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The Several Futures of Property:
Of Cyberspace and Folk Tales, Emission Trades and Ecosystems

Carol M. Rose†

INTRODUCTION

Private property has long been associated with gloomy images—the rapaciousness of various Robber Barons on the one hand, the musty casuistry of future interests and the Rule Against Perpetuities on the other. But in the late twentieth century, property seems blessed with a bright, perhaps even glamorous future. This article is an essay to predict that future—that is, to predict at least some of the directions that the institution of property is likely to take over the next generation.

Property has always been one of the chief ways through which human beings have avoided what is alleged to be the "tragedy of the commons." That is the situation in which unowned and unmanaged common resources are available to all, with the consequence that entrants crowd onto these resources, overusing them and underinvesting in their maintenance and improvement.1 One chief rival to property in allaying the "tragedy" has been a system of directives from above: command and control governmental regimes avoid the

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tragedy through the application of central planning and administration. But today, in the era following the general disillusionment with Marxist economics, property and its close companion, contract, at least in theory have all but swept away command and control as a device for managing resources. From the demise of the authoritarian socialist regimes, we have taken the lesson that modern economies need not the centralization of direct governmental control, but rather the decentralization associated with property and contract.²

As a part of a more general privatization of the world's economies, property seems to be thriving on all kinds of fronts. Newly invigorated market-oriented economies look to private property solutions for a variety of social issues, from fishery management to cyberspace, from air pollution to the dismantling of once forcibly collectivized farms and factories. Indeed, the current confidence about individual private property brings to mind some of the early modern hopes for property as an almost redemptive social institution. Carolyn Merchant, a feminist environmental historian, has recently revisited John Locke's famous disquisition on property, and has concluded that in Locke's view, property would reintroduce humankind to a new version of Eden.³

How could property reacquaint us with Eden? While Merchant did not describe this process explicitly, the idea seems to be that, in seventeenth century theological terminology, property yokes the fallen and sinful nature of human beings to the Biblical command to labor. We humans are lazy, and disinclined to work. But property, by concentrating resource control on individuals, takes advantage of each individual's sinfulness—or as we now call it, self-interest.⁴ With property, each individual harvests the rewards of her care and effort in the management of her resources, just as she suffers the losses from her sloth and poor management;

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those features of property make her vastly more likely to exercise diligence and prudence about the things she owns.

And property does more: it identifies who has what. In performing this basic function, property allows owners to trade with one another,\textsuperscript{5} rather than getting into unproductive and wasteful fights over resources. Trade in turn yields information about who \textit{wants} what and how much, permitting individuals to specialize their labor on the things that others desire. As Adam Smith so trenchantly pointed out, specialization makes an individual's labor all the more valuable, thus further enticing otherwise slothful humans to labor.\textsuperscript{6} In all these ways, property enhances peaceable, fruitful effort—competitive, to be sure, but competitive within nondestructive bounds. With the ensuing grand bustle of trade and labor, we all grow richer. What's more, we do so in an environment of peace rather than of conflict.

Hence we arrive at the new Eden, the new paradise, or as Adam Smith called it, the Wealth of Nations. These benefits of property—enhancing wealth, dispelling conflict—are well-known, and they have been stressed anew in the modern law and economics movement.\textsuperscript{7} If we take that perspective at face value, it would seem that the more things that get turned into property, the better. Is this, then, the future of property—the universal application of "propertization," in the sense of turning all resources into individual private property?

Probably not. While other authors—notably Margaret Radin—have pointed out some normative problems in "commodifying" some kinds of good things,\textsuperscript{8} the law and economics perspective in itself yields some insights why, as a matter simply of factual prediction, universal commodification or propertization is unlikely. In the following pages I will first


\textsuperscript{6} See \textit{1 ADAM SMITH, THE WEALTH OF NATIONS} 7-8, 13-16 (Mod. Lib. ed. 1937).


\textsuperscript{8} See Margaret J. Radin, \textit{Market-Inalienability}, 100 HARV. L. REV. 1849, 1870-74, 1877-87 (1987) (arguing that commodification of certain objects might be antagonistic to the interests of personhood).
describe some reasons why even an economic approach might be skeptical of universal propertization. Then I will turn to two of the most dynamic arenas for the development of property concepts, namely cyberspace and environmental management. Resource management in these areas illustrates some very rich modern possibilities for property, but it also illustrates some well-grounded challenges to universal propertization, even on purely economic grounds.

Interestingly enough, the objections to propertization—the arguments of "too much property"—take quite different turns in these two areas. In the cyberspace arena, critics of property generally call for the removal of property altogether; that is, to a kind of return to an unowned commons or unmanaged public space with respect to cyberspace information and creative effort. In the environmental arena, on the other hand, critics of property tend to call for more hands-on public management of environmental resources, even for the command and control techniques supposedly now discredited.

A central argument of this article, however, is that we need to consider and refine our thinking about still another and rather different category of property. This category is what I call the "limited common property" or LCP—property held as a commons among the members of a group, but exclusively vis-à-vis the outside world. I will argue that the new developments in cyberspace and environmentalism particularly demonstrate how much we need to develop our concepts of the LCP, a property type that is neither entirely individualistic nor entirely public. Our legal system has hitherto been oddly oblivious to many forms of limited common property—even though common property itself is actually ubiquitous, if unremarked. The reasons for that obliviousness are in some measure economic, but they are also in part cultural—a culture now quite dramatically challenged by the

9. Another author who has noted some relationships between cyberspace and environmentalism is James Boyle, though his analysis takes a rather different direction. See James Boyle, A Politics of Intellectual Property: Environmentalism for the Net?, 47 DUKE L.J. 87 (1997) (discussing a more political approach to decisionmaking in both areas).

10. See ROBERT C. ELLICKSON ET AL., PERSPECTIVES ON PROPERTY LAW xii (2d ed. 1995) (citing shared dormitory room as common property); Robert C. Ellickson, Property in Land, 102 YALE L.J. 1315, 1394-95 (1993) (observing that the vast majority of the American population lives in multi-person households, a form of limited-access "commons").
questions of property in intellectual creativity and environmental protection.

I. LAW AND ECONOMICS APPROACHES TO PREDICTING PROPERTY

Why might economists bridle at the notion that everything can be turned into property? The dominating reason is simple: economists point out that, for all their benefits, property regimes are not to be had for free.\textsuperscript{11} It costs something to define rights, to monitor trespasses, and to expel intruders. Even with a relatively simple resource like land, it costs something to build a fence, to keep an eye on interlopers, and to maintain a police force to remove them. It costs vastly more to establish, track, and enforce property rights in body parts,\textsuperscript{12} reproductive material,\textsuperscript{13} or air pollution emission rights,\textsuperscript{14} particularly when those rights are transferable. We do not bother with the elaborate record keeping systems and enforcement devices for such rights unless the collective returns are high enough to cover the costs—and even then we may not bother, if too few people can be convinced that they personally will improve their positions through a system of defined property rights.\textsuperscript{15}

\textsuperscript{11} See Harold Demsetz, \textit{The Exchange and Enforcement of Property Rights}, 7 J.L. & Econ. 11, 14 (1964) (referring to the cost of systems that control and exchange goods, regardless of whether the systems are based on property or governmental alternatives).

\textsuperscript{12} See Moore v. Regents of the Univ. of Cal., 793 P.2d 479, 488-97 (Cal. 1989), cert. denied, 499 U.S. 936 (1991) (refusing to recognize a property right in favor of donor of bodily materials from which cell line was developed).

\textsuperscript{13} See, e.g., Kerry Cork, Comment, \textit{Test Tube Parents: Collaborative Reproduction in Minnesota}, 22 WM. MITCHELL L. REV. 1535, 1541-46 (1996) (discussing inadequacies of record keeping for sperm donation and recent changes regarding the demand of anonymity, and identifying similar problems with record keeping for donated eggs).

\textsuperscript{14} See Clean Air Act, 42 U.S.C. §§ 7651-7651o (1994) (establishing program for tradable emission permits in acid rain precursors).

\textsuperscript{15} See Demsetz, \textit{supra} note 11, at 16-20 (noting the ability of a property regime to generate information, but arguing that it is only efficient to have such a regime when the information is worth more than the costs); GARY D. LIBECAP, \textit{CONTRACTING FOR PROPERTY RIGHTS} 19-26 (1989) (describing the impediments to establishing property regimes even when aggregate benefits outweigh costs); Mark J. Roe, \textit{Chaos and Evolution in Law and Economics}, 109 Harv. L. Rev. 641, 651 (1996) (describing systems as "strong path dependence" if information and political considerations prevent even efficient changes in legal regimes).
This approach means that if we are going to predict changes in what counts as property, at a minimum we have to take into account both the costs and the benefits of establishing property regimes or modifying existing ones. This accounting, of course, is only a minimum—a necessary but not sufficient precondition for establishing or altering property regimes, because many other impediments lie in the way even of cost-effective changes in property. Property regimes involve collective efforts, and they can fall victim to the usual pathologies of collective action—shirking, uncorrected misinformation, rent-seeking and bickering, among others. But if the minimal calculus of costs and benefits does not come out right, we are unlikely even to get to those pathologies; we will not even think about establishing or modifying property regimes at all.

A. SCARCITY AND PROPERTY'S BENEFITS

Looking first to the benefit side of property rights, law and economics scholars note that the payoffs from property are very strongly associated with scarcity. Nobody bothers to create property for some resource that lies around in abundance. Even crows dispense with their normal territoriality when food is plentiful; they allow other nesting crow families to join them, and even occasionally feed the neighbors' kids. There are good reasons for this relaxed attitude, for humans as well as crows. A plentiful resource does not produce strife among rival claimants. More important for humans, there is no particular point in trying to encourage investment in order to produce more of something that is already abundant. Hence on those two very standard grounds why the institution of property can


be helpful in human affairs—allaying strife and encouraging investment—there is no reason to go through the time and effort it takes to establish a system of property rights for an abundant resource.

But when a resource becomes scarce or pressured, there are many more benefits associated with some form of resource management, including property. Under conditions of scarcity, it is much more likely that the resource will respond to what the institution of property can do—that is, encourage investment and contain strife. This, of course, leads to the next question: when do resources become scarce, so that it might be worth the effort to establish some kind of property rights regime for their management? There are various events or developments that cause resources to become scarce (e.g., natural disasters), but one such development is simply an increase in humans' interest in the resource. Native American hunters created property rights in beaver habitat in response to the European fad for furs. The oil industry created much more sophisticated property regimes for crude oil and its derivatives after automobiles were invented and created a huge market for petroleum products. And, more generally, if lots of people come to want some previously unowned resource, it may be predicted that someone is going to try to claim it as property. In fact, that is when we most need some kind of system of property: when too many people want something, property rights can mediate disputes by enabling the claimants to negotiate and trade instead of fighting among themselves.

Thus, one place to look for changes in property regimes—that is, to discern the possible future of property—is to look for resources that come under greater pressure. Scarcity or pressure will not automatically produce property regimes, but

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20. See Krier, supra note 16, at 335-39, 345 (arguing that property rights do not arise automatically from the need to have them); cf. Gary D. Libecap, Economic Variables and the Development of the Law: The Case of Western Mineral Rights, in EMPIRICAL STUDIES IN INSTITUTIONAL CHANGE 31, 57-58 (Lee J. Alston et al. eds., 1996) (concluding that legal changes defining
it is unlikely that there will be property without scarcity or pressure; once again, these are necessary conditions, even if not sufficient ones.

B. CHANGING COSTS OF PROPERTY

Now, let us turn to the cost side of establishing property regimes. Among scarce resources, some are considerably easier to turn into property than others. The law and economics approach would suggest that those things that are easiest to "propertize" would be likely to be propertized first, all other things being equal.

Land is an extremely common subject of property rights, and indeed land is the central metaphor for property itself. It may be that one reason land is so central a subject of property is because land is relatively easy to turn into property. Land stands still. You can put a fence around it or put up a sign on it. You can see trespassers and try to expel them.

But other resources are much trickier and costlier to reduce to property. Take water, for example: water moves around, sometimes escaping into hidden locations. It cannot be marked easily, and some of its most important uses—navigation, fish and wildlife habitat, natural power generation—may leave few permanent signs on the water to warn other takers of a prior or more valuable claim. Perhaps as a consequence of all these factors, entitlements to water resources often are embedded in much more elaborate property regimes than are land rights; those regimes—such as irrigation systems—may be communal or public in nature, and they may entail many more intricate rights and duties among the participants.

property rights in Nevada mining responded to increased efficiency gains from such definitions); Dean Lueck, The Economic Nature of Wildlife Law, 18 J. LEGAL STUD. 291, 321 (1989) (concluding that legal institutions have shaped wildlife ownership law in efficient ways).


22. See, e.g., J.H. DALES, POLLUTION, PROPERTY & PRICES 61-62 (1968) (comparing the ease of dividing land into parcels with the difficulty of dividing air and water into parcels).

23. See Acton v. Blundell, 152 Eng. Rep. 1223 (Ex. Ch. 1843) (describing both invisibility and uncertainty of the location of subsurface water sources, and using these characteristics as the reason for allowing landowners to take water freely beneath their own property).

24. See generally SHUI YAN TANG, INSTITUTIONS AND COLLECTIVE
Parenthetically, the hotly contested "takings issues" in American property law may in part result from the differential costs of property regimes in different resources. If it is easy to establish property in land, but much more difficult for such land-adjacent resources as air, water and wildlife, then we may expect to see landed property rights emerge prior to property regimes in those other resources. Landowners become accustomed to regarding their land as their property, but they simultaneously regard the adjacent air, water, and wildlife as goods that are free for the taking—unowned goods that they can "piggyback" onto their own land uses.\textsuperscript{25} This pattern is hardly a problem so long as landowners are widely dispersed and their uses small in scale. But in the absence of property rights to constrain their uses of the commons in air, water or wildlife, these resources may be taken heedlessly. Indeed, when overuse begins—when, say, smoke or pollution begins to bother the neighbors or the public at large—courts often develop a crude new form of property rights in the form of nuisance law. A next step is likely to be more formal regulation, which could be seen as an assertion of public rights in previously unowned, but now pressured, common resources.\textsuperscript{26} For example, New York's first major zoning ordinance in 1916, aimed in significant measure at preserving light and air, was passed amidst the clamor that greeted the massive new forty-story Equitable Building.\textsuperscript{27} In turn, such regulatory initiatives may outrage landowners, who may think


\textsuperscript{26} See DALES, supra note 22, at 63-65; Rose, supra note 25, at 274 (describing legislative regulation in response to the increasing frequency of the nuisance action against pigsties in urban areas).

\textsuperscript{27} See SEYMOUR I. TOLL, ZONED AMERICA 48, 68-72, 180-83 (1969) (discussing the 1915 Equitable Building, opposition to it, and the campaign for zoning law regulating height as well as uses).
that their "piggybacked" uses of adjacent shared resources are a matter of right.\textsuperscript{28}

Of course, the costs of establishing property regimes are not static. Among other things, those costs change with technology.\textsuperscript{29} As historians of the West have pointed out, the invention of barbed wire made it easier to claim property in land, although it is worth noting—a point to which I will return later—that the new technology of barbed wire also enabled the fence-installers to overreach, and to claim property that actually belonged to others owners or to the public.\textsuperscript{30} More recently, our newly invented (if still imperfect) methods for monitoring and tracking air pollutants have enabled us meaningfully to consider marketable emission rights that can be traded among pollution sources.\textsuperscript{31} Indeed, we could think about governmental institutions as a species of technology—that is, administrative technology. Appropriative water rights, for example, depend crucially upon the states' administrative abilities to keep central records.\textsuperscript{32} This is true of real estate transactions as well; recording systems, for all their vulnerability to the recent sabotage of self-styled "militiamen," nevertheless normally enable complete strangers to recognize one another's property rights, and thus to finance deals and organize purchases even from great distances.\textsuperscript{33}

\begin{itemize}
\item \textsuperscript{28}See, e.g., Alyson C. Flournoy, Preserving Dynamic Systems: Wetlands, Ecology and Law, 7 DUKE ENVTL. L. & POL'Y F. 105, 105 n.1, 121-23 (1996) (describing the wetlands' importance in flood control, water purification, and wildlife conservation, but noting the constraining impact of the current "property rights movement" on regulatory efforts to limit owners' filling of wetlands).
\item \textsuperscript{29}See Robert C. Ellickson, Property in Land, 102 YALE L.J. 1315, 1330 (1993) (describing the economic prediction that enhanced technology for boundary enforcement will lead to further enclosure).
\item \textsuperscript{30}See id.; see also ROBERT C. ELLICKSON, ORDER WITHOUT LAW 26 n.30 (1991) (describing historical literature on barbed wire); Wayne Gard, The Law of the American West, in THE BOOK OF THE AMERICAN WEST 261, 292 (Jay Monaghan ed., 1963) (describing the introduction of barbed wire); ERNEST STAPLES OSGOOD, THE DAY OF THE CATTLEMAN 190 (1929) (describing the introduction of barbed wire). Both Gard and Osgood observed that barbed wire encouraged overreaching at the outset. See Gard, supra, at 192-93 (noting illegal enclosures); OSGOOD, supra, at 191-195 (additionally noting conflicts over the enclosure of scarce water sources and public roads).
\item \textsuperscript{31}See State of Ohio v. EPA, 784 F.2d 224, 228-232, aff'd on reh'g, 798 F.2d 880, 882 (6th Cir. 1986) (describing new air pollution model, though finding it insufficiently tested).
\item \textsuperscript{32}See JOSEPH L. SAX ET AL., LEGAL CONTROL OF WATER RESOURCES: CASES AND MATERIALS 245-46 (2d ed. 1991).
\item \textsuperscript{33}See John L. McCormick, Torrens and Recording: Land Title
it seems fair to predict that when there are changes in the technological or administrative costs of establishing, monitoring and trading property, there may well be changes in property regimes as well: lower costs are likely to lead to a proliferation of propertization—perhaps, however, including some property claims that overreach.

C. THE LIMITED COMMONS AS A PROBLEM AREA

Property claims, of course, do not always take the paradigmatic form of individual rights. Sometimes the physical characteristics of certain resources, taken together with the limitations of human administration and technology, make individual propertization difficult. Air and water were already mentioned; these resources can indeed be organized into at least partial regimes of individual entitlement, but only with great expense and effort. Similarly, it is sometimes difficult to turn large forests or ocean fisheries into individual property. Often, if there are property regimes at all in these resources, they may take the form either of public property or communal property; they are a commons with respect to the membership, but property with respect to outsiders.

Limited common property regimes (LCPs) have a quite problematic place in the western legal tradition. We do indeed have a number of devices for the creation and maintenance of certain forms of LCP—condominiums, for example, where the membership is specifically defined through purchase, and where the rights, obligations and goals are more or less defined in advance. But many LCPs are held together by custom rather than private "constitutions." Their membership may be defined on amorphous ex post criteria such as residence or informal acceptance by existing members, and their practices


and goals, if definable at all, may be subject to subtle shifts and redirections. These features mean that they often modify the traditional trappings of individual property. For example, a communal fishery may not allow the members to alienate their shares. James Acheson has described at length some informal communal property regimes among Maine lobster fisheries, and his work demonstrates that membership in a fishing community cannot be transferred smoothly to outsiders, but rather rests heavily on a web of connections—long residence, kinship and local friendships, proven skill, and acceptance of local norms.\(^{35}\) Similarly, an LCP may modify the vaunted right to exclude; members of the community instead may be expected to share their gains when things go well for themselves but not so well for their neighbors. That was a part of the tradition of the potlatch among Native Americans of the Pacific Northwest, whose members shared the norms of an extended set of fishing communities.\(^{36}\)

Perhaps because of these modifications of the traditional trappings of property, the western legal tradition has historically had a certain cultural myopia about the many non-individual forms of property in the limited commons. That is, many limited common property regimes do not look like property at all to us, and we have tended to ignore them.\(^{37}\) There are some economic reasons for doing so, of course; communal regimes tend to be quite complex internally, and they are more unwieldy than individual property, particularly with respect to questions of alienability. Their amorphousness as to membership raises issues of who belongs, who does not, and for what purposes; there are yet other issues when the LCP regime changes direction over time—when fishers change their target from one species to another, or when farmers shift from one irrigation technology to another. These and other factors mean that, in a limited commons, claims of entitlement may be more difficult to recognize, monitor, transfer, and enforce.

But there is a second and sometimes overlapping reason why property consciousness may lapse with respect to communal claims: communal claims are frequently made by


\(^{37}\) See ROSE, supra note 16, at 18-19, 294-96.
what seem to be persons that are somehow deemed inappropriate to make claims of entitlement. Such social notions of the "propriety" of property-ownership have been more widespread than it might seem, sometimes coming from self-conscious decisions, but sometimes from what is perceived as "nature." Until the later nineteenth century, our ideas of the correct ordering of the family relegated married women (along with slaves) to propertilessness, while our concern for "domestic privacy" has continued to curtail women's entitlements vis-à-vis spouses, particularly with respect to bodily integrity. Similarly, the inability of gays and lesbians to marry constrains their ability to dispose of property as they choose.

In LCPs, both factors—unconventional communal claims and unrecognized social status—overlap and conspire against property recognition. Historically, this was perhaps most noticeable in European encounters with Native Americans. Although it is overly romantic to regard Native Americans as consistent conservationists, many of their practices nevertheless did conserve and enhance resources. No matter: we all too often feared and condemned American Natives at the same time that we overlooked the ways that they managed their various resource bases. For example, like other Native Americans, tribal peoples in New England used fire very extensively to clear the land and to encourage new browse for the wildlife they hunted. The Puritans held earnest discussions about whether the Indians' fire practices were enough to mark out their territory as property; they decided that the answer was no—although to the Puritans' credit, they at least discussed the subject, and in fact some compensation to the tribes was routinely a part of the New England


expansion on the frontier.\textsuperscript{42} In other encounters, particularly as settlement pushed out toward the more nomadic tribal groups of the West, settlers far more summarily dismissed Native American practices that might constitute property.\textsuperscript{43}

This is not the only history in which our property concepts have failed with respect to indigenous peoples' claims. Just as we disregarded the role of indigenous North Americans' fire regimes, Europeans have disregarded the ways that other elaborate indigenous customs preserved fisheries and forests,\textsuperscript{44} just as they failed to acknowledge that native artisans and storytellers were producing creative artworks.\textsuperscript{45} Not understanding or appreciating these practices and their products, we did not treat them as creating property rights; instead, we stopped the fire regimes,\textsuperscript{46} impeded the customary practices,\textsuperscript{47} and appropriated the artworks.\textsuperscript{48} Notice that at


\textsuperscript{46} See generally Pyne, supra note 40, at 163-80 (describing systematic efforts to stop forest fires).

\textsuperscript{47} See Johnsen, supra note 36, at 46-47 (describing Canadian attempts to halt potlatch); Arthur McEvoy, \textit{The Fisherman's Problem} 47 (1986) (describing the California goldminers' destruction of salmon breeding waters as a major source of conflict between natives and settlers).

least some of this pattern could easily be characterized as a redistribution from producers to vandals, thieves and freeloaders—hardly an efficient outcome, even putting fairness questions to one side.

Some progress has undoubtedly been made on these fronts, slow though it may be. I will return to this subject, but for now, I want simply to flag the phenomenon: certain property claims do not make it onto our property radar screen, or appear only dimly there. At best this pattern creates an imbalance in favor of the kinds of claims that we do recognize, while at worst it may foster violence and dissipate wealth. Hence some part of the future of property may revolve around recognizing as property the resource management of previously unnoticed groups. Indeed, we should expect to see more property if and when we can overcome these myopias—that is, if we come to recognize that some previously invisible community has resource interests and management practices of its own.

Summing up so far, the conventional economic story suggests that we may predict alterations in property—and specifically, more refined property—under certain conditions. The first condition is that social interest increases in some subject, so that we gain greater benefits if we use property to manage conflict and encourage investment. The second condition concerns costs: we should expect to see more refined property where technological or administrative advances make it cheaper for us to organize property regimes. But the third condition is cultural and to some degree political: we may also expect to see some changes in property simply from taking notice of unconventional forms of property, or property among previously under-acknowledged persons and groups—which sometimes amounts to the same thing.

