, rent, or sell, but the groundwater basins themselves may be managed by a combination of general-purpose and special-purpose governmental units and private associations (Blomquist, 1992).

Implementing operational and efficient individual withdrawal rights to mobile resources is far more difficult in practice than demonstrating the economic efficiency of hypothetical systems. Simply gaining valid and accurate measurements of 'sustainable yield' is a scientifically difficult task. In systems where resource units are stored naturally or by constructing facilities such as a dam, the availability of a defined quantity of the resource units can be ascertained with considerable accuracy, and buying, selling, and leasing rights to known quantities is relatively easy to effectuate in practice. Many mobile resource systems do not have natural or constructed storage facilities and gaining accurate information about the stock and reproduction rates is very costly and involves considerable uncertainty (Allen and McGlade, 1987; Wilson, et al., 1991). Further, as Copes (1986) has clearly articulated, appropriators from such resources can engage in a wide diversity of evasive strategies that can destabilize the efforts of government agencies trying to manage these systems. Further, once such systems have allocated individual withdrawal rights, efforts to further regulate patterns of

withdrawal may be very difficult and involve expensive buy-back schemes (Örebech, 1982). Experience with these individual withdrawal-rights systems has varied greatly in practice (see McCay, 1992; McCay, et al., 1996; Pinkerton, 1992; Wilson and Dickie, 1995).

Exactly which attributes of both physical and social systems are most important to the success of individual withdrawal rights from common-pool resources is not as well established as the attributes of common-pool resource systems conducive to group proprietorship or ownership. On the physical side, gaining accurate measurements of the key variables (quantity, space, technology) that are to be involved in management efforts is essential. Resource systems that are naturally well-bounded facilitate measurement as well as ease of observing appropriation behavior. Storage also facilitates measurement. Where resource units move over vast terrain, the cost of measurement is higher than when they are contained (for example, it is easier to develop effective withdrawal-rights systems for lobsters than for whales).

Considerable recent research has also stressed the importance of involving participants in the design and implementation of such property-rights systems. When participants do not look upon such rules as legitimate, effective, and fair, the capacity to invent evasive strategies is substantial (Seabright, 1993; J. Wilson, 1995). The size of the group involved and the heterogeneity of participants also affect the costs of maintaining withdrawal-rights systems (Edwards, 1994). And, the very process of allocating quantitative and transferable rights to resource units may undo some of the common understandings and norms that allowed communal ownership systems to operate at lower day-to-day administrative costs.

## **8. Communal Property Regimes in the Twenty-First Century**

The focus of this entry has been primarily on natural resources. Many of the lessons learned from the operation of communal property regimes in these sectors, however, are quite relevant for a wide diversity of similar property regimes that are currently in wide use and likely to have a substantial presence in the next century. A very large number of housing developments - both apartment houses and individual family dwellings - involve individual property to the housing unit itself combined with communal property to the grounds, recreational facilities, and other joint facilities. While individuals can buy and sell their individual housing units, at the time of purchase they assume a set of duties in respect to the closely related communal properties. Monthly assessments for the repair and maintenance of these common facilities are not unlike the assessments made by a community of irrigators on themselves for the maintenance of their own system. Further, purchase

and sales frequently require the permission of other members of the group. Similarly, many sports clubs allocate use quotas to members and assess members regular fees for the maintenance of the commonly owned facilities.

The modern corporation is frequently thought of as the epitome of private property. While buying and selling shares of corporate stock is a clear example of the rights of alienation at work, relationships within a firm are far from being 'individual' ownership rights. Since the income that will be shared among stockholders, management, and employees is itself a common pool to be shared, all of the incentives leading to free riding (shirking) and overuse (padding the budget) are found within the structure of a modern corporation (Ghoshal and Moran, 1996; Putterman, 1995; Seabright, 1993). Thus, where many individuals will work, live, and play in the next century will be governed and managed by mixed systems of communal and individual property rights.

### Acknowledgments

Support from the National Science Foundation (Grant Nos. SBR-9319835 and SBR-95 21918) and the Ford Foundation is gratefully acknowledged. Comments on an initial draft of this entry by Arun Agrawal, David Feeny, Vincent Ostrom, Peter Örebech, and Jimmy Walker are gratefully acknowledged. The comments of two anonymous reviewers were of considerable value. The editing skills of Patty Dalecki have been, as usual, of immense assistance - particularly in a paper involving such an extensive bibliography as Charlotte Hess and I have prepared for this entry.

### Bibliography on Private and Common Property Rights (2000) (by Elinor Ostrom and Charlotte Hess)

- Acheson, James M. (1988), *The Lobster Gangs of Maine*, Hanover, NH, University Press of New England.
- Ackerman, Bruce A. (1975), *Economic Foundations of Property Law*, Boston, MA, Little Brown.
- Adasiak, Allen (1979), 'Alaska's Experience with Limited Entry', *36 Journal of the Fisheries Research Board of Canada*, 770-782.
- Agrawal, Arun (1994), 'Rules, Rule Making, and Rule Breaking: Examining the Fit between Rule Systems and Resource Use', in Ostrom, Elinor, Gardner, Roy, and Walker, James M. (eds), *Rules, Games, and Common-Pool Resources*, Ann Arbor, University of Michigan Press, 267-282.
- Agrawal, Arun (1996), *Group Size and Successful Collective Action: A Case Study of Forest Management Institutions in the Indian Himalayas*, Forests, Trees and People Programme,

- Phase II, Working Paper, Rome, Italy, Food and Agriculture Organization of the United Nations.
- Agrawal, Arun (forthcoming), *Greener Pastures: Markets, Politics, and Community among a Migrant Pastoral People*, Durham, NC, Duke University Press.
- Agrawal, Arun and Yadama, Gautam (1997), 'How Do Local Institutions Mediate Market and Population Pressures on Resources? Forest *Panchayats* in Kumaon, India', **28** *Development and Change*, 435-465.
- Aguilera-Klink, Federico (1991), *The Tragedy of the Commons or the Tragedy of Misinterpretation in Economics*, presented at the second annual conference of the International Association for the Study of Common Property, Winnipeg, Manitoba.
- Alchian, Armen A. (1961), *Some Economics of Property*, Santa Monica, CA, The Rand Corporation, Rand Paper P-2316.
- Alchian, Armen A. and Demsetz, Harold (1973), 'The Property Rights Paradigm', **33** *Journal of Economic History*, 16-27.
- Allen, P.M. and McGlade, J.M. (1987), 'Modelling Complex Human Systems: A Fisheries Example', **30** *European Journal of Operational Research*, 147-167.
- Allison S.T. and Messick, David M. (1985), 'Effects of Experience on Performance in a Replenishable Resource Trap', **49** *Journal of Personality and Social Psychology*, 943-948.
- Alston, Lee J., Eggertsson, Thráinn and North, Douglass C. (eds) (1996), *Empirical Studies in Institutional Change*, New York, Cambridge University Press.
- Alston, Lee J., Libecap, Gary D. and Schneider, Robert (1996), 'The Determinants and Impact of Property Rights: Land Titles on the Brazilian Frontier', **12** *Journal of Law, Economics and Organization*, 25-61.
- Andelson, Robert V. (1991), 'Commons Without Tragedy: The Congruence of Garrett Hardin and Henry George', in Andelson, R.V. (ed.), *Commons Without Tragedy: The Social Ecology of Land Tenure and Democracy*, London, Centre for Incentive Taxation.
- Anderson, C. Leigh (1991), *Nature vs. Nurture: Systems of Property Rights in First Peoples*, presented at the second annual conference of the International Association for the Study of Common Property, Winnipeg, Manitoba.
- Anderson, J.M. (1974), 'Model for Tragedy of Commons', **2434** *IEEE Transactions on Systems, Man and Cybernetics*, 103-105.
- Anderson, Terry L. (ed.) (1992), *Property Rights and Indian Economies*, Savage, MD, Rowman & Littlefield.
- Anderson, Terry L. and Hill, Peter J. (1975), 'The Evolution of Property Rights: A Study of the American West', **18** *Journal of Law and Economics*, 163-179.
- Anderson, Terry L. and Hill, Peter J. (1983), 'Privatizing the Commons: An Improvement?', **50** *Southern Economic Journal*, 438-450.
- Anderson, Terry L. and Lueck, Dean (1992), 'Land Tenure and Agricultural Productivity on Indian Reservations', **35** *Journal of Law and Economics*, 427-454.
- Antilla, Sten and Torp, Aivind (1996), 'Environmental Adjustment and Private Economic Strategies in Reindeer Pastoralism: Combining Game Theory with Participatory Action Theory', Working Paper, Mid-Sweden University.
- Arnold, J.E.M. (1993), 'Management of Forest Resources as Common Property', **72** *Commonwealth Forestry Review*, 157-161.

- Arnold, J.E.M. and Campbell, J. Gabriel (1986), 'Collective Management of Hill Forests in Nepal: The Community Forestry Development Project', in National Research Council, *Proceedings of the Conference on Common Property Resource Management*, Washington, DC, National Academy Press, 425-454.
- Arnold, J.E.M. and Stewart, W.C. (1989), *Common Property Resource Management in India*, Oxford, Oxford Forestry Institute, University of Oxford, Department of Plant Sciences (Tropical Forestry Papers, no. 24).
- Ascher, William (1995), *Communities and Sustainable Forestry in Developing Countries*, San Francisco, ICS Press.
- Atran, Scott (1986), 'Hamula Organization and Masha'a Tenure in Palestine', **21** *Man*, 271-295.
- Atran, Scott (1993), 'Itza Maya Tropical Agro-Forestry', **34** *Current Anthropology*, 633-700.
- Baack, Bennett (1982), 'Testing the Impact of Exclusive Property Rights: The Case of Enclosing Commons Fields', in Ransom, R., et al. (eds), *Explorations in the New Economic History: Essays in Honor of Douglass C. North*, New York, Academic Press.
- Baden, John (1977), 'A Primer for the Management of Common Pool Resources', in Hardin, Garrett and Baden, John (eds), *Managing the Commons*, San Francisco, W.H. Freeman.
- Bailey, Martin (1992), 'Approximate Optimality of Aboriginal Property Rights', **35** *Journal of Law and Economics*, 183-198.
- Baird, Douglas, Gertner, Robert H., and Picker, Randal C. (1994), *Game Theory and the Law*, Cambridge, MA, Harvard University Press.
- Baird, John S. (1982), 'Conservation of the Commons: Effects of Group Cohesiveness and Prior Sharing', **10** *Journal of Community Psychology*, 210-215.
- Baland, Jean-Marie and Platteau, Jean-Philippe (1994), 'Should Common Property Resources be Privatized? A Re-Examination of the Tragedy of the Commons', Faculté des Sciences économiques et sociales, Faculté Universitaire Notre-Dame de la Paix, Namur, Belgium. (Cahiers de la Faculté des Sciences Economiques et Sociales, no. 143; Collection 'Développement').
- Bardhan, Pranab K., (ed.) (1989), *The Economic Theory of Agrarian Institutions*, Oxford, Clarendon Press.
- Bardhan, Pranab K. (1993a), 'Analytics of the Institutions of Informal Cooperation in Rural Development', **21** *World Development*, 633-639.
- Bardhan, Pranab K. (1993b), 'Symposium on Management of Local Commons', **7** *Journal of Economic Perspectives*, 87-92.
- Barzel, Yoram (1991), *Economic Analysis of Property Rights*, New York, Cambridge University Press.
- Bauer, C. (1983), 'A Tragedy of the Commons?', **3** *Free Market Magazine*, 18-22.
- Becker, Nir (1990), 'Common Property Resources and Prisoner's Dilemma Games: The Missing Linkage', presented at the first annual conference of the International Association for the Study of Common Property, Durham, NC, September 27-30, 1990.
- Behnke, Roy H., Jr (1984), 'Fenced and Open-Range Ranching: The Commercialization of Pastoral Land and Livestock in Africa', in Simpson, J.R. and Evangelou, P. (eds), *Livestock Development in Sub-Saharan Africa*, Boulder, CO, Westview Press.

