

THE COMPLEXITIES OF PROPERTY-REGIME CHOICE FOR ENVIRONMENTAL PROTECTION

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Introduction

This paper summarizes theses and arguments presented in my 2002 book *Pollution and Property: Comparing Ownership Institutions for Environmental Protection* (Cambridge University Press). The analysis is unavoidably truncated, and references are kept to a minimum.

Many different property systems – including private, public and common property regimes and innumerable hybrid regimes – have been, and are today, used throughout the world to conserve valuable environmental goods, *i.e.*, natural resources including land, minerals, clear water, and clean air, over time. In the world of the “Coase theorem,” the choice among those property systems would be immaterial, as individuals within societies would costly contract with one another to achieve the highest and best use of all resources. In the real world, however, property-regime choice matters because (a), as Coase pointed out,¹ the costs of transacting are positive and often quite high and (b) there is no universal, first-best property regime, regardless of circumstances. A property system that functions particularly well in one set of ecological, technological, and social (including cultural) circumstances, may function relatively poorly in another. Consequently, the choice among property regimes (if it is, indeed, a deliberate choice)

¹ Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960).

turns out to be largely circumstantial. This paper explores the various strengths and weaknesses of alternative property systems (as traditionally conceived), and provides a rudimentary model of property-regime choice.

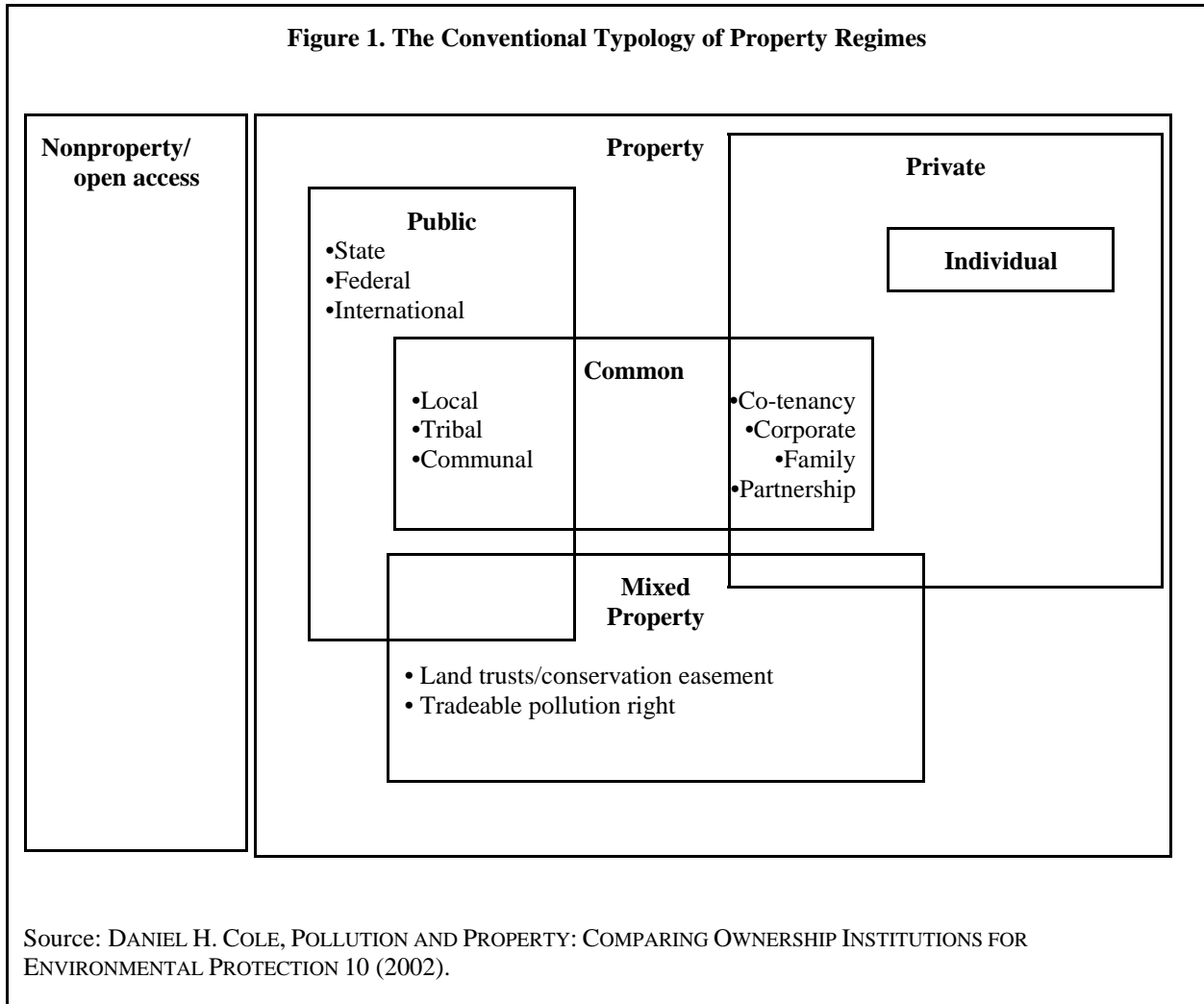
I. The Conventional Typology of Property Regimes

