

COMMON PROPERTY ARRANGEMENTS FOR THE CONTEMPORARY WORLD

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Margaret A. McKean
Political Science Department
Box 90204
Duke University
Durham, North Carolina 27708-0204 USA

tel: 919-660-4340
fax: 919-660-4330
Email: mamckean@acpub.duke.edu

ABSTRACT:

From the last several centuries of evolution in property arrangements in many societies, it would be easy, though almost certainly incorrect, to conclude that individual private property is always a more efficient form of property rights than common or shared property. We know that commons have been enclosed and parcelled all over the world to increase investment in them and to increase production that can be extracted from them, often with great success. But we also know that even though this change seems to have improved both protection and production on many resources, it has not worked on others. In many environmentally stressed resource systems around the world, we now witness a battle over further transformations of property rights, between those who would legitimize and legalize common property arrangements and those who advocate continued enclosure and parcelling. It is clear that some people want to apply "privatization" (or really "individualization," since it may be appropriate to see common property as shared private property and thus as "privatized" already) as a universal treatment for environmental distress, while others see circumstances in which common property will serve the cause of environmental protection and environmentally sustainable production better. This paper attempts to sort out systematically the conditions - when and where - common property arrangements may actually be more efficient than individually parcelled ownership. It relies on both deductive argument from theories of property rights and inductive generalizations based on the historical record of human experience with common property arrangements. It concludes that common property arrangements can be regarded as a package of Coaseian bargains with an efficiency advantage in internalizing externalities that arise among parcels within a large resource system, in ecological settings where these externalities are inevitable, and in providing both incentives and mechanisms to cap aggregate use of a resource system that is being used very close to the limit of sustainability.

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One might think, given the rate of disappearance of common property arrangements around the globe, that they have no future, are a relic from an inefficient past, and should be allowed to continue disappearing. If human institutions evolve on average in the direction of improved efficiency,¹ then we should stand back without intervening. Actually, though, even this optimistic rendering of human history refers only to average trends and thus allows for the possibility of mistakes and back-sliding (downturns on the curve); interventions maybe what it takes to get us back on course toward improved efficiency. And then there are those of us who do not share the functionalist belief that human institutions move automatically in the direction of improved efficiency, and who think instead that we can expect no improvements unless we nudge them into being. This paper treats the human history of experimentation with various kinds of property rights as a set of laboratory results to be analyzed to find out **when** and where certain experiments seem to be associated with good results and to have a long life, and when and where they do not. Only in this way we will learn whether common property — one particular experiment — should really disappear from our repertoire.²

Common-property regimes, used by communities to manage forests and other resources for long-term benefit, were once widespread around the globe. Some may have disappeared naturally as communities opted for other arrangements, particularly in the face of technological and economic change, but common-property regimes seem in most instances to have been legislated out of existence, often amidst great struggle. Among the many justifications usually advanced for eliminating community ownership of resources was the argument that individual or public ownership would offer enhanced efficiency in resource use and greater long-term protection of the resource. But it is now apparent that the arrangements that emerged to replace common-property regimes are often ineffective in promoting sustainable resource management. The transfer of property rights from traditional user groups to others eliminates incentives for monitoring and restrained use, converts owner-protectors into poachers, and thus exacerbates the resource depletion it was supposedly intended to prevent. Individual owners are often willing to invest, but in a time of rising resource value often prefer to exploit their resource to extinction and convert the proceeds into other assets (Swiss bank accounts come to mind.) Governments as owners are poor monitors and very vulnerable to rent-seeking campaigns by hopeful resource users with short-term goals who would like to "cut and run," quite literally, and have little interest in sustainable resource use. Thus there is renewed awareness of the possibility that we have read our history incorrectly and that community ownership or management might actually be consistent with sound resource stewardship (see Agrawal, 1992,1994; Berkes, 1992; Bromley et al., 1992; McCay and Acheson, 1987; McKean, 1992a; 1992b; Netting, 1981; Ostrom, 1990).

DEFINITIONS

Common-Pool Resources

Before one can talk about what value there may be in common-property arrangements, it is necessary to define terms. Unfortunately, there is a long history of confusing and conflicting usage. The first task is to distinguish among types of goods or resources. Common-pool resources have two defining traits. First is the exclusion problem: it is costly to develop institutions to exclude potential beneficiaries from them, as is the case with public goods. Without institutional mechanisms to exclude noncontributing beneficiaries from common-pool resources, they are essentially open-access resources

¹ I use the term "efficiency" in the classic Pareto-optimality sense, to signify ordinary economic efficiency (ratio or difference between output and inputs) **with social and environmental costs included**. Thus what is more profitable for one productive enterprise will not be socially efficient if it also makes someone else worse off.

² This paper draws in part on papers and presentations I have done over the last few years, particularly McKean, 1993, 1995a, 1995b, 1996a, 1996b, 1996c.

available to anyone and therefore unlikely to elicit investments in maintenance or protection. Second is subtractability: the resource units harvested by one individual are not available to others — they are subtractable or rivalrous in consumption, like private goods, and can thus be depleted. The subtractability of consumption means that de facto open access arrangements lead quickly to resource depletion. **Common-pool goods**, which include natural resource systems and environmental resources, pose both challenges of provision or supply and the risk of depletion. Not only is it difficult to get them produced, but it is easy to deplete the supply of whatever does get produced.

Common-Property Regimes

Our second definitional task is to distinguish between goods and property. The nature of a good is an inherent physical characteristic, not susceptible to manipulation by humans. The term "common-pool resources" therefore refers to the physical qualities of a natural resource, and not to the social institutions human beings have attached to them. I use "common property" or "common-property regime" to refer not to any inherent natural or physical qualities of a resource, but rather to a particular property-rights arrangement in which a group of resource users share rights and duties toward a resource.³

Our third definitional task is to distinguish among types of property. The "privateness" of private property rights refers to the clarity, specificity, and especially the exclusivity of the rights, and not to the identity of the rights-holder. Economists (Locke, 1965; DeAlessi, 1980, 1982; Johnson and Libecap, 1982; Libecap, 1989) usually argue that investment and accumulation leading to economic growth result from the creation of private-property rights to the extent that they have the following four attributes: (a) they should be clearly specified, setting out exactly what the holder of the right is entitled to do, (b) they must be exclusive, vested in the holder of the right and **not** in nonholders of the right, (c) they must be secure, so the holder of the right is protected from confiscation by others and by the state alike, and (d) they should comprise an intact bundle of rights, so the holder of use rights also holds the right to change the way the resource is used, even to destroy it, as well as rights of alienation through sale or bequeathal (Schlager and Ostrom, 1992; 1993). It is important to note here again that the definition of private-property rights has to do with the rights, not with the nature of the entity that holds them. The privateness of private-property rights does not require that they be held by individual persons

Thus private-property rights can be vested in groups of individuals as well. All of us acknowledge that private-property rights can be vested in business partnerships and joint-stock corporations. Indeed, when the group of individuals and the property rights they share are well defined (clearly specified, exclusive to the group, secure, and intact), then **common property** as defined above should clearly be classified as a form of **shared private property** — a form of ownership that should be of great interest to anyone who believes that private-property rights promote long time horizons and responsible stewardship of resources.⁴

Oddly, the term "common property" seems to have entered the social science lexicon to refer not to any form of property at all but to its absence, nonproperty or open access resources to which no one has defined rights or duties.⁵ At issue here is far more than semantic nitpicking: it is absurd to use a single

³ I prefer to avoid the term "common-property resources" because it conflates property (a social institution) with resources (a part of the natural world). I will also avoid using the acronym CPR, since that could easily stand for any of the three terms (common-pool resources, common-property regimes, or the confusing amalgam "common property resources").