- Behnke, Roy H., Jr (1985), 'Open-Range Management and Property Rights in Pastoral Africa: A Case of Spontaneous Range Enclosure in South Darfur, Sudan', London, Overseas Development Institute.
- Bell, Frederick W. (1986), 'Mitigating the Tragedy of the Commons', *52 Southern Economic Journal*, 653-664.
- Benjamin, Paul, Lam, Wai Fung, Ostrom, Elinor and Shivakoti, Ganesh (1994), *Institutions, Incentives, and Irrigation in Nepal*, Decentralization: Finance & Management Project Report, Burlington, VT, Associates in Rural Development.
- Berck, P. (1979), 'Open Access and Extinction', *47 Econometrica*, 877-882.
- Beres, L.R. (1973), 'Bipolarity, Multipolarity, and Tragedy of the Commons', *26 Western Political Quarterly*, 649-658.
- Berge, Erling (ed.) (1993), *Common Property Regimes: Law and Management of Non-Private Resources: Proceedings of the Conference; Vol. I*, Ås, Norway, The Agricultural University of Norway.
- Berge, Erling and Ott, Derek (eds) (1993), *Common Property Regimes: Law and Management of Non-Private Resources: Proceedings of the Conference; Vol. II*, Ås, Norway, The Agricultural University of Norway.
- Berge, Erling and Stenseth, Nils C. (eds) (1995), *Law and the Management of Renewable Resources*, Trondheim, Norway, University of Trondheim, Department of Sociology and Political Science.
- Berkes, Fikret (1983), 'The Critique of the "Tragedy of Commons" Paradigm', presented at the ICAES, Quebec City, Canada, August 1983.
- Berkes, Fikret (ed.) (1989), *Common Property Resources; Ecology and Community-Based Sustainable Development*, London, Belhaven.
- Berkes, Fikret (1992), 'Success and Failure in Marine Coastal Fisheries of Turkey', in Bromley, Daniel W. et al. (eds), *Making the Commons Work: Theory, Practice, and Policy*, San Francisco, ICS Press, 161-182.
- Berkes, Fikret, Feeny, David, McCay, Bonnie J. and Acheson, James M. (1989), 'The Benefits of the Commons', *340 Nature*, 91-93.
- Bishop, Richard C., et al. (1985), 'Restraint under Open Access: Are Voluntary Incentives Sufficient or is Coercion Required?', *67 American Journal of Agricultural Economics*, 356-376.
- Blackstone, William (1766), *Commentaries on the Laws of England, Book II*, Chicago, University of Chicago Press.
- Blaikie, Piers M. and Brookfield, Harold C. (eds) (1987), *Land Degradation and Society*, New York, Methuen.
- Blewett, Robert A. (1994), *Property Rights as a Cause of the Tragedy of the Commons: Institutional Change and the Pastoral Maasai in Kenya*, presented at the annual meetings of the Public Choice Society, Austin, TX.
- Blomquist, William (1992), *Dividing the Waters: Governing Groundwater in Southern California*, San Francisco, ICS Press.
- Blomquist, William and Ostrom, Elinor (1985), 'Institutional Capacity and the Resolution of a Commons Dilemma', *5 Policy Studies Review*, 383-393.
- Bolle, F. (1986), 'On the Oligopolistic Extraction of Non-Renewable Common-Pool Resources', *53 Economics*, 519-527.



- Boulding, Kenneth E. (1977), 'Commons and Community: The Idea of a Public', in Hardin, Garrett and Baden, John (eds), *Managing the Commons*, San Francisco, W.H. Freeman.
- Bromley, Daniel W. (1978), 'Property Rules, Liability Rules, and Environmental Economics', **12** *Journal of Economic Issues*, 43-60.
- Bromley, Daniel W. (1985), 'Common Property Issues in International Development', **5** *Bostid Developments*, 12-15.
- Bromley, Daniel W. (1989), *Economic Interests and Institutions: The Conceptual Foundations of Public Policy*, New York, Basil Blackwell.
- Bromley, Daniel W. (1991a), *Environment and Economy: Property Rights and Public Policy*, Cambridge, MA, Basil Blackwell.
- Bromley, Daniel W. (1991b), 'Testing for Common Versus Private Property: Comment (On J.S. Clark and G.A. Carlson)', **21** *Journal of Environmental Economics and Management*, 92-96.
- Bromley, Daniel W. (1992a), 'The Commons, Common Property, and Environmental Policy', **2** *Environmental and Resource Economics*, 1-17.
- Bromley, Daniel W. (1992b), 'The Commons, Property, and Common-Property Regimes', in Bromley, Daniel W. et al. (eds), *Making the Commons Work: Theory, Practice, and Policy*, San Francisco, ICS Press, 3-15.
- Bromley, Daniel W. and Cernea, Michael M. (1989), *The Management of Common Property Natural Resources: Some Conceptual and Operational Fallacies*, Washington, DC, The World Bank, Discussion Paper no. 57.
- Bromley, Daniel W., Feeny, David, McKean, Margaret, Peters, Pauline, Gilles, Jere, Oakerson, Ronald, Runge, C. Ford and Thomson, James (eds) (1992), *Making the Commons Work: Theory, Practice, and Policy*, San Francisco, ICS Press.
- Brox, Ottar (1990), 'The Common Property Theory: Epistemological Status and Analytical Utility', **49** *Human Organization*, 227-235.
- Bruce, John W. (1995), *Legal Bases for the Management of Land-Based Natural Resources as Common Property*, Forests, Trees and People Programme, Rome, Italy, Food and Agriculture Organization of the United Nations.
- Bruce, John W., Fortmann, Louise and Nhira, Calvin (1993), 'Tenures in Transition, Tenures in Conflict: Examples from the Zimbabwe Social Forest', **58** *Rural Sociology*, 626-642.
- Bruce, John W. and Migot-Adholla, Shem E. (eds) (1994), *Searching for Land Tenure Security in Africa*, Dubuque (IA), Kendall/Hunt.
- Buchanan, James M. (1968), 'Congestion on the Commons: A Case for Government Intervention', **33** *Il Politico: Revista Italiana Di Scienze Politiche*, 776-786.
- Buchanan, James M. (1973), 'The Institutional Structure of Externality', **14** *Public Choice*, 69-82.
- Buchanan, James M. and Tullock, Gordon (1965), *The Calculus of Consent: Logical Foundations of Constitutional Democracy*, Ann Arbor, University of Michigan Press.
- Calabresi, Guido and Melamed, A. Douglas (1972), 'Property Rules, Liability Rules, and Inalienability: One View of the Cathedral', **85** *Harvard Law Review*, 1089-1128.
- Carroll, Thomas M., Ciscil, David H. and Chisholm, R.K. (1979), 'Market as a Commons: Unconventional View of Property Rights', **13** *Journal of Economic Issues*, 605-627.

- Casimir, Michael J. (1990), 'The Determinants of Rights to Pasture: Territorial Organization and Ecological Constraints', in Casimir, M.J. and Rao, A. (eds), *Mobility and Territoriality*, New York, Berg.
- Cass, Robert C. and Edney, Julian J. (1978), 'The Commons Dilemma: A Simulation Testing the Effects of Resource Visibility and Territorial Division', **6** *Human Ecology*, 371-386.
- Centre for Ecological Sciences (1991), *Conference on Common Property, Collective Action, and Ecology, 19-20 August 1991*, Selected Papers, Bangalore, India, Centre for Ecological Sciences, Indian Institute of Science.
- Cerneja, Michael M., (ed.) (1991), *Putting People First: Sociological Variables in Rural Development*, 2nd edn, New York, Oxford University Press.
- Cheung, S.N.S. (1970), 'The Structure of a Contract and the Theory of a Nonexclusive Resource', **13** *Journal of Law and Economics*, 49-70.
- Christy, Francis T. (1964), *The Exploitation of a Common Property Natural Resource: The Maryland Oyster Industry*, PhD Dissertation, University of Michigan, Ann Arbor.
- Christy, Francis T. (1973), *Fisherman Quotas: A Tentative Suggestion for Domestic Management*, Kingston, RI, University of Rhode Island, Law of the Sea Institute.
- Ciriacy-Wantrup, Siegfried V. (1963), *Resource Conservation: Economics and Policies*, rev. edn, Berkeley, CA, University of California, Division of Agricultural Sciences.
- Ciriacy-Wantrup, Siegfried V. and Bishop, Richard C. (1975), 'Common Property' as a Concept in Natural Resource Policy', **15** *Natural Resources Journal*, 713-727.
- Clark, Colin W. (1976), *Mathematical Bioeconomics: The Optimal Management of Renewable Resources*, New York, Wiley.
- Clark, Colin W. (1980), 'Restricted Access to Common-Property Fishery Resources: A Game Theoretic Analysis', in Lin, P.T. (ed.), *Dynamic Optimization and Mathematical Economics*, New York, Plenum, 117-132.
- Clark, J. Stephen and Carlson, Gerald A. (1991), 'Testing for Common Versus Private Property: The Case of Pesticide Resistance', **21** *Discussion*, 92-96.
- Cleveland, Cutler, et al. (1995), *The Relationship between Ecosystems and Human Systems: Scale Challenges in Linking Property Rights Systems and Natural Resource Management*, presented at 'Reinventing the Commons,' the fifth annual conference of the International Association for the Study of Common Property, Bodo, Norway.
- Coase, R.H. (1960), 'The Problem of Social Cost', **3** *Journal of Law and Economics*, 1-44.
- Commons, John R. (1968), *Legal Foundations of Capitalism*, Madison, University of Wisconsin Press.
- Copes, Parzival (1984), 'The Market as an Open Access Commons: A Neglected Aspect of Excess Capacity', **132** *Economist*, 49-60.
- Copes, Parzival (1986), 'A Critical Review of the Individual Quota as a Device in Fisheries Management', **62** *Land Economics*, 278-291.
- Cordell, John C. and McKean, Margaret A. (1992), 'Sea Tenure in Bahia, Brazil', in Bromley, Daniel W., et al. (eds), *Making the Commons Work: Theory, Practice, and Policy*, San Francisco, ICS Press, 183-205.
- Cornes, Richard, Mason, Charles F. and Sandler, Todd (1986), 'The Commons and the Optimal Number of Firms', **101** *Quarterly Journal of Economics*, 641-646.