It is useful to begin by reviewing the conventional typology of property systems, which may be best understood as a series of dichotomies. The first dichotomy is between property and non-property (sometimes referred to as open-access). The distinction between the two is simple enough: with non-property, no one has the right to exclude anyone else from accessing and using a resource; with property, someone or some group must have a right to exclude others (and others must have a corresponding duty not to interfere with the property).

All other dichotomies occur within the larger category of property. The next major dichotomy is between public and private property. Public property constitutes ownership by some governmental body presumably on behalf of, or in trust for, the general public. Private property constitutes ownership by an individual or non-governmental group. Thus, we have a further distinction between individual private property and so-called “common property.”

Common property is a particularly interesting category in that it really straddles public and private property. Some forms of common ownership, such as traditional co-tenancy arrangements, corporate ownership and family ownership are essentially forms of private property. But other common property arrangements, such as tribal or communal property, seem more like public property.

Figure 1. The Conventional Typology of Property Regimes



Source: DANIEL H. COLE, POLLUTION AND PROPERTY: COMPARING OWNERSHIP INSTITUTIONS FOR ENVIRONMENTAL PROTECTION 10 (2002).

Finally, there are mixed or hybrid property regimes that combine elements of private, public, and/or common ownership, including for example lands subject to conservation easements, where the title remains with the private landowner, but some governmental agency or nongovernmental organization owns a negative easement in gross to prevent development.

Admittedly, the conventional typology of property regimes is artificial (like all attempts to categorize human or natural systems). Public choice theorists would argue that there really is

no such thing as “public property,” as the notion that government bureaucrats manage government-controlled resources for the benefit of the public at large is a myth. Rather, government bureaucrats manage the resources under their control either to benefit themselves by maximizing agency turf and budgets or to benefit some favored interest group.² As James Huffman has written, there always are private rights in public lands.³ On the other hand, it must be said that there is no such thing as purely private (individual) property, unrestricted by public rights. The concept of “allodial” property is a modern libertarian myth. Private property rights have always been, and are everywhere today, restricted by the correlative rights of neighboring property owners, *e.g.*, private nuisance law, as well as by public health and safety requirements.⁴ Realistically, therefore, we might concede that all property regimes are admixtures of private and public rights. There is no analytical advantage to be gained, however, from lumping all ownership regimes into a single, undifferentiated category of mixed property. Even if the conventional typology of property systems is somewhat unrealistic, at least it remains analytically useful. After all, some property regimes are far more (or less) public (or private)

² *See, e.g.*, JAMES BUCHANAN AND GORDON TULLOCK, *THE CALCULUS OF CONSENT* (1962); MANCUR OLSON, *THE LOGIC OF COLLECTIVE ACTION* (1965); WILLIAM A. NISKANEN JR., *BUREAUCRACY AND REPRESENTATIVE GOVERNMENT* (1971).

