

SYMPOSIUM INTRODUCTION: PROPERTY RIGHTS AND THE ENVIRONMENT

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The importance of property rights in determining the use and value of environmental assets has been noted by both economists and legal scholars since the middle of the 20th Century.¹ Nothing has changed in that regard: many environmental problems typically originate from an imperfect alignment between resource ownership and resource use or benefit. In a well-known example, in an open-access fishery, because individual fishermen each own just the fish they catch, and not the larger stock of fish in the sea and hence do not face the full net benefits of properly managing the entire fish stock, over-fishing often results.² Similarly, landowners may manage their land in ways that affect adjacent resources like air, water, wildlife, or open space, without confronting the full range of costs and benefits to the latter, resulting in air or water pollution, over-pumping of groundwater, species extinction, or loss of large intact landscapes. One response to such patterns of overuse and over-exploitation is to extend the scope of property rights such that their scale is coincident with the asset. Questions remain, however,

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1. The literature on the importance of property rights in environmental problems begins with R. H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960). For earlier important work in the economics of property rights, see Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347 (1967); H. Scott Gordon, *The Economic Theory of a Common-Property Resource: The Fishery*, 62 J. POL. ECON. 124 (1954); F. H. Knight, *Some Fallacies in the Interpretation of Social Cost*, 38 Q.J. ECON. 582 (1924). Many of these important ideas are also found in WILLIAM BLACKSTONE, COMMENTARIES ON THE LAWS OF ENGLAND (University of Chicago Press revised ed. 1979) (1765).

2. H. Scott Gordon was the first to thoroughly examine this problem. See Gordon, *supra* note 1.

as to the effectiveness of this response as well as the political, social and legal obstacles to the development of property rights approaches.

To probe recent developments in the use of property rights regimes to counter the problem of overuse and over-exploitation of natural resources, the newly-created Program on Economics, Law, and the Environment at the University of Arizona³ devoted its first hosted symposium to a discussion of these issues. Entitled “Property Rights in Environmental Assets: Economic and Legal Perspectives,” the symposium was held on October 26, 2007, at the Arizona State Museum on the University of Arizona campus. The purpose of the symposium was to examine the modern causes of the misalignment between property and environment, along with the modern responses to this misalignment. Scholars in economics and law met to discuss six original papers, comprising both theoretical and empirical analyses. Among the key questions to be considered were: How might property institutions be designed to manage environmental assets efficiently? Why do some resources remain open access commons, resulting in the “tragedy of the commons,” while other resources avoid this fateful trap? What explains the transition from open access to various types of property regimes, ranging from fee simple private property, to managed common property, to bureaucratically administered property? What explains the timing of these transitions? The articles in this volume are the outgrowth of the original symposium papers, which the *Arizona Law Review* has graciously agreed to publish. We are especially grateful for financial support from the following sources that made the conference and this volume possible: the Cardon Endowment for Agricultural and Resource Economics, the Institute for the Study of Planet Earth, and the James E. Rogers College of Law.

The articles in this volume are divided into theoretical and applied studies. The first two papers, by Gary D. Libecap⁴ and Carol M. Rose,⁵ probe the causes and consequences of the evolution of property rights regimes. Libecap seeks to answer a question that has long puzzled property rights scholars, namely why property rights in environmental resources are developed only late in the game, seemingly only after widespread losses from an open-access exploitation. He argues that early, formal property rights are an expensive commodity, involving high resource and political costs relative to their expected gains. As a result, property rights approaches are developed only after their costs are offset by the aggregate rents saved from avoided over-exploitation. Libecap documents this pattern of property rights evolution in oil and gas reservoirs, ground water aquifers, fisheries, and ozone-depleting and green house gas emissions. “Accordingly,” Libecap states, “for individuals, as well as risk-adverse politicians and agency officials, property rights often are the solution of last resort, rather than the front line of attack on the tragedy of the commons.”⁶ Libecap concludes that

3. The Program on Economics, Law, and the Environment website can be accessed at <http://ele.arizona.edu/>.

4. Gary D. Libecap, *Open-Access Losses and Delay in the Assignment of Property Rights*, 50 ARIZ. L. REV. 379 (2008).

5. Carol M. Rose, *Big Roads, Big Rights: Varieties of Public Infrastructure and Their Impact on Environmental Resources*, 50 ARIZ. L. REV. 409 (2008).

6. Libecap, *supra* note 4, at 409.

the delay in the development of property rights may be efficient considering the uncertainties that must be overcome and the arrangements that may need to be made to respond to inequities in the distribution of benefits from a property rights regime.

Rose's contribution similarly concentrates upon the evolution of property rights regimes in environmental resources and, in fact, accepts and builds upon Libecap's insight that property rights regimes emerge later, after a regulatory phase during which the government replaces a regime of open-access with restrictions upon environmental resource use. Rose's focus is upon the climax phase, the development of "modernist property rights," which she defines as those that are "good against the world" because they include the elements of publicness in information, enforcement, and alienability to any potential buyer, whether they be insiders or strangers to the community. Rose analogizes such modernist property rights, "big rights," to the hallmark of modern public infrastructure, highways or "big roads," to drive home the point that, like roads, modernist property rights can undo pre-existing management regimes, leading to considerable instability and environmental destruction. Roads affect environmental resources directly, for example, by fragmenting habitat and introducing new species, but, just as importantly, they link areas commercially and thus tend to reduce local resource diversity. Modernist property rights have similar impacts, often undermining existing informal practices, introducing unfamiliar persons and resource uses, and fostering a wider trade that works together with roads to reduce localized resource diversity. Nevertheless, Rose argues that the use of modernist property rights for environmental protection evokes a mixed response by traditional environmental interest groups who, in reaction against this ambivalence, may embrace what she terms the "sticky" or "fuzzy" property rights found in consultative regulatory requirements of such measures as Section 7 of the Endangered Species Act.