- Cornes, Richard and Sandler, Todd (1986a), *The Theory of Externalities, Public Goods, and Club Goods*, New York, Cambridge University Press.
- Cornes, Richard and Sandler, Todd (1986b), 'On Commons and Tragedies', **83** *American Economic Review*, 787-792.
- Coward, E. Walter, Jr. (ed.) (1980), *Irrigation and Agricultural Development in Asia: Perspectives from the Social Sciences*, Ithaca, NY, Cornell University Press.
- Cox, Susan J.B. (1985a), *Flawed Perceptions in the Foundations of Public Policy: The Case of Hardin's Tragedy of the Commons*, presented at the Southern Political Science Association annual meeting, Nashville, TN.
- Cox, Susan J.B. (1985b), 'No Tragedy on the Commons', **7** *Environmental Ethics*, 49-61.
- Crawford, Sue E.S. and Ostrom, Elinor (1995), 'A Grammar of Institutions', **89** *American Political Science Review*, 582-600.
- Croucher, Jack (1989), 'The Use and Management of Common Property Resources: A Collective Action/Club Good Approach', Ph.D. dissertation, University of Pennsylvania.
- Cruz, Wilfrido D. (1986), 'Overfishing and Conflict in a Traditional Fishery: San Miguel Bay, Philippines', in National Research Council, *Proceedings of the Conference on Common Property Resource Management*, Washington, DC, National Academy Press, 115-135.
- Curtis, Donald (1991), *Beyond Government: Organizations for Common Benefit*, London, Macmillan.
- Dahl, Robert A. and Lindblom, Charles E. (1963), *Politics, Economics and Welfare: Planning and Politico-Economic Systems Resolved into Basic Social Processes*, New York, Harper.
- Dales, John H. (1968), *Pollution, Property, and Prices: An Essay in Policy-making and Economics*, Toronto, University of Toronto Press.
- Dasgupta, Partha (1982), *The Control of Resources*, Cambridge, MA, Harvard University Press.
- Dasgupta, Partha and Heal, Geoffrey M. (1979), *Economic Theory and Exhaustible Resources*, Garden City, NJ, J. Nisbet.
- Dawes, Robyn M. (1973), 'The Commons Dilemma Game: An N-Person Mixed-Motive Game with a Dominating Strategy for Defection', **13** *Oregon Research Institute Bulletin*, 1-12.
- Dawes, Robyn M., McTavish, Jeanne and Shaklee, Harriet (1977), 'Behavior, Communication, and Assumptions about Other People's Behavior in a Commons Dilemma Situation', **35** *Journal of Personality and Social Psychology*, 1-11.
- De Alessi, Louis (1980), 'The Economics of Property Rights: A Review of the Evidence', **2** *Research in Law and Economics*, 1-47.
- De Alessi, Louis (1982), 'On the Nature and Consequences of Private and Public Enterprises', **67** *Minnesota Law Review*, 191-209.
- Demsetz, Harold (1964), 'The Exchange and Enforcement of Property Rights', **7** *Journal of Law and Economics*, 11-26.
- Demsetz, Harold (1967), 'Toward a Theory of Property Rights', **62** *American Economic Review*, 347-359.
- Devany, A.S., et al. (1969), 'A Property System for Market Allocation of Electro-Magnetic Spectrum: A Legal-Economic-Engineering Study', **30** *Stanford Law Review*, 1499-1561.

- Douglas, Roy (1991), 'The Commons and Property Rights: Towards a Synthesis of Demography and Ecology', in Andelson, R.V. (ed.), *Commons Without Tragedy: The Social Ecology of Land Tenure and Democracy*, London, Centre for Incentive Taxation.
- Dudley, Dean (1993), *Essays on Individual Behavior in Social Dilemma Environments: An Experimental Analysis*, PhD Dissertation, Indiana University.
- Dukeminier, J. and Krier, J.E. (1993), *Property*, 3rd edn, Boston, MA, Little, Brown.
- Durrenberger, E.P. and Palsson, G. (1987), 'Ownership at Sea: Fishing Territories and Access to Sea Resources', **14** *American Ethnologist*, 508-522.
- Edney, Julian J. (1980), 'The Commons Problem: Alternative Perspectives', **35** *American Psychologist*, 131-150.
- Edney, Julian J. and Bell, P.A. (1983), 'The Commons Dilemma: Comparing Altruism, the Golden Rule, Perfect Equality of Outcomes, and Territoriality', **20** *Social Science Journal*, 23-33.
- Edwards, Steven F. (1994), 'Ownership of Renewable Ocean Resources', **9** *Land Economics*, 253-273.
- Eggertsson, Thráinn (1990), *Economic Behavior and Institutions*, Cambridge, Cambridge University Press.
- Eggertsson, Thráinn (1992), 'Analyzing Institutional Successes and Failures: A Millennium of Common Mountain Pastures in Iceland', **12** *International Review of Law and Economics*, 423-437.
- Eggertsson, Thráinn (1993a), 'The Economic Rationale for Communal Resources', in Berge, Erling (ed.), *Common Property Regimes: Law and Management of Non-Private Resources; Proceedings of the Conference, Vol. I*, Ås, Norway, The Agricultural University of Norway.
- Eggertsson, Thráinn (1993b), 'The Economics of Institutions: Avoiding the Open-Field Syndrome and the Perils of Path Dependence', **36** *Acta Sociologica*, 223-237.
- Eggertsson, Thráinn (1994), *Property Rights, Economic Analysis and the Information Problem*, presented at the conference 'What is Institutionalism Now?', University of Maryland, College Park.
- Ellickson, Robert C. (1991), *Order Without Law: How Neighbors Settle Disputes*, Cambridge, MA, Harvard University Press.
- Ellickson, Robert C. (1993), 'Property in Land', **102** *Yale Law Journal*, 1315-1344.
- Ellickson, Robert C., Rose, Carol M. and Ackerman, Bruce A. (1995), *Perspectives on Property Law*, Boston, MA, Little, Brown.
- Emel, Jacques L. and Brooks, Elizabeth (1988), 'Changes in Form and Function of Property Rights Institutions under Threatened Resource Scarcity', **78** *Annals of the Association of American Geographers*, 241-252.
- Engels, Friedrich (1972), *The Origin of the Family, Private Property, and the State, in the Light of the Researches of Lewis H. Morgan*, New York, International Publishers.
- Ensminger, Jean (1992), *Making a Market; the Institutional Transformation of an African Society*, New York, Cambridge University Press.
- Ensminger, Jean and Rutten, Andrew R. (1987), 'The Politics of Changing Property Rights: Dismantling a Commons from Within', Working paper, Washington University, St. Louis, MO.
- Epstein, Richard A. (1979), 'Possession as the Root of Title', **13** *Georgia Law Review*, 1221-1243.

- Epstein, Richard A. (1985), *Takings*, Cambridge, MA, Harvard University Press.
- Epstein, Richard A. (1994), 'On the Optimal Mix of Private and Common Property', in Paul, E.F., Miller, F.D. and Paul, Jeffrey (eds), *Property Rights*, New York, Cambridge University Press.
- Eswaran, Mukesh and Lewis, Tracy R. (1982), *Exhaustible Resources, Property Rights and Alternative Equilibrium Concepts*, Working paper, University of British Columbia, Vancouver, British Columbia, Canada.
- Feder, Gershon and Feeny, David (1991), 'Land Tenure and Property Rights: Theory and Implications for Development Policy', **5** *World Bank Economic Review*, 135-153.
- Feder, Gershon, Onchan, T., Chalamwong, Y. and Hangladoran, C. (1988), *Land Policies and Form Productivity in Thailand*, Baltimore, MD, Johns Hopkins University Press.
- Feeny, David (1988), 'Agricultural Expansion and Forest Depletion in Thailand, 1900-1975', in Richards, John F. and Tucker, Richard P. (eds), *World Deforestation in the Twentieth Century*, Durham, NC, Duke University Press, 112-143.
- Feeny, David (1993), 'The Demand for and the Supply of Institutional Arrangements', in Ostrom, Vincent, Feeny, David and Picht, Hartmut (eds), *Rethinking Institutional Analysis and Development*, San Francisco, ICS Press, 159-209.
- Feeny, David, Berkes, Fikret, McCay, Bonnie J. and Acheson, James M. (1990), 'The Tragedy of the Commons: Twenty-Two Years Later', **18** *Human Ecology*, 1-19.
- Field, Barry C. (1984), 'The Evolution of Individual Property Rights in Massachusetts Agriculture, 17th-19th Centuries', **14** *Northeastern Journal of Agricultural and Resource Economics*, 97-109.
- Field, Barry C. (1985), 'The Optimal Commons', **67** *American Journal of Agricultural Economics*, 364-367.
- Field, Barry C. (1986), 'Induced Changes in Property-Rights Institutions', University of Massachusetts, Amherst, Department of Agricultural and Resource Economics (Research Paper Series, no. 86-1).
- Field, Barry C. (1989), 'The Evolution of Property Rights', **42** *Kyklos*, 319-345.
- Folke, Carl and Berkes, Fikret (1995), 'Mechanisms that Link Property Rights to Ecological Systems', in Hanna, Susan and Munasinghe, Mohan (eds), *Property Rights and the Environment*, Stockholm and Washington, DC, The Beijer International Institute of Ecological Economics and The World Bank.
- Fortmann, Louise and Bruce, John W. (1988), *Whose Trees? Proprietary Dimensions of Forestry*, Boulder, CO, Westview Press.
- Frey, Bruno S. (1990), 'Institutions Matter; The Comparative Analysis of Institutions', **34** *European Economic Review*, 443-449.
- Friedman, Alan E. (1971), 'The Economics of the Common-Pool: Property Rights in Exhaustible Resources', **18** *UCLA Law Review*, 855-873.
- Frohlich, Norman and Oppenheimer, Joe E. (1972), 'A Reformulation of the Collective Good: Private Good Distinction', presented at the 1972 annual meeting of the Public Choice Society, Pittsburgh, PA, May 3-6, 1972.
- Frohlich, Norman, Oppenheimer, Joe A. and Young, Oran R. (1971), *Political Leadership and Collective Goods*, Princeton, NJ, Princeton University Press.
- Furubotn, Eirik G. (1987), 'Privatizing the Commons: Comment, with Reply by Terry L. Anderson and Peter J. Hill', **54** *Southern Economic Journal*, 219-224.

- Furubotn, Eirik G. and Pejovich, Svetozar (1972), 'Property Rights and Economic Theory; A Survey of Recent Literature', **10** *Journal of Economic Literature*, 1137-1162.
- Gadgil, Madhav and Iyer, Prema (1989), 'On the Diversification of Common-Property Resource Use by Indian Society', in Berkes, Fikret (ed.), *Common Property Resources: Ecology and Community-Based Sustainable Development*, London, Belhaven Press, 240-272.
- Gaffney, Mason (1992), 'The Taxable Surplus in Water Resources', **10** *Contemporary Policy Issues*, 74-82.
- Gardner, Roy and Ostrom, Elinor (1991), 'Rules and Games', **70** *Public Choice*, 121-149.
- Gardner, Roy, Ostrom, Elinor and Walker, James M. (1990), 'The Nature of Common-Pool Resource Problems', **2** *Rationality and Society*, 335-358.
- Gardner, Roy, Ostrom, Elinor and Walker, James M. (1994), 'Social Capital and Cooperation: Communication, Bounded Rationality, and Behavioral Heuristics', in Schulz, U., Albers, W. and Mueller, U. (eds), *Social Dilemmas and Cooperation*, New York, Springer-Verlag, 375-411.
- Ghoshal, Sumantra and Moran, Peter (1996), 'Bad for Practice: A Critique of the Transaction Cost Theory', **21** *Academy of Management Review*, 13-47.
- Gibson, Clark (forthcoming), *Peasants, Poachers, and Politicians: The Political Economy of Wildlife in Africa*, Cambridge, Cambridge University Press.
- Gibson, Clark and Marks, Stuart (1995), 'Transforming Rural Hunters Into Conservationists: An Assessment of Community-Based Wildlife Management Programs in Africa', **23** *World Development*, 941-957.
- Gilles, Jere L. and Jamtgaard, Keith (1981), 'Overgrazing in Pastoral Areas: The Commons Reconsidered', **2** *Sociologia Ruralis*, 335-358.
- Glaser (Picht), Christine (1987), 'Common Property Regimes in Swiss Alpine Meadows', presented at the Conference on Advances in Comparative Institutional Analysis, Inter-University Center of Postgraduate Studies, Dubrovnik, Yugoslavia, October 19-23.
- Godwin, R. Kenneth and Shepard, W. Bruce (1977), 'Population Issues and Commons Dilemmas', **6** *Policy Studies Journal*, 231-238.
- Godwin, R. Kenneth and Shepard, W. Bruce (1979), 'Forcing Squares, Triangles, and Ellipses into a Circular Paradigm: The Use of the Commons Dilemma in Examining the Allocation of Common Resources', **32** *Western Political Quarterly*, 265-277.
- Goetze, David B. (1987), 'Identifying Appropriate Institutions for Efficient Use of Common Pools', **27** *Natural Resources Journal*, 187-191.
- Goldsmith, Edward et al. (eds) (1992), *Whose Common Future? A Special Issue of The Ecologist*, Vol. 22, No.4, July/August 1992, Dorset, Agriculture House.
- Gordon, H. Scott (1954), 'The Economic Theory of a Common-Property Resource: The Fishery', **62** *Journal of Political Economy*, 124-142.
- Grima, A.P. Limo and Berkes, Fikret (1989), 'Natural Resources: Access, Rights to Use and Management', in Berkes, Fikret (ed.), *Common Property Resources; Ecology and Community-Based Sustainable Development*, London, Belhaven, 33-54.
- Grossi, Paolo (1981), *An Alternative to Private Property; Collective Property in the Juridical Consciousness of the Nineteenth Century*, Chicago, University of Chicago Press.