³ James L. Huffman, *The Inevitability of Private Rights in Public Lands*, 65 U.COLO. L.REV. 241 (1994).

⁴ For several hundred years, private land uses have been subject to municipal regulations designed to, among other things, protect public air and water quality. In fourteenth-century Italy, for example, tanneries were forced to locate downstream of public water systems to prevent their “corruption.” *See* RONALD E. ZUPKO AND ROBERT A. LAURES, *STRAWS IN THE WIND: MEDIEVAL URBAN ENVIRONMENTAL LAW: THE CASE OF NORTHERN ITALY* (1996). During that same century, the City of London banned the burning of “sea coal” (heavily-polluting anthracite coal shipped to London from northwest England by boat) to minimize the haze that at that time already overhung the city. *See* PETER BRIMBLECOMBE, *THE BIG SMOKE: A HISTORY OF AIR POLLUTION IN LONDON SINCE MEDIEVAL TIMES* (1987).

than others.

II. Property-Regime Choice

So then, we have various property regimes to choose from, and the question arises: which regime do we choose? In answering this question, it is important to recognize from the outset that, from the perspective of environmental protection, there is no universal, first-best property regime. Like all of our other social institutions, our property systems all fail more or less to achieve our goals, whether those goals are to maximize environmental protection or to optimize a social welfare function.⁵ Thus, in making decisions about property-regime choice, we inevitably are in the world of the second best. Fortunately, for some purposes and circumstances, this does not pose much of a problem for property-regime choice. It is easy enough to conclude that, under current technological circumstances, the atmosphere (or most of it at least) should be public property and that most, if not all, lands used for economic production or habitation should be privately owned. But in many respects, these simple cases are among the least interesting. The more interesting cases are also the more contentious ones – the cases in which environmental goods have substantial private *and* public values, leading to reasonable contention over whether those goods are better managed as public, private, or common property.

The chief problem for property-regime choice in the “interesting” cases is that we do not yet have a sufficient working model. Several scholars have offered more or less rudimentary

⁵ As Ronald Coase has explained, all of society’s mechanisms for organizing social behavior, including markets, firms, and governments, are “more or less failures.” Ronald H. Coase, *Discussion: The Regulated Industries*, 54 AMER. ECON. REV. 194 (1964).

models. Rose Ann Devlin, for example, argues that property-regime choice should depend on the nature of the resource itself. Some resources, on her model, are essentially public goods or private goods.⁶ The problem with this model is that the supposed public or private nature of goods is subject to change. Because of changes in economic and/or technological circumstances, what is a public good today may become a private good tomorrow, or *vice versa*. For example, some lands that were deemed public goods in the early nineteenth century because exclusion costs were deemed too high became private goods later in the nineteenth century after the innovation of barbed wire greatly reduced exclusion costs.⁷

Richard Epstein has offered a different model of property regime choice, which depends on the relative costs of exclusion (the costs of defining and enforcing boundaries) and coordination (the costs of resolving collective action problems to take advantage of scale economies, e.g., for protecting endangered species with large areas of critical habitat). The goal is to maximize net social advantage by minimizing those respective costs, given the economic and technological conditions. If coordination costs exceed exclusion costs, the resource should be privately owned. If exclusion costs exceed coordination costs, then the resource should be commonly or publicly owned.⁸

⁶ Rose Ann Devlin, *Property Rights, Tenure Systems, and Managing Natural Capital*, in M.D. Kaplowitz, ed., *PROPERTY RIGHTS, ECONOMIC, AND THE ENVIRONMENT* 103 (2000).

⁷ See Terry L. Anderson and Peter J. Hill, *The Evolution of Property Rights: A Study of the American West*, 12 *J.L. & ECON.* 163 (1975).

⁸ Richard A. Epstein, *On the Optimal Mix of Private and Common Property*, in E.F. Paul, F.D. Miller, Jr., and J. Paul, eds., *PROPERTY RIGHTS* 17 (1994).