D. TOO MUCH PROPERTY?

With all these guideposts staked out to the future of property, I now turn to two specific subject matter areas that may suggest the directions that property could take in the future. These are not subjects within the usual canon of property law, and they appear only marginally, if at all, in first-year property textbooks. Nevertheless, they are subjects on which property discussions have been quite heated in recent years, and it is for this reason that they may give some clue about the more general trends for property law. The first of
these subjects is the role of property in cyberspace, where there is considerable discussion of the need for new forms of private property, particularly in order to encourage the development of new intellectual and commercial products. But in cyberspace as in intellectual property more generally, there is but also a quite vociferous claim that there is “too much property” and a spirited attack on the idea that property should reign at all in that domain. The second subject is environmental law, which in recent years has proved to be a prolific source of new types of property, particularly some species of hybrid, regulatorily-created property rights in pollution control and resource preservation. Here too, however, there has been a strong undercurrent of dissent, an argument that there is “too much property” in environmental matters; but here the proposed solutions are generally not a return to the unmanaged commons, but rather various continuations and refinements of centralized command and control ordering.

In both cyberspace and environmental law, however, a further undercurrent suggests that the most intriguing and potentially most fruitful direction for property regimes lies in the areas of limited common property—the often-ignored regimes that we might consider “property on the outside, commons on the inside.” I will argue in the conclusion that adaptation to accommodate limited common property regimes may be one of the most important challenges facing our property law.

II. PROPERTY AND THE NET

Intellectual property has become the Dodge City of property—wild and out of control but wonderfully exciting and innovative. Throughout the world, tremendous wealth is now tied up in intellectual property. Not only is the ownership of that property sharply contested,49 however, but there is an even more fundamental attack on the notion that intellectual matters should be reduced to property at all. This is a quite striking contrast to more conventional areas of property, notably in that quintessential subject of property, land. With land, the view that resources should remain open to

49. See, e.g., John E. Giust, Noncompliance with TRIPs by Developed and Developing Countries: Is TRIPs Working?, 8 IND. INT'L & COMP. L. REV. 69, 94-95 (1997) (noting that developing countries traditionally resist strong intellectual property protections on ground that such protections favor more developed countries and limit access to technology).
unconstrained common entry is extremely limited; only in quite special circumstances does unrestricted public use of land seem to result in "comedy"—that is, a happy and productive outcome—rather than "tragedy." Intellectual property scholars, on the other hand, have long and heatedly debated whether or when the goal of this field—the encouragement of useful creativity—is better served by treating intellectual productivity as property, or (at least to some degree) as part of a commons that is open to all comers. Indeed, a very considerable part of the thinking about intellectual property involves an effort to find an appropriate balance between property and commons.

Not surprisingly, the phenomenal development of computerized communication has had an impact on this debate, and on intellectual property generally. Indeed, it seems inevitable that the "information superhighway" must cause some rethinking of intellectual property law. Among other things, cyberspace activity makes the traditional category of "exclusion"—so central to property of all kinds—more problematic, because, on the net, it is much more difficult to monitor copying, or even to say what copying is.

50. Carol M. Rose, The Comedy of the Commons: Custom, Commerce, and Inherently Public Property, 53 U. CHI. L. REV. 711, 711-14 (1986). Property most needful for commerce is a traditional candidate for publicness, see id. at 774-77, but in recent years there have been arguments for recreation and speech as foundations of public property, see id. at 774-81, as well as ecosystem preservation, see Alison Rieser, Ecological Preservation as a Public Property Right: An Emerging Doctrine in Search of a Theory, 15 HARV. ENVTL. L. REV. 393, 402, 418-26 (1991).

51. See, e.g., Robert P. Merges, Rent Control in the Patent District: Observations on the Grady-Alexander Thesis, 78 VA. L. REV. 359, 373-74 (1992) (arguing that inventiveness is not appropriately represented as a limited resource or zero-sum game, but rather as a positive sum game). A much more extreme view of the public nature of ideas was once common. See Martha Woodmansee, The Genius and the Copyright: Economic and Legal Conditions of the Emergence of the "Author", 17 EIGHTEENTH CENTURY STUD. 425, 434 (1984) (describing a view, prevalent until the late eighteenth century, that an author was a mere craftsman transcribing ideas already in the public domain, and by extension, an author's work was in the public domain as well).

A. CYBERSPACE: NOT ENOUGH PROPERTY, OR TOO MUCH?

As Keith Aoki has observed, there seems to be something of a disagreement among intellectual property scholars whether cyberspace utterly demolishes the existing structure of intellectual property or simply necessitates some minor tinkering at the fringes. Jessica Litman notes that the "merely tinkering" school argues from historical continuity: their position is that intellectual property categories have easily adjusted to the major telecommunications advances over the course of the century. From that perspective, computerized communications can just be chalked up with radio, movies and television; those media too no doubt gave occasion for dire predictions, but intellectual property found room for them all. Yet Litman herself disputes the seamless assimilation of new technology to existing categories of intellectual property, and she and others make a strong case that new forms of computer creativity particularly challenge the categories and metaphors of standard intellectual property law. Perhaps it is no surprise that the two sides of this dispute roughly track the opposing schools of "not enough property" versus "too much property" in cyberspace.

1. "Not Enough Property." Most notorious among the productions of the "not enough property" school is the 1995 report of the Information Infrastructure Task Force, a writing commonly known as the White Paper. This report not only calls for an extension of copyright law principles into cyberspace, but argues that only relatively minor adjustments are required to perform this task. The White Paper's

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53. See Aoki, supra note 52, at 1305-08 (contrasting the views of John Perry Barlow and Jane C. Ginsburg).


55. See id.; see also Pamela Samuelson et al., A Manifesto Concerning the Legal Protection of Computer Programs, 94 COLUM. L. REV. 2308, 2343, 2347-48, 2365 (1994) (arguing that the existing intellectual property law categories are unsuited with respect to software). Interestingly, these authors argue that one of the principle sources of value in new software is metaphor, such as the metaphor of the page in word processing. See id. at 2334.

normative claim deploys the standard argument that property encourages labor and trade: cyberproperty allows individuals to market the fruits of their creativity, thus permitting them to reap the gains from their creative processes; simultaneously, property makes marketing activities attractive, thus promoting even greater dissemination of information and ideas.\(^{57}\) Conversely, open access is to be eschewed: in an open access regime, people who have valuable information will be likely to withhold it, simply because they cannot exclude others from appropriating their ideas and intellectual efforts.

This, of course, is a point that could have been made several centuries ago about the violin makers of Cremona. Since the creators of those fabulously tuneful instruments could not protect their methods through property rights, they tried to protect them through secrecy. They succeeded all too well, so that their fabled techniques went with them to the grave, to the immense frustration of future generations of musicians.\(^{58}\) That story, of course, reinforces the point that property—including most especially the right to exclude—does not necessarily encourage creators to hoard ideas to themselves. Quite the contrary, it is the absence of property that leads to hoarding, secrecy, and evasion. And, of course, property’s protection of the right to exclude is intimately linked to incentives to invest and disseminate valuable intellectual creations, because the right to exclude allows the creator to charge for the things that she makes available to others.\(^{59}\)

With respect specifically to the Internet, Margaret Radin has elaborated on a related point about information quality:

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major extensions of copyright law, limiting earlier patterns of free use and requiring major intrusions into existing cyberspace practice). For other challenges to the White Paper, see Keith Aoki, Foreword: Innovation and the Information Environment: Interrogating the Entrepreneur, 75 OR. L. REV. 1, 12-13 (1996).

57. See White Paper, supra note 56, at 10-11.

58. See Barbara Jepson, It Is No Disgrace to Be Second Fiddle to a Stradivarius, SMITHSONIAN MAG., Oct. 1990, at 160 (describing modern efforts to recreate the lost secrets of Cremona violin production).

she argues that if information on the net is an entirely free good, with open access to all, then net information is likely to devolve into something akin to advertising, or more specifically, infomercials.\textsuperscript{60} That is, the net content will very largely slide toward information that someone is attempting to foist on the viewer—partisan, untrustworthy, and thin in usable content.

Aside from concerns over the creation, dissemination, and maintenance of high quality intellectual products in cyberspace, a different but related argument for property concerns unwanted intrusions. There is a considerable efflorescence of “anti-property” on the Internet. Vandals try to get into other people’s files so that they can destroy them; false message-senders conceal their identity and masquerade as others; criminals attempt to secure access to personal financial and health data of individuals. To be sure, some of these activities seem to be quite liberating. Apparently one of the glories of the “alt.sex” channels is that the user can pretend to be anyone at all, of any age, race, religion, or persuasion; all characteristics are candidates for choice in a kind of invention of the self, or indeed of a group of alternative selves.\textsuperscript{61}

Liberating or not, however, the net’s opportunities for deception and intrusion can turn into serious abuses, undermining the net’s value as a medium of communication. Sexual predators are perhaps the most striking of the Internet’s potential for abuse, but there are many more varieties.\textsuperscript{62} Computerized embezzlers make the net less usable for commercial purposes; blackmailers, snoops, and virus-spreaders may frighten ordinary citizens off the net altogether, leaving them to hide in their own private and unconnected


computers. Any such retreats of course reinforce the point that the ability to exclude can expand a sociable exchange of information, whereas the inability to exclude can shrink these desirable activities. Indeed, even the relatively innocuous false message senders, the self-inventors as it were, can undermine trust in all the other information on the net.63 There is a kind of "market for lemons" at work here: if liars have an easy time of it, then even truthful people cannot easily reassure others of the quality of their messages.64

Given the disadvantages of complete open access on the net, but given also the current difficulties of policing access to and use of the net's resources, it not surprising that there is great interest in what we might think of as Internet barbed wire fences, both legal and technological. On the technological side, encryption is already a growth industry, and sure to remain one for the foreseeable future. Encryption raises problems of its own,65 but it also illustrates the impact of technology on property: encryption can increase the property aspects of cyberspace, because it lessens the expense of the classic right to exclude.

As to legal barbed wire, the White Paper merely encapsulates a number of recent calls for an enhancement of the administrative technology devoted to securing effective property rights in Internet products. These include not only sharpened forms of intellectual property and legal bolstering for encryption efforts,66 but also more sophisticated criminal and civil litigation strategies to prevent privacy violations and preserve confidential information.67 Indeed, the heated debate

63. See Froomkin, supra note 61, at 402-407 (discussing several ways that anonymity on the Internet can undermine trust and result in greater surveillance); cf. id. at 407-411 (discussing advantages of anonymity in preserving privacy).


66. See White Paper, supra note 56, at 211-20, 230-34 (recommending expansion of copyright law to include technology aimed at protecting intellectual property on the Internet). But see Samuelson, supra note 56, at 135 (criticizing potential effects of White Paper's suggestions).

67. See Nina Bernstein, On Frontier of Cyberspace, Data Is Money, and a Threat, N.Y. TIMES, June 12, 1997, at A1 (stating that a woman sued a
over the White Paper suggests that even the foes of cyberproperty think that these legal protections could have some effective bite.

2. "Too Much Property." There is another side to this argument, however. Like the proponents of cyberproperty, the opponents—the "too much property" school—take up both positive and normative arguments. On the positive side, antipropertarians sometimes make what Lawrence Lessig somewhat skeptically calls the "argument from futility":68 that is, they claim that it is pointless to try to create legal property in cyberspace. David Johnson and David Post, for example, stress not only the ease of copying via computer, but also the difficulties that governments have in policing Internet use; evaders, they argue, can shift their work not only from location to location within any national jurisdiction but from place to place around the globe.69 Political obstacles make it difficult to change that situation: governments do not now agree on rigorous uniform standards to protect intellectual property in cyberspace, particularly given what are perceived as distributional inequities in the adoption of conventional western intellectual property.70 Even if this impasse ultimately proves to be only temporary, the Internet's erosion of national legal boundaries today harks back to the fragmented legal culture faced by eighteenth-century German authors, who also could not protect their works from being copied in a multitude of other jurisdictions, and who—as Martha Woodmansee argues in a much-cited work—effectively invented a cult of

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68. Lessig, supra note 67, at 1405 (describing the standard arguments marshaled against expanding traditional copyright protection in cyberspace).