- Guillet, David W. (1992), *Covering Ground: Communal Water Management and the State in the Peruvian Highlands*, Ann Arbor, MI, University of Michigan Press.
- Gupta, Anil K. (1985), *Managing Common Properties: Some Issues in Institutional Design*, Indian Institute of Management, Center for Management in Agriculture, Ahmedabad, India, presented at the Common Property Resource Management Conference, Annapolis, MD, April 21-26, 1985.
- Gupta, Anil K. (1986), 'Socioecology of Stress: Why Do Common Property Resource Management Projects Fail?', in National Research Council, *Proceedings of the Conference on Common Property Resource Management*, Washington, DC, National Academy Press, 305-322.
- Gwartney, James D. and Stroup, Richard (1988), 'Communal vs. Private Property Rights', *38 Freeman*, 58-59.
- Hackett, Steven, Dudley, Dean and Walker, James (1995), 'Heterogeneities, Information and Conflict Resolution: Experimental Evidence on Sharing Contracts', in Keohane, Robert O. and Ostrom, Elinor (eds), *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*, London, Sage, 93-124.
- Hackett, Steven, Schlager, Edella and Walker, James M. (1994), 'The Role of Communication in Resolving Commons Dilemmas: Experimental Evidence with Heterogeneous Appropriators', *27 Journal of Environmental Economics and Management*, 99-126.
- Haefele, Edwin T. (ed.) (1974), *The Governance of Common Property Resources*, Baltimore, MD, Johns Hopkins University Press.
- Hanna, Susan (1995), 'Efficiencies of User Participation in Natural Resource Management', in Hanna, Susan and Munasinghe, Mohan (eds), *Property Rights and the Environment*, Stockholm and Washington, DC, The Beijer International Institute of Ecological Economics and The World Bank, 59-68.
- Hanna, Susan, Folke, Carl and Mäler, Karl-Göran (1995), 'Property Rights and Environmental Resources', in Hanna, Susan and Munasinghe, Mohan (eds), *Property Rights and the Environment*, Stockholm and Washington, DC, The Beijer International Institute of Ecological Economics and The World Bank, 15-30.
- Hanna, Susan, Folke, Carl and Mäler, Karl-Göran (eds) (1996), *Rights to Nature: Ecological, Economic, Cultural, and Political Principles of Institutions for the Environment*, Washington, DC, Island Press.
- Hanna, Susan and Munasinghe, Mohan (1995a), 'An Introduction to Property Rights and the Environment', in Hanna, Susan and Munasinghe, Mohan (eds), *Property Rights and the Environment*, Stockholm and Washington, DC, The Beijer International Institute of Ecological Economics and The World Bank.
- Hanna, Susan and Munasinghe, Mohan (eds) (1995b), *Property Rights and the Environment*, Stockholm and Washington, DC, The Beijer International Institute of Ecological Economics and The World Bank.
- Hanna, Susan and Munasinghe, Mohan (eds) (1995c), *Property Rights in a Social and Ecological Context; Case Studies and Design Applications*, Stockholm and Washington, DC, The Beijer International Institute of Ecological Economics and The World Bank.
- Hardin, Garrett (1968), 'The Tragedy of the Commons', *162 Science*, 1243-1248.
- Hardin, Garrett (1985), *Filters Against Folly: How to Survive Despite Economics, Ecologist and the Merely Eloquent*, New York, Viking.

- Hardin, Garrett (1991), 'The Tragedy of the Unmanaged Commons: Population and the Disguises of Providence', in Andelson, R.V. (ed.), *Commons Without Tragedy*, Savage, MD, Barnes and Noble.
- Hardin, Garrett and Baden, John (eds) (1977), *Managing the Commons*, San Francisco, W.H. Freeman.
- Hayami, Yujiro and Otsuka, Keijiro (1993), *The Economics of Contract Choice*, Oxford, Clarendon Press.
- Herring, Ronald J. (1990), 'Resurrecting the Commons: Collective Action and Ecology', **44** *Items*, 64-68.
- Hess, Charlotte (1996), *Common Pool Resources and Collective Action: A Bibliography, Volume 3*, Bloomington, IN, Indiana University, Workshop in Political Theory and Policy Analysis.
- Higgs, Robert (1982), 'Legally Induced Technical Regress in the Washington Salmon Fishery', **7** *Research in Economic History*, 55-86.
- Higgs, Robert (1996), 'Legally Induced Technical Regress in the Washington Salmon Fishery', in Alston, Lee J., Eggertsson, Thráinn and North, Douglass C. (eds), *Empirical Studies in Institutional Change*, New York, Cambridge University Press, 247-279.
- Hilton, Rita (1992), 'Institutional Incentives for Resource Mobilization: An Analysis of Irrigation Schemes in Nepal', **4** *Journal of Theoretical Politics*, 283-308.
- Hine, Donald William (1990), 'The Commons Dilemma: Quantitative Review', MA Thesis, University of Victoria.
- Hoebel, E. Adamson (1954), *The Law of Primitive Man: A Study in Comparative Legal Dynamics*, Cambridge, MA, Harvard University Press.
- Hoff, Karla and Lyon, Andrew (1993), *The Sequencing of Land and Credit Reforms in Developing Countries: A Theoretical Perspective*, Washington, DC, Institute for Policy Reform.
- Hotelling, Harold (1931), 'The Economics of Exhaustible Resources', **39** *Journal of Political Economy*, 137-175.
- Jankowski, Richard (1990), 'Punishment in Iterated Chicken and Prisoner's Dilemma Games', **2** *Rationality and Society*, 449-470.
- Jodha, Narpal S. (1986), 'Common Property Resources and Rural Poor in Dry Regions of India', **21** *Economic and Political Weekly*, 1169-1181.
- Jodha, Narpal S. (1990), 'Depletion of Common Property Resources in India: Micro-level Evidence', in McNicoll, G. and Cain, M. (eds), *Rural Development and Population: Institutions and Policy*, Oxford, Oxford University Press, 261-283.
- Jodha, Narpal S. (1996), 'Property Rights and Development', in Hanna, Susan S., Folke, Carl and Mäler, Karl-Göran (eds), *Rights to Nature*, Washington, DC, Island Press, 205-222.
- Johnson, Baylor L. (1995), 'Common Property and Corporate Property: A Comparison of Property Rights', presented at 'Reinventing the Commons,' the fifth annual conference of the International Association for the Study of Common Property, Bodo, Norway, May 24-28.
- Johnson, Omotunde E.G. (1972), 'Economic Analysis: the Legal Framework and Land Tenure Systems', **15** *Journal of Law and Economics*, 259-276.



- Johnson, Ronald N. (1985), 'Restraint Under Open Access: Are Voluntary Incentives Sufficient or is Coercion Required?', *67 American Journal of Agricultural Economics*, 373-376.
- Johnson, Ronald N. and Libecap, Gary D. (1982), 'Contracting Problems and Regulation: The Case of the Fishery', *72 American Economic Review*, 1005-1022.
- Kaitala, Veijo T. and Munro, Gordon R. (1995), 'The Management of Transboundary Resources and Property Rights Systems: The Case of Fisheries', in Hanna, Susan and Munasinghe, Mohan (eds), *Property Rights and the Environment*, Stockholm and Washington, DC, The Beijer International Institute of Ecological Economics.
- Kanbur, Ravi (1991), *Heterogeneity, Distribution and Cooperation in Common Property Resource Management*, Background paper, Washington, DC, The World Bank.
- Karp, Larry S. (1992), 'Efficiency Inducing Tax for a Common Property Oligopoly', *102 The Economic Journal*, 321-332.
- Kaul, Minoti Chakravarty (1996), *Common Lands and Customary Law: Institutional Change in North India over the Past Two Centuries*, Oxford, Oxford University Press.
- Kenkman, Paul (1995), *Public Versus Private Property: Opinions of Estonians at the Time of Transition*, presented at 'Reinventing the Commons,' the fifth annual conference of the International Association for the Study of Common Property, Bodoe, Norway.
- Keohane, Robert O., Haas, Peter M. and Levy, Marc A. (1993), 'The Effectiveness of International Environmental Institutions and Transboundary and Commons Problems', in Haas, Peter M., Keohane, Robert O. and Levy, Marc A. (eds), *Institutions for the Earth; Sources of Effective International Environmental Protection*, Cambridge, MA, MIT Press.
- Keohane, Robert O. and Ostrom, Elinor (eds) (1995), *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*, London, Sage.
- Kiser, Larry L. and Ostrom, Elinor (1982), 'The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches', in Ostrom, Elinor (ed.), *Strategies of Political Inquiry*, Beverly Hills, CA, Sage, 179-222.
- Knight, F. (1924), 'Some Fallacies in the Interpretation of Social Cost', *38 Quarterly Journal of Economics*, 582-606.
- Kramer, R.M. and Brewer, Marilyn M. (1986), 'Social Group Identity and the Emergence of Cooperation in Resource Conservation Dilemmas', in Wilke, Henk A., Messick, David M. and Rutte, Christel G. (eds), *Experimental Social Dilemmas*, Frankfurt, Verlag Peter Lang.
- Krueckeberg, D.A. (1995), 'The Difficult Character of Property: To Whom Do Things Belong?', *61 Journal of the American Planning Association*, 301-386.
- Kruskal, Joseph B. (1983), 'An Overview of Sequence Comparison', in Sankoff, David and Kruskal, Joseph B. (eds), *Time Warps, String Edits, and Macromolecules: The Theory and Practice of Sequence Comparison*, Reading, MA, Addison-Wesley.
- Lam, Wai Fung (1996), 'Institutional Design of Public Agencies and Coproduction: A Study of Irrigation Associations in Taiwan', *24 World Development*, 1039-1054.
- Lam, Wai Fung (1998), *Institutions, Engineering Infrastructure, and Performance in the Governance and Management of Irrigation Systems: The Case of Nepal*, San Francisco, ICS Press.