⁴ This usage happens to be consistent with that of Japanese legal scholars Kawashima Takeyoshi and Kainô Michitaka, who represent the "*shiyûken*" [privately held rights] view of *iriaiken* [common access rights] rather than the *kôyûken* [publicly held rights] view used by prewar legal scholars to defend the Meiji government's attempt to nationalize *iriaichi* [common access lands] beginning in 1873.

⁵ For some early examples, see Gordon, 1954; Scott, 1955; Demsetz, 1967; Alchian and Demsetz, 1973. Later examples of this peculiar confusion of a word with its opposite are so frequent that it becomes impossible to cite them.

term for both a thing and its opposite, and it is downright dangerous, perhaps even tragic, to use the same label for both the problem and quite possibly for its solution! The inefficiencies and resource exhaustion to which open access arrangements are prone are well known. Open access is an acceptable method for resource management only when we need not manage resources at all: when demand is too low to make the effort worthwhile. In a common-property arrangement, on the other hand, a particular group of individuals share rights to a resource. Thus there is property rather than nonproperty (rights rather than the absence of rights), and these are common not to all but to a specified group of users. Thus, common property is not access open to all but access limited to a specific group of users who hold their rights in common (Runge, 1981, 1984, 1992; Bromley and Cernea, 1989; Bromley et al., 1992). I argue here that common-property regimes may be what we need to create for the management of common-pool resources, at least if we can identify the factors and conditions that lead to successful regimes. Sharing rights can help resource users get around problems of exclusion. They can patrol each other's use, and they can band together to patrol the entire resource system and protect it from invasion by persons outside of their group. Solving the exclusion problem then begins to solve the problems of provision and maintenance. The property rights in a common-property regime can be very clearly specified, they are by definition exclusive to the co-owners (members of the user group), they are secure if they receive appropriate legal support from governments, and in some settings are fully alienable (on Switzerland and Japan, see Netting, 1981; Glaser, 1987; McKean, 1992a).

Sharing private property does have its weaknesses: all arrangements of shared private property, from firms to resource cooperatives, contain internal collective action problems because they are comprised of more than one individual owner. Just as there can be shirking and agency problems in a firm, there can be temptations inside a common-property regime to cheat on the community rules. But there are productive efficiencies to be captured through team production that may be larger than losses due to shirking, making centralized or large-scale forms of production like the firm worthwhile anyway. Similarly, there may be gains from joint management of an intact resource that can outweigh losses due to cheating (or the cost of mechanisms to deter cheating) in a common-property regime (Coase, 1937; Miller, 1993). The rest of this paper tries to determine when and where human beings prefer common property to individually parcelled property, and when and where they prefer parcelled property. I believe that if we look very closely at these choices, we can do a better job of figuring out when to parcel and when to amalgamate property rights.

Once we understand the difference between goods and property rights (discussed above), we can understand common-property regimes as a way of privatizing the rights to goods without dividing the goods into pieces: in effect, privatizing rights to **flow** without privatizing or parcelling the rights to the **stock** or resource system itself. Consider, for instance, the various ways in which two people may own a typewriter. They could try to parcel the typewriter — chop it in half perhaps down the middle of the keyboard so that one can produce documents consisting mostly of "ASDFG" and the other can compose documents containing a lot of "YUIOP". But even the most rivalrous pair of aspiring typists will understand that parcelling the typewriter itself destroys most of its use value. A second scheme would be for one to own the typewriter and rent out occasional access to it to the other person (equivalent to the classic landlord-tenant relationship on the land). And a third scheme would be for them to share ownership of the typewriter itself and divide access to it into equal time-shares. They might even allow mortgaging or sub-letting or subsequent sale of their time-shares. In this way they share ownership of the productive stock without chopping it in half, and they parcel the flow of use-units into individually owned rights (equivalent to shared private ownership, or common property). Natural resource systems have something in common with the typewriter of this example: they can be far more productive when left intact than when sliced up, and there are many ways to allocate use to individuals even while keeping the typewriter itself in one well-maintained piece.

Similarly, common property offers a way of parcelling the flow of skimmable or harvestable "income" (the interest) from an interactive resource system without parcelling the principal itself. It

would obviously be desirable when the resource system, like the typewriter in our example above, is most productively managed as an intact whole rather than in uncoordinated bits and pieces. Inherent in this basic characteristic of common property — the combination of individually parcelled rights to flow with shared rights to an intact stock — lies the explanation for its appearance among human institutions. Historically, we find common-property regimes in places where a resource production system gets congested (demand is too great to tolerate continuing open access non-management) so property rights in resources have to be created, but some other factor makes it impossible or undesirable to parcel the resource itself. What follows is a thought experiment, a mental exercise designed to think through the choice between individually parcelled property rights and shared property rights. What are the reasons people might choose to manage a resource — especially one that is physically divisible — collectively and not individually, when they are fully familiar with both possibilities, and when they have a real choice between the two arrangements.⁶ Envision a resource system, probably on land but not necessarily, that can tolerate 100 users at current levels of technology and consumption. These 100 people have to decide whether to share use or to subdivide the resource into 100 separate parcels that they would then each manage individually

CONDITIONS UNDER WHICH COMMON PROPERTY MAY BE EFFICIENT

(1) Indivisibility

The first and most overpowering reason for choosing common or shared property over parcelled property arises where there is no choice at all: the resource may have physical traits that literally forbid parcelling; the production system may simply not be amenable to physical division or demarcation. This is obvious where the resource system cannot be bounded (the high seas, the stratosphere) or the resources we care about are mobile over a large territory (air, water, fish, wildlife). This physical fact does not always stop us from trying, foolishly, to create parcelled property rights on indivisible resources. In Anglo-American common law, for instance, persons supposedly own the air space over their landed property, but of course they cannot police it or control what happens in their little piece of airshed. These property rights are essentially meaningless. Similarly, although it is possible for persons to own small fixed blobs of stationary water (ponds and lakes contained entirely within their landed property perhaps), it is impossible for them to possess exclusive rights to water that moves into and out of their lands. In the final analysis, all three of the major contending principles for allocating rights to rivers (the Harmon principle in which upstream users dominate, the riparian principle in which downstream users dominate, and the "equitable allocation" principle in which upstreamers and downstreamers negotiate with each other), actually involve property rights to **flow** (income, interest, or removable portions) rather than to productive **stock** (the river itself). Thus they actually turn out to be common property arrangements in which the rival users share ownership of the stock and divide ownership rights to the flow of the river.