In *Pollution and Property*,⁹ I offer a variation on Epstein's model. What matters on my model is not whether coordination costs exceed exclusion costs (or *vice versa*), but the sum of those two sets of costs under alternative property arrangements. In other words, we should add exclusion and coordination costs to derive the total costs under a specific property regime, and then compare that total cost with the total costs under alternative property arrangements. My model is based on the presumption that different property regimes could entail different levels of exclusion and/or coordination costs, resulting in differential total costs.

Whichever model you might prefer, the fact remains that real-world circumstances are far more diverse and complex than any of our existing models allow. We might all agree that relative exclusion and coordination costs matter, but just how, and how much, those factors matter defies easy formulation. Moreover, as we shall see, there are other factors involved in property-regime choice that are notoriously difficult to model. Having said that, scholars have managed, over time, to gain some understanding of the various strengths and weaknesses of alternative property regimes. We are at least beginning to get a sense of what works when – that is, the circumstances under which one property regime can be expected to outperform another.

A. Advantages and Disadvantages of Private Ownership

With respect to private property (and in this context, I'm talking about individual ownership, and co-ownership forms like co-tenancy arrangements and corporate property), we

⁹ DANIEL H. COLE, *POLLUTION AND PROPERTY: COMPARING OWNERSHIP INSTITUTIONS FOR ENVIRONMENTAL PROTECTION* 131-4 (2002).

have a fairly good idea about its advantages and disadvantages. Among its advantages, private property creates strong incentives for investing in economically productive activities because of strong use and exclusion rights. Importantly, the same rights to use and exclude also makes private property a strong institution for environmental protection (conservation of scarce environmental goods over time) for the reasons Harold Demsetz recognized in 1967.¹⁰

On the other hand, private ownership sometimes suffers from weaknesses that reduce its utility as an environmental protection institution. For one thing, as the economist Colin Clark demonstrated in the early 1970s, resource extermination or exhaustion sometimes constitutes an economically optimal strategy for a private owner, depending on rates of resource regeneration and returns from current consumption.¹¹ More generally, private owners manage resources to fulfill their own preferences, which are not always conducive to socially efficient levels of environmental protection. History is replete with tales of owners who intentionally abused or destroyed socially valuable resources simply because that is what they preferred to do.¹² Even when private resource owners attempt to maximize economic value, they are concerned with maximizing *private*, not *social*, value. In other words, private ownership does not avert the problem of environmental externality (although it may often reduce that problem in comparison with other property regimes in some circumstances). If a private landowner can successfully

¹⁰ Harold Demsetz, *Toward a Theory of Property Rights*, 57 AMER. ECON. REV. 347 (1967).

¹¹ Colin W. Clark, *Profit Maximization and the Extinction of Animal Species*, 81 J.POL. ECON. 950 (1973); Colin W. Clark, *The Economics of Overexploitation*, 181 SCI. 630 (1973).

¹² Joe Sax tells several such tales about the intentional destruction, by private owners, of socially valuable artworks in JOSEPH L. SAX, PLAYING DARTS WITH A REMBRANDT: PUBLIC AND PRIVATE RIGHTS IN CULTURAL TREASURES (2001).

externalize costs, he can be expected to do so.

Private owners also have difficulty coordinating the management of extensive or mobile resources over multiple properties, especially when those resources are not economic commodities. Consider, for example, the problem of protecting endangered species habitat on private lands. According to the U.S. Fish and Wildlife Service, the critical habitat of the endangered Peninsular Big Horn Sheep comprises 845,000 acres of contiguous land in Southern California.¹³ If private property owners were to attempt to aggregate such huge parcel of contiguous, unfenced land to protect the big horn sheep, the coordination costs would be monumental. Suffice it to say, it never has been done.

In the North Maine Woods, a large group of landowners managed to amass a 2.6 million acre parcel of contiguous land for hunting and logging purposes.¹⁴ In that case, however, the private owners anticipated that the huge coordination costs would be more than offset by the expected financial returns from logging and hunting. No similar financial returns would be expected to accrue from protecting the critical habitat of the Big Horn Sheep in Southern California, where the opportunity costs of devoting lands to conservation are higher than in Maine to begin with because demand for land and land values are so much greater.