- Larson, Bruce A. and Bromley, Daniel W. (1990), 'Property Rights, Externalities, and Resource Degradation: Locating the Tragedy', **33** *Journal of Development Economics*, 235-262.
- Laveleye, Emile de (1985), *Primitive Property*; Translated from the French of Emile de Laveleye, ed. G.R.L. Marriott, Littleton, CO, F.B. Rothman (Reprint of 1878 edn).
- Lee, Myungsuk (1994), *Institutional Analysis, Public Policy, and the Possibility of Collective Action in Common Pool Resources: A Dynamic Game Theoretic Approach*, Ph.D. dissertation, Indiana University.
- Levi, Margaret and North, Douglass C. (1982), 'Toward a Property Rights Theory of Exploitation', **11** *Politics and Society*, 315-320.
- Levine, B.L. (1986), 'The Tragedy of the Commons and the Comedy of Community: The Commons in History', **14** *Journal of Community Psychology*, 81-99.
- Lewis, Tracy R. and Cowens, James (1983), *Cooperation in the Commons: An Application of Repetitious Rivalry*, Vancouver, University of British Columbia Press.
- Libecap, Gary D. (1989a), *Contracting for Property Rights*, New York, Cambridge University Press.
- Libecap, Gary D. (1989b), 'Distributional Issues in Contracting for Property Rights', **145** *Journal of Institutional and Theoretical Economics*, 6-24.
- Libecap, Gary D. (1995), 'The Conditions for Successful Collective Action', in Keohane, Robert O. and Ostrom, Elinor (eds), *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*, London, Sage, 161-190.
- Libecap, Gary D. and Wiggins, Steven N. (1984), 'Contractual Responses to the Common Pool: Prorationing of Crude Oil Production', **74** *American Economic Review*, 87-98.
- Lichbach, Mark I. (1996), *The Cooperator's Dilemma*, Ann Arbor, University of Michigan Press.
- Lipnowski, Irwin F. (1991), *Solving the 'Tragedy of the Commons': An Alternative to Privatization*, presented at the second annual conference of the International Association for the Study of Common Property, Winnipeg, Manitoba, September.
- Lueck, Dean (1994), 'Common Property as an Egalitarian Share Contract', **25** *Journal of Economic Behavior and Organization*, 93-108.
- Lueck, Dean (1995), 'The Rule of First Possession and the Design of the Law', **38** *Journal of Law and Economics*, 393-436.
- Lund, Soren (1995), *Institutional Rational Choice Theory and Design of Appropriate Institutional Arrangements for Natural Resource Management*, presented at 'Reinventing the Commons,' the fifth annual conference of the International Association for the Study of Common Property, Bodoe, Norway, May 24-28.
- Maass, Arthur and Anderson, Raymond L. (1986), . . . and the Desert Shall Rejoice: *Conflict, Growth, and Justice in Arid Environments*, Malabar, FL, R.E. Krieger.
- Macpherson, C.B., Parel, Anthony and Flanagan, Thomas (1979), *Theories of Property: Aristotle to the Present: Essays*, Waterloo, Ontario, Wilfred Laurier University Press for the Calgary Institute for the Humanities.
- Magrath, William B. (1989), 'The Challenge of the Commons: The Allocation of Nonexclusive Resources', Washington, DC, The World Bank.
- Maine, Henry Sumner (1890), *On Early Law and Custom*, London, J. Murray.

- Maine, Henry Sumner (1963), *Ancient Law: Its Connection with the Early History of Society and its Relation to Modern Ideas; With Introduction and Notes by Frederick Pollack*, Boston, Beacon Press (Reprint of 1861 edn).
- Marchak, Patricia, Guppy, Neil and McMullan, John (eds) (1987), *Uncommon Property: The Fishing and Fish-Processing Industries in British Columbia*, New York, Methuen.
- Martichuski, Diane K. and Bell, Paul A. (1991), 'Reward, Punishment, Privatization, and Moral Suasion in a Commons Dilemma', **21** *Journal of Applied Social Psychology*, 1356-1369.
- Martin, Edward G. (1986), 'Resource Mobilization, Water Allocation, and Farmer Organization in Hill Irrigation Systems in Nepal', Ph.D. dissertation, Cornell University.
- Martin, Edward G. and Yoder, Robert (1983a), 'Review of Farmer-Managed Irrigation in Nepal', in *Water Management in Nepal: Proceedings of the Seminar on Water Management Issues, July 31-August 2*, Kathmandu, Nepal, Ministry of Agriculture, Agricultural Projects Services Centre, and the Agricultural Development Council, 82-91.
- Martin, Edward G. and Yoder, Robert (1983b), 'The Chherlung Thulo Kulo: A Case Study of a Farmer-Managed Irrigation System', in *Water Management in Nepal: Proceedings of the Seminar on Water Management Issues, July 31-August 2*, Kathmandu, Nepal, Ministry of Agriculture, Agricultural Projects Services Centre, and the Agricultural Development Council, 203-217.
- Martin, Edward G. and Yoder, Robert (1983c), *Water Allocation and Resource Mobilization for Irrigation: A Comparison of Two Systems in Nepal*, presented at the annual meeting of the Nepal Studies Association, University of Wisconsin, Madison, WI.
- Martin, Fenton (1989), *Common Pool Resources and Collective Action: A Bibliography, Volume 1*, Bloomington, IN, Indiana University, Workshop in Political Theory and Policy Analysis.
- Martin, Fenton (1993), *Common Pool Resources and Collective Action: A Bibliography, Volume 2*, Bloomington, IN, Indiana University, Workshop in Political Theory and Policy Analysis.
- Martin, Kent O. (1979), 'Play by the Rules or Don't Play at All: Space Division and Resource Allocation in a Rural Newfoundland Fishing Community', in Anderson, Raoul (ed.), *North Atlantic Maritime Cultures: Anthropological Essays on Changing Adaptations*, The Hague, Netherlands, Mouton, 276-298.
- Martin, Lisa L. (1995), 'Heterogeneity, Linkage and Commons Problems', in Keohane, Robert O. and Ostrom, Elinor (eds), *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*, London, Sage, 71-92.
- Marwell, Gerald and Oliver, Pamela (1993), *The Critical Mass in Collective Action: A Micro-Social Theory*, New York, Cambridge University Press.
- Mason, C.F., Sandler, Todd and Cornes, Richard (1988), 'Expectations, the Commons, and Optimal Group Size', **15** *Journal of Environmental Economics and Management*, 99-110.
- Matthews, David Ralph (1993), *Controlling Common Property: Regulating Canada's East Coast Fishery*, Toronto, University of Toronto Press.

- Maurer, Georg Ludwig von (1854), *Einleitung zur Geschichte der Mark-, Hof Dorf- und Stadtverfassung unter der Öffentlichen Gewalt*, Munich, Verlag von Christian Kaiser.
- Maurer, Georg Ludwig von (1856), *Geschichte der Markenverfassung in Deutschland*, Erlangen, F. Enke.
- McCay, Bonnie J. (1992), 'Everyone's Concern, Whose Responsibility?: The Problem of the Commons', in Ortiz, S. and Lees, S. (eds), *Understanding Economic Process: Monographs in Economic Anthropology, no. 10*, Lanham, MD, University Press of America.
- McCay, Bonnie J. (1996), 'Common and Private Concerns', in Hanna, Susan, Folke, Carl, and Mäler, Karl-Göran (eds), *Rights to Nature: Ecological, Economic, Cultural, and Political Principles of Institutions for the Environment*, Washington, DC, Island Press, 111-126.
- McCay, Bonnie J. and Acheson, James M. (eds) (1987), *The Question of the Commons: The Culture and Ecology of Communal Resources*, Tucson, AZ, University of Arizona Press.
- McCay, Bonnie, Wright, Ian, Apostle, Richard and Mazany, Leigh (1996), 'Fleet Concentration in an ITQ Fishery: A Case Study of the Southwest Nova Scotia Mobile Gear Fleet', presented at the sixth annual conference of the International Association for the Study of Common Property, Berkeley, CA, June 5-8, 1996.
- McCloskey, Donald N. (1976), 'English Open Fields as Behavior Towards Risk', in Uselding, Paul J. (ed.), *Research in Economic History I*, Greenwich, CT, JAI Press.
- McCloskey, Donald N. (1989), 'The Open Fields of England: Rent, Risk, and the Rate of Interest, 1300-1815', in Galenson, David W. (ed.), *Markets in History: Economic Studies of the Past*, Cambridge, Cambridge University Press.
- McGinnis, Michael and Ostrom, Elinor (eds) (1996), 'Design Principles for Local and Global Commons', in Young, Oran R. (ed.), *The International Political Economy and International Institutions, Vol. II*, Cheltenham, Edward Elgar, 465-493.
- McKean, Margaret A. (1982), 'The Japanese Experience with Scarcity: Management of Traditional Common Lands', *6 Environmental Review*, 63-88.
- McKean, Margaret A. (1992a), 'Management of Traditional Common Lands (*Iriaichi*) in Japan', in Bromley, Daniel W., et al. (eds), *Making the Commons Work: Theory, Practice, and Policy*, San Francisco, ICS Press, 63-98.
- McKean, Margaret A. (1992b), 'Success on the Commons: A Comparative Examination of Institutions for Common Property Resource Management', *4 Journal of Theoretical Politics*, 247-282.
- McKean, Margaret A. (1995), *Common Property Regimes as a Solution to Problems of Scale and Linkage*, presented at 'Reinventing the Commons,' the fifth annual conference of the International Association for the Study of Common Property, Bodoe, Norway, May 24-28.
- McKean, Margaret A. (1996), *Common Property: What Is It, What Is It Good For, and What Makes It Work?*, Forests, Trees and People Programme, Phase II, Working paper, Rome, Food and Agriculture Organization of the United Nations.
- McKean, Margaret A. and Ostrom, Elinor (1995), 'Common Property Regimes in the Forest: Just a Relic from the Past?', *46 Unasylva*, 3-15.
- McKlevay, R. (1985), 'Decentralized Regulation of a Common Property Renewable Resource Industry with Irreversible Investment', *12 Journal of Environmental Economics and Management*, 287-307.

- McMillan, John and Sinn, H.W. (1984), 'Oligopolistic Extraction of a Common-Property Resource: Dynamic Equilibria', in Kemp, M.C. and Long, N.V. (eds), *Essays in the Economics of Exhaustible Resources*, Amsterdam, North Holland.
- Mearns, Robin (1996), 'Community, Collective Action and Common Grazing: The Case of Post-Socialist Mongolia', **32** *Journal of Development Studies*, 297-339.
- Merlo, M. (1989), 'The Experience of the Village Communities in the North-Eastern Italian Alps', in Merlo, M., et al. (eds), *Collective Forest Land Tenure and Rural Development in Italy*, Rome, Italy, Food and Agriculture Organization of the United Nations, 1-54.
- Messerschmidt, Donald A. (1986), 'People and Resources in Nepal: Customary Resource Management Systems of the Upper Kali Gandaki', in National Research Council, *Proceedings of the Conference on Common Property Resource Management*, Washington, DC, National Academy Press, 455-480.
- Messerschmidt, Donald A. (ed.) (1993), *Common Forest Resource Management: Annotated Bibliography of Asia, Africa, and Latin America*, Forests, Trees and People Programme, Rome, Italy, Food and Agriculture Organization of the United Nations.
- Messick, David M., et al. (1983), 'Individual Adaptations and Structural Change as Solutions to Social Dilemmas', **44** *Journal of Personality and Social Psychology*, 294-309.
- Mestelman, Stuart (1995), 'Studying Environmental Regulation in Laboratory Environments', presented at 'Reinventing the Commons', the fifth annual conference of the International Association for the Study of Common Property, Bodo, Norway, May 24-28.
- Migot-Adholla, Shem E., Hazell, Peter, Blarel, Benoit and Place, Frank (1991), 'Indigenous Land Rights Systems in Sub-Saharan Africa: A Constraint on Productivity?', **5** *World Bank Economic Review*, 155-175.
- Miller, David (1989), 'The Evolution of Mexico's Spiny Lobster Fishery', in Berkes, Fikret (ed.), *Common Property Resources: Ecology and Community-Based Sustainable Development*, London, Belhaven Press, 185-198.
- Mitchell, Ronald B. (1995), 'Heterogeneities at Two Levels: States, Non-state Actors and Intentional Oil Pollution', in Keohane, Robert O. and Ostrom, Elinor (eds), *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*, London, Sage, 223-251.
- Monbiot, George (1994), 'The Tragedy of Enclosure', **270** *Scientific American*, 159-160.
- Montias, John Michael (1976), *The Structure of Economic Systems*, New Haven, CT, Yale University Press.
- Morgan, Betty N. (1995), 'Chaos on the Commons: Considering the Implications of Nonequilibrium Theory for Common Property Research', presented at 'Reinventing the Commons', the fifth annual conference of the International Association for the Study of Common Property, Bodo, Norway, May 24-28.
- Moulin, Hervé (1990), 'Interpreting Common Ownership', presented at the first annual conference of the International Association for the Study of Common Property, Durham, NC, September 27-30.
- Murphy, Earl Finbar (1977), *Nature, Bureaucracy and the Rules of Property: Regulating the Renewing Environment*, New York, North-Holland.