(2) Economies of Scale in Enforcement or Administrative efficiency

Even if resources are readily divisible into parcels, where nature is uniform in its treatment of different parcels so that risk and uncertainty are low, and where intensive independent use of adjacent parcels does not produce problematic externalities, the administrative support to enforce property rights to individual parcels may not be available. The society may be too poor to support a large court system

⁶ Having a real choice of property rights arrangements means that these people are not forced by others or the state to choose one form over the other. Neither the government nor the World Bank nor anyone else is going to decide for them, or to rig incentives one way or the other, and outsiders are going to respect the choice these people make. Unfortunately, these are not realistic conditions of course, but we must remember that it is not fair to evaluate the choices people make when they are not choosing freely.

to enforce individual land titles, and even cheap fencing would be expensive by this society's standards. Creating a common-property regime here is a way of substituting collective management rules — which function as imaginary fences and informal courts internal to the user group — for what is missing. It is cheaper in these circumstances, and it is within the power of a group of resource users to create (even if they cannot create a nationwide system of courts and cannot afford barbed wire). Common-property regimes can be particularly attractive in providing administrative efficiency when resource management rules can simply be grafted onto the functions of a pre-existing community organization.

Even where a society is not especially poor, there may be significant economies of scale in enforcement or supervision of the resource. A resource system that is owned jointly as one intact piece has only external boundaries to patrol, whereas the parcelled version of the same system could require each parcel owner to install a representative on the resource to monitor the much more numerous boundaries between parcels. Parcelling creates more boundaries to be patrolled. This extra enforcement on parcels might not be too challenging to take care of if work on the resource is constant, so co-owners can work and monitor at the same time. The extra work of enforcement might be necessary and worthwhile if people are investing very heavily in their parcels - this of course is the essential reason that people do often choose to parcel their cultivated land, for crops whose value rises rapidly with additional investment, into individually owned plots. Similarly, it is easy (very little additional cost) to monitor parcelled use if housing is scattered, with each dwelling inside its parcel if this is a landed resource. But the economies of scale for collective enforcement become greater when resources are not visited and worked on constantly by owners., or if housing is nucleated and distant from the resource. The economies of scale in enforcement become really dramatic if pooling of labor is possible, as in grazing or the use of meadow and forest, where perhaps just a few people might be able to do all the patrolling of the external boundary against invaders and of behavior within the resource by its co-owners.

Administrative efficiency is a valued goal in both rich and poor societies. Even in settings where labor is a relatively abundant resource (compared to other inputs like land or water), it is sensible to seek administrative efficiency by reducing the cost of labor devoted to enforcement, so that labor goes into actual production instead. After all, in a labor-abundant environment, we expect to see labor-intensive methods of production, and that in turn means that labor is **needed** in direct production. If two shepherds can take care of the herds of 50 farmers, or if two water-guards can monitor a community water tank more easily than 50 persons can guard 50 separate wells, or if two youths on horseback can patrol a forest co-owned by 200 villagers, then coordinated and collective enforcement may well be more efficient overall than separate enforcement on individual parcels.

(3) Economies of Scale in Managing a Complex Interactive Resource System

Some resources appear to be quite divisible — they are on land that stands still and can be fenced if necessary — but actually need to be managed in very large units for optimal productivity. The problem here is that the resource is interactive and will be much less productive if broken up and if owners of different parcels handle their various parcels differently. Land, particularly forests, may seem much more divisible (and fenceable) at first glance than some other kinds of resource systems, but in fact where forests are being managed not only for products that can be taken from them but also for their value in protecting water and soil, not to mention local climate, forests need to be managed in large units at least the size of watershed basins. Similar, a multi-use forest that humans use for timber, firewood, other multipurpose plants, fodder for animals, agricultural inputs, as well as wildlife, is essentially a habitat that may not yield these products if broken up. Humans have only recently acquired interest in biodiversity, but leaving natural systems unparcelled and managing them in large units multiplies the biodiversity provided, sometimes exponentially, compared to managing the same acreage in separated parcels.

We need to distinguish here between the ecosystem requirements that dictate large-scale management units, and the political and social features of the human society that depends on the resource. Ecosystem traits do not dictate what kind of political relationships exist among the humans using the ecosystem, only that management units be large in scale. As far as the ecosystem itself is concerned, allocation of huge parcels to a few individuals might be fine. However, where many people are dependent on this ecosystem, there may be unacceptable political and social costs associated with awarding all decisionmaking power over the resource system to an elite few. We may find considerable variation in the social organizations that manage large resource systems, just as there are many ways to allocate assets to one, some, many, or all members of a group of people. Many of us, including me, would have a normative preference for allocating co-ownership rights to many persons who would share decisionmaking power and management rights over the resource (thus creating common property) over allocating all ownership rights to one individual landlord who then deals with the other people as sharecroppers, tenants, or day laborers. But we must recognize that we should actually investigate empirically (as Stiglitz did with ownership patterns on cultivated agricultural land) to compare egalitarian co-ownership with other distributions of property rights if we want to find out which distribution of rights to members of a social group seems to accompany good environmental management of large-scale resource systems.

The remaining conditions are all elaborations of the third. That is, each offers an additional reason why people dependent on a resource can improve productive efficiency still further if they collaborate with each other on the management of a resource that is more productive when managed in large units. Each has to do with with capping and controlling aggregate resource use, a very important consideration in a resource that is being used close to the limit of sustainability.

(4) Dispersal of risk due to uncertainty in either location or yield of productive zones across time

Nature may impose great uncertainty on the productivity of any particular section of a resource system, and the location or the yield of the productive (and unproductive) sections cannot easily be predicted from year to year. In effect, nature imposes compulsory fallowing on some resource systems by randomly rendering portions of them unproductive. In such resource systems, resource users may well prefer to share the entire area, and decide together where to concentrate use at a particular time, rather than parcelling the area into individual tracts and thereby imposing the risk of total disaster on some of their members (those whose parcels turn out to be bad ones that year). John Rawls would call this a just choice, promoted by the veil of ignorance - you do not know if you will be among the lucky or the unlucky, so you pick a system that is good even to its unluckiest members in case that happens to be yourself! Creating a common-property regime is a way of acknowledging that this risk is substantial, and sharing it rather imposing all of the risk, randomly, on some particular users each year.

This problem can exist in complex, biodiverse, abundant resource systems like tropical forests where the "average" or "total" productivity of the entire area may be fairly steady over the years, so that if the entire system is the focal point of management effort, uncertainties about production possibilities in particular locations can be averaged out. In this situation, the resource system as a whole holds still and may even have fairly obvious boundaries, but the usable portions of it do not stand still from year to year. Tropical forests contain many useful non-timber products that either cannot be harvested annually or whose location simply cannot be predicted. Some will be in fixed locations, like rubber or chicle latex, but because tapping requires a multi-year recovery period the harvesting activity must move from year to year. Other products will appear in different locations from year to year because of the way they reproduce. In complex multispecies environments, the reproductive cycles of many plants may require participation of other plants and animals to scatter seed or nibble away rivals. These are plants that turn out to be very difficult to cultivate because humans cannot duplicate these processes adequately. The only way to harvest from these plants, then, is to let the tropical forest put them where it will, and for us to go find them, and to use only as many as the forest can spare without having this reproductive arrangement disturbed. The form of property

rights that people have most often devised for situations like this is to manage the forest in large-sized units, and for foraging parties to enter the forest, both to harvest according to rules that protect the ability of the resource to regenerate, and (simultaneously) to patrol and protect the resource against intrusions by others. In this situation, the fact that the point of use must move from year to year, even though potential use can be quite high and stable over the years, requires that the ecosystem be managed in large units.

Uncertainties about total yield from a resource system arise in marginal environments and create even greater risks to users. This is essentially the reason for the strong preference for communal management in arid grazing societies, where rainfall and watering holes will move around from year to year, and it is simply not known in advance where the good spots will be. We are slowly coming to accept the fact that grazing (at a very low ratio of animals to unit area) may be the only "productive" use of certain very fragile lands that humans can extract. The choice on these lands is not between grazing and intensive agriculture, but between grazing and nothing. In this case, managing grazing over vast expanses, so that the animals can move within and between seasons as the previous season's precipitation and temperatures permit, is the only way to use the land at all. One could contemplate parcelling the pasture of course, but in an arid area, one knows in advance that parcel-owners will then have to negotiate complex exchanges with each other so that those with bad parcels can buy rights to use parcels that turned out to be good that year. Joint management may well turn out to be a lot less trouble than this.

In sum, then, common property over large units rather than individual ownership of smaller parcels permits resource owners to share the risk that any particular spot will be unproductive and also to share the risk that total yield will fall below critical levels. They can make collective (coordinated) decisions about harvesting rates in particular locations and keep track of aggregate harvest from the entire system as well, in good times and bad.

(5) Productive efficiency via internalizing 'internal' externalities

This oxymoronic phrase (externalities are by definition not internal!) refers to the harms that can move within the resource system from one parcel to another if the system is parcelled. In an unparcelled system, these are in fact internalities and not externalities at all, but if the very same system is parcelled, then these flows become externalities among parcels. In a parcelled system, owners of individual parcels may (wittingly or not) engage in activities on their own parcels that cause no harm to themselves but that do cause harm to the owners of neighboring parcels. Wherever the activities of one user are highly likely to affect another, users will want to coordinate their uses with each other. They may want to prohibit certain uses or certain levels of intensity (no clearcutting, no replanting of monoculture, no fencing that inhibits the mobility of wildlife, no deep digging, no sinking of wells, no use of certain pesticides, etc.). Co-owners of a tropical forest system may want to choose collectively where and how much forest to cut down for swidden agriculture, choosing cuts so that each one is fully surrounded by other parcels of mature forest, rather than letting the cut parcels be all in a row or a batch. This will permit the forest to recover effortlessly (no human effort needed to bring it back or to assure multispecies recovery). This is in fact the strategy used by tropical forest dwellers who "garden" in the forest on 20-year cycles. They can save themselves the effort of micro-managing recovery if they make sure their cuts are small enough in area for the natural forest to come back and "infill" the holes they have cut. A failure to coordinate could undermine this effort-economizing strategy for everyone.

If the resource system is being used close to sustainable limits, these harms will be numerous and more readily apparent, and users may also want to coordinate with each other in order to set and enforce a cap on aggregate use. Owners of parcelled resources can do this if they coordinate as Coase suggests they will (Coase, 1960), but as soon as they do that, they are converting overall resource health or ecosystem health into a common property arrangement. Our hypothetical 100 users might actually find the transactions costs of Coasian bargains lower if they own the resource in common and use collective management — one set of rules, one cap on total use. Although occasional community meetings are anathema to some people,

presumably negotiating thousands ($100 \times 99 / 2 = 4950!$) of bilateral contracts could be a lot worse. In effect the impacts that flow from one point of use to another will be externalities in a parcelled system but they will be internalized through collective management. Thus collective management and essentially ownership might be chosen to internalize the "internal" externalities, those that would flow from parcel to parcel within the resource system.

(6) Productive efficiency via internalizing external externalities

This equally oxymoronic phrase (aren't "externalities" already external?) refers to the harms that can flow from the resource system that we are examining to other resources. It is conceivable that what looks like good sustainable management on a resource if one looks only within the boundaries of that resource may actually be doing harm to other resources. For example, one can imagine an agricultural area where all the cultivated fields look healthy and harvests are abundant and apparently sustainable, but where this outcome results from irrigation with groundwater at a rate more rapid than the groundwater basin gets recharged. Eventually it will become necessary to cap aggregate withdrawals from the aquifer, and farmers will have to coordinate with each other in their water use. The same logic applies to an above-ground system of water storage and irrigation (Blomquist, 1992; Ostrom, 1992; Tang, 1992.)

Similarly, imagine a hillside with fields down low in the valley near water and pastures and forests in the uplands. The aggregate impact of many individual decisions, say, to harvest timber or prospect for valuable minerals on the hillside, may cause soil erosion, flooding, water pollution, and in the long run even lowering of the water table that feeds downhill fields, even if it does not actually harm the upland resource itself. To prevent these very substantial externalities that spill over beyond the uplands themselves, the owners of upland parcels and the owners of downhill fields should want to negotiate Coaseian contracts with each other. Either the downhill farmers would pay uphill forest-owners not to cut all the trees they might want to, or uphill forest-owners would cut all the trees they want to and instead compensate downhill farmers for damaged fields with the extra earnings from timber sales. Once again, though, in order to simplify this exponential problem of Coaseian bargaining, a farming community with individually owned fields in the valley may choose to own the uplands jointly rather than in parcels akin to their cultivated fields below. With common ownership of the uplands, they can make rules that govern the type (mining or timbering or just mushroom-picking?) and placement (in which spots?) and extent (a few places or everywhere at once?) of upland resource use. In this way they can calibrate the activity on the upland resource system to optimize the combined output of both uplands and downhill fields. Similarly, one can imagine a coastal community where most residents are fishers, who need to make sure that local wetlands remain protected as breeding areas that supply their fishery. It would be logical for these fishers to own their fishery in common both in because it is essentially an indivisible resource that cannot be parcelled anyway and also because they will usually want to cap use under the limits that are sustainable. But they may want to own the wetlands in common as well (that is, to have clear and specific community rights to manage the wetland as a wetland and prevent intrusion by others) in order to protect their fishery.