The remaining articles in the symposium comprise applied studies, ranging from fishery resources to biosprospecting for pharmaceutical ingredients. In the first of these, Henry Smith⁷ probes the nature of property rights in water, explaining the mixture of exclusion and governance strategies in riparianism and first appropriation rights according to an information-cost theory. Smith argues that because exclusion strategies are particularly costly where the resource, like water, is amenable to simultaneous multiple uses, exclusion strategies will give way to governance strategies that can monitor access by multiple potential appropriators. Smith posits that the special combination of minimal exclusion and elaborate governance strategies leads to a prevalence of what he calls "semicommons"⁸ water management regimes whereby private and common property overlap and potentially interact.

7. Henry E. Smith, *Governing Water: The Semicommons of Fluid Property Rights*, 50 ARIZ. L. REV. 445 (2008).

8. Henry E. Smith, *Semicommon Property Rights and Scattering in the Open Fields*, 29 J. LEGAL STUD. 131 (2000).

The two articles by Katrina Wyman⁹ and by Robert Deacon, Dominic Parker, and Chris Costello¹⁰ both examine property rights in marine resources and further explore the details of property rights regimes. Deacon, Parker, and Costello study a salmon fishery in the Chignik region of Alaska and demonstrate the efficiency gains that can result from coordinating fishing effort through the formation of an association of harvesters whose members agree to abide by the directions of a central manager in exchange for a suitable quid pro quo. They take advantage of an Alaska Supreme Court decision that shut down the cooperative in 2005 to study fisheries management under two distinct regimes. In doing so, Deacon et al. explain how an individual transferable quota (“ITQ”) system that relies on a single price to allocate harvest rights in a fishery will not be fully efficient unless the stock in question is uniform in economic value. Variations in the location or density of portions of a stock can give rise to corresponding variations in value, leading harvesters to compete for the *best* portions of the stock. The size of the waste that can arise from this competition is governed in part by the degree of heterogeneity—greater heterogeneity leads to greater losses. Similar losses can arise from inefficient search in cases where rights are not spatially delineated. However, each of these potential losses can be eliminated either by coordinating fishing effort among quota holders or by delineating ITQ harvest rights more precisely.

Wyman’s article examines the issues of property rights more generally including such regimes as the ITQs studied by Deacon et al. and such recent regimes as marine reserves. Wyman argues that no single property rights arrangement is likely optimal for all fisheries at all times; rather, different optimal mixes of property rights that will likely be appropriate for individual fisheries at given times depending upon the applicable demand for fish, negative externalities, economies of scale, and administrative costs. She also argues that marine reserves mirror the use of individual private rights and communal protected areas such as wilderness areas in the United States to manage land. Wyman concludes that the trend illustrates a failure to develop property rights approaches that would take into account not only wild fisheries but also aquaculture, which is largely replacing wild fisheries as a source of food in many nations.

The symposium’s final article by George Frisvold and Kelly Day-Rubenstein¹¹ examines whether private-sector bioprospecting for pharmaceutical compounds can create significant incentives for conservation of biological diversity. Advocates of bioprospecting have argued that forests can be managed as extractive reserves where genetic resources can be sustainably harvested for pharmaceutical development. Frisvold and Day-Rubenstein examine how the actual discovery of a medically and economically important compound, the anti-cancer drug taxol derived from the Pacific Yew tree, has affected incentives to

9. Katrina M. Wyman, *The Property Rights Challenge in Marine Fisheries*, 50 ARIZ. L. REV. 511 (2008).

10. Robert T. Deacon, Dominic P. Parker & Christopher Costello, *Improving Efficiency by Assigning Harvest Rights to Fishery Cooperatives: Evidence From the Chignik Salmon Co-op*, 50 ARIZ. L. REV. 479 (2008).

11. George Frisvold & Kelly Day-Rubenstein, *Bioprospecting and Biodiversity Conservation: What Happens When Discoveries Are Made?*, 50 ARIZ. L. REV. 545 (2008).

conserve old-growth forests in the Pacific Northwest. They conclude that the simple creation of a market demand for genetic resources with medical applications will not necessarily promote biodiversity conservation. In fact, the discovery of taxol and the search for taxol-like compounds illustrates how bioprospecting can substitute one threat to biodiversity, habitat conversion, with another, over-harvesting that results from increasing the value of a resource that is exploitable in an open-access setting. Hence, Frisvold and Day-Rubenstein conclude that creating market demand for a genetic resource without clearly defining property rights can lead to resource depletion, rather than resource conservation.

These six articles do not, of course, represent the last word on property rights and the environment. Nonetheless several notable themes emerge. First, natural resource property rights regimes are not costless and will thus emerge only after the costs of their development is offset by losses resulting from an open-access regime, or, as Libecap argues, a middle phase characterized by prescriptive government regulation of uniform rules and standards. Second, Rose's analogy between "big rights" and "big roads" shows that highly developed property rights regimes have costs of their own. In the case of modernist property rights, these consist of the undermining of existing informal practices and the fostering of wider trade that reduces local resource diversity. Third, the applied studies in this symposium demonstrate the complexity inherent in matching a property rights regime to a particular natural resource. Environmental assets—land, water, marine ecosystems, oil reservoirs, and genetic resources—are complex assets and the property regimes that ultimately govern them are similarly complex and often subtle. Only by studying the subtle complexities can we hope to gain a deeper understanding of the questions posed by this symposium. The articles in this volume address all of these points and further our understanding of the relationship between property rights and environmental quality, mapping out how this journey may take shape.