- Nabli, Mustapha K. and Nugent, Jeffrey B. (1989), *The New Institutional Economics and Development: Theory and Tunisian Case Studies*, Amsterdam, North-Holland.
- Nam, Kidok (1991), 'The Effects of Uncertainty and Penalty on Cooperative Behavior in a Resource Dilemma', Ph.D. dissertation, University of Illinois at Urbana-Champaign.
- Negry, Donald H. (1989), 'The Common Property Aquifer as a Differential Game', **25** *Water Resources Research*, 9-15.
- Netting, Robert McC. (1976), 'What Alpine Peasants Have in Common: Observations on Communal Tenure in a Swiss Village', **4** *Human Ecology*, 135-146.
- Netting, Robert McC. (1981), *Balancing on an Alp: Ecological Change and Continuity in a Swiss Mountain Community*, New York, Cambridge University Press.
- Netting, Robert McC. (1982), 'Territory, Property, and Tenure', in Adams, R. McC., Smelser, N.J. and Treiman, D.J. (eds), *Behavioral and Social Science Research: A National Resource*, Washington, DC, National Academy Press, 446-501.
- Netting, Robert McC. (1993), *Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture*, Stanford, CA, Stanford University Press.
- North, Douglass C. (1990), *Institutions, Institutional Change, and Economic Performance*, New York, Cambridge University Press.
- North, Douglass C. (1993), 'Toward a Theory of Institutional Change', in Barnett, W.A., Hinich, M.J., and Schofield, N.J. (eds), *Political Economy: Institutions, Competition, and Representation*, New York, Cambridge University Press.
- North, Douglass C. and Thomas, Robert Paul (1976), *The Rise of the Western World: A New Economic History*, London, Cambridge University Press.
- North, Douglass C., Anderson, Terry L. and Hill, Peter J. (1983), *Growth and Welfare in the American Past: A New Economic History*, Englewood Cliffs, NJ, Prentice-Hall.
- Nugent, Jeffrey B. and Sanchez, Nicolas (1989), 'The Efficiency of the Mesta Reconsidered: A Parable', **26** *Explorations in Economic History*, 261-284.
- Nugent, Jeffrey B. and Sanchez, Nicolas (1993), 'Tribes, Chiefs, and Transhumance: A Comparative Institutional Analysis', **42** *Economic Development and Cultural Change*, 87-113.
- Nugent, Jeffrey B. and Sanchez, Nicolas (1994), 'The Local Variability of Rainfall and Tribal Institutions: The Case of Sudan', presented to the session entitled 'Political Economy and Institutions of the Middle East', Middle East Economic Association/ASSA meeting, Washington, DC, January 7, 1995.
- Nugent, Jeffrey B. and Sanchez, Nicolas (1995), 'The Local Variability of Rainfall and Tribal Institutions: The Case of Sudan', presented to the Middle East Economic Association/ASSA meeting, Washington, DC, January 7.
- Oakerson, Ronald J. (1992), 'Analyzing the Commons: A Framework', in Bromley, Daniel W., et al. (eds), *Making the Commons Work: Theory, Practice, and Policy*, San Francisco, ICS Press, 41-59.
- Oliver, Pamela (1971), 'Rewards and Punishments as Selective Incentives for Collective Action: Theoretical Investigations', **85** *American Journal of Sociology*, 1356-1375.
- Olson, Mancur (1965), *The Logic of Collective Action: Public Goods and the Theory of Groups*, Cambridge, MA, Harvard University Press.
- Örebech, Peter (1982), *Konsesjoner i fisket*, Oslo, Tano.

- Örebech, Peter (1993), 'Common and Public Property Rights Regimes to Non-Private Resources. Some Legal Issues on Self-Governing Conservation Systems', in Berge, Erling (ed.), *Common Property Regimes: Law and Management of Non-Private Resources; Proceedings of the Conference, Vol. I*, Ås, Norway, The Agricultural University of Norway.
- Ostrom, Elinor (1977), 'Collective Action and the Tragedy of the Commons', in Hardin, Garrett and Baden, John (eds), *Managing the Commons*, San Francisco, W.H. Freeman, 173-181.
- Ostrom, Elinor (1986a), 'How Inexorable is the 'Tragedy of the Commons? Institutional Arrangements for Changing the Social Structure of Social Dilemmas', presented as a Distinguished Faculty Research Lecture, Office of Research and Graduate Development, Indiana University, Bloomington, IN, April 3.
- Ostrom, Elinor (1986b), 'Issues of Definition and Theory: Some Conclusions and Hypotheses', in National Research Council, *Proceedings of the Conference on Common Property Resource Management*, Washington, DC, National Academy Press, 599-615.
- Ostrom, Elinor (1987), 'Institutional Arrangements for Resolving the Commons Dilemma: Some Contending Approaches', in McCay, Bonnie J. and Acheson, James M. (eds), *The Question of the Commons: The Culture and Ecology of Communal Resources*, Tucson, AZ, University of Arizona, 250-265.
- Ostrom, Elinor (1990), *Governing the Commons: The Evolution of Institutions for Collective Action*, New York, Cambridge University Press.
- Ostrom, Elinor (1992), 'The Rudiments of a Theory of the Origins, Survival, and Performance of Common-Property Institutions', in Bromley, Daniel W., et al. (eds), *Making the Commons Work: Theory, Practice, and Policy*, San Francisco, ICS Press, 293-318.
- Ostrom, Elinor (1993), 'The Evolution of Norms, Rules, and Rights', presented at a Workshop on Social and Ecological System Linkages of the Property Rights and Performance of Natural Resource Systems Group at the Beijer International Institute of Ecological Economics, The Royal Swedish Academy of Sciences, Stockholm, Sweden, September 2-4.
- Ostrom, Elinor (1995a), 'Constituting Social Capital and Collective Action', in Keohane, Robert O. and Ostrom, Elinor (eds), *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*, London, Sage, 125-160.
- Ostrom, Elinor (1995b), 'Designing Complexity to Govern Complexity', in Hanna, Susan and Munasinghe, Mohan (eds), *Property Rights and the Environment: Social and Ecological Issues*, Stockholm and Washington, DC, The Beijer International Institute of Ecological Economics and The World Bank, 33-45.
- Ostrom, Elinor (1996), 'Incentives, Rules of the Game, and Development', in *Proceedings of the Annual World Bank Conference on Development Economics 1995*, Washington, DC, The World Bank, 207-234.
- Ostrom, Elinor and Gardner, Roy (1993), 'Coping with Asymmetries in the Commons: A Challenge for Development', in Berge, Erling (ed.), *Common Property Regimes: Law and Management of Non-Private Resources; Proceedings of the Conference, Vol. I*, Ås, Norway, The Agricultural University of Norway, 15-39.

- Ostrom, Elinor and Schlager, Edella (1996), 'The Formation of Property Rights', in Hanna, Susan, Folke, Carl, and Mäler, Karl-Göran (eds), *Rights to Nature*, Washington, DC, Island Press, 127-156.
- Ostrom, Elinor and Walker, James M. (1991), 'Communication in a Commons: Cooperation without External Enforcement', in Palfrey, Thomas (ed.), *Laboratory Research in Political Economy*, Ann Arbor, MI, University of Michigan Press, 287-322.
- Ostrom, Elinor, Gardner, Roy and Walker, James M. (1994), *Rules, Games, and Common-Pool Resources*, Ann Arbor, MI, University of Michigan Press.
- Ostrom, Elinor, Gardner, Roy and Walker, James M. (1997), 'Theory, Field, and Laboratory: The Continuing Dialogue', in Albers, Wulf, Güth, Werner, Hammerstein, Peter, Moldovanu, Benny, and van Damme, Eric (eds), *Understanding Strategic Interaction: Essays in Honor of Reinhard Selten*, Berlin, Springer-Verlag, 386-393.
- Ostrom, Elinor, Walker, James and Gardner, Roy (1992), 'Covenants With and Without A Sword: Self-Governance is Possible', *86 American Political Science Review*, 404-417.
- Ostrom, Vincent (1975a), 'Alternative Approaches to the Organization of Public Proprietary Interests', *15 Natural Resources Journal*, 765-789.
- Ostrom, Vincent (1975b), 'Public Choice Theory: A New Approach to Institutional Economics', *58 American Journal of Agricultural Economics*, 844-850.
- Ostrom, Vincent (1982), 'A Forgotten Tradition: The Constitutional Level of Analysis', in Gillespie, Judith A. and Zinnes, Dina A. (eds), *Missing Elements in Political Inquiry: Logic and Levels of Analysis*, Beverly Hills, CA, Sage, 237-252.
- Ostrom, Vincent (1984), 'Why Governments Fail: An Inquiry Into the Use of Instruments of Evil to do Good', in Buchanan, James M. and Tollison, Robert D. (eds), *The Theory of Public Choice - II*, Ann Arbor, MI, University of Michigan Press, 422-435.
- Ostrom, Vincent (1989), 'Some Developments in the Study of Market Choice, Public Choice, and Institutional Choice', in Rabin, Jack, Hildreth, W. Bartley, and Miller, Gerald J. (eds), *Handbook of Public Administration*, New York, Marcel Dekker, 861-882.
- Ostrom, Vincent and Ostrom, Elinor (1977a), 'Public Goods and Public Choices', in Savas, E.S. (ed.), *Alternatives for Delivering Public Services: Toward Improved Performance*, Boulder, CO, Westview Press, 7-49.
- Ostrom, Vincent and Ostrom, Elinor (1977b), 'A Theory for Institutional Analysis of Common Pool Problems', in Hardin, Garrett and Baden, John (eds), *Managing the Commons*, San Francisco, W.H. Freeman, 157-172.
- Ostrom, Vincent, Feeny, David and Picht, Hartmut (eds) (1988), *Rethinking Institutional Analysis and Development; Issues, Alternatives, and Choices*, San Francisco, ICS Press.
- Oye, Kenneth A. and Maxwell, James H. (1995), 'Self-interest and Environmental Management', in Keohane, Robert O. and Ostrom, Elinor (eds), *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*, London, Sage, 191-221.
- Panayotou, Theodore (1982), 'Management Concepts for Small-Scale Fisheries: Economic and Social Aspects', FAO Fisheries Technical Paper no. 228, Rome, Italy, Food and Agriculture Organization of the United Nations.