70. See Aoki, supra note 52, at 1340-45 (describing the difficulty of arriving at common standards for cyberspace and the distributional unevenness of universalizing the Western standard of "romantic authorship"); see also Pamela Samuelson, Big Media Beaten Back, WIRED MAG., Mar. 1997, at 61 (describing the rejection of White Paper's approach in an international copyright conference).
genius to give some simulacrum of property in their intellectual productions.\textsuperscript{71}

In modern copyright law, the cult of genius has turned into what has come to be known as the "author principle," and one of the most interesting current anti-property arguments in cyberspace takes the form of an attack on this very principle. Some critics attribute author- or inventor-centrism to excessive romanticism about the lone individual’s ability to create intellectual goods ex nihilo.\textsuperscript{72} But their more fundamental charge is that property rights in cyberspace fragment what should be seen as an integrated whole. Rosemary Coombe, for example, in writing about intellectual property in cyberspace, contends that much of the intellectual creativity incorporated in any given production derives from the contributions of vast numbers of persons, coming from very different statuses and cultures; but the "author principle" pretends that some particular individual may take credit for the whole.\textsuperscript{73} Moreover, she and others claim that this pattern has serious distributional consequences: the extension of the author or inventor principle privileges the contributions of the industrialized West over those of non-Western cultures, among other matters by rejecting intellectual property status for folklore or for carefully cultivated plant products from third-world agrarian groups.\textsuperscript{74} The implication of these charges is

\begin{itemize}
\item \textsuperscript{71} Woodmansee, supra note 51, at 425-26, 438-39, 443-45 (describing the nascent recognition of authors of tangible property).
\item \textsuperscript{73} Rosemary Coombe, Left Out on the Information Highway, 75 OR. L. REV. 237, 246 (1996) (using the example of uncopyrighted African designs woven into copyrighted American textiles).
\item \textsuperscript{74} See id. at 245-47; see also Rosemary J. Coombe, The Properties of Culture and the Politics of Possession Identity: Native Claims in the Cultural Appropriation Controversy, 6 Can. J.L. & Juris. 249, 280-84 (1993) (discussing the mismatch between western property categories and Native American cultural claims); Shayana Kadidal, Plants, Poverty, and Pharmaceutical Patents, 103 Yale L.J. 223 (1993) (suggesting a more equitable intellectual property regime to protect less developed countries’ biological materials); Naomi Roht-Arriaza, Of Seeds and Shamans: The
that author- or inventor-centrism is inappropriate even from the central perspective of property's underlying rationale; propertization via the author principle effectively allows some to appropriate the efforts of others.

On the other hand, property theory also suggests reasons for the attraction of author- and inventor-centrism, as well as the closely-related focus on originality. Relative to other candidates for property, the author principle is easy; and, as in most other kinds of property, the easy things get propertized first. It is easier to identify a single author (or definite set of authors) than an amorphous group, like a "village"; it is easier to identify a sharply unusual intellectual product than one that builds incrementally on the ideas of others, like a folktale; it is easier to mark out a product of sudden innovation than a gradual modification of nature, like a village's long-cultivated plant product.\(^{75}\)

But easy or not, the answer is that the author principle, together with the analogous inventor principle in patent law, represents a kind of partial propertization—like the rangeland, where some uses can deploy barbed wire but others cannot. Some things get treated as property, some things do not; some persons get treated as owners, some do not. The effect of partial propertization is that non-propertized contributions can be expropriated or ignored, or both. Conflicts inevitably ensue, and it is small wonder that one branch of the attack on the author principle is the claim that "too much property" leads to strife and litigiousness rather than creativity, peace, and the encouragement of effort.\(^{76}\)

Insofar as the critique of the author principle is an argument against partial propertization, it is in some ways ambiguous; it is not clear that this argument eschews property in principle, or whether its proponents in theory could be satisfied by a more complete extension of property rights to currently unpropertized materials made by previously

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75. Cf. Kadidal, supra note 74, at 228-29 (stating that intellectual property regimes undervalue indigenous traditional breeding practices that form a basis for western commercial seeds); Roht-Arriaza, supra note 74, at 936-40 (describing the patent system's favoritism to sharply defined innovative steps over gradual communal accretions of knowledge).

76. Cf. Boyle, supra note 9, at 133-34.
unrecognized contributors. If the latter, then what appears to be a claim of "too much property" could in principle turn into its opposite: "too little property."

But there is no such ambiguity in a rather different antiproperty argument, one particularly associated with the Internet and popularized under the slogan "[i]nformation wants to be free"—a slogan now particularly targeting the White Paper's proposals for cyberproperty. From the outset of the Internet, a considerable number of users have asserted not only that the net is loose, open, amorphous, and uncontrollable, but that it ought to have those characteristics. The most important consideration here seems to be a vision of intellectual activity as interactive and mutually synergistic. If that is the nature of intellectual activity—and the structure of university education suggests that to some degree many of us think that it is—then those engaged in intellectual creations should want more open entry rather than less. The normal rationing function of property and pricing would be out of place here, because ideas are not scarce goods in the same sense as, say, coffee beans. Intellectual activities are rather goods whose number and value is enhanced with more entry, more use; if particular innovations are walled off and payment is required for access, the sum of innovation will decline. The White Paper controversy thus represents one battle in the more general and longstanding contest of property versus commons in intellectual property. The modern defenders of an open Internet take the position that the free exchange of ideas is a kind of comedy of the commons, where total creativity is enhanced by open access and interaction among all entrants' ideas. Hence the net, they argue, is an inappropriate vehicle for property's exclusive rights; instead, it is in its best form as an open access regime.

3. A Mixed Regime? Clearly, the startling "big bang" of cyberspace has reopened longstanding issues of property

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77. For a brief history of this mantra, described as "[t]he motto of the hacker world," see Marci A. Hamilton, The TRIPs Agreement: Imperialistic, Outdated and Overprotective, 29 VAND. J. TRANSNAT'L L. 613, 625 n.30 (1996).

78. See, e.g., Peter Jaszi, Caught in the Net of Copyright, 75 OR. L. REV. 299, 305-07 (1996) (arguing that the White Paper's proposals would alter Internet use without the traditional protections for open access); Samuelson, supra note 70, at 134-35.

versus commons in the world of ideas. Some availability of the classic property right to exclude, whether technologically or legally created, unquestionably has positive social benefits in cyberspace, from the point of view of the privacy, accuracy, and usefulness of the net as an information vehicle. On the other hand, where the legal effort to delineate property rights substantially outstrips the technological means, there are some expediential arguments against property too. Sufficiently nuanced forms of property would cost a great deal to create and enforce; but insufficiently nuanced forms, as the critics of the White Paper point out, would encourage (and have already encouraged) a scramble to stake out claims, along with litigation, litigation, litigation. In short, the creation of “too much property” in cyberspace can be administratively costly and socially counterproductive, creating strife and waste rather than peace and fruitful labor. This expediential critique is, of course, a kind of transaction cost analysis—important but perhaps less intriguing than the argument that the commons positively promotes creativity, by inviting inventive minds to play with one another’s ideas.80

Ultimately, one might guess that the net will tend to divide into at least two arenas, one propertized and the other public. The propertized portion may be more useful, linear, and directed, where users can make a computer card payment without worrying about computer thieves; or make a date with someone with reasonable confidence about the other person’s identity; or pay to watch a movie or hear a concert, in an environment in which the right to exclude permits the sender to charge for the service, and thus encourages the sender to make the movie or concert available in the first place.

But in the latter arena, one might envision a public space that is full of junk, trash, lies, and risks, but also excitement and thrills—like Central Park after dark.81 It is important to


81. See David M. Herszenhorn, For Central Park’s Late Shift, Darkness is Lure, Not Threat, N.Y. TIMES, May 29, 1997, at A1 (describing late-night subculture in Central Park after dark as gatherings for roller-skating,
have such a public space. This commons is not purely tragic; creativity thrives not only on the ability to cash in on one's ideas—an ability that one gets from property—but also on a kind of free-wheeling give and take that we derive from open access and public space. Traditional intellectual property law has generally incorporated some mixture of property and commons, relying on such doctrines as “fair use” in copyright and relying also on the larger climate of First Amendment claims that modify intellectual property law. Whatever the technological differences from other forms of intellectual property, the Internet too appears to call for some balance of property and commons.

B. THE CASE FOR LIMITED COMMON PROPERTIES

The debate over Internet property in many ways replicates longstanding tensions between private property and public space in the intellectual realm. But the growth of cyberspace communication has also begun to stimulate discussion of a different kind. That discussion revolves around the need to foster and protect what I have been calling limited common property—a regime that holds some resource as a commons among a group of “insiders,” but as an exclusive right against “outsiders”—commons on the inside, property on the outside.

In the cyberspace context, the discussion of limited common properties (LCPs) is still at an early stage, much of it playing out over the subject of informal norms. Internet usage clearly has already generated a tremendous informal culture among users, including behavioral norms as well as language. As a kind of clincher to the “futility” argument against cyberproperty, some authors have argued that property is not only impossible but also unnecessary on the Internet, because the work of formal property can be done by these informal norms. Johnson and Post, for example, draw an analogy to communities of medieval merchants, who enforced commercial norms among themselves; similarly, these authors say, Internet users police one another's bad behavior by various

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82. See Boyle, supra note 9, at 98-103 (discussing arguments that creative endeavors may be encouraged by public access as well as privatization).

83. See, e.g., Jessica Litman, Revising Copyright Law for the Information Age, 75 OR. L. REV. 19, 39-40 (1996) (noting widespread public norms that run contrary to formal copyright law and enforce only commercial exploitations).
tactics of ostracism and disapproval, including such vividly-named practices as "flaming" and "mailbombing."\textsuperscript{84}

This claim has met with skepticism among other writers. Among other things, the analogy may not be entirely apt. Medieval traders dealt with one another over long periods of time and had many opportunities to take stock of one another; some shared relationships on a number of fronts, including religion, family, and place of origin, giving them many opportunities for mutual enforcement of trading norms.\textsuperscript{85} Margaret Radin points out that while such norms for self-policing might have been viable in "early cyberspace," when the net users shared an outlook and were limited in numbers, such norms may be much less viable in the mass-entry environment of "late cyberspace;"\textsuperscript{86} in that context, she says, it remains to be seen whether a laissez-faire regime alone will produce the means to protect user groups sufficiently,\textsuperscript{87} or whether certain kinds of uses might require more formal protection than the users can carve out for themselves.

Finally, it is not entirely clear in what direction norms may lead; indeed, they could conceivably lead straight back to individual property. If the intellectual property historians are correct, the much-decried author- and inventor-centrism of our intellectual property law itself derives from an informal norm: in the absence of effective formal copyright law, authors

\textsuperscript{84} Johnson & Post, \textit{supra} note 69, at 1388-91 (arguing that cyberspace users can develop internal norms comparable to medieval "law merchant"); \textit{see also} Llewellyn Joseph Gibbons, \textit{No Regulation, Government Regulation, or Self-Regulation: Social Enforcement or Social Contracting of Governance in Cyberspace}, 6 CORNELL J.L. & PUB. POLY 475, 509-23 (1997) (describing Internet users' methods for self-governance).

\textsuperscript{85} \textit{See} Avner Greif, \textit{Reputation and Coalitions in Medieval Trade: Evidence on the Maghribi Traders}, 49 J. ECON. HIST. 857, 875-81 (1989) (describing Maghribi medieval traders who were in a defined group with substantial sources of information about one another; also describing Italian merchants' organization in family units); \textit{see also} Gibbons, \textit{supra} note 84, at 520-23 (noting the lack of multidimensional relationships on the Internet as a problem for the enforcement of norms, but also observing that some Internet users become "residents" susceptible to social enforcement).

