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Book Review

Replaying the Tragedy of the Commons


Fred P. Bosselman

In 1968, California ecologist Garrett Hardin wrote “[p]erhaps the most influential article ever written in the environmental field,”¹ a short essay for Science magazine entitled The Tragedy of the Commons.² He called for international cooperation to reduce world population growth and analogized the environmental problem to the inevitable failure of peasants to prevent overgrazing of common lands.

Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons.

... Explicitly or implicitly, more or less consciously, he asks, "What is the utility to me of adding one more animal to my herd?" This utility has one negative and one positive component.³

The positive component is the benefit to the individual peasant from grazing one additional animal. The negative component is the reduction in grass available to feed his other animals. But since "the effects of overgrazing are shared by all the herdsmen,"⁴ the negative component as measured by any given herdsman is overshadowed by the positive benefit to him of grazing an additional animal.

Therein is the tragedy. Each man is locked into a system that

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²Garrett Hardin, The Tragedy of the Commons, 162 SCIENCE 1243 (1968). The summary of Hardin’s work given here does not begin to do justice to the complexity and thoughtfulness of his argument.

³Id. at 1244.

⁴Id.
compels him to increase his herd—without limit—in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.5

From his parable, Hardin drew the conclusion that we must "explicitly exorcise" the "invisible hand" when dealing with problems involving commons.6 Conscience would not be enough; coercive measures would be required.7

Few metaphorical creatures have had the rhetorical force of Hardin's poor peasants and their cattle. Most of the popular environmental law casebooks quote at length from Hardin's essay8 and, like many law teachers, I have frequently used it to introduce basic concepts of environmental law. Recently I realized with some embarrassment that I had never bothered to ask whether anyone had actually checked the health of cows that graze on common lands. I had simply assumed that the facts supported Hardin's seemingly unexceptionable thesis.

Yet Hardin's thesis has been challenged by recent studies of the management of ancient English common lands. These studies question whether the enclosure of common lands increased overall efficiency, as had long been assumed, and suggest instead that pre-enclosure management of common lands may have been much more efficient than previously believed.9 Model building experiments have raised similar questions about whether the medieval commons were the economic disaster postulated by Hardin's essay.10

5. Id.
6. Id.
7. Id. at 1246-47. Hardin recommended that coercion be achieved by democratic means, "mutually agreed upon by the majority of people affected." Id. at 1247. Classical economic theory advocates the privatization of common property as a means of avoiding the kind of problems that Hardin describes. See CAROL M. ROSE, PROPERTY AND PERSUASION: ESSAYS ON THE HISTORY, THEORY, AND RHETORIC OF OWNERSHIP 105-106 (1994).
10. See Bruce A. Larson & Daniel W. Bromley, Property Rights, Externalities, and Resource Degradation: Locating the Tragedy, 33 J. DEV. ECON. 235 (1990); Carlisle Ford Runge,
But the value of Hardin’s thesis rests not in the historical accuracy of the metaphor but in the logic of his reasoning, which can be tested in its modern application. In the last decade, however, as researchers have begun to study commonly-owned property more carefully, they have found a lot of fat and happy cattle (and their symbolic equivalents) grazing on commons. Was Hardin wrong?

*Rules, Games, and Common-Pool Resources* (hereinafter *Rules/Games*) by Elinor Ostrom and various co-authors, is a progress report on the efforts of scholars in a variety of fields to explain how the management of common lands actually works. It follows Ostrom’s earlier book, *Governing the Commons*, and I hope that it will be followed in its turn by further and equally helpful reports on her ongoing research into common property management. This essay will first summarize the methodology and conclusions of *Rules/Games*, then discuss how the book fits with other ongoing research into common property issues, and finish by offering some comments on the potential usefulness of the various research methodologies employed.

I. Methodology and Conclusions

In *Rules/Games*, the authors use both field studies and classroom simulations to test the hypotheses advanced in Ostrom’s 1990 book. Part One of *Rules/Games* describes the problem of what Ostrom calls “common-pool resources,” a term possibly designed to avoid introducing property concepts into the definition of the resource. After describing a few typical examples of overused resources, she describes the methodology of the overall study in a traditional policy analysis framework, and provides some basic explanations of the hypotheses she plans to test through game simulations.

Part Two describes the game simulations, which used as subjects students enrolled in introductory economics at Indiana University. The students were asked to decide how much to spend to exploit a depletable resource as they

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14. OSTROM, supra note 11, at 23-50.

15. Id. at 106.
observed data on repeated iterations of the aggregate expenditures of all of the
students on such exploitation.  

Even in the simplest versions of these simulations, game theory failed to predict the simulations' "disequilibrium results." In more complex versions, the most common divergence from theory was the tendency of the students to cooperate when theory suggested they would do otherwise.