- Panayotou, Theodore and Ashton, Peter S. (1992), *Not by Timber Alone: Economics and Ecology for Sustaining Tropical Forests*, Washington, DC, Island Press.
- Paul, Ellen Frankel, Miller, Fred D. and Paul, Jeffrey (eds) (1994), *Property Rights*, New York, Cambridge University Press.
- Peters, Pauline E. (1994a), *Dividing the Commons: Politics, Policy, and Culture in Botswana*, Charlottesville, VA, University Press of Virginia.
- Peters, Pauline E. (1994b), 'Common Property, Property and Social Analysis', presented at the Society for Economic Anthropology meeting, March 1994.
- Pinkerton, Evelyn (ed.) (1989), *Co-Operative Management of Local Fisheries: New Directions for Improved Management and Community Development*, Vancouver, Canada, University of British Columbia.
- Pinkerton, Evelyn (1992), 'Conclusions: Where Do We Go From Here? The Future of Traditional Ecological Knowledge and Resource Management in Canadian Native Communities', in Boothroyd, P. and Sadler, B. (eds), *Traditional Ecological Knowledge and Environmental Assessment*, Ottawa, Canadian Environmental Assessment Research Council.
- Pinkerton, Evelyn (1994), 'Local Fisheries Co-Management: A Review of International Experiences and Their Implications for Salmon Management in British Columbia', **51**, *Canadian Journal of Fisheries and Aquatic Sciences*, 2363-2378.
- Place, Frank and Hazell, Peter (1993), 'Productivity Effects of Indigenous Land Tenure Systems in Sub-Saharan Africa', **75** *American Journal of Agricultural Economics*, 10-19.
- Plourde, C.G. (1970), 'Exploitation of Common Property Replenishable Natural Resources', **9** *Western Economic Journal*, 256-266.
- Posner, Richard A. (1980), 'A Theory of Primitive Society, with Special Reference to Law', **23** *Journal of Law and Economics*, 1-53.
- Provencher, Bill (1991), 'A Quantitative Analysis of Private Property Rights in Groundwater', Ph.D. Dissertation, University of California, Davis.
- Putterman, Louis (1995), 'Markets, Hierarchies, and Information: On a Paradox in the Economics of Organization', **26** *Journal of Economic Behavior and Organization*, 373-390.
- Quiggin, John (1988), 'Private and Common Property Rights in the Economics of the Environment', **22** *Journal of Economic Issues*, 1071-1087.
- Randall, Alan (1975), 'Property Rights and Social Microeconomics', **15** *Natural Resources Journal*, 729-747.
- Randall, Alan (1978), 'Property Institutions and Economic Behavior', **12** *Journal of Economic Issues*, 1-21.
- Rapoport, Anatol (1988), 'Experiments with N-Person Social Traps: Tragedy of the Commons', **32** *Journal of Conflict Resolution*, 473-488.
- Rasmussen, Lise Nordvig and Meinen-Dick, Ruth (1995), 'Local Organizations for Natural Resource Management: Lessons from Theoretical and Empirical Literature', Environment and Production Technology Division, International Food Policy Research Institute, Washington, DC.
- Raychaudhuri, Bikash (1980), *The Moon and the Net: Study of a Transient Community of Fishermen at Jambudwip*, Calcutta, Government of India Press, Anthropological Survey of India.

- Repetto, Robert (1986), *Skimming the Water: Rent-Seeking and the Performance of Public Irrigation Systems*, Washington, DC, World Resources Institute.
- Ridley, Matt and Low, Bobbi S. (1993), 'Can Selfishness Save the Environment?', **272** *The Atlantic Monthly*, 76-86.
- Roberts, Russell D. (1990), 'The Tragicomedy of the Commons: Why Communities Rationally Choose 'Inefficient' Allocations of Shared Resources', St. Louis, MO, Washington University, School of Business and Center in Political Economy.
- Roemer, J. and Silvestre, J. (1991), 'Proportional Solution for Economies with both Private and Public Ownership', presented at the second annual conference of the International Association for the Study of Common Property, Winnipeg, Manitoba, September 26-29, 1991.
- Rohlmann, Monika (1992), 'Integrated Natural Resource Management - A Question of Property Institutions?', presented at the third annual conference of the International Association for the Study of Common Property, Washington, DC, September 17-20, 1992.
- Rose, Carol M. (1985), 'Possession as the Origin of Property', **52** *University of Chicago Law Review*, 73-88.
- Rose, Carol M. (1986), 'The Comedy of the Commons: Custom, Commerce, and Inherently Public Property', **53** *University of Chicago Law Review*, 711-781.
- Rose, Carol M. (1990), 'Property as Storytelling: Perspectives from Game Theory, Narrative Theory, Feminist Theory', **2** *Yale Journal of Law and the Humanities*, 37-57.
- Rose, Carol M. (1994), *Property and Persuasion*, Boulder, CO, Westview Press.
- Rose-Ackerman, Susan (1977), 'Market Models for Water Pollution Control: Their Strengths and Weaknesses', **25** *Public Policy*, 383-406.
- Rose-Ackerman, Susan (1985), 'Inalienability and the Theory of Property-Rights', **85** *Columbia Law Review*, 931-969.
- Roumasset, James A. (1991), 'Constitutional Management of Free Riders and Common Property Resources', **40** *Osaka Economic Papers*, 321-330.
- Roumasset, James A. (1992), 'The Coevolution of Property, Governance, and Inequality: A Constitutional Perspective', presented at 'Inequality and the Commons', third annual conference of the International Association for the Study of Common Property, Washington, DC, September 1992.
- Ruddle, Kenneth (1989), 'Traditional Sole Property Rights and Modern Inshore Fisheries Management in the Pacific Basin', in Campbell, H., Menz, K. and Waugh, G. (eds), *Economics of Fishery Management in the Pacific Islands Region*, Canberra, Australia, The Australian Centre for International Agricultural Research.
- Ruddle, Kenneth (1994), 'A Guide to the Literature on Traditional Community-Based Fishery Management in the Asia-Pacific Tropics', Rome, Food and Agriculture Organization of the United Nations.
- Ruddle, Kenneth (1995), 'Back to First Principles: Clearly Defined Boundaries', presented at 'Reinventing the Commons', the fifth annual conference of the International Association for the Study of Common Property, Bodoe, Norway, May 24-28.
- Runge, C. Ford (1981), 'Common Property Externalities: Isolation, Assurance and Resource Depletion in a Traditional Grazing Context', **63** *American Journal of Agriculture Economics*, 595-606.

- Runge, C. Ford (1984a), 'The Fallacy of Privatization', *7 Journal of Contemporary Studies*, 3-17.
- Runge, C. Ford (1984b), 'Institutions and the Free Rider: The Assurance Problem in Collective Action', *46 Journal of Politics*, 154-181.
- Runge, C. Ford (1984c), 'Strategic Interdependence in Models of Property Rights', *66 American Journal of Agricultural Economics*, 807-813.
- Runge, C. Ford (1985), 'The Innovation of Rules and the Structure of Incentives in Open Access Resource', *67 American Journal of Agricultural Economics*, 368-372.
- Runge, C. Ford (1987), 'Common Property and Collective Action in Economic Development', *14 World Development*, 623-635.
- Ryan, Alan (1984), *Property and Political Theory*, New York, Blackwell.
- Samuelson, Charles D. (1991), 'Perceived Task Difficulty, Casual Attributions, and Preferences for Structural Change in Resource Dilemmas', *17 Personality and Social Psychology Bulletin*, 181-187.
- Samuelson, Charles D., et al. (1984), 'Individual and Structural Solutions to Resource Dilemmas in Two Cultures', *47 Journal of Personality and Social Psychology*, 94-104.
- Sandberg, Audun (1993), 'The Analytical Importance of Property Rights to Northern Resources', colloquium presentation, Indiana University, Bloomington, IN, Workshop in Political Theory and Policy Analysis, September 27, 1993.
- Sandberg, Audun (1996a), 'A European Debate Revisited', Working paper, Bodoe, Norway, Nordland College.
- Sandberg, Audun (1996b), 'Against the Wind: On Reintroducing Commons Law in Modern Society', presented at the sixth annual conference of the International Association for the Study of Common Property, Berkeley, CA, June 5-8, 1996.
- Sandler, Todd (1992), *Collective Action; Theory and Applications*, Ann Arbor, University of Michigan Press.
- Sandler, Todd and Posnett, John (1991), 'The Private Provision of Public Goods: A Perspective on Neutrality', *19 Public Finance Quarterly*, 22-42.
- Sandler, Todd and Sargent, Keith (1995), 'Management of Transnational Commons: Coordination, Publicness, and Treaty Formation', *68 Land Economics*, 249-262.
- Sandler, Todd and Sterbenz, Frederic P. (1990), 'Harvest Uncertainty and the Tragedy of the Commons', *18 Journal of Environmental Economics and Management*, 155-167.
- Sato, Kaori (1987), 'Distribution of the Cost of Maintaining Common Property Resources', *23 Journal of Experimental Social Psychology*, 19-31.
- Savas, E.S. (1987), *Privatization: The Key to Better Government*, Chatham, NJ, Chatham House Publishers.
- Sax, Joseph L. (1971), 'Takings, Private Property, and Public Rights', *81 The Yale Law Journal*, 149-186.
- Schaefer, Milner (1957), 'Some Considerations of Population Dynamics and Economics in Relation to the Management of the Commercial Marine Fisheries', *14 Journal of the Fisheries Research Board of Canada*, 669-681.
- Schahczenski, Jeffrey J. (1990), 'Common Property and Political Power: Some Theoretical Connections', presented at the first annual conference of the International Association for the Study of Common Property, Durham, NC, September 27-30, 1990.

- Schelling, Thomas C. (1978), *Micromotives and Macrobehavior*, New York, W.W. Norton.
- Schlager, Edella (1990), 'Model Specification and Policy Analysis: The Governance of Coastal Fisheries', Ph.D. dissertation, Bloomington, IN, Indiana University.
- Schlager, Edella (1994), 'Fishers' Institutional Responses to Common-Pool Resource Dilemmas', in Ostrom, Elinor, Gardner, Roy and Walker, James M. (eds), *Rules, Games, and Common-Pool Resources*, Ann Arbor, MI, University of Michigan Press, 247-265.
- Schlager, Edella and Ostrom, Elinor (1992), 'Property Rights Regimes and Natural Resources: A Conceptual Analysis', **68** *Land Economics*, 249-262.
- Schlager, Edella, Blomquist, William and Tang, Shui Yan (1994), 'Mobile Flows, Storage, and Self-Organized Institutions for Governing Common-Pool Resources', **70** *Land Economics*, 294-317.
- Schmid, A. Allan (1994), 'Property, Power, and Politics: Some Methodological Challenges to Understanding Access and Control in Sub-Saharan African Resource Management', Working paper, East Lansing, MI, Michigan State University, Department of Agricultural Economics.
- Schotter, Andrew (1981), *The Economic Theory of Social Institutions*, Cambridge, MA, Cambridge University Press.
- Schulz, Ulrich, Albers, Wulf and Mueller, Ulrich (eds) (1994), *Social Dilemmas and Cooperation*, Berlin, Springer-Verlag.
- Schworm, William E. (1983), 'Monopsonistic Control of a Common Property Renewable Resource', **16** *Canadian Journal of Economics*, 275-287.
- Scott, Anthony D. (1955), 'The Fishery: The Objectives of Sole Ownership', **63** *Journal of Political Economy*, 116-124.
- Scott, Anthony D. (1983), 'Property Rights and Property Wrongs', **16** *Canadian Journal of Economics*, 555-573.
- Seabright, Paul (1993), 'Managing Local Commons: Theoretical Issues in Incentive Design', **7** *Journal of Economic Perspectives*, 113-134.
- Sedjo, Roger A. (1992), 'Property Rights, Genetic Resources, and Biotechnological Change', **35** *Journal of Law and Economics*, 199-213.
- Sell, Jane and Wilson, Rick K. (1991), 'Levels of Information and Contributions to Public Goods', **70** *Social Forces*, 107-124.
- Sened, Itai (1991), 'Contemporary Theory of Institutions in Perspective', **3** *Journal of Theoretical Politics*, 379-402.
- Sengupta, Nirmal (1991), *Managing Common Property: Irrigation in India and the Philippines*, New Delhi, Sage.
- Sengupta, Nirmal (1993), *User-Friendly Irrigation Designs*, New Delhi, Sage.
- Sethi, Rajiv and Somanathan, E. (1996), 'The Evolution of Social Norms in Common Property Resource Use', **86** *The American Economic Review*, 766-788.
- Singh, Chatrapati (1986), *Common Property and Common Poverty: India's Forests, Forest Dwellers, and the Law*, Oxford, Oxford University Press.
- Singh, Chatrapati (1992), 'Basic Issues in Management of Common Resources', presented at 'Inequality and the Commons', the third annual conference of the International Association for the Study of Common Property, Washington, DC, September 17-20, 1992.