\textsuperscript{86} Radin, \textit{supra} note 60, at 516; \textit{see also} Gibbons, \textit{supra} note 84, at 520-21 (noting additional problems of anonymity and heterogeneity of net users). \textit{But see id.} at 509-23 (describing a variety of technological and norm-based techniques for policing outsider intrusion and insider misbehavior in Internet groups).

\textsuperscript{87} \textit{See} Radin, \textit{supra} note 60, at 525.
themselves cultivated a norm recognizing "genius," in order to protect their own literary efforts.\textsuperscript{88}

In any event, these discussions of norms link cyberspace to the subject of the limited commons. In most contexts, norms are associated with relatively small communities—"close-knit groups," as they are called by Robert Ellickson, one of the leading contemporary theorists of norms.\textsuperscript{89} Within such close-knit user groups, the exchange of information and ideas might well benefit from organization as LCPs. Discussions among mathematicians, musicians, or even Scrabble players might well be more productive if the participants could join a discussion that was completely free-wheeling among themselves internally—subject, of course to their own agreements and norms—but limited in such a way as to exclude vandals and tyros.\textsuperscript{90} In physical spaces held as LCPs, informal norms and user-created enforcement techniques may go some distance toward self-policing and perimeter defense,\textsuperscript{91} and in various segments of cyberspace too, users may police themselves by informal norms—norms of a given profession, for example, or of a common interest, or of a shared body of knowledge. Nevertheless, external intrusions are a problem; the very amorphousness that makes individual property difficult in cyberspace undoubtedly makes LCPs susceptible to interlopers as well, and hence limited commons groups might benefit from legal protections for their joint efforts.

Along those lines, Robert Merges has urged that intellectual property law should encourage limited common productivity by positively nurturing contractual regimes among intellectual property rights-holders, who in turn can develop internal norms for their own internal relationships.\textsuperscript{92}

\textsuperscript{88} See Woodmansee, \textit{supra} note 51, at 438-39, 443-47 (describing the relation of an absence of intellectual property to discussions of "genius" in Germany); ROSE, \textit{supra} note 72, at 124-28 (detailing discussions of originality and genius advanced in England to protect literary works).

\textsuperscript{89} ELLICKSON, \textit{supra} note 30, at 177-83 (1991).

\textsuperscript{90} See Robert P. Merges, \textit{Property Rights Theory and the Commons: The Case of Scientific Research}, 13 \textit{Soc. Phil. & Pol'y} 145, 162-63 (1996) (describing how scientific research and discovery is furthered by internal common access when coupled with group norms that prevent the exploitation of property rights).


Although there are some non-property legal issues involved (particularly antitrust), this is not necessarily a long reach for current intellectual property; the current regime already has room for shared property rights when a set of creators define themselves in advance as joint participants in the common creation of some fixed product.\(^9\) In this respect, intellectual property is similar to the law of landed property, which also can accommodate various mixes of limited common property, sometimes in very complex contractual schemes like condominiums and cooperatives—so long as the participants and their rights are identified in advance.

Much more difficult and problematic, however, are the emergent intellectual products of less easily defined groups—folktales, folk art, local cultivars, and so on—products that are in some ways always a work in progress, and that include incremental contributions of group participants who are not easily identified as individuals.\(^9\) The growth of the Internet has highlighted products of this emergent character, and in that respect may constitute the most serious challenge for intellectual property. Take, for example, the genre of writing known as the "story tree"—a story started by one person, added to by the next and so on. These story trees are by no means new with the Internet; indeed, in a sense, folklore itself is a kind of story tree production. More recently, story trees have been a part of the fan magazine (or fanzine) culture surrounding science fiction; Star Trek in particular has generated quite a number, particularly among women fans.\(^9\)

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\(^9\) Organizations, 84 CAL. L. REV. 1293, 1293-1330, 1355-58 (1996); see also Gibbons, supra note 84, at 523-32 (calling for "contracting for governance in cyberspace").

\(^9\) See 17 U.S.C. § 201(a) (1996) (defining authors of joint work as co-owners). The notes of the Committee on the Judiciary, see H.R. Rep. No. 94-1476, at 2 (1976), reprinted in 1976 U.S.C.C.A.N. 5659, describe a joint work as one in which each participant prepares his or her contribution with the knowledge and intent that it will be merged with the contributions of the others. For antitrust issues in pooling intellectual property rights, see Merges, supra note 92, at 1355-56 (attributing paucity of patent pools to outmoded antitrust law). But see Laura G. Lape, A Narrow View of Creative Cooperation: The Current State of Joint Work Doctrine, 61 ALB. L. REV. 43, 51-74 (1997) (describing judicial hostility to and narrow interpretation of the joint work doctrine).

\(^9\) See Farley, supra note 48, at 9 (describing the emergent, community-based character of folklore); id. at 29-31, 33-35 (noting that the community-oriented character of indigenous art presents problems for copyright categories, including joint authorship).

\(^9\) See Camille Bacon-Smith, Spock Among the Women, N.Y. TIMES, Nov.
But the Internet has given new opportunities for story trees, just as it has provided a forum for similarly interactive "chain art" productions in the visual arts.  

Traditional intellectual property has often been unhelpful to this sort of production, so long as it is still in the form of a loose, fluid, un-"fixed" collaborative activity rather than the finished or purportedly finished production. As critics of the "author principle" have frequently pointed out, the overwhelming rhetorical practice of intellectual property law is to focus on the distinctive, completed work claimed by the specified individual author or inventor—a rhetoric of romantic genius that is in some ways quite odd, since it distorts the incremental and collaborative nature of much of the actual creative process, both in the arts and the sciences.

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96. See Chon, supra note 52, at 274 (describing the Internet Chain Art Project). Jane Ginsburg uses a variant of a story tree to explore some of the difficulties of copyright protection in cyberspace. See Jane Ginsburg, Putting Cars on the "Information Superhighway": Authors, Exploiters, and Copyright in Cyberspace, 95 COLUM. L. REV. 1466 (1995).

97. See Chon, supra note 52, at 266-69 (describing the difficulty of applying traditional copyright law to a similar Internet production, "Chain Art"); Farley, supra note 48, at 18-17, 56-57 (arguing that copyright law can provide some protection to folklore, but also describing serious limitations); Ginsburg, supra note 96, at 1498-99 (concluding that collective works have "uncertain" protection in cyberspace); Lape, supra note 93, at 74-76 (describing the difficulties for "joint work" copyright protection for the Internet's serial productions).

98. See ROSE, supra note 72, at 5-7; Boyle, supra note 9, at 56-57; Chon, supra note 52, at 263-64; Coombe, supra note 74, at 251-52, 256-57. Copyright law itself requires that a work be "fixed" for copyright to attach, a requirement that may allow outsiders to appropriate folk art, see Farley, supra note 48, at 27-29. For patent, see Shayana Kadidal, Subject-Matter Imperialism? Biodiversity, Foreign Prior Art and the Neem Patent Controversy, 37 IDEA 371, 389 (1997) (noting that the patent system favors large inventive leaps over knowledge acquired in "incremental inventive culture," but citing an incremental patent system derived from German patent law).

99. See ROSE, supra note 72, at 122, 128 (observing that although Shakespeare was treated as the quintessential lone genius in the emerging argument for copyright in the eighteenth century, he was in fact steeped in collaborative creation); Peter Jaszi, On the Author Effect: Contemporary Copyright and Collective Creativity, in THE CONSTRUCTION OF AUTHORSHIP, supra note 95, at 29, 38 (describing contemporary writing practice as
Property theory of course suggests that the individual, novel work has dominated intellectual property law not because it captures the real character of the creative process, but simply because it is easy,\textsuperscript{100}—certainly easier than affixing a property label to the emergent work of amorphous groups. In some measure, however, cultural bias may compound the myopia toward less definite group productions. Story trees, folklore and traditional plant products may go unrecognized as property not only because of their indefinite group character, but also because of dismissive attitudes toward their creators. Those creators are often women on the one hand and traditional peoples on the other. As to the former, some feminist literature asserts that "women's work" has often received short shrift in intellectual property law, observing for example the slow recognition of quilting as an artform; not only is quilting often the product of an indefinite group, but quilts often use designs from natural objects that have been ruled to be insufficiently "original" to merit copyright.\textsuperscript{101} As to the latter, the failure to recognize traditional people's creative work—in which generations of people add incrementally to local legends, craft traditions, and cultivated products—has of course led a number of critics to assert that author- and inventor-centrism has the intended or unintended consequence of privileging the intellectual products of the modern West over the non-Western world, indeed permitting Western appropriators to plunder the work of traditional peoples.\textsuperscript{102} Yet the creators of these collaborative works could benefit from property protection—not necessarily to cash in on their work, but sometimes simply to achieve recognition, and to prevent outsiders from appropriating and commercializing their emergent artistic products.\textsuperscript{103} And the rest of us too could

\textsuperscript{100} See supra text accompanying note 75.

\textsuperscript{101} See Shelley Wright, A Feminist Exploration of the Legal Protection of Art, 7 CANADIAN J. WOMEN \\ & L. 59, 90-94, 96 (1994) (describing decisions denying protection to women's sewing craft productions and noting the marginalization of women under the myth of an artist as a romantic hero).

\textsuperscript{102} See Boyle, supra note 9, at 125-130; Kadidal, supra note 74, at 228-29; Roht-Arriaza, supra note 74, at 929-47.

\textsuperscript{103} See Chon, supra note 52, at 274 (describing an Internet Chain Art Project participant's sense that outsiders should not be able to appropriate
benefit if such artistic endeavors had property protections, since property protections might encourage artists to collaborate in these productive and valuable creative activities.

No doubt some of these cultural biases have eroded substantially in the last years. The Internet’s story tree culture and collaborative artworks—like the newly-awakened demands of indigenous peoples—could erode such biases even more dramatically, making salient the value of interactive group productions, and perhaps changing the implicit benefit/cost analysis that in the past has limited protections for informal group activities. In this way, the Internet could awaken a more general interest in property rights for informal limited commons—that is, in the products from "spaces" that are common to insiders, where each takes inspiration from the others, but exclusive from outsiders, so that the fruits of their intellectual products redound to the benefit of the creators as a group. Even now, intellectual property can accommodate protection for specified groups with specified products, and some biases against incrementally-created traditional production seem to be waning. But more profoundly, the Internet's interactive works suggest that it may be the "spaces," rather than the products from those spaces, that most require a rethinking of intellectual property protection—the LCP as a set of activities rather than, or in addition to, a set of products.

In brief, then, the Internet suggests several points about the future of property: first, the net illustrates the point that while the protections of property can indeed be useful on the net, there can be too much property, in the sense that a merely partial set of property rights may undermine or overwhelm activities and resources not so easily reduced to property. Second, the Internet suggests that there can be too much

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104. See Coombe, supra note 74, at 269 (observing that claims of non-Western people may put categories of intellectual property under scrutiny).
property in another sense: the gaudy looseness of public access vitally nourishes the creativity that our intellectual property laws aim to foster. Finally, the net introduces a more subtle aspect of property than propertization vel non: we need to be looking for property in unconventional places, and most particularly in emergent activities of interactive groups. The net dramatizes something that we should have known all along: that many kinds of intellectual production may be best fostered in a "limited commons," where members encourage one another internally but still preserve a domain of their own, separate from the rest of the world.

Curiously enough, the intellectual property canon has seemed to recognize fairly readily the value of open access for the public at large, for example by incorporating "fair use" and by limiting the time of intellectual property protection. But rather less attention has been paid to the value of the limited common property. Even more curiously, this blind spot in some ways replicates a blind spot with respect to property in physical resources. In that domain, Elinor Ostrom has vigorously attacked the widely-stated notion that the only solutions to the "tragedy of the commons" are either private property on the one hand or governmental command and control management on the other. Instead, she has insisted that scholars and policy-makers pay attention to the vast numbers of informal limited commons that in fact make up a widespread intermediary management strategy throughout the world. It is no accident that Robert Merges, one of the chief proponents of limited common rights in intellectual property, prominently cites Ostrom's work. The work of these scholars suggests that in the domain of physical things as well as creative ones, the activities in the limited commons have eluded conventional western concepts of property—to our own considerable detriment—and are only now coming into their own as a focus for "limited common" property rights.