Assuming that individuals perceive the game as we have operationalized it in the laboratory setting, the subgame consistent equilibrium prediction for one-shot and repeated communication is the same as that for a finitely repeated constituent game without communication. Communication in any form should not make a difference, but it does. Repeating the opportunity for 'mere jawboning' should not yield different results than one-shot communication, but it does. If communication were simply being used to agree upon a joint strategy, then one round of communication should suffice. Once individuals have made an agreement in the lab, much of the time spent communicating is devoted to establishing trust and verbally chastising unknown individuals if agreements are broken. These activities, when not backed up by enforceable agreements, do not yet play a theoretical role in explaining results within noncooperative game theory.

The authors were obviously frustrated with the students' failure to act as game theory predicted they would, but the description of the simulations occupies 172 pages and provides useful reading for those who wish to determine how much credibility to attach to theories derived from such studies. The authors conclude that the predictions of game theory are "supported, at least at an aggregate level" in "many" of the settings studied, but that the research encountered "anomalies" that required rethinking the game theory hypotheses that were used. The support for game theory was found in "situations that most closely approximate a barren institutional setting.

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16. Id. at 106-08.
17. Id. at 121.
18. Id. at 197. (It grieves me to quote a sentence that uses the word "operationalized," but the quoted paragraph concisely summarizes the key finding of Ostrom's game simulations.)
19. By this time, so many college students throughout the country have been employed as pawns in mock interactions that it must be difficult to find subjects who lack preconceived strategies.
20. Id. at 51-223.
21. Id. at 21. One of the most valuable skills in academia is the ability to describe completed research in a way that honestly exposes its lack of success while demonstrating that at least one more grant is justified to pursue the work.
involving no capacity to make binding agreements as well as no capacity to communicate. Even in these environments, however, behavior at an individual level did not conform to theoretical predictions and did not appear to settle down to an equilibrium.”

Ostrom points out that many other researchers also have found that people in these simulations cooperate more than game theorists would have predicted. And although she believes it is premature to suggest how communication among the participants induces such cooperation, her overall conclusions from both the field studies and the simulations have convinced her of the importance of such communication.

Part Three of the book consists of field studies conducted by the authors themselves and of analyses of other research regarding common-pool resources. Shui Yan Tang, the author of the chapter on irrigation systems, updates his earlier research that made use of forty-seven separate studies of irrigation systems in thirteen different countries. The chapter on coastal fisheries, by Edella Schlager, covers thirty case studies from sixteen countries.

Arun Agrawal’s chapter on community forests in India is more site-specific. He reviews rulemaking, monitoring, sanctioning, and arbitration practices in six different Indian villages where community forests are being used. In the final field study chapter, William Blomquist updates his earlier work on the regulation of groundwater basins in Southern California. The summaries of the field work are clearly and concisely written using a common framework of terminology and analysis. The high quality of this coordinated research is a testimony to the teamwork established by Ostrom’s workshop at Indiana University.

The authors’ overall conclusions in Part Four derive primarily from their analysis of the field studies rather than the game simulations. The authors conclude that certain rules seem to be essential to the optimal management of common property resources. First and foremost is the existence of strict limits on the number of persons who may use the resource. These “boundary rules”

22. Id. at 218-19.
23. Id. at 168.
24. Id. at 168-69, 197-99, 322-27.
26. OSTROM, supra note 11, at 243-45.
27. Id. at 255-56.
28. Id. at 267-82.
30. OSTROM, supra note 11, at 283-300.
31. The authors are all participants in the Workshop in Political Theory and Policy Analysis at the Indiana University at Bloomington.
exist in all successful systems of common property management, although the rules are not always formally adopted. 32

In a sense, therefore, Ostrom's study confirms the logic behind Hardin's theory while rejecting the appropriateness of his specific metaphor. Hardin hypothesized a commons "open to all" on which an unlimited number of English peasants could graze an unlimited number of cattle. Historically, however, such a commons never existed. Under the common law, the right to graze cattle on the common was limited to individuals who had actual grants 33 or prescriptive servitudes, 34 and to the residents of a locality who by custom had traditionally grazed their cattle there in the past. 35 Furthermore, people's ability to move from one English rural community to another was also limited by both practical and legal restrictions. 36

Ostrom and her co-authors also emphasize that rules promoting internal communication among resource users are a key element in the development and maintenance of successful common-property management systems. Such communication makes it possible for users informally to monitor and enforce rules for the utilization of the resource. 37 The results of the game simulations reinforce this conclusion by suggesting that communication can be far more effective than traditional game theory would predict. 38

More tentatively, the authors identify two characteristics of common-property resources that can be most successfully managed: (1) resources that are stationary rather than mobile; 39 and (2) resources that can be stored, rather than having to be used at once or lost. 40 For example, water in an underground basin is both stationary and subject to being stored, while migratory fish in an ocean are much more mobile and difficult to store. Stationary resources can more easily be limited to users within a particular geographic area, thus underscoring the importance of boundary limits noted earlier. The ability to store the resource apparently makes it easier to devise acceptable methods of allocating rights among a group of users whose access

32. OSTROM, supra note 11, at 302-04.
33. See THOMAS E. SCