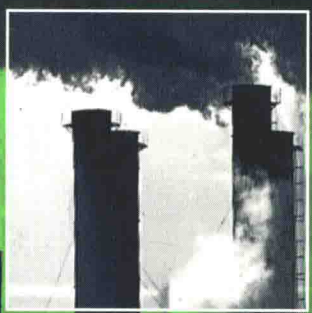
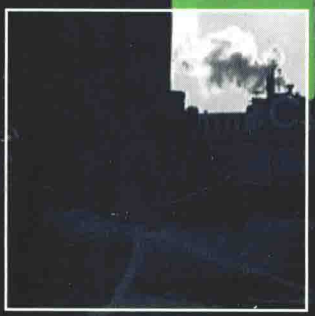
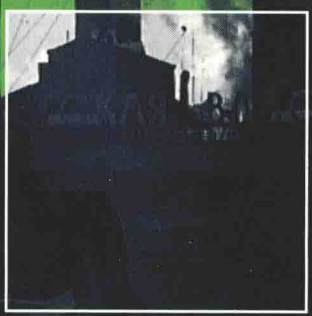
DANIEL H. COLE

Pollution & Property

Comparing Ownership Institutions for Environmental Protection







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Pollution and Property

Comparing Ownership Institutions for Environmental Protection

Environmental protection and resource conservation depend on the imposition of property rights (broadly defined) because in the absence of some property system – private, common, or public – resource degradation and depletion are inevitable. But there is no universal, first-best property regime for environmental protection in this second-best world.

Using case studies and examples taken from countries around the world, Professor Cole demonstrates that the choice of ownership institution is contingent upon institutional, technological, and ecological circumstances that determine the differential costs of instituting, implementing, and maintaining alternative regimes. Consequently, environmental protection is likely to be more effective and more efficient in a society that relies on multiple (and often mixed) property regimes.

The book concludes with an assessment of the important contemporary issue of "takings," which arise when different property regimes collide.

DANIEL H. COLE is M. Dale Palmer Professor of Law at the Indiana University School of Law at Indianapolis, where he teaches and writes about the law and economics of property, natural resources and environmental protection. His publications include *Environmental Protection in Transition* (coedited with John Clark, 1998) and *Instituting Environmental Protection: from Red to Green in Poland* (1998), which received the prestigious AAASS/Orbis Polish Book Prize in 1999.

For Marysia and Stefan

Preface

The basic environmental problem is to prevent the overuse and abuse of "environmental goods," including clean air, water, and wildlife, by controlling access and use. As control implies the assignment of private (individual or common) or public rights and duties with respect to otherwise open-access resources, this book posits that *all* approaches to environmental protection ultimately are property-based. On this view, even government regulation constitutes a property-based approach to environmental protection. Regulations impose private duties with respect to the use of environmental goods, and in doing so necessarily create concomitant public rights of enforcement. Consequently, the choice in environmental protection is not *whether* to take a property-based approach but *which* property-based approaches to use under various circumstances.

As to the latter question, there is no universal, first-best property-based solution to all environmental problems in all circumstances. This book assesses the utility of public, common, and private property-based approaches to environmental protection, and finds them all useful but within limits. Each has advantages and disadvantages, which may be maximized or minimized, respectively, depending on the ecological, institutional, technological, and cultural circumstances. One property system may work better than another in one set of circumstances, but compare very poorly under different conditions. No single property regime is demonstrably superior to all others, in all circumstances, across all dimensions of policy concern.

That conclusion should not surprise anyone. Yet much of the existing literature on relations between property and environmental protection either presupposes or argues normatively in favor of one property system or another, regardless of circumstance. This book, by contrast, seeks to describe relations between property and environmental protection more realistically, in their full complexity. Thus, its purpose is largely positive. The book also offers some normative arguments in favor of *multiple* property systems and admixtures of property systems. In part, those arguments constitute resort to a default position because of the difficulties

inherent in predicting which property systems are likely to work best in different settings. The variables are too many and the *ex ante* uncertainty too great to reliably predict which approach would work best, except in the easiest – and, therefore, least interesting – cases. In more interesting and important cases, society's decision to impose some property regime (or admixture of regimes), rather than some other, for environmental protection remains "in the nature of a social experiment."

