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PRIVATE AND COMMON PROPERTY RIGHTS

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Abstract

The relative advantages of private property and common property for the efficiency, equity, and sustainability of natural resource use patterns have long been debated in the legal and economics literatures. 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. 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. There are, however, no panaceas! No institutions generate better outcomes for the resource and for the users under all conditions. Many of the lessons learned from the operation of communal property regimes related to natural resource systems are theoretically relevant to 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 during the twenty-first century (see Atran 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' ([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, 1994, 2002).

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 2008). 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 due to three problems. 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). 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 stated 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 1991). 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 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 1989, 1994; Acheson 2003; Wilson, Yan, and Wilson 2007).

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 (Wiersma 2005).

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). 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; 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 (V. Ostrom and E. 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, 1993) 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 judgments can be made concerning the efficiency of a particular type of property right.

Instead of focusing on one right from the bundle, it is more useful to classify five types 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.

(Table 1 about here)

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.

‘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; Shivakoti and Ostrom 2002).

‘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; McCay and Acheson 1987; McCarthy 2006).

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-rights 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 (Quinn et al. 2007). 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 clear 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 (Blomquist 1992; Tang 1994; Lam 1998; T. Yandle 2003; Weinstein 2000).

‘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). 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; Martin 1986; 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.

With new commons, such as the Internet, the bundle may include other types of rights. Hess and Ostrom (2007, pp. 52–53) found that electronic information resources often have more than five types of rights. Drawing on Schlager and Ostrom (1992), seven major types of property rights were identified. The following rights are defined for an online institutional repository.

Access	The right to enter a defined physical area and enjoy nonsubtractive benefits.
Contribution	The right to contribute to the content.
Extraction	The right to obtain resource units or products of a resource system.
Removal	The right to remove one's artifacts from the resource.
Management/ Participation	The right to regulate internal use patterns and transform the resource by making improvements.
Exclusion	The right to determine who will have access, contribution, extraction, and removal rights and how those rights may be transferred.
Alienation	The right to sell or lease management and exclusion rights.

Other examples are the Creative Commons (CC) licenses that were established to allow authors to different rights for their works rather than the 'one size fits all' standard copyright agreement. CC defines the spectrum of possibilities between full copyright—all rights reserved—and the public domain—no rights reserved. Rights given to users by the authors are Attribution, Noncommercial, No derivative works and Share alike (see <http://creativecommons.org/about/license/>).

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. 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 a sustainable level of harvesting 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 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 may be taken by the joint owners to divide the commons into 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 1989).

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.

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 (Agrawal 1999). 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 had use rights, what the specific access and withdrawal rights were, 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 (Ørebech et al. 2005; Sandberg 1998).

The importance of sharing risk is stressed in other theoretical and empirical studies of communal proprietorships (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. In the Sudan, for instance, the variance in the productivity of land over space—due largely to the fluctuation in rainfall from year to year—is strongly associated with the size of communally held parcels allocated to grazing

(Nugent and Sanchez 1993). 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 et al. 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.

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, 1995b; Kaul 1996; Sandberg 1998). 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; Lam 1998). Schlager's (1994) 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 and colleagues' studies also demonstrate that communal proprietorship systems are more efficient than frequently thought (Wilson et al. 1994; Wilson, Yan, and Wilson 2007).

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 (Agrawal 2000; Libecap 1989a, 1989b). 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 (Poteete and Ostrom 2004, 2008). 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 (Blomquist, Schlager, and Heikkila 2004). Agrawal and Goyal (2001) have 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 (Varughese and Ostrom 2001). 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's (1984) studies of the prorationing 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 (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; C. Clark 1980). 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; J. 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. Experience with these individual withdrawal-rights systems has varied greatly in practice (see McCay 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). 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.

Notes on the bibliography

The updated and revised bibliography¹ adds well over 200 additional citations to the earlier version. We have selected articles and books that continue the tradition of common property scholarship as well as those that reflect new trends in this area of study. Noteworthy stronger foci are sustainability, the global commons, property regimes in transition, and the intersection of intellectual property rights and environmental goods.

The crucial questions surrounding common-property management have continued to be ones of equity, efficiency and sustainability. Since the turn of this past

century, however, the issue of sustainability has increased in its importance and visibility in the commons literature (see, for instance, Agrawal 2001; Anderies et al. 2007; Bressers and Kuks 2004; Costanza et al. 2001; Kamara, Kirk, and Swallow 2004; Marshall, Fritsch, and Dulhunty 2005; McMahon 2006; Meinzen-Dick and Di Gregorio 2004; Ørebech et al. 2005; Oses-Erasoa and Viladrich-Grau 2007; Pasqual and Souto 2003; Smajgl and Larson 2007; Veeman and Politylo 2003). Ecological economist Robert Costanza (2000) writes:

The most critical task facing humanity today is the creation of a shared vision of a sustainable and desirable society, one that can provide permanent prosperity within the biophysical constraints of the real world in a way that is fair and equitable to all of humanity, to other species, and to future generations.

Some authors argue that developing new common-property regimes may be helpful in achieving sustainability (Buck 2002; Brunckhorst 2003; Buxton 2004; Marshall, Fritsch, and Dulhunty 2005; Williamson, Brunckhorst, and Kelly 2003).

New research demonstrates the urgent need for effective approaches to commons problems that are global in scale (E. Ostrom et al. 1999). Particular areas of focus on the global commons in this bibliography are biodiversity (Choudry 2005; Coban 2004; Goeschl and Iglioni 2006; Tisdell 2004; Trommetter 2005) and water resources (Becker and Easter 1999; Dilworth 2007; Dinar 2000; Fisher 2004; Smets 2004).

Common-property regimes in transition is another noteworthy recurrent theme (see Banner 2002; Dekker 2003; Mwangi 2006, 2007a, 2007b; Majumdar

2007; J. Marshall 2001; John McCarthy 2000; Moyo 2005; Muñoz Piña, de Janvry, and Sadoulet 2003; Okello 2005; Rao et al. 2003; D. Thompson 2006). Mwangi (2007b), for instance, illustrates the complexity of regime change in her research on the transition from collective to individualized rights in Kenya's Maasailand and the complications of politics and procedural problems. The ambiguity of certain property regimes leads a number of researchers to examine "who owns" various resources (Barnes 2001 [sky]; F. Brown 2003 [native culture]; Gepts 2004 [biodiversity]; Ho 2001 [land]; Macinko and Bromley 2002 [fisheries]). Privatization is another kind of regime transition of great concern regardless of which kind of resource is involved (for representative works see Hannesson 2006; Hedlund 2001; Lesorogol 2003; Mansfield 2004; National Research Council 2001).

Another growing area of study is the intersection of traditional property rights and intellectual property rights. Drahos and Mayne (2003) write that patents, as types of intellectual property rights, can reduce access to knowledge in such life-sustaining areas as genetics, health, and agriculture—a problem even worse in developing countries. Aoki calls one of these intersections 'seed wars'—battles 'over the ownership of intellectual property rights of germplasm—arguments over weeds, seeds and deeds' (Aoki 2003; see also Borowiak 2004; Dutfield 2000; C. Thompson 2004). A number of works focus on rights to plant genetic resources and threats to indigenous knowledge and systems of agriculture (Barnett 2000; Dickenson 2004; Eyzaguirre et al. 2004; Kennedy 2006; Rifkin 2002; Spier 2001).

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Notes

¹ The commons database in the library of the Workshop in Political Theory and Policy Analysis contains 50,500 records of literature on the commons, common-pool resources, and common property. Of those, 779 have “common property” in the title.

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Table 1
Bundles of Rights Associated with Positions

	Owner	Proprietor	Claimant	Authorized User	Authorized 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).