Some private landowners, such as the Nature Conservancy, exist for the very purpose of protecting lands with special environmental values, including habitat for rare or endangered species. In fact, the Nature Conservancy is the largest private owner of land in the United States.

¹³ 66 Fed.Reg. 8650.

¹⁴ See TERRY L. ANDERSON AND DONALD R. LEAL, *FREE-MARKET ENVIRONMENTALISM* 69 (1991).

However, the largest single, contiguous parcel of Nature Conservancy land is only 56,000 acres – less than 1/15th the size of the critical habitat of the Peninsular Bighorn Sheep. By contrast, publicly-owned lands can provide far larger areas for wildlife habitat. The largest National Park in the United States, Wrangell-St. Elias in Alaska, encompasses more than 7.66 million contiguous acres. Together, all the national parks of the United States comprise nearly 150 million acres of land.

The problem, of course, is that the boundaries of public lands have never been established to map onto wildlife habitats. The vast majority of endangered species of plants and animals in the US have most or all of their critical habitat on private lands. This is not good news for the species. According to a 1996 study by the Environmental Defense Fund, endangered species on private lands are “faring much worse” than endangered species on public lands.¹⁵ The evidence suggests that private landownership does not protect the habitat of (noncommodity) endangered species very well at all.

However, the fact that private ownership does not always succeed in achieving social goals, such as wildlife habitat protection, should not lead us to conclude that it is a deficient system which ought to be discarded. As we shall see, none of the available alternatives always succeed either; in some (perhaps many) circumstances they may fail even worse than private ownership.

¹⁵ David S. Wilcove, Michael J. Bean, Robert Bonnie, and Margaret McMillan, *Rebuilding the Ark: Toward a More Effective Endangered Species Act for Private Land* (1996), available on the World Wide Web at <http://www.edf.org/pubs/Reports/help-esa/index.html#problem>.

B. Advantages and Disadvantages of Public Ownership

Like private property, public ownership has some well understood advantages and disadvantages. It's major advantage concerns scale economies. As we have already seen, public land holdings can be large enough to coordinate management of mobile or extensive resources such as endangered species, which seem to be better protected on publicly owned lands than on privately owned lands.¹⁶ Likewise, public ownership of the airspace used for purposes of national defense and civilian aviation appears to minimize transaction (specifically, coordination) costs, when compared with private ownership.¹⁷ However, the scale advantages of public ownership are not always so valuable. For example, there are no scale economies to be gained from public ownership of human residential property or lands used for economic production.

Public property also suffers from several well-known disadvantages. First and foremost, public land managers always are susceptible to public choice pressures, which can, and often do, result in overuse and abuse of publicly-owned resources. For example, because the U.S. Forest Service's budget depends on timber sale revenues, the agency has an incentive to sell a lot of timber, even when timber sales are uneconomical (the social costs exceed the social benefits) and/or environmentally harmful.¹⁸ Public land managers also find it difficult (though not

¹⁶ See *supra* note 15 and accompanying text.

¹⁷ In the famous case of *U.S. v. Causby*, 328 US 256 (1946), the U.S. Supreme Court ruled that only the immediately useful airspace among private lands is private owned. Above that, the public owns the airspace because, otherwise, civilian aviation would become impracticable.