This work has roots in various disciplines, including law, economics, political science, and anthropology. Unfortunately, the increasing specialization of academic disciplines has created a situation in which the property literature of one field often goes undiscovered – or worse, ignored – by scholars in other disciplines. This is not invariably the case, of course. There are scholars who regularly cross disciplinary boundaries in search of what is worthwhile and useful, from whatever source. I count myself among them. Although I am first and foremost a legal scholar, I do not believe that a narrowly conceived legal analysis of relations between property systems and environmental protection would be either illuminating or very interesting. At the same time, I sense that an economic analysis of environmental protection devoid of considerations of law and other institutions, technology, ecology, and culture, is likely to be quite sterile and unrealistic. By combining legal and economic analysis, along with some lessons from anthropology – in short, by undertaking a New Institutional approach to the problem of environmental protection – this book's *comparative institutional analysis* will hopefully prove to be more robust and realistic.

My thinking about the relations between property systems and environmental protection has been influenced by many writers, but three above all others: John Dales, Dan Bromley, and Elinor Ostrom. J. H. Dales's *Pollution, Property and Prices* (1968) is a classic work in the environmental economics literature, but arguably should be even more influential – and for more reasons – than it is. Professor Dales is universally acknowledged as the originator of transferrable pollution rights as an environmental policy instrument. Ironically, he was not. An economist at the University of Wisconsin–Milwaukee named Thomas D. Crocker (1966, p. 81) recommended the very same thing in 1966, two years before Professor Dales published *Pollution, Property, and Prices.* Professor Dales's fame is justly deserved, however, because he first analyzed tradeable pollution rights in a systematic way. In any case, there is much more to *Pollution, Property, and Prices* than tradeable pollution rights. It is in the best tradition of economic analysis – rigorous but realistic, analytical but humane, even humble. It is, in brief, a very wise book about the power and, just as importantly, the limitations of economic analysis for describing and resolving

environmental protection issues. And its unique influence on my own thinking about those issues is manifest throughout this book, beginning with the title, which I chose in part as a tribute to Professor Dales.

Daniel Bromley is another economist who has greatly influenced my thinking on environmental matters. His book *Environment and Economy: Property Rights and Public Policy* (1991) first started me thinking about a comparative property systems-based approach to environmental protection. In contrast to many economists, Professor Bromley treats the law – and property law in particular – seriously, as an institution that shapes economic behavior. His analysis is, consequently, more nuanced and realistic than much of the economic literature on environmental policy.

I also owe a sizeable intellectual debt to the political scientist Elinor Ostrom, whose book *Governing the Commons* (1990) opened the eyes of so many scholars in various disciplines to the continuing role of common property systems in the contemporary world. In particular, her systematic, comparative institutional approach to assessing property regime choice for resource conservation has provided an extraordinarily useful framework for analysis. My approach, though perhaps less formal than her own, owes a great deal to her process for analyzing property problems and solutions.

This book was written, in almost equal measures, in Indianapolis, USA and Cambridge, UK. I owe several debts of gratitude in both locations. In Indianapolis, I am grateful to Dean Norman Lefstein and my faculty colleagues at the Indiana University School of Law at Indianapolis, who provided me with the means and the time, including successive Summer Research Fellowships and a six-month sabbatical in 2000, to research and write the book. Several colleagues and friends at IU, including Nicholas Georgakopoulos, Andy Klein, and Florence Roisman went above and beyond the call of duty, providing helpful comments on drafts of several chapters or the entire book.

In Cambridge, I am grateful first and foremost to Malcolm Grant, who arranged visitorships for me in the Faculties of Land Economy and Law from June to December of 2000. Malcolm possesses an almost unique combination of admirable traits: he is at once an accomplished scholar, an exceptional administrator, and a very kind person. Several of his colleagues on the Law Faculty and in the Land Economy Department were instrumental in helping me sort out various issues relating to this project. I am grateful especially to Simon Deakin, Timo Goeschl, Ian Hodge, and Joanne Scott. In addition, I want to thank Sanjay Peters of the Economics Faculty for being such a good friend and mentor in all things Cambridge.