Now that we have figured out in the abstract the conditions under which people might choose common property over parcelled property, we should be able to extrapolate other results as well.

- When resources acquire scarcity value because they are in demand, people will attach some sort of property rights to them.
- The more valuable the resource, the clearer, more specific, and more exclusive the package of rights will be.
- If any of the six conditions above pertains, we should expect to see individuals share some of these rights.
- The more of the six conditions that pertain, the more likely that we will see people opt to share the rights attached to the resource and thus to devise common ownership of the resource system

(the productive stock), although they may well continue to allocate rights to the flow (the harvest, the income) to individuals.

- Where none of these conditions pertain, we should expect to see parcelled individual property attached to those resources.
- Where these six conditions diminish or disappear over time, we expect to see a voluntary transition from common to parcelled property.

When the six conditions itemized earlier arise and increase, we should expect to see increased coordination and Coaseian bargaining, more consensual regulation over the freedoms of individual property owners, and finally some surrendering of certain, if not all, of the strands in the bundle of property rights from individuals to communities. Our next task is to apply these findings across time.

HISTORICAL EVOLUTION OF COMMON PROPERTY ARRANGEMENTS

Over time, the three essential dynamics that can cause change are (1) the emergence of scarcity and thus increased resource value that lead to "propertyization" of the resource or the invention of some sort of property rights arrangement; (2) the potential **appearance** of the six conditions that make common property the more desirable form of private property rights; and (3) the potential **disappearance** of the six conditions that make common property preferable, thus rendering individually parcelled property the desirable form of private property rights. Not long ago it was commonplace to argue that common property was primitive and thus a preliminary stage, perhaps, in the evolution of individually parcelled property, and thus that the displacement of much common property around the world with individually parcelled property was natural, appropriate, efficient, desirable, and presumably permanent. However, on the basis of the reasoning above, I would argue that this temporal sequence is not set in stone, and that individually parcelled property only displaces common property rights on a resource when the six conditions enumerated above **diminish**. However, population increase and intensifying pressure on our resources all over the planet are actually leading to an **increase** in the number of resource systems characterized by the conditions that make common property look more efficient. That is, as we push resources to the limit of sustainability, we become more and more concerned with creating institutions that help us calibrate our aggregate use levels so that we may live within these limits. The remainder of this section offers a stylized account of the creation of property itself (both common and parcelled property alongside each other), the decision to parcel much of the commons, and the troubled discovery that parcelling intact bundles of property rights to individuals allows resource degradation and environmental externalities to emerge. It concludes by considering two additional issues: long-distance environmental transfers that can mask the conditions that should precipitate efficiency-enhancing adjustments and thus prevent or retard an "appropriate" transformation in property rights, and the role of public rather than private ownership.

Creation Of Private Property Rights, including Parcelled and Common Variants

Institutional economists argue persuasively that human beings begin to attach property rights to objects when these objects acquire scarcity value - that is, as demand rises and it takes increased human effort to find and protect these objects. What Locke (1965) describes as a moral right to the resources that one invests labor in is probably an accurate enough description of how and why people articulate property claims. People will not bother to develop property rights, private or common, unless they have at least a minor brush with disaster to prove to them that their resources are finite and they really are capable of exhausting them. When there is little trade between regions and transport costs are high, people cannot buy someone else's grain, or charcoal, or wool when they have made a mess of their own resources. Once people know that their choices are limited to sustainable resource management, migration, or death, they are likely to experiment a bit with property rights. They then lay claim to natural resource systems in order to enforce conservative or sustainable resource use when substitutes for those resources are not readily available. Over time, we see increased "propertyization" of open-access resources and increased effort to

bring clarity, specificity, security, and comprehensive control into the definition of both individual and shared property rights. Although indivisibility and dispersion of risk may dictate the adoption of shared, or common, rights in some instances, we may see the creation of shared rights on resources that would not otherwise require it, simply in order to economize on enforcement costs. Eventually we see economic systems with both individually parcelled property rights and communally held property rights, the most widespread combination being individual ownership of intensely worked lands and portable store-able objects, and communal ownership of extensive natural resource systems.

Parcellization Of Common Property Into Individual Property

Historically, the rise of markets and a money economy clearly stimulated the enclosure and conversion of much communal property into individual (and government) property, though I believe we have studied this process much too casually and thus concluded too crudely that shared property is archaic and inefficient whereas individual property is modern and efficient. The revisionist attempts to re-examine the centuries of struggle between those who wanted to continue common ownership of lands and those who wanted to enclose more and more of it into individually owned parcels are extremely valuable contributions, pointing out that sometimes the gains of particular individuals can be aggregate losses for others who will fight bitterly, not because they are old-fashioned or "irrational" but perhaps because they are very rational utility maximizers indeed (Ault, 1952, 1954, 1965, 1972; Dahlman, 1980; Fenoltea, 1988; McCloskey, 1975, 1976, 1985). Why does parcellization of the commons occur with the rise of trade and commoditization of the products of the commons?

(a) In settings where people adopted common property only to hold enforcement costs down, if the products of the commons increase in value — due, say, to the emergence of markets and trade and a larger number of eager buyers of the product — increased spending on enforcement may be required and justified by the newly available returns. Thus parcellization of the resource may then become worthwhile.

(b) Trade, the emergence of specialization and alternative employment, and economic differentiation within the user community can increase the cost of negotiating compromises in joint management. Users who begin to feel that they have options other than managing the commons in traditional ways may not cause trouble if they simply leave town, but there can be big trouble if they stay behind and begin to argue for a transformation on the commons — or simply begin cheating. Now the transactions costs of negotiating management decisions can skyrocket. Decision-making by majority rule can produce dissension and open defection from the rules. And attempting to honor unanimity decision-rules can prove mind-boggling. In Japanese communities that require unanimous decisions, the costs of talking late into the night to persuade holdouts to agree or of tracing heirs of some rights-holders to the ends of the earth for a crucial signature prove ridiculously high. Unanimity rules change to majority decision rules, majority decision rules produce unaccommodated dissenters, large commons with many owners are divided into smaller commons with fewer co-owners, and eventually parcellization into individually-held units with higher enforcement costs begins to look better than collective management with astronomical negotiations costs.