105. An important exception is Robert Merges, see supra notes 90 and 92; another is Margaret Chon, see supra note 52, at 275-76 (describing benefits of expanding "joint work" category for copyright protection).

106. OSTROM, supra note 91, at 8-13 (attacking the theories of either "Leviathan" or "privatization" as the "only way" to solve problems of the commons).

107. See id. at 15-21, 24-25.

108. Merges, supra note 90, at 160-62; Merges, supra note 92, at 1322-23.
III. ENVIRONMENTAL MANAGEMENT

As in the tradition of intellectual property, a sharp anti-property strain runs through the tradition of environmentalism. The environmental historian Theodore Steinberg, for example, subtitled his book on property and the environment "The Folly of Owning Nature," reflecting the persistent thought that nature is far too grand for the meager categories of human control. Deep ecologists, environmental ethicists, and ecofeminists are among those who have argued that the capitalist institutions like property are part and parcel of a misguided attempt to dominate nature, and to treat nature as severable, mechanical parts rather than as an integrated, interactive whole—with dreadful results for our treatment of natural systems. The strident claims of so-called "property rights" groups, the attacks on environmental measures as "takings" of private property—all have undoubtedly exacerbated many environmentalists' sense that an undue attention to private property is a central feature of the general human despoiling of the environment.

In spite this strain of skepticism about property within environmentalism, the last several years have seen an astonishing burst of property thinking in environmental law. Putting to one side the ever-disputed "takings" issue, the most noticeable impact of property concepts has occurred in the discussion and implementation of market-oriented environmental controls. Among these controls' central models for pollution control and resource conservation are regulatorily-created, transferable property-like rights. Richard Stewart


112. An early discussion was J.H. DALES, POLLUTION, PROPERTY AND PRICES: AN ESSAY IN POLICY-MAKING AND ECONOMICS (1968). Somewhat
is one of the environmental law scholars who has long championed these property-like schemes, and, lamenting the lack of a good shorthand term to describe them, falls back on the phrase “hybrid property.”

A. THE ADVENT OF “HYBRID PROPERTY”

A great deal of our normal property is “hybrid” in the sense of owing its existence and management to regulation. Formal intellectual property is of course entirely statutory; property in corporate securities is so regulation-laden as to have little existence independent of that regulatory regime; and property in land itself has a large regulatory component, even in something so elementary as our privileging of land claims that are properly recorded or registered. But the “hybrid property” that Stewart describes in environmental law has a more distinctive character: it is focused on allocations of rights to a larger resource whose total use has been consciously limited through regulation.

The basic idea of this hybrid property is to preserve resources that are large and diffuse but nevertheless finite—resources such as air, water or wildlife stocks. A hybrid property regime begins by establishing a regulatory “cap” on total use of a given resource; then within the capped allowable amount, the regime allocates individual portions to persons or entities; finally, these persons or entities can buy, sell or trade their individual hybrid property rights to others. Thus the cap preserves the larger resource from over-appropriation, while the individual hybrid rights facilitate trades among the

later, among others, was T.H. Tietenberg, Emissions Trading: An Exercise in Reforming Pollution Policy (1985).


appropriable amounts—trades that ultimately should place the rights in the hands of those that most value them.

One of the chief predecessors to this approach came from land use regulation, and specifically the regulation of overall building density. In that domain, the chief hybrid property mechanism has been a set of devices known as “transferable development rights,” or “TDRs,” widely discussed now for about a generation. The TDR concept gave regulators a technique to curtail land development in one location, but, in return, to permit the owner to build in excess of normal regulatory bulk somewhere else—or even to sell the excess development permission to a third party in the new location. Implicit in the TDR concept was the idea that an area should have some overarching density cap; but within that cap, allowable density units could be moved from location to location. Thus TDRs introduced the idea of an unconventional form of hybrid and at least somewhat marketable entitlements—entitlements effectively created by regulation.

In environmental circles, however, the breakthrough for hybrid property occurred with the 1990 Amendments to the Clean Air Act. These amendments incorporated a scheme for tradable emission rights for air pollution, particularly in the precursor gases that precede the formation of acid rain. Once again, the main components of the new acid rain program were (1) a regulatory cap—here an upper limit on total allowable emissions of acid rain precursors, notably sulfur dioxide; (2) a division of the total permissible emission level into individually-held, property-like “emission rights”; and (3) institution of methods for trading the emission rights.

Since 1990, analogous concepts of hybrid property rights have invaded many other areas of environmentalism. There are now discussions of tradable rights for other kinds of air


pollutants, including the elusive and difficult precursors to urban smog.\textsuperscript{118} Water pollution regulators have instituted experiments with entitlements-trading as between point and non-point sources.\textsuperscript{119} Fishery management agencies are conducting experiments with individual transferable quotas (ITQs) of fish catch.\textsuperscript{120} In international environmental law, a current hot topic concerns the ways in which the developed nations might purchase carbon dioxide reduction credits from rainforest countries, so that greenhouse gases can be reduced worldwide.\textsuperscript{121} Needless to say, all these schemes reflect a standard idea in property: that is, property rights can encourage careful resource management and conservation, including investment in pollution reduction methods.

B. WHY NOW? COSTS, BENEFITS AND UNCONVENTIONAL PROPERTY

What is the source of this proliferation of "property-talk" in environmental circles? Once again, the standard law and economics benefit/cost calculation yields some useful ideas about the reasons why property approaches seem so attractive. First, the perceived benefits of property approaches may be increasing with respect to environmental resources. Air, water, and wildlife all suffer from increasing human pressures, while new technology such as satellite monitoring has greatly magnified our perceptions of those pressures. Pressured resources in turn are a classic location upon which we often think property approaches might help to reduce conflict and to promote careful management and investment.

Second, the costs of property-like regimes have declined, at least in some areas. Technological and administrative changes have made some property rights cheaper to create and to

\begin{itemize}
  \item \textsuperscript{118} See, e.g., Maura Donal, Smog in Much of Basin Down 50\%, Study Says, L.A. TIMES, July 21, 1992, at A1 (describing smog control, including a new scheme for tradable pollution credits).
  \item \textsuperscript{120} See RIGHTS-BASED FISHING (Philip A. Neher et al. eds., 1988) (containing articles on various forms of transferable quotas in fishing).
  \item \textsuperscript{121} See, e.g., Climate Change: More than 2,400 Scientists Call for U.S. to Have Emission Control Plan by December [May 1, 1997 to April 30, 1998], 28 ENV'T REP. (BNA) 404 (June 27, 1997) (calling for industrial nations to develop emission allowance trading programs and to sponsor emission offset projects in less developed nations).
\end{itemize}
Tradable emission rights in sulfur dioxide are only feasible because we can monitor whether rights-holders are staying within the quotas that they have purchased.\textsuperscript{122} International trade in carbon dioxide credits is only conceivable because we now have remote sensing devices that can monitor forest burnings and preservation—the same remote sensing devices that let us recognize the devastating effects of resource pressure in the first place.\textsuperscript{123} Similarly, the technology of administration has improved, at least somewhat.\textsuperscript{124} Hybrid property rights in environmental law can only exist where our governmental institutions have the capacity to run the regimes—to define total allowable use, to allocate rights, to keep track of their trades and subsequent uses, and, ultimately, to enforce the quotas. But these regimes benefit from the increased regulatory capacity that comes from information exchange among governments,\textsuperscript{125} from enhanced accountability following the collapse of a number of authoritarian regimes, and from the watchdog activities of environmental non-governmental organizations.

But there is a third reason why more property concepts are appearing in environmental management, one that perhaps often accompanies a greater perceived value in resources: environmentalists have simply become more imaginative about


\textsuperscript{124} See Marchant, supra note 122, at 634-35 (pointing out that the United States has developed administrative expertise in emissions trading, although not in emissions taxes); see also Tripp & Dudek, supra note 116, at 377-88 (describing lessons from existing environmental rights trading schemes used by various states).

\textsuperscript{125} See, e.g., Daniel J. Dudek et al., Environmental Policy for Eastern Europe: Technology-Based versus Market-Based Approaches, 17 COLUM J. ENVTL L. 1, 16-18, 28-31 (1992) (arguing that the American experience with market-based approaches can be instructive for Eastern European pollution control).
the kinds of resources and resource control to which they apply the concepts of property. Hybrid property rights—the tradable emission rights in air quality, the TDRs in land use, the ITQs in fisheries—represent a considerable imaginative achievement.

An equally impressive imaginative achievement has been the environmentalists' dawning recognition of previously unnoticed resource users as potential candidates for some form of entitlement. It has now come to be quite fashionable to enlist local populations in wildlife or forest preservation, and the allocation of entitlements is critical in that effort. Thus local people may receive a portion of the revenues from game parks, or become employees in ecotourism enterprises, or take a share of the royalties from pharmaceuticals that derive from the wild flora of their surroundings. The very sensible hope is that when local people have a stake in conservation, they will report poachers instead of assisting them, or will protect forest vegetation instead of burning it off. Indeed, Lee Breckenridge has pointed out the convergence of ecosystem management and human rights concerns, particularly with respect to indigenous peoples in rainforest environments. Closer to home, some environmentalist organizations have begun to pay western ranchers to induce them to tolerate wolf dens on their land; effectively, this entails a recognition that the ranchers control the wildlife in practice if not in law—nevertheless, the ranchers may be induced to preserve the wolves for a fee, rather than simply destroying the animals as pests. Such programs, hesitant and error-prone though they

126. See, e.g., NANCY LEE PELUSO, RICH FOREST, POOR PEOPLE: RESOURCE CONTROL AND RESISTANCE IN JAVA 235-37 (1992) (describing how state commanded systems have failed to preserve Indonesian forests, and arguing that local populations should be integrated into forest management to deal with this problem); R. David Simpson & Roger A. Sedjo, Contracts for Transferring Rights to Indigenous Genetic Resources, RESOURCES, Fall 1992, at 1 (discussing contracts for sharing pharmaceutical royalties with rainforest countries); Eric Weiner, Ecotourism: Can It Protect the Planet?, N.Y. TIMES, May 19, 1991, §5, at 15 (discussing recruitment of locals in ecotourism).


may be, represent a creative reach across the boundaries set by prior customs, legal conventions, and intransigence.

In spite of the blossoming of imaginative new quasi-property arrangements in environmental management, however, some members of the environmental community continue to challenge the idea that property is an appropriate vehicle for the human interaction with nature. Their reasons fall into two broad categories, somewhat reminiscent of the cyberspace antiproprietarians. The first is that property regimes in environmental management are partial and hence distorted, and thus create contention and overreaching rather than peace and productivity. The second is more radical: that property in the environment is inherently undesirable, because property approaches lose sight of—and blight—the fruitful interactions among the multiple parts of larger ecosystems. Unlike the antiproperty writers in the cyberspace arena, however, the environmental antiproprietarians generally do not look to a wide open, uncontrolled commons as the solution, but rather to some version of centralized command and control regulation.

C. TOO MUCH PROPERTY OR NOT ENOUGH? THE PARTIAL PROPERTIZATION CONUNDRUM REVISITED

In environmentalism as in cyberspace, there is something of an "argument from futility" about property rights: environmental resources, it is said, are so interconnected and complex, and so needful of flexible management, that property rights are likely to "get it wrong," introducing a rhetoric of fixity that only leads to misunderstanding and strife. Scholars of water law, for example, have argued that little is to be gained by calling entitlements "property" without considering the background context; the "property" designation rather leads people to ignore the overlapping nature of their claims and the need for change, and to think that their rights have greater expanse than they actually should. Thus New Zealand fisheries managers found themselves ensnared in claims for compensation from holders of individual fishing quota rights, when it turned out that total fish availability had

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129. See Benson, supra note 24, at 367 (citing Barton Thompson's comments that "ownership" of water is too simplistic a concept); Sax, supra note 24, at 944, 950-51 (noting changing public claims on water).
been overestimated and quotas had to be reduced;\textsuperscript{130} thus, to avoid such misunderstandings and to head off the otherwise predictable “takings” claims, the Clean Air Act carefully declined to designate tradable emission rights as compensable “property.”\textsuperscript{131}

Why might property rights “get it wrong” for complex environmental resources? As in cyberspace, property rights are likely to be partial; partial propertization leads to imbalance, and imbalance may lead to conflict and waste. Because property enlists our self-interest, it catches our attention; indeed, this attention-getting capacity is one of the advantages of property, particularly in environmental matters, where the diffuseness of harms is likely to mask the gravity of widespread resource depletions.\textsuperscript{132} But even more clearly than in intellectual property, when we propertize certain aspects of the environment—for example, some particularly desirable plant or animal—we may reduce attention to other aspects of an ecosystem taken as a whole.

Take, for example, property rights in certain kinds of fish: hybrid property rights, created through a licensing system, give fishers incentives to catch those fish at appropriate levels; but these hybrid entitlements may do little to preserve the non-target fish. Fishers may indiscriminately destroy the non-target species as so-called by-catch;\textsuperscript{133} or, in order to avoid paying for quota, they may shift their efforts and overfish the “free” non-target fish.\textsuperscript{134} Indeed, some critics point out that if the hybrid property rights are not defined sufficiently precisely, they may encourage waste in the very resource they

\textsuperscript{130} See Individual Transferable Fish Harvest Privileges: Hearings Before the Subcomm. on Fisheries of the House Comm. on Merchant Marine and Fisheries, (1994) (testimony of the Environmental Defense Fund) [hereinafter Hearings] (noting that New Zealand’s definition of individual fishing quota rights required costly buy-back of rights when it turned out that available catch limit had been set too high); see also Carrie A. Tipton, Protecting Tomorrow’s Harvest: Developing a National System of Individual Transferable Quotas to Conserve Ocean Resources, 14 VA. ENVTL. L.J. 381, 411-12 (1995) (discussing concerns over takings claims in planning American ITQ fisheries).

\textsuperscript{131} Clean Air Act, 42 U.S.C. § 7651b(f) (1995) (stating that a sulfur dioxide emission allowance “does not constitute a property right”).


\textsuperscript{133} See RIGHTS-BASED FISHING, supra note 120, at 117, 140-42 (discussing the difficulty of controlling discarding of by-catch in ITQ regimes).

\textsuperscript{134} See Tipton, supra note 130, at 414 (noting the substitution problem).
are aimed at preserving: fishers with ITQs for a particular species, for example, may have an incentive to dispose of all but the largest specimens, since the larger fish bring more at the market. There are similar issues with respect to hunting. Hunting licenses are a version of hybrid property, requiring hunters to pay a fee for some share in a total allowable take, and sometimes plowing the fees back into habitat restoration for the game animals. But when entitlements focus attention on the game species, non-game species may be disregarded, even though they play a critical role in the ecosystem as a whole. Water pollution gives another example: hybrid property schemes to reduce water pollution normally focus on end-of-the-pipe "point sources," since these are easier to propertize than the more diffuse non-point sources such as runoff. But in allocating pollution rights to point sources in exchange for their cleanup of offsetting non-point sources, both point and non-point cleanup costs are effectively loaded on the point sources. Among other things, this should raise some concerns about substitution effects, i.e., polluters may attempt to avoid the "point source" designation by declining to channel and collect pollutants, with the result that pollution becomes less controllable.

Command and control regimes do not necessarily escape such problems, but

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135. See RIGHTS-BASED FISHING, supra note 120, at 115 (noting that ITQs may give incentives to excessive discarding of non-target fish and less valuable target fish, with consequences for larger ecology).

136. This is the pattern of the popular Duck Stamp Act, 16 U.S.C. § 718 (1996). A similar pattern has also been suggested for tradable emission rights, see Ackerman & Stewart, supra note 113, at 180-81 (arguing for the auction of emission rights with auction fees returning to environmental agencies).

137. See Taylor & Gerath, supra note 119, at 20 (noting that the bulk of the trading burden may fall on point sources).

138. This is also a concern raised by conventional command and control regulation, which regulates point sources more heavily than non-point sources.

139. For distortions under command and control regulations, see Sierra Club v. Abston Construction Co., 620 F.2d 41 (5th Cir. 1980) (noting that under command and control regulations, wastes channeled into sediment basins are regulated more heavily, as point sources, than unchanneled "non-point" wastes); ALLSTON CHASE, PLAYING GOD IN YELLOWSTONE: THE DESTRUCTION OF AMERICA'S FIRST NATIONAL PARK 18-30, 36-37, 50-53 (1986) (criticizing sharply Park Service's management of Yellowstone for capitulation to elk hunters, effectively inducing the Service to manage the park as a breeding ground for elk, even though elk's browsing habits drove out other species).
hybrid property regimes can sometimes exacerbate them, in part because property introduces a rhetoric and mentality of entitlement.

Indeed, one notices the issue of partial propertization lurking beneath the surface of "environmental justice" concerns, where some argue that poor and minority neighborhoods have been targeted disproportionately as sites for the production and disposal of hazardous materials. One perspective on these issues suggests not so much direct racism as a new twist on a familiar problem of partial property. Robert Collins has argued that a critical indirect role in environmental justice problems has been played by the so-called "not-in-my-back-yard" or NIMBY syndrome. Although by no means an elite matter—many leaders were initially quiet mothers in blue-collar neighborhoods—NIMBY protests have been the vehicle through which relatively better organized communities have exerted an effective property right over their neighborhood quality, inducing politicians and facilities managers to search elsewhere for sites for hazardous facilities. Conversely, insofar as weaker or minority neighborhoods have lagged in organization and protest, they may have looked cheap and accessible—hence the complaint that NIMBY turns into PIBBY: "place-in-blacks'-backyard." If this is indeed the sequence with respect to hazardous siting, then it resembles the partial propertization in a fishery or a

140. For a brief overview of the growing concern regarding environmental justice issues, see Richard J. Lazarus, Pursuing "Environmental Justice": The Distributional Effects of Environmental Protection, 87 NW. U. L. REV. 787, 801-06 (1993), and sources cited therein.


142. For the somewhat under-studied role of women in grassroots environmental organizations, see Robert R.M. Verchick, In a Greener Voice: Feminist Theory and Environmental Justice, 19 HARV. WOMEN'S L. J. 23 (1996) (exploring the role of women in environmental grassroots organizations) and Ronald Alsop, Amateur Ecologists: Local Citizen Groups Take a Growing Role Fighting Toxic Dumps, WALL ST. J., Apr. 18, 1983 (describing opponents to toxic sites as blue collar; pointing out the role of housewives).

143. See William Glaberson, Coping in the Age of "Nimby", N.Y. TIMES, June 19, 1988, § 3, at 1 (describing the consultant's effort to find demographic characteristics least likely to resist waste siting decisions—e.g., small-town, rural, conservative, low income, etc.).

hunting area: one cannot simply organize a single aspect of the whole, because that aspect will get attention at the expense of others; instead, one has to propertize all aspects—or failing that, fall back on some safety net of command and control. 145

There is considerable controversy over the role that race plays in these modern siting questions, 146 but the more general point is that in environmental matters as elsewhere, partial propertization can lead to distortion. The problem is not that a property regime fails to encourage investment and conservation in the propertized resource; quite the contrary, conservation of that resource may be disproportionately great, while the use of non-propertized resources is simply spendthrift—an imbalance that can threaten a larger and intricately interrelated ecosystem. 147

Moreover, it is easy to see that such distortions usually derive from a classic characteristic of property: some things are simply easier to turn into property than others, and the easy things are likely to get propertized first—leaving the rest behind. Indeed, the most glaring distortion comes from the ease of propertizing land in comparison to the diffuse resources to which land is attached, like air, water and wildlife—with the effect that landowners may claim that regulation of land "takes" their property rights, while ignoring their own inroads on common resources. 148

145. In the environmental justice context, a command and control regulation now protects against governmental agencies' ignoring the interests of poor and minority communities. Executive Order Number 12989, 3 C.F.R. 859 (1994), reprinted in 42 U.S.C.A. § 4321 (1994) requires federal agencies to analyze disproportionate health or environmental effects of federal actions on minority and low income populations.

146. See Vicki Been, Analyzing Evidence of Environmental Justice, 11 J. LAND USE & ENVTL. L. 1, 21 (1995) (arguing that issues of income, class, education, and employment are as important or more important than race in sitings). For a review of some of the controversies, particularly concerning statistical studies, see id. at 1-4, and sources cited therein. Professor Been has also stressed the importance of distinguishing cases in which unwanted uses are sited from the outset in predominantly minority neighborhoods, from other cases in which minority members disproportionately move into the vicinity of such a site because the site makes nearby land cheaper, see Vicki Been, Locally Undesirable Land Uses in Minority Neighborhoods: Disproportionate Siting or Market Dynamics?, 103 YALE L.J. 1383 (1994).

147. See Hearings, supra note 130 (calling for "iron-clad harvest limits" in "virtually every fishery" in order for ITQs to be effective); Tipton, supra note 130, at 414-15 (calling for a multi-species version of ITQs).

But notice that, in a sense, just as in one strand of contention about intellectual property, the problem of partial propertization is not an argument against property at all. In theory, the first-best solution would be more complete property, sweeping in those elements that may be overlooked or overexploited because they are still free goods. Where propertization is only partial—where only some portion of a number of interrelated resources can be cheaply turned into property but others cannot—distortions are bound to arise, and for that reason we may continue to need some corrective to deal with the non-propertized elements. In the cyberspace antiproperty arguments, the solution is to abandon property altogether, and to return to free-wheeling, open-access commons. But here the environmental antiproperty takes a very different turn: it too eschews property, but calls rather toward a continuation of a command and control regulatory regime. Thus, in this context, the too-much-property argument concludes that we cannot entirely shift from centralized, command and control management regimes until we have better means to propertize more completely the varying interactive elements of an entire ecosystem.149

At bottom, the problem of partial propertization in ecosystem management raises the economists' category of the “second-best”:150 a command and control regime could be preferable as a second-best approach where it is too expensive to define and defend property rights completely; but, arguably, the first-best solution would mean not less property, but more.

D. ECOSYSTEMS AND LIMITED ENVIRONMENTAL COMMONS

A second anti-property strand in environmentalism is a more straightforward rejection of property, and a more enthusiastic endorsement of a kind of pro-commons outlook. Radical environmentalists have long stressed that the environment must be understood as an entire interactive system, and, in particular, that human beings should practice a non-instrumentalist ethic that places human activities in the


150. See id. at 1270-71, 1302 (describing command and control as the “second-best” solution).
context of interconnected ecosystems.\textsuperscript{151} On this account, the environmental whole is greater than the sum of the parts; the isolation of one element for pragmatic "resource development" may unravel the larger networks of biota that mutually support one another.\textsuperscript{152} This view has implications for property: it suggests that while property may indeed focus our attention, it misguidedly focuses our attention on the parts rather than the whole. An attempt to divide an ecosystem entirely into bits and pieces of property would thus detract from what is needed, that is, a holistic view of an ecosystem or indeed the earth in its entirety. But generally speaking, environmentalists taking holistic approaches also seem to contemplate not an open access regime for nature but rather some form of larger-scale controls over human activities.\textsuperscript{153}

Interestingly enough, however, some holistic approaches do implicitly adopt a property approach with respect to particular ecosystems. Radical environmentalists as well as others have shown considerable interest in reserving distinct ecosystems for local people, or for the indigenous populations that have fruitfully interacted with them over long periods of time.\textsuperscript{154} In such cases, holism still includes the concept of


\textsuperscript{152} EUGENE P. ODUM, FUNDAMENTALS OF ECOLOGY 408 (3d ed. 1971) (arguing that environment change must be understood as a complex whole, rather than "on the basis of isolated projects"); see also GEORGE P. MARSH, THE EARTH AS MODIFIED BY HUMAN ACTION 33-41 (2d ed. 1882) (describing the interconnectedness of nature and the destructiveness of human interventions).