While in Cambridge, my family and I resided at Clare Hall, of which I am proud to be a Life Member. I would like to thank Clare Hall's former President, Gillian Beer, and the entire staff of the college, especially Elizabeth Ramsden, for making our stay in Cambridge so pleasant and memorable.

At Cambridge University Press, I am profoundly grateful to my editor and friend Finola O'Sullivan, who nurtured this project with great care and enthusiasm. Finola's assistant Jennie Rubio has also been extremely helpful, as has my copyeditor, Hilary Hammond.

Several individuals outside of Indiana University and the University of Cambridge, including Daniel Bromley, John Dales, Robert Ellickson, and Richard Lazarus, provided helpful comments on various chapters of the book. I am especially indebted to my friend and frequent collaborator, Peter Z. Grossman, who, to paraphrase Franz Joseph Haydn, is among the very best economists I know either personally or by reputation. Peter provided much needed encouragement as well as critical commentary on every chapter of the book. Finally and above all, I am eternally grateful to my wife, Izabela, and children, Marysia and Stefan. This book could not have been written without their constant support and love.

This book is the product of several years' thinking about the relations between environmental problems and property systems, which began when I was first invited, in 1996, to contribute an entry on "New Forms of Property: Property Rights in Environmental Goods" to the *Encyclopedia of Law and Economics* (2000). Since then, I have published several articles relating, in one way or another, to this topic. Each of those earlier works has found its way into this book, although none completely in its original form. Sentences, paragraphs, sometimes whole sections of previously published works are scattered here and there, throughout the various chapters. I am grateful to the following journals for providing permissions to reprint: Duke Environmental Law and Policy Forum, for "Clearing the Air: Four Propositions About Property Rights and Environmental Protection," *Duke Environmental Law & Policy Forum* 10 (1999); Indiana Law Review, for "The Importance of Being Comparative: the M. Dale Palmer Professorship Inaugural Lecture," *Indiana Law Review* 33 (2000); and Wisconsin Law Review, for "When is Command-and-Control Efficient? Institutions, Technology, and the Comparative Efficiency of Alternative Regulatory Regimes for Environmental Protection," *Wisconsin Law Review* (1999) (coauthored by Peter Z. Grossman).

Table of government documents

INTERNATIONAL TREATIES

Kyoto Protocol to the United Nations Climate Change Convention, Dec. 10, 1997.

STATUTES

Clean Air Act, 42 USC §§ 7401–7671q (1970).
Colorado Revised Statutes §§ 38-30.5-107, 109 (1994).
Endangered Species Act, 16 USC §§ 1531–1544 (1973).
Florida Statutes Annotated 70.001(2), (3)(e) (1995).
Indiana Code § 32-5-2.6-7 (1984).
Internal Revenue Code, 21 USC § 1 et seq. (2001).
Michigan Compiled Laws 336.11 et seq. (1995, repeated 1994).
Michigan Statutes Annotated 14.58(1) et seq. (1994).
Texas Government Code Annotated 2007.041, 2007.002, 2007.003 (1995).
Uniform Conservation Easement Act (Supp. 1995).

BILLS

S. 1180, 105th Congress; 1st Session (1997).

LEGISLATIVE HISTORY

Environment and Natural Resources Policy Division (1993), Library of Congress, 103rd Cong., 1st Sess., *A Legislative History of the Clean Air Act Amendments of 1990*, Washington, DC: US Senate Committee on Environment and Public Works Print.

Environmental Policy Division (1974), Library of Congress, 93rd Cong., 2nd Sess., *A Legislative History of the Clean Air Act Amendments of 1970*, Washington, DC: US Senate Committee on Public Works Print.

Environmental Policy Division (1978), Library of Congress, 95th Cong., 2nd Sess., *A Legislative History of the Clean Air Act Amendments of 1977: a Continuation of the Clean Air Act Amendments of 1970* (1978), Washington, DC: US Senate Committee on Environment and Public Works Print.

REGULATIONS

26 CFR § 1.170A-14(h)(3)(ii) (Nov. 23, 2001).
49 CFR § 171.15 (Nov. 23, 2000). Immediate notice of certain hazardous materials incidents.
Chicago, Ill., Gen. Ordinances, §§ 1650, 1651 (1880).
Department of the Interior, Fish and Wildlife Service 2001, *Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for Peninsular Bighorn Sheep*, 50 Fed. Reg. 8650.
Environmental Protection Agency 1986a, *Emissions Trading Policy Statement; General Principles for Creation, Banking, and Use of Emission Reduction Credits*, 51 Fed. Reg. 43,814.
Environmental Protection Agency 1986b, *Emissions Trading Technical Document*, 51 Fed. Reg. 43,837.
Environmental Protection Agency 1993, *Final Rule on the Acid Rain Program*, 58 Fed. Reg. 3,677–78.
Revenue Procedure 92-91, Oct. 29, 1992, 92 Fed. Reg. para. 46,595.

CASES

ENGLAND

Attorney-General *v.* Antrobus, 2 Ch. 188 (1905).
Attorney-General *v.* Sheffield Gas Consumers Co., 3 De G.M. & G. 304 (1853).
Blount *v.* Layard, 2 Ch. 691, n. (1891).
Burmah Oil *v.* Lord Advocate, AC 75 (1965).
Grant *v.* Duke of Gordon, III Paton 679 (1776).
Sisters of Charity of Rockingham *v.* The King, 2 AC 315 (PC) (1922).

AMERICA

Alliance for Clean Coal *v.* Bayh, 888 F. Supp. 924 (SD Ind. 1995).
Armstrong *v.* United States, 364 US 40 (1960).
Atlanta Processing Co. *v.* Brown, 227 Ga. 203 (1971).
Babbit *v.* Sweet Home Chapter of Communities for a Greater Oregon, 515 US 687 (1995).
Boone *v.* United States, 944 F. 2d 1489 (9th Cir. 1991).
Briggs & Stratton Corp. *v.* Concrete Sales & Servs., 29 F. Supp. 2d 1372 (MD Geo. 1998).
Buck *v.* Bell, 274 US 200 (1927).
Cabinet Mountains Wilderness *v.* Peterson, 685 F. 2d 678 (DC Cir. 1982).
Christy *v.* Hodel, 857 F. 2d 1324, 1334 (9th Cir. 1988), cert. denied sub nom.
Christy *v.* Lujan, 490 US 1114 (1989).
City of Chicago *v.* Commonwealth Edison Co., 24 Ill. App. 3d 624 (1974).
Commonwealth *v.* The Barnes Foundation, 159 A. 2d 500 (Pa. 1960).
Detroit Edison Co. *v.* Michigan Air Pollution Control Commission, 167 Mich. App. 651 (1988).
Dolan *v.* City of Tigard, 512 US 374 (1994).
Douglas *v.* Seacoast Products, Inc., 431 US 265 (1977).

COURT BRIEFS

Contents

1 Pollution and property: the conceptual framework

This chapter describes the theoretical relations between pollution and property and provides a framework for the analysis that follows in subsequent chapters. Sections 1 and 2, respectively, rehearse and critique the conventional but too simplistic notion that environmental problems are at bottom property problems. In fact, the structure of property rights *and* environmental problems are both largely consequences of other factors, most notably transaction costs, which in turn are substantially determined by institutional and technological circumstances. Section 2 illustrates this point by describing an ideal, frictionless economy, in which well-defined property rights are clearly *not* a precondition to optimal environmental protection. In a world of zero transaction costs, the optimal level of environmental protection would be attained regardless of the existence and initial allocation of property rights. This is not to argue, however, that the structure of property rights is irrelevant to environmental protection. As I will show in section 3, where I take readers from the ideal world of perfect markets and costless transacting to the real world of imperfect institutions and costly transacting, the structure of property rights can significantly influence environmental performance, and has done so throughout history. Section 3 introduces the "tragedy-of-open-access" model and discusses one of its most important but often overlooked implications: that all means of averting the tragedy, including regulatory measures, are property-based. Section 3 also attempts to clarify some terminological issues in defining property rights, and frames the task for subsequent chapters, which is to compare how alternative property systems differentially effect environmental protection in various institutional and technological circumstances. Finally, section 4 sets forth the organizational structure of subsequent chapters.