(c) Rapidly rising commercial value of some products of the commons may also increase the temptation of some co-owners of the commons to cheat against their fellows and harvest more of these products (fuelwood, timber, cockatoos) than the rules allow in order to obtain short-term economic benefit. For individuals who expect to turn the gains into an investment into a new occupation or a new life in the city, this short-term strategy also brings long-term payoffs. These persons then become willing to ignore the rules and punishments of the community. In game theoretic terms, the change in external markets increases the temptation payoff in the prisoner's dilemma matrix and creates the possibility that some commons users will decide to cheat early, accumulate the rising payoffs to cheaters while other community members are still cooperating (like suckers), and then skip town. They have no intention of sticking around for an indefinite number of iterations. They leave a degraded commons behind for others to fix. Indeed, if many

members of the community adopt the same strategy, we may actually see a social consensus in favor of intentionally destroying the commons! If the community has been seriously fractured by this experience with rampant cheating, then the social basis for continued collective management is gone, and parcellization may look like the only sensible option left. A robust social organization might be able to command large contributions of labor and funds in order to restore the health of the commons as a commons, but if the community is socially depleted as well, this may not be possible. Parcellization becomes attractive, at least as a short-term strategy for recovery, in order to attract the investment of effort needed to restore the commons. This may involve afforestation, or conversion to cultivation. However, as long as the problems of risk and externalities remain, the reasoning above would predict that there still might be efficiency gains from converting some of the rights to this resource back into shared rights.

(d) The rise of trade and markets can also produce the exact opposite stimulus — not greater demand for the traditional products of the commons, but less. A reduced demand for products of the commons can also be associated with a reduction in concern for conservative (prudent) behavior on the commons. That is, new technologies and, more importantly, long-distance trade make substitutes available for the products of the commons. There is then less need for conservative management of local resources. People may begin to use their commons carelessly (intentionally mining the resource with a plan to switch to readily available substitutes whenever necessary), or to convert the commons into completely different uses. A reduced demand for the traditional products of the commons may also mask the functions the commons may have played in providing environmental benefits.

The new uses of the converted or parcelled commons may produce fewer environmental services, but the environmental costs of the change may take a long time to accumulate and attract notice. Examples of the resource substitutions that can make the commons less important as a source of products than before range from environmentally sustainable ones to globally damaging ones. People may improve their ability to catch or buy fish to supplement the local diet, so they become less dependent on food products from their commons. They become able to use fertilizer derived from fish-meal (or petroleum!) on their arable land, so they become less dependent on green manure gathered from the common meadow. Or they become able to buy wood (or propane!) from far away to supplement or even replace wood supplied by local forests. We might see a conversion from fuelwood coppice to apple orchard. We might see an enclosure of grazing land that can support cultivation with the addition of synthetic fertilizers from far away, especially if they are heavily subsidized. People may begin using more machinery in agriculture (especially of the subsidized variety) and have less need of livestock as work animals. This means that a commons that was needed for fertilizer or hay or fuelwood or grazing can be converted to other uses. The commons might be parcelled and the forests cut down for arable fields or urban expansion (bowling alleys, shopping malls, or even golf courses!). Coastal fisheries might be displaced by higher value-added activities like industrial harbors and petrochemical complexes.

The intensification of agriculture that occurs at this point usually means an "enclosure" of uncultivated land in order to expand cultivation. But there is also a counter-example in Scotland, where we have a conversion from cultivation to grazing rather than the reverse. During the highland clearances, common-field cultivated agriculture (the *run-rig* system of the highlands) accommodating many people was enclosed, captured by single owners, and converted to use as pasture. During this process, "sheep ate people." The clan chiefs or lairds (whose position was rather like *sengoku daimyō*) claimed residual ownership of the highland commons. When they decided that sheep were more valuable than than people, they terminated collective uses by humans and installed large herds of sheep on their vast estates, thus forcing their displaced crofters to emigrate to the new world in the process. In some cases, the lairds actually paid for the ship passage to Canada or America in order to ensure that the crofters left Scotland. One wonders if this choice (of grazing) would have been economically or politically attractive if the lairds had not been able to depopulate the land so conveniently.

Parcellization on relatively flat land, where externalities within the resource system and externalities that the resource can impose on other resources may not be so serious, may work well indefinitely. This accounts for a great portion of the enclosure of commons that has taken place during the past several hundred years in Europe and Japan. (Although Japan is largely mountainous, the expansion of cultivatable to new fields (*shinden*) occurred from valley floors upwards.) The common resources that are most likely to survive as commons even when parcellization of other resources is all the rage is the common property that is designed (a) to disperse risks that cannot be eliminated through environmental transfers and (b) to internalize externalities within and beyond the resource system. As long as those potential externalities are significant and noticeable to a single generation (or perhaps two or three), there should be tremendous resistance to parcellization. This may be why we have had the longest survival of commons in arid lands and mountainous areas. These lands are more marginal, less attractive to potential parcel-owners as their personal acquisitions, and also more likely to be appreciated by their users for environmental benefits. Mountain communities have for centuries realized that they needed their upland forests not only as a renewable source of wood products but also to protect the community itself against avalanches (in Switzerland) and to provide clean water (in the Japan Alps, the term for old-growth forest on the tops of mountain ridges was often *mizu no me hayashi* [water-source forest]).

But wherever a commons is needed for its environmental services, conversion to parcelled ownership creates the possibility that environmental externalities that were once kept under control through collective management (conditions #5 and #6) may emerge again, although they may not be noticed for a long time, particularly in an area where the former commons do not undergo an intensification of use. Once new environmental externalities become intolerable, a return to coordinated management will be needed, although a reversion to traditional uses may be impossible. The mountain may have been bulldozed, the shoreline carved up, the old-growth forest that provided habitat for certain animals may have been irretrievably simplified.⁷ In some of these cases, the externalities that result from parcellization and uncoordinated management are visible within a few decades and promote a reversal of policy, as we are beginning to see in many countries today — India, Nepal, and the Philippines are cases in point.

Environmental Transfers that Conceal the Environmental Costs of Parcelling

It might seem that the "fragility" of "marginal" lands is climatologically fixed (arid lands stay arid), but sometimes a technological change can improve predictability so that management in smaller parcels is acceptable. This may involve an environmental transfer — resource inputs brought in from other regions — and such transfers may turn out much later to have undesirable or unjust effects. Most of the gigantic resource-moving schemes of the 19th and 20th centuries should be seen as environmental transfers, and therefore as environmental subsidies in the receiving area. Consider agricultural production in the American southwest. Without the technology to move water around, the central valley of California could never have become a center for intensive agriculture. It is fundamentally a desert, and left to its own devices Southern California should have become a region of nomads grazing their donkeys where we now have Tinseltown. Logically, the Los Angeles area would have been managed as commons, and it would never have become a center of orange groves, suburbs, automobiles, or Disneyland. The natural flow of the Owens and Colorado rivers would have improved agricultural productivity elsewhere (Mexico). Perhaps moving this water, or some of it, to the valleys of California was wise for the United States (though not from Mexico's point of view of course) because the soil there turns out to be incredibly fertile when damp. It is