\textsuperscript{153} See, e.g., Cymie Payne, Foreword to the Ecosystem Approach: New Departures for Land and Water, 24 ECOLOGY L.Q. 619 (1997) (suggesting that the first hallmark of ecosystem management is "taking the ecosystem as a unit to be managed and regulated"). Despite the considerable antibureaucratic strain in "deep ecology" and some of the more radical strains of environmentalism, writers contemplate considerable control over human activities. See, e.g., Devall, supra note 151, at 313 (rejecting bureaucratic control but calling for the designation of large areas of the earth as "off limits" to dense human settlement or development).

\textsuperscript{154} See Devall, supra note 151, at 315-16 (citing P. BERG & R. DASSMANN, REINHABITING A SEPARATE COUNTRY (1978)) (calling for community regeneration of ecosystems, using Native American communities as model); see also PETER C. LIST, RADICAL ENVIRONMENTALISM 12 (1993) (explaining the "bioregionalism" philosophy of Murray Bookchin and others as an environmentalist theory of integrating human and natural systems in local places); Gary Snyder, The Place, the Region and the Commons, in THE PRACTICE OF THE WILD 25-47 (1990) (discussing "growing into a natural community" from a Native American perspective); Breckenridge, supra note
property, since the vision of a community that is integrated into the ecosystem implies that insiders share duties and benefits from which outsiders are excluded. In such a vision, the holistic claim effectively constitutes another version of an argument not against property rights as such, but rather in favor of property rights at the community level—that is to say, property in the form of the limited commons.

Construed as arguments for limited commons regimes, ecosystem approaches are linked to some quite practical critiques of hybrid property regimes. According to some critics, hybrid property regimes thus far have simply attempted to mimic conventional, individually-held entitlements, and, in doing so, have missed important opportunities to build on LCPs and on the internal norms embedded in such regimes. Fisheries management offers an example: in criticizing the experiments in individual trading quotas (ITQs) for fish, Alison Rieser has pointed out that many fisheries throughout the world have decidedly communal features, and that in devising hybrid property rights schemes, we should be thinking more about these LCPs, perhaps allocating fishing quota rights to communities rather than to individuals, so as to replicate and enhance the existing normative structures of community management.155 Indeed, one might well think that ITQs—particularly given their uneven distribution among existing fishers—might sometimes foster dissension and a decline of environmental responsibility among the members of existing fishing communities.156 Quite aside from that, fisheries and marine environments are extremely complex, and Rieser argues that at least in some instances, community-level management is likely to deal with these complexities more efficiently, and more ecologically soundly, than can individuals.157 Vis-à-vis outsiders, community-based manage-

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127, at 738-39 (summarizing convergent human rights and environmentalist perspectives by focusing on the protection of indigenous peoples within given ecosystems).


157. Rieser, supra note 155, at 824 (noting the ability of community fisheries to police habitat, prevent pollution, and coordinate with other fishing
ment regimes can use their powers of exclusion to hold down the numbers of participants in resource extraction;\textsuperscript{158} vis-à-vis fellow insiders, smaller and more close-knit groups can agree on more nuanced and intricate sets of rights and responsibilities than would be possible among the holders of the generic, centrally-defined ITQs.\textsuperscript{159}

Another environmental law scholar, Eric Freyfogle, makes the case that at the landscape level, we might also get more environmental mileage out of community efforts than individual ones, for many of the same reasons: purely individual actions may overlap and interact poorly, whereas individuals within communities can work out quite intricate sets of internal rights, responsibilities, and overarching norms of expected give and take.\textsuperscript{160} If that is the case, then perhaps at least some of the new hybrid property rights should fall at the community level rather than the individual level.

Indeed, one might suggest that these writers illustrate a more general advantage that limited common property regimes may have over either individualized property on the one hand or government fiat on the other: a community-based resource management may be large enough to internalize the externalities of certain kinds of resource use, but, at the same time, it can be small enough to reduce bargaining costs among the participants, so that they can arrive at complex and nuanced norms to allocate mutual rights and responsibilities. The result could be “property on the outside, contract (or norms) on the inside”—that is, the highly intricate but also often very effective and durable common property regimes seen over time throughout the world.

Community-based property regimes of this sort may not “look like property” from a conventional Western perspective, since individual entitlements within that community are

\textsuperscript{158} See, e.g., ACHESON, supra note 35, at 74-76, 153-59 (illustrating that perimeter-defended areas protect the lobster population better than nucleated areas around the Green, Metinic, and Monhegan Islands).

\textsuperscript{159} See id. at 76-77 (describing lobster fishing norms among the fishermen within the territorial systems); see also Rieser, supra note 155, at 826-27 (describing community management as more nuanced than government regulation, including ITQs).

hemmed in by complex norms and agreements; but there are actually a considerable number of precedents for them, even in Western law. The easy versions (like the easy versions of joint ownership in intellectual property) are the arrangements in which a number of specific rights-holders consciously pool their resources and plan in advance for their joint obligations and expectations. Thus nineteenth century state law permitted what was effectively a scheme of "unitization" to allow communities of salt marsh property owners to organize management regimes for the marshes and prevent free-riding. More modern versions of such projects are unitization in oil and gas, or condominium regimes organized under modern statutes. Environmentalists have begun to organize limited common property regimes as well: such groups as the Georgia Environmental Policy Institute in the southeast, or the Sonoran Institute in the southwestern United States and northern Mexican states, or the Malpai Borderlands Group in New Mexico have undertaken to gather together interested parties—so-called "stakeholders"—in sensitive ecological resource areas, and to work out consensual arrangements, reinforced by legal devices, to share responsibility for managing these resources in sustainable ways.

The most difficult of these limited common property regimes are those whose memberships are less definite, and whose goals may shift, such as ecosystems managed by indigenous groups. Like folklore or the progressive artworks

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162. See Jake Page, Ranchers Form a 'Radical Center' to Protect Wide-Open Spaces, SMITHSONIAN MAG., June 1997, at 50 (discussing the Malpai Borderlands Group uniting to manage resources); Interview by Carol M. Rose with Laurie Fowler, Exec. Dir., Georgia Environmental Policy Institute (Apr. 3, 1997); Interview with Luther Probst, Exec. Dir., Sonoran Institute (May 5, 1997); see also Federico Cheever, Public Good and Private Magic in the Law of Land Trusts and Conservation Easements: A Happy Present and a Troubled Future, 73 DENV. U. L. REV. 1077 (1997) (discussing the possibilities and pitfalls of the legal devices for conservation). The forthcoming American Law Institute's Third Restatement of Servitudes, may make such efforts easier by simplifying the complex law of easements and covenants. The reform could make it easier for participants in preservation groups to organize their respective rights and obligations. However, this Restatement could also present difficulties; see generally id. at 1099 (describing the potential destruction of land trusts under doctrines in Third Restatement).
cyberspace, these common resources are works in progress, and the participants who shape them are not entirely specifiable; indeed, the memberships are more akin to family or political communities than to such explicitly consensual communities as condominiums. Establishing limited common property regimes for such participants is a much trickier enterprise—yet also not without precedent in the common law. British customary law recognized evolving limited common property rights in communities well into the nineteenth century; those communities (but not outsiders) enjoyed rights to such various economic and recreational uses of land, and they were expected to govern their own behavior through reasonable community norms. In the United States, judicially-created riparian law in the nineteenth century effectively turned river-bank landowners into participants in common property regimes for particular rivers, from which outsiders were excluded (no interbasin water transfers) and insiders were each expected to use the common resource "reasonably"—in effect, in a way that was compatible with equal correlative use by all the other riparian owners. Nuisance law, using precepts very like those of riparian law, effectively created common property regimes among the neighbors for the reasonable preservation of their common enjoyment of quiet, clean air, and water; again, the participants were expected to act according to "reasonable" norms of mutual forbearance. It has only been a failure of our own imagination that has kept us from seeing these judicially-created regimes for what they are—common property regimes involving emergent resource uses, including only imprecisely specified participants.

Modern environmentalists have a special reason to pay attention to emergent commons regimes of this sort. Just as

163. See Rose, supra note 50, at 739-44. Courts in the United States were more hostile to customary claims, partly because of the feudal origin of such claims and partly because their informal governance role seemed contrary to constitution-based government. See id. at 741-43; see also Fred Bosselman, Limitations Inherent in the Title to Wetlands at Common Law, 15 STAN. ENVT. L.J. 247, 273-88 (1996) (describing the medieval English commons in the wetlands as controlled by the "fen people").

164. See Rose, supra note 16, at 163 (discussing riparian regimes); see also RIRIAN RIGHTS, NEW PALGRAVE DICTIONARY OF LAW AND ECONOMICS (forthcoming 1998).

the critics of Romantic Authorship assert that creative works, however fixed they seem, are actually parts of an interactive and emergent process, so does ecosystem theory increasingly suggest that all ecosystems have the dynamic character of works in progress. According to many new ecological theorists, there is no "balance of nature," no static climax state toward which environmentalism can drive. Instead, every ecosystem is always in an emergent state, whose participants and constituent features may be roughly known but not completely specifiable in advance.\textsuperscript{166} If that is true, then the task of devising and learning from these fluid, emergent forms of limited common property may be especially acute—for the "adaptive management" that now seems required in environmental matters,\textsuperscript{167} just as for the patent pools, participatory artworks and story trees of cyberspace.

CONCLUSION

Property has always concerned the encouragement of investment and the reduction of strife. Those are among the most important reasons that we have property. The law and economics approach teaches that the future of property will revolve around the rising perceived benefits and the falling perceived costs of establishing property regimes. But new property developments in cyberspace and environmentalism offer some important additions and correctives to this picture of the future.

First, cyberspace and environmentalist critics of property implicitly point our attention to some unexpected costs of property. In particular, they point out that the course of propertization may be partial and uneven and that the distortions from partial propertization may be both destructive of resources and distributionally unfair, producing strife and rancor rather than peace and productiveness.


\textsuperscript{167} See Tarlock, supra note 166, at 1139-40.
Second, quite aside from such distortions, both cyberspace and environmentalism raise issues about the desirability of turning resources into property at all. Cyberspace discussions in particular continue a rich tradition in intellectual property, one that has long sought a balance between property rights on the one hand, and on the other hand the interactive creativity that occurs in a wide open commons. The environmental analog is the argument for holistic ethics, portraying nature as an interactive whole that would be disrupted by division into property rights; here, however, the proffered solution is not at all the wide open commons, but rather diligent centralized oversight.

Third, and perhaps most surprising, both cyberspace and environmentalism bring into relief a certain cultural blank spot in our thinking about property. That blank spot is the difficulty we often have in recognizing the value, or even the existence, of the limited commons, the resource management practices that are “commons” among the insiders but exclusive with respect to outsiders. The difficulty is especially acute when the limited commons revolves about emergent, interactive resource use, by somewhat indefinite participants, whose interactions smack more of ongoing political participation than of fixed contractual arrangements. Cyberspace gives useful examples, as in the proliferation of story trees or collaborative artworks in progress, created by groups of successive writers. Environmentalism gives still more, in the great variety of limited common property resources, from indigenous forests and fisheries to neighborhood efforts to shape local landscapes.

The emergent, interactive characteristics of these limited common property regimes mirror the core attributes of much creative production and perhaps all ecological change; creative works and ecological change too are in their own ways emergent and interactive. The unfortunate pattern, however, has often been to ignore these limited common property regimes or deny them any legal status. This works to the considerable detriment of the underlying resources and the often under-recognized peoples who contribute to the preservation of those resources—and to the detriment of our own ability to come to grips with the strengths and weaknesses of these limited common regimes and their appropriate role in the larger political community.
Nevertheless, our law does offer some assistance to the formation and maintenance of limited common property regimes, including the law of servitudes, riparianism, nuisance, and customary law. All these legal areas include complex devices, and as law and economics approaches inform us, their great complexity may be one reason why they have not been used as much as perhaps they should be. They are simply too difficult to organize and to keep organized. But another reason that common property arrangements have been underutilized is that we have often been myopic about them. Even the participants in limited common property regimes may not think of their participation as partaking of property at all, while outsiders may be hostile to them as "private governments."168 This is a cultural matter, not just a cost-benefit or technological one. Cyberspace and environmentalism may ask us to re-examine this culture; and, if so, they may demonstrate one of the most important new directions in the future of property.