- Singh, Katar (1994), *Managing Common Pool Resources: Principles and Case Studies*, New Delhi, Oxford University Press.
- Singh, Katar and Ballabh, Vishwa (1996), *Cooperative Management of Natural Resources*, New Delhi, Sage.
- Singleton, Sara and Taylor, Michael (1992), 'Common Property, Collective Action and Community', *4 Journal of Theoretical Politics*, 309-324.
- Sinn, Hans-Werner (1984), 'Common Property Resources, Storage Facilities and Ownership Structures: A Cournot Model of the Oil Market', *51 Economica*, 235-252.
- Siy, Robert Y., Jr (1982), *Community Resource Management: Lessons from the Zanjera*, Quezon City, Philippines, University of the Philippines Press.
- Skaperdas, Stergios and Syropoulos, Constantinos (1995), 'Competing for Claims to Property', Working paper, University of California, Irvine, Department of Economics.
- Smith, R.J. (1981), 'Resolving the Tragedy of the Commons by Creating Private Property Rights in Wildlife', *1 CATO Journal*, 439-468.
- Smith, Vernon L. (1968), 'Economics of Production from Natural Resources', *58 American Economic Review*, 409-431.
- Snidal, Duncan (1985), 'Coordination versus Prisoners Dilemma: Implications for International Cooperation and Regimes', *79 American Political Science Review*, 923-947.
- Snidal, Duncan (1995), 'The Politics of Scope: Endogenous Actors, Heterogeneity and Institutions', in Keohane, Robert O. and Ostrom, Elinor (eds), *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*, London, Sage, 47-70.
- Soden, Dennis L. (1988), *The Tragedy of the Commons: Twenty Years of Policy Literature, 1968-1988*, Monticello, IL, Vance Bibliographies.
- Sproule-Jones, Mark (1982), 'Public Choice Theory and Natural Resources: Methodological Explication and Critique', *76 American Political Science Review*, 790-804.
- Sproule-Jones, Mark (1989), 'Rights, Rules and the Organization of Environmental Decision Making', presented at the Public Choice Society Annual Meeting, Orlando, FL, March 17-19, 1989.
- Sproule-Jones, Mark (1995), 'Institutional Design for the Economy and the Environment: The Identification and Representation of Stakeholders', in Sadler, B., Manning, E. and Dendy, John O. (eds), *Balancing the Scale: Integrating Environmental and Economic Assessment*, Ottawa, Canada, Canadian Environmental Assessment Agency.
- Stern, P.C. (1978), 'When do People Act to Maintain Common Resources: A Reformulated Psychological Question for Our Times', *13 International Journal of Psychology*, 149-158.
- Stevenson, Glenn G. (1991), *Common Property Economics: A General Theory and Land Use Applications*, Cambridge, Cambridge University Press.
- Stillman, Peter G. (1975), 'The Tragedy of the Commons: A Re-analysis', *4 Alternatives*, 12-15.
- Sugden, Robert (1986), *The Economics of Rights, Cooperation, and Welfare*, Oxford, Basil Blackwell.

- Swallow, Brent M. and Bromley, Daniel W. (1994), 'Co-management or No Management: The Prospects for Internal Governance of Common Property Regimes through Dynamic Contracts', *22 Oxford Agrarian Studies*, 3-16.
- Swaney, James A. (1990), 'Common Property, Reciprocity, and Community', *24 Journal of Economic Issues*, 451-462.
- Swierzbinski, Joseph (1988), 'When More Isn't Better: Information and Common-Property Resources', *11 Mathematical and Computational Modelling*, 899-902.
- Tang, Shui Yan (1992), *Institutions and Collective Action: Self-Governance in Irrigation*, San Francisco, ICS Press.
- Tang, Shui Yan (1994), 'Building Community Organizations: Credible Commitment and the New Institutional Economics', *13 Human Systems Management*, 221-232.
- Taylor, Michael (1987), 'The Prisoner's Dilemma, Chicken and Other Games in the Provision of Public Goods', in Taylor, Michael (ed.), *The Possibility of Cooperation*, New York, Cambridge University Press.
- Taylor, Michael and Singleton, Sara (1995a), *Anarchy and Cooperation*, London, Wiley.
- Taylor, Michael and Singleton, Sara (1995b), 'The Communal Resource: Transaction Costs and the Solution of Collective Action Problems', *21 Politics and Society*, 34-46.
- Thomson, James T. (1977), 'Ecological Deterioration: Local-Level Rule-Making and Enforcement Problems in Niger', in Glantz, Michael H. (ed.), *Desertification: Environmental Degradation in and around Arid Lands*, Boulder, CO, Westview Press, 57-79.
- Thomson, James T., Feeny, David and Oakerson, Ronald J. (1992), 'Institutional Dynamics: The Evolution and Dissolution of Common-Property Resource Management', in Bromley, Daniel W., et al. (eds), *Making the Commons Work: Theory, Practice, and Policy*, San Francisco, ICS Press, 129-160.
- Townsend, Ralph E. and Wilson, James (1987), 'An Economic View of the "Tragedy of the Commons"', in McCay, Bonnie J. and Acheson, James M. (eds), *The Question of the Commons: The Culture and Ecology of Communal Resources*, Tucson, AZ, University of Arizona Press, 129-160.
- Townsend, Ralph E. and Pooley, Samuel G. (1995), 'Distributed Governance in Fisheries', in Hanna, Susan and Munasinghe, Mohan (eds), *Property Rights and the Environment*, Stockholm and Washington, DC, The Beijer International Institute of Ecological Economics and The World Bank, 311-326.
- Tullock, Gordon (1969), 'Federalism: Problems of Scale', *6 Public Choice*, 19-30.
- Udehn, Lars (1993), 'Twenty-Five Years with *The Logic of Collective Action*', *36 Acta Sociological*, 239-261.
- Ullmann-Margalit, Edna (1978), *The Emergence of Norms*, Oxford, Oxford University Press.
- Umbeck, John R. (1981a), *A Theory of Property Rights: With Application to the California Gold Rush*, Ames, IA, Iowa State University Press.
- Umbeck, John R. (1981b), 'Might Makes Rights: A Theory of the Formation and Initial Distribution of Property Rights', *20 Economic Inquiry*, 38-59.
- Vadnjal, Dan T. (1993), 'Property Rights, Choice and Contingent Valuation', presented at 'Common Property in Ecosystems Under Stress', fourth annual conference of the International Association for the Study of Common Property, Philippines, June 16-19, 1993.

- Vincent, Linden (1995), *Hill Irrigation: Water and Development in Mountain Agriculture*, London, Overseas Development Institute.
- Wade, Robert (1992), 'Common-Property Resource Management in South Indian Villages', in Bromley, Daniel W., et al. (eds), *Making the Commons Work: Theory, Practice, and Policy*, San Francisco, ICS Press, 207-228.
- Wade, Robert (1994), *Village Republics: Economic Conditions for Collective Action in South India*, San Francisco, ICS Press.
- Waldron, Jeremy (1988), *The Right to Private Property*, Oxford, Clarendon.
- Walker, James M. and Gardner, Roy (1992), 'Probabilistic Destruction of Common-Pool Resources: Experimental Evidence', **102** *Economic Journal*, 1149-1161.
- Walker, James M., Gardner, Roy and Ostrom, Elinor (1990), 'Rent Dissipation in a Limited-Access Common-Pool Resource: Experimental Evidence', **19** *Journal of Environmental Economics and Management*, 203-211.
- Walker, James M., Gardner, Roy and Ostrom, Elinor (1991), 'Rent Dissipation and Balanced Deviation Disequilibrium in Common Pool Resources: Experimental Evidence', in Selten, Reinhard (ed.), *Game Equilibrium Models II: Methods, Morals, and Markets*, Berlin, Springer-Verlag, 337-367.
- Walker, James M., Gardner, Roy, Ostrom, Elinor and Herr, Andrew (1995), 'Voting on Allocation Rules in a Commons Without Face-to-Face Communication: Theoretical Issues and Experimental Results', presented at the conference on 'Game Theory in the Behavioral Sciences', Tuscon, AZ, October 11-12, 1995.
- Walker, S. Tjip (1995), 'Both Pretense and Promise: The Political Economy of Privatization in Africa', Working paper, Bloomington, IN, Indiana University, Workshop in Political Theory and Policy Analysis.
- Weissing, Franz and Ostrom, Elinor (1991), 'Crime and Punishment: Further Reflections on the Counterintuitive Results of Mixed Equilibria Games', **3(3)** *Journal of Theoretical Politics*, 343-350.
- Weitzman, Martin (1974), 'Free Access vs. Private Ownership as Alternative Systems for Managing Common Property', **8** *Journal of Economic Theory*, 225-234.
- Welch, W.P. (1983), 'The Political Feasibility of Full Ownership Property Rights: The Cases of Pollution and Fisheries', **16** *Policy Sciences*, 165-80.
- Wiggins, Steven N., Hackett, Steven C. and Battalio, Raymond C. (1991), 'Imperfect Information, Multilateral Bargaining, and Unitization: An Experimental Analysis', presented at the second annual conference of the International Association for the Study of Common Property, Winnipeg, Manitoba, September 26-30, 1991.
- Wilke, Henk (1992), 'Greed, Efficiency and Fairness in Resource Management Situations', **2** *European Review of Social Psychology*, 165-187.
- Wilson, James A. and Dickie, Lloyd M. (1995), 'Parametric Management of Fisheries: An Ecosystem-Social Approach', in Hanna, Susan and Munasinghe, Mohan (eds), *Property Rights in a Social and Ecological Context: Case Studies and Design Applications*, Stockholm and Washington, DC, The Beijer International Institute of Ecological Economics and The World Bank.
- Wilson, James A. (1995), 'When are Common Property Institutions Efficient?', Working Paper, Orono, ME, University of Maine, Department of Agriculture and Resource Economics.

- Wilson, James A., French, J., Kleban, P., Mckay, S.R. and Townsend, R. (1991), 'Chaotic Dynamics in a Multiple Species Fishery: A Model of Community Predation', **58** *Ecological Modelling*, 303-322.
- Wilson, James A., et al. (1994), 'Chaos, Complexity, and Community Management of Fisheries', **18** *Marine Policy*, 291-305.
- Wilson, Rick K. (1985), 'Constraints on Social Dilemmas: An Institutional Approach', **2** *Annals of Operations Research*, 183-200.
- Wunderlich, Gene (1974), 'Property Rights and Information', **412** *The Annals of American Academy of Political and Social Science*, 80-96.
- Wunderlich, Gene and Gibson, W.L. (eds) (1972), *Perspectives of Property*, College Station, PA, Pennsylvania State University, Institute for Research on Land and Water Resources.
- Yandle, Bruce (ed.) (1995), *Land Rights: The 1990's Property Rights Rebellion*, Lanham, MD, Rowman & Littlefield
- Yang, Tai-Shuenn (1987), 'Property Rights and Constitutional Order in Imperial China', PhD dissertation, Indiana University.
- Young, Oran R. (1982), *Resource Regimes: Natural Resources and Social Institutions*, Berkeley, University of California Press.
- Young, Oran R. (1989), *International Cooperation: Building Regimes for Natural Resources and the Environment*, Ithaca, NY, Cornell University Press.
- Young, Oran R. (1995), 'The Problem of Scale in Human/Environment Relationships', in Keohane, Robert O. and Ostrom, Elinor (eds), *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*, London, Sage, 27-46.