¹⁸ On below-cost timber sales in US National Forests, see, e.g., RICHARD L. STROUP AND JOHN A. BADEN, NATURAL RESOURCES: BUREAUCRATIC MYTHS AND ENVIRONMENTAL MANAGEMENT 111-12 (1983).

impossible) to exercise the right to exclude so as to protect scarce resources from too much public access. US land management agencies charge visitor fees, but those fees are intended primarily to raise revenues for the agencies, rather than reduce over-access to scarce resources. According to a 1998 General Accounting Office Report, new fees and fee increases in the 1990s “had no major adverse effect on visitation to ... sites.”¹⁹ Moreover, many members of the public, who supposedly own the resources, sometimes generally object to user fees and other mechanisms that would restrict their access.²⁰ For that reason, among others, National Parks and other public lands in the United States tend to be overcrowded. Yosemite National Park in California, which used to be famous just for its natural beauty, is now almost equally famous for its traffic jams.²¹ Park congestion erodes aesthetic and other amenity values that visitors flock to parks to enjoy. In some cases, too much public access degrades not only resource values but the resources themselves. According to one scholar, air pollution levels at Yosemite sometimes exceed air pollution levels in Los Angeles on the same day.²² A Sierra Club study found that

¹⁹ GAO Report to Congressional Requesters, *Recreation Fees: Demonstration Fee Program Successful in Raising Revenues But Could Be Improved*, GAO/RCED-99-7 3 (Nov. 1998).

²⁰ See, e.g., Kira Dale Pfisterer, *Foes of Forest Fees: Criticism of the Recreation Fee Demonstration Project at the Forest Service*, 22 J. LAND USE & ENVTL. L. 309, 346 (2002); Ron C. Judd, *Opponents Span Spectrum When It Comes To User Fees*, Seattle Times, Apr. 1, 2001. There is also concern with the distributional affects of user fees, which have disproportionate impacts on poorer citizens. If the equitable interest in public lands is held by the public at large, then exclusion based on ability to pay seems inappropriate.

²¹ See, e.g., Dale A. Oesterle, *Public Land: How Much Is Enough?*, 23 ECOL. L.Q. 521, 548 (1996)(noting that “Yosemite’s central road now carries traffic equal to that of downtown Houston”); Richard J. Annsen, Jr., *Funding Our National Parks in the 21st Century: Will We Be Able to Preserve and Protect Our Embattled National Parks?*, 11 FORDHAM ENVTL. L.J. 1, 1-2 (1999).

²² Oesterle, *supra* note 21, at 548.

smog levels increased in 20 of 28 American National Parks from 1993 and 2002.²³

Fortunately, public land managers do not always fail to control public access to valuable publicly-owned resources. In France, for example, the government closed down the famous Lascaux cave to all public access after determining that carbon dioxide from visitors' exhalations was damaging the primitive cave drawings. Today, only scientists are allowed to enter the original cave; tourists must content themselves with visiting a replica.²⁴ More generally, public art museums successfully control access by fees and/or queuing

C. Advantages and Disadvantages of Common Property Regimes

A third option is common property, which has certain advantages over either private ownership or public ownership. Because common property regimes (CPRs) are the focus of this conference, I will discuss them a bit more extensively. CPRs have existed for millenia, and survive today in diverse places around the world, serving many functions. It is unlikely that such an institution would have survived for so long were it not adaptively efficient.²⁵

We know from the work of scholars such as Elinor Ostrom and Daniel Bromley that

²³ See <http://www.sierraclub.org/cleanair/factsheets/pollutedparks.asp>.

²⁴ See <http://www.culture.gouv.fr/culture/arcnat/lascaux/en/>.

²⁵ See Armen A. Alchian, *Uncertainty, Evolution, and Economic Theory*, 58 J.POL. ECON. 211 (1950). *But see* DOUGLASS C. NORTH AND ROBERT C. THOMAS, *THE RISE OF THE WESTERN WORLD: A NEW ECONOMIC HISTORY* (1973) (noting that inefficient institutions can long survive if they are sufficiently well supported by interest groups that benefit from those institutions). Douglass C. North first articulated the concept of adaptive efficiency to describe the importance for long-run economic growth of institutions, including market institutions, that are able to survive exogenous (environmental, technological, etc.) shocks. See DOUGLASS C. NORTH, *INSTITUTIONS, INSTITUTIONAL CHANGE, AND ECONOMIC PERFORMANCE* 80-81 (1990).