⁷ Nonetheless, when conditions are sufficiently desperate, reversals that one might have thought impossible can actually occur. In the United States, some of the most destructive large dams are actually being dynamited open to restore rivers to natural flow. Wetlands that had been drained earlier are being filled again with water and allowed to revert. There are also campaigns to retreat from cultivation and cattle grazing in portions of the Great Plains in order to allow the natural tall grass prairie to revive and also to allow buffalo herds to return to former habitat. Finally, on the barrier islands of the Atlantic coast, there is an increasingly powerful campaign to stop rebuilding artificial cement works intended to stop beach erosion and instead to allow the natural movement of these islands to proceed.

former seabed, rich in organic deposition and minerals. However, the fact that the water was moved via tremendous subsidies and the recipients did not pay the full cost of moving the water causes tremendous waste to this day. We all know that it would have been better to move only the amount of water that recipients would have been willing to pay the full cost for, and indeed water-conserving agricultural methods might have permitted tremendous improvements in agricultural productivity over an even larger area, including northern Mexico perhaps. The point is that sometimes technological change can increase predictability in a large resource system and thus make parcellization efficiency-enhancing. On the other hand, if the technological change is subsidized to absurd levels over a very long time, it might, once the full environmental bill is taken into account, be efficiency-reducing over the long term. California's and Arizona's patterns of water use are no longer considered sustainable, and there are great efforts under way to reduce waste, almost a century after the first water projects began. Similarly, the technology of deep boreholes in Africa, also built with huge subsidies, exacerbated overgrazing and overuse of resources rather than alleviating these problems.

Environmental transfers convert local environmental externalities into long-distance ones, and some of them are quite noxious in that they occur without the consent of all parties. Rich folks high on the food chain can pay for a huge proportion of the world's fertilizer supply to permit the extreme intensification of agriculture to produce broccoli for themselves and corn for their cattle, vastly increasing the rate of global land-clearing and deforestation. Rich folks in big houses who work in offices that go through football fields full of paper can deforest all over the world. They then encourage replanting with eucalyptus trees so they can do it again, leaving the toxic soils and diminished water supplies behind after the eucalyptus have done their local damage. Environmental transfers of this kind - in which nations not only trade in materials but trade in environmental burdens — are socially inefficient subsidies — just like price subsidies — that cause overuse of the thing that is subsidized. Appropriate property rights institutions that internalize externalities would serve as a barrier to transfers of environmental burdens.

REINVENTING COMMON PROPERTY

To review then: private-property rights in resources evolve only when demand for those resources makes the extra effort of defining and enforcing property rights worthwhile: that is, when resource use intensifies beyond some point. These may take the form of common-property rights — individually owned rights to flow based on shared rights to stock — when it is impossible, undesirable, or very expensive to divide the stock (the resource base or production system) into parcels. A common-property regime consists of joint management of the resource system by its co-owners, and is more likely to exist when the independent behavior of individual resource users would impose high costs on other resource users — that is, as mutual negative externalities multiply. Vesting clear, specific, secure, and exclusive rights in private entities encourages investment and protection of resources. Vesting those rights in large enough groupings of individual resource users so that they can then coordinate their uses to match ecosystem requirements internalizes environmental externalities.

Classic individual private ownership — the classic intact bundle of all imaginable rights to a thing — is just fine if there are no externalities likely to result from any uses to which an individual owner might put a parcel. However, in a congested world, it is less and less likely that no externalities will result. We probably cause more externalities than ever before in both an absolute and relative sense. We **do** more to our resources than we were capable of before steam engines — we dig deeper holes, churn up more land, move more water, cut more trees, melt more rock, wipe out other species almost indiscriminately, and tamper more with planetary atmosphere and weather. And even when we only do the same thing we used to do, some one or thing that can be harmed is far more likely to be located in the path of the damage. It may seem odd to say that classic individual private ownership is less appropriate for our times in an age when communism and socialism are considered thoroughly bankrupt experiments that we are well rid of. But the emergence of environmental degradation, or externalities, demonstrates to us that our property rights arrangements need much more fine tuning.

Embedded in this observation is a very important theoretical proposition. That is, mutual regulation through the institutional equivalent of a common-property regime is **more** desirable, because of its capacity to cope with multiplying externalities, as resource use **intensifies** and approaches the productive limits of the resource system. Further, since it is people who use resources, we should also find that common property becomes **more** desirable — not necessarily more workable but more valuable and thus more worth trying — as population density **increases** on a given resource base. If human beings depend on extracting as much out of a resource system as the system can sustainably offer, then careful **mutual** fine-tuning their resource use becomes essential. Common-property regimes are essentially a way to institutionalize and orchestrate this kind of fine-tuning when resource systems are pushed to their limits. Private-property rights stimulate long-term planning, investment in the productive quality of a resource base, and stewardship. Sharing these private-property rights is a way to solve some of the externality problems that arise from population pressure and intensification of use. If we fail to solve these problems through Coasean bargains or collective management of resources, we inevitably deplete those resources and reduce their productive potential well below what it could have been, if not all the way to zero.

Too many observers and policymakers today now throw up their hands in despair when they see population pressure and resource depletion, condemn common property as quaint and unworkable, and recommend "privatization." But what they mean by "privatization" as they use the term is either an outright award of the entire resource system to a single individual, without regard to the political consequences of enraging all other former users of the resource, or parcellization, rather than shared private property or common property that should be encompassed in the notion of "privatization". **The advocacy of "privatization," then, tends to overlook what may in fact be the most appropriate form of privatization in some instances!** I would argue that common-property regimes may be the most appropriate things to create where resource systems are under both environmental and population

pressure, at least where prevailing cultural values support cooperation as a conflict-solving device. Like individual parcellization, common property gives resource owners the incentive to husband their resources, to make investments in resource quality, and to manage them sustainably and thus efficiently over the long term. But unlike individual parcellization, common property offers a way to continue limited harvesting from a threatened or vulnerable resource system while solving the monitoring and enforcement problems posed by the need to limit that harvesting. Sharing the ownership of the resource base is simply a way of institutionalizing the already-obvious need to make Coaseian deals to control what are externalities for a parcelled system and internalities for a co-owned intact system.

In effect, owners of individual but contiguous parcels may have an interest in mutual regulation of land use — the equivalent of zoning. Zoning and urban planning are actually the creation of common or shared-property rights in choices over land use, and the vesting of those rights in the citizens of a municipality. Just as zoning in a frontier area where population density is low would be an absurdly unnecessary effort but increasingly desirable to control externalities in more densely populated areas, so common property becomes more desirable, not less, with more intense resource use.

A ROLE FOR PUBLIC OWNERSHIP?

Thus far I have spoken only of two varieties of clear, specific, exclusive, and therefore private property rights: those shared by a group of individuals and those parcelled up and allocated to individuals directly. Is there any role for public ownership, property rights vested in (preferably representative) government institutions? Certainly. The reasoning above is based entirely on the principle that internalizing externalities enhances efficiency, a view long advocated by economists as necessary for social efficiency even though many of them have misunderstood and mislabelled common property.

Public ownership of ultimate resource rights may be the preferred form when the resource system produces benefits important to and valued by society as a whole or by an even larger collective body (the planet?), but not capturable by the smaller collective entity that would be the co-owners in a common property system or an individual owner of rights to the resource. An example might be old-growth forests, which produce three kinds of benefits: (a) privately capturable benefits in the form of timber and other forest products; (b) complementary positive externalities in the form of clean air, clean water, watershed management, and erosion control that are automatically produced when the owner practices sustainable timbering; (c) and another class of not-easily measured positive externalities that may **not** be produced if the owner concentrates on the privately capturable benefits only. Old-growth forests have great value as a habitat for diverse and increasingly precious biological resources and as a research laboratory for understanding the role of old-growth forests versus plantation stands of monoculture timber in climate change. If privately owned, these forests would be slowly converted by private timber firms into plantation monocultures that could still produce the first and second kinds of benefits, but not the third class of hard-to-measure public goods. To secure this last category of benefits, governments (preferably the perfect ones that are invulnerable to rent-seekers...) may have to retain ultimate ownership of rights to certain kinds of increasingly precious resource systems.

One device to improve the incentives of a common property user group to attenuate their resource use so they they continue to produce positive externalities valued by others is to have the beneficiaries of those externalities pay the group that produces them. This Coaseian solution is workable only when the value of the positive externalities in question is easily and adequately measured, and when there is a mechanism for transferring payment. One could imagine constructing such a transfer mechanism at the international level to guarantee a minimum income to residents-users-harvesters who rely on extractive reserves in the tropics for income. I am told that extractive reserves are no panacea for their residents; the minute they discover a wonderful new tropical forest product and begin to harvest it for sale on the world market, somebody comes along and synthesizes it so the market for the natural product crashes. And one

cannot count on a given extractive reserve to generate a new wonderful product every year or so to provide income to replace that from the product whose market just crashed. Biodiversity royalties are a step in the right direction, though there are tremendous problems as one begins to think about where the royalties ought to go and how to guarantee that they get there.

Public ownership is often recommended when a resource system is so threatened, so abused (or so close to that point) that most uses and harvesting must be prohibited for the time being. Here the function of public ownership is to sequester the resource for a long period of compulsory "fallowing." This would obviously be the case for preserving or re-creating habitat of a species we have decided to rescue (the cheetah, Siberian tiger, Javanese rhino, Chinese panda, California condor), and it is also the intent of the "wilderness" designation in American and Swedish national forests. Where there is population pressure on the resource system, sequestering or fallowing will be quite difficult and will necessitate some arrangement for buying the cooperation of local people so that they become co-enforcers with government, rather than perpetual encroachers. For example, I would expect that if Madagascar shifted to a sturdy system of court-backed common property rights in areas dominated by *tavi* (swidden) agriculture, we might well see a stabilization of forest cover in Madagascar. But it would probably be forest cover without the rich biodiversity that now exists only in Madagascar. The people of Madagascar have an incentive to protect that biodiversity only to the extent that they earn direct returns from it. Although efforts have been made to incorporate local communities into planning for the national parks, these transfers of ecotourism revenue are not working properly, and there is still widespread resentment at the idea that outsiders value Madagascar's lemurs more highly than its people (Zdeb, 1997).

Comanagement is a blend of public ownership of ultimate resource rights (the right to decide whether the resource in question is to be a salmon run or a power station, a forest or a shopping mall, a wetland or a petroleum refinery) with private ownership by local resource-using communities of actual day-to-day use rights. Comanagement is the most appropriate solution when public ownership is desirable in order to produce hard-to-measure positive externalities produced by the resource system or to protect resource systems that are seriously threatened (the two situations discussed above), **and** where local enforcement agents are crucial to the success of the protection mission. This will be particularly necessary when a resource is threatened because of nearby population pressure. The only effective way to enforce restrictions on access on lots of people is to have lots of other people with a very serious and tangible interest in the resource they are protecting to do the enforcing. The different approaches to protecting elephant populations in East and Southern Africa clearly illustrate that one guard, even a highly motivated one with an automatic weapon, is not as effective as several hundred highly motivated people with lesser weapons, partly because of the physical size of the resource base that needs protection. In east Africa, all hunting of elephants is banned, and well-armed government guards are empowered to shoot poachers (fatally) on sight. Nonetheless, poaching continues to be a problem and herds are still declining in size. In southern Africa, local communities possess property rights in the elephant herds and hunt them (or lease out the right to hunt them to trophy hunters) at sustainable levels for profit (within-country sale of meat and other products, though they had to stockpile the ivory collected until they won an exemption from the CITES ban on ivory trade in June 1997). Community members thus have a high incentive to guard "their" herds themselves from attack by anyone else. In southern Africa, poaching (e.g., hunting by those who without community rights in herds) is under control and herds are increasing in size. If a resource system can tolerate any use at all, then my guess is that the cheapest way to hire guards is to devolve rights to engage in those tolerable uses to some particular group of people who already live in the area and may be traditional users of the resource system.

To summarize, then, Common Property and Comanagement arrangements share a crucial advantage with individual private property arrangements (because actually they incorporate private property rights) in that the owner of secure rights has a strong incentive to enforce those rights vis a vis encroachers **and** to manage the resource efficiently. Public ownership seems most appropriate only when tolerable levels of resource use are near zero or when resource systems that can still tolerate certain uses produce benefits for

persons whose interests would not be represented by a community of common property co-owners, let alone by an individual owner. Common Property and Comanagement strike me as the preferred property rights arrangement for managing resource systems that cannot be parcelled for physical, Coaseian, or political reasons and that are in considerable distress but can still tolerate some amount of use.

In a nutshell, our material-intensive lives are bringing us into constant collision with the conditions (uncertainty, risk, and externalities) that are related to capping aggregate use. We have encountered a need to retreat from individually parcelled property on stressed resources, and especially to retreat from "intact" bundles of property rights all vested in the same owner. We do not have to react to this crisis by communalizing all of the rights attached to every aspect of a resource, but increasingly we find it necessary to make collective decisions that restrict the choices that single owners of single parcels are free to make. Wherever resources are under population pressure, vesting shared property rights to those resources in the people creating the pressure should give those people incentives for better environmental management. Every time we transfer a particular decision-making right concerned with a particular resource from an individual to a regulatory community, we are shifting a little bit from parcelled to common property on that resource. When the community, and not an individual, decides that a resource will be a wetland, or a polyculture forest, or a wildlife habitat, or an open space buffer, or a marine protected area, or a historical treasure that cannot be painted purple, or an area onto which waste automotive oil may not be poured, or a residential garden in which malathion may not be used, then the community is claiming some of the strands in the proverbial bundle of property rights. Common property is being created out of formerly parcelled rights.

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