I Things that are unowned receive the least care

Scholars long ago recognized that the nature, extent, and allocation of property rights can significantly affect rates of resource depletion and

degradation. In the fourth century BCE Aristotle observed that whatever "is common to the greatest number has the least care bestowed on it" (Aristotle 1941, § 1262b34–5). His observation has resonated throughout history, and today is understood (after Hardin 1968) as "the tragedy of the commons."

Despite Aristotle's early warning, many environmental goods never have been subject to private ownership for a variety of economic, technological, political, and cultural reasons. Writing 350 years after Aristotle, the Roman poet Ovid (1992, p. 111) put these words in the mouth of Dædalus: "Though he may possess everything, Minos does not possess the air." Indeed, according to Roman law, it was against natural law for any individual, even the emperor, to own the air or other socially significant environmental goods. The Institutes of Justinian, compiled 1,000 years after Aristotle, decreed "[b]y the law of nature these things are common to mankind – the air, running water, the sea and consequently the shores of the sea" (Grapel 1994, p. 50). In most countries, for most purposes, these environmental goods have ever since remained off limits to private ownership.

If we were to construct a syllogism, positing Aristotle's observation as a major premise and the rule from Justinian's Institutes as a minor premise, the conclusion would be that the commonly owned air, running water, sea, and seashore have the least care bestowed upon them. History, unfortunately, has too often confirmed this. In the absence of property rights to protect them, environmental goods have been abused, sometimes to the point of destruction.

Obviously, there is an important connection between pollution and property. But what is the nature of this connection?

II If the absence of property rights explains pollution, what explains the absence of property rights?

It is frequently said that pollution and other environmental problems stem, in the first instance, from the absence of property rights in natural resources (or "environmental goods") (see, for example, Goodstein 1995, p. 1029). This reductionist assertion is repeated so often that it has become a truism. But it begs a further reductionist question: what accounts for the absence of property rights in many environmental goods? If some other factor is responsible for the lack of completely specified property rights, then the lack of property rights itself cannot be the ultimate "cause" of pollution and other environmental problems. This reflects a standard problem with reductionist arguments: at what point does the process of reduction end?

As economists know (at least since Coase 1960), property rights are not completely specified for all – really any – environmental goods because they are costly to define, sometimes *too* costly.[1] We might legitimately claim, therefore, that the cost of establishing property rights, rather than the absence of such rights, is the ultimate cause of environmental problems. But that only leads us to the next reductionist question: why are the costs of imposing property rights sometimes, but not always, too high? With this question we finally arrive at the twisted root of the matter: the economic, institutional, technological, and ecological *circumstances* that in large measure determine the costs of defining property rights in, and transacting over, environmental goods. Relations between pollution and property are ultimately determined by the economic, institutional, technological, and ecological circumstances that prevail at a given time and place.[2]

III Property and pollution in an ideal (nonexistent) world

In a world of perfectly defined property rights, optimal environmental protection would be achieved automatically, but only if certain other preconditions were met. Interestingly, those preconditions would obviate the assumption of perfectly defined property rights.

Imagine a society characterized by a perfectly functioning market economy, with attendant institutions such as freedom of contract.[3] In this ideal economy, benefit and cost functions are fully known; a social welfare function is completely specified; information costs for all people in society are very low, so that the level of pollution and the distribution of costs and benefits are both always known; and transacting (including bargaining, policing deals, and enforcing contracts and property rights) is costless.[4] This is the world of the Coase theorem,[5] and in it social costs and benefits equal private costs and benefits.

In this ideal world, the optimal level of pollution control is attained automatically by virtue of the assumptions of perfect markets, nearly perfect

[1] See also Barzel (1989, p. 64).

[2] I am hardly the first author to recognize this (see, for example, Dahlman 1980, ch. 3).

[3] The description of the ideal economy in this section is adapted from Cole and Grossman (1999, pp. 895–6).

[4] To these assumptions, many scholars would add the further assumption that property rights are perfectly defined. But, as will be shown later, this assumption is unnecessary to ensure optimal efficiency and optimal environmental protection in a world of costless transacting.

[5] The world of the Coase theorem is not the world Coase was concerned to explain. He posited the "Coase theorem" (the label was coined by George Stigler) as a counterfactual heuristic device, to illustrate the importance of legal institutions in the real world, which is characterized by ubiquitous and often quite high transaction costs. See generally Coase (1960).