CPRs have in many cases successfully conserved resources over long periods of time.²⁶ One widespread CPR, known as the open-field system of agricultural, thrived in Europe for more than 1,000 years, and persists today in various parts of the world, including Switzerland, Japan, and Bolivia; although it is far less prominent than it once was. Common property fisheries at places like Alanya and Çamlık in Turkey have successfully averted over-fishing while maintaining consistent catch rates.

Meanwhile, new uses for common resource management are being found today as an alternative to government regulation. Recently, along the Thanet coast in Southeastern England, English Nature brought together a diverse group of coastal-zone “stakeholders,” to negotiate a quasi-contractual, nongovernmental common resource management plan. The purpose of the resource management plan was to preserve Thanet’s marine life, chalk cliffs, and reefs, in compliance with European Union designations, without the need for government regulation. The stakeholders all agreed to regulate their own access and use. The enforceability and long-term stability of the Thanet’s management plan remain in question; but it is an interesting modern experiment in the use of common property management.

While CPRs can successfully preserve scarce natural resources over long periods of time, we also know that they fail about as often as they succeed. Instability is a critical problem for CPRs. In her justly celebrated book, *Governing the Commons*, Lin Ostrom assesses the

²⁶ See ELINOR OSTROM *GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION* (1990); DANIEL W. BROMLEY, ED., *MAKING THE COMMONS WORK: THEORY, PRACTICE, AND POLICY* (1992); GLENN G. STEVENSON, *COMMON PROPERTY ECONOMICS: A GENERAL THEORY AND LAND USE APPLICATIONS* (1991); CARL J. DAHLMAN, *THE OPEN-FIELD SYSTEM AND BEYOND: PROPERTY RIGHTS ANALYSIS OF AN ECONOMIC INSTITUTION* (1980).

conditions under which such regimes are likely to fail or succeed. A CPR is more likely to succeed (*i.e.*, groups of users are more likely to succeed in regulating their own access and use) when the following six conditions are met: (1) most individuals in the group share a common perception that they are better off cooperating than not cooperating in resource ownership and management; (2) most of them would be similarly affected by common management rules or rule changes; (3) most of them employ relatively low discount rates; (4) transaction costs are relatively low; (5) social norms of reciprocity and trust predominate within the group; and (6) the group of resource users is relatively small and stable.²⁷ These six conditions could be boiled down to just one: transaction costs. If those costs are low enough, neither group size, stability, heterogeneity or any other factors should prevent cooperation, if cooperation is, indeed, efficient. Of course, in real-world circumstances we can never simply assume that transaction costs are low; and the other factors Ostrom lists may be empirical proxies for assessing whether transaction costs are likely to be low enough to permit cooperation. Certainly, the wide variety of real-world circumstances suggests that such proxies are important for predicting the success or failure of CPRs.

One problem with CPRs from an environmental perspective, which has gone unnoticed, is that they rarely, if ever, are used to protect non-commodity resources. For example, common-property fisheries traditionally have been deemed successful so long as they conserved sustainable catches of certain fish species over long periods of time, even if fishing practices decimated other non-commodity species. Even on Ostrom's criteria, a CPR would be deemed a "success" if it successfully preserved a local fishery (or irrigation system), even if it decimated

²⁷ OSTROM, *supra* note 26, at 211.

local dolphin populations (or caused pesticide run-off that harmed downstream fish populations) to the detriment of non-CPR members. Thus, even when CPRs “succeed,” they may not be optimal, or even preferable, for environmental protection purposes.

D. Factors that Complicate Property-Regime Choice

Given the various advantages and disadvantages of conventional property regimes, the question becomes: how do we choose? The problem, as I already noted, is that we don’t yet have an adequate model to help us answer this question. We do, however, know some of the important elements that any such model would likely include.

1. First, we need to know what society is trying to maximize. If the goal is to maximize protection of environmental goods, that may militate in favor of a property regime that minimizes incentives for development. If we are trying to maximize a social welfare function, another property regime may be preferred.

2. Obviously, the respective costs of coordination and exclusion under various alternative property regimes will matter, though how much they matter will, again, depend on what function we are trying to maximize. The extent of coordination and exclusion costs will, to some extent, be a function of a society’s technology capabilities. For example, as noted earlier, the invention of barbed wire in the mid-nineteenth century substantially reduced the costs of enclosing land, thus facilitating the settlement/privatization of the public domain in the United States.²⁸

3. History and culture also matter, although they are notoriously difficult to model. The

²⁸ See *supra* note 7 and accompanying text.

Asian Development Bank learned this the hard way, when it tried to replace the traditional irrigation schedules of water temple priests – a kind of CPR – with modern hydrological techniques. Farmers on the Island of Bali traditionally irrigated their rice paddies based on schedules issued by the water temple priests. The Indonesian government, together with the Bank, sought to improve rice yields by replacing the religious-based institution with modern agricultural techniques. As one American engineer explained, ““These people don’t need a high priest, they need a hydrologist!””²⁹ When the new techniques were implemented, rice yields did improve, but very soon the Balinese farmers were “visited by all the plagues of the Bible.”³⁰ The rice paddies were decimated by pests and fungus. The Indonesian government, Asian Development Bank, and foreign hydrologists had all arrogantly, but mistakenly, assumed that the irrigation schedules of the water temple priests were based on nothing more than religious dogma. In fact, they were based on centuries of experience of what worked to ensure satisfactory rice yields while minimizing pestilence. Because the reformers ignored local conditions and local knowledge, the introduction of modern technologies made matters worse, not better. Eventually, they compromised by incorporating their technological improvements within the preexisting irrigation schedules of the water temple priests.

The case of the Balinese water temples stands as a cautionary tale to those who would casually replace traditional, supposedly inefficient, institutions with new, *theoretically* more efficient policies. This is not to deny that technological innovations and novel, theory-based

²⁹ *Quoted in* STEPHEN TOULMIN, RETURN TO REASON 60-2 (2001).

³⁰ *Id.*

institutions should be discarded; to be sure, such innovations can generate tremendous improvements in both production and resource conservation. However, those innovations should not be introduced without careful consideration for preexisting institutions and cultural constraints.

Another example of how culture, history and preexisting institutions can confound our theoretical expectations about different property regimes, consider how privatization of farms in parts of Africa have reduced production and efficiency. In the 1970s, Botswana privatized its communal grazing lands expressly in order to avoid the tragedy of the commons. But subsequent studies found that privatization of the grazing lands did not improve either economic or environmental conditions. Output per head of cattle remained constant; cost per head was higher for privatized ranches than for ranches still under communal (tribal) governance; margins per head were lower on privatized ranches; and the return on capital was 61 percent lower for privatized ranches.³¹ Based on these and other considerations, N.H. Fidzani draws the stark (perhaps too stark) conclusion that privatization was not “the answer to range degradation.”³² Stephen Toulmin concurs that “the introduction of European methods of cultivation and systems of landholding is now seen to reduce, not increase, the productivity of local agriculture” in Africa.³³ At least in some ecological, technological, and social circumstances, common-field agriculture can still outperform private agriculture.

³¹ Carl Bro International, *An Evaluation of Livestock Management and Production with Special References to Communal Areas* (1984).

³² N.H. Fidzani, *The Botswana Tribal Grazing Land Policy: A Property Rights Study*, in J. Rietbergen-McCracken and A. Hussein, eds., *Economic Instruments for Environmental Management* 29 (2000).

³³ TOULMIN, *supra* note 29, at 104-5.

Conclusion: From Ideology to Empirics in Property System Choice

We have a long way to go to better understand just how property regimes work and do not work to conserve environmental goods in various circumstances. As we move forward, it would help if we could reduce some of the ideological baggage that seems to accompany so much of the property system literature. We should focus more on empirical analyses to develop theories based on comparative utility, rather than ideological purity. In addition, I have noticed that much of property system scholarship suffers from disciplinary insularity. It is rare to find legal scholars citing economists, or economists citing anthropologists, or anthropologists citing political scientists. We really need to be more interdisciplinary about this enterprise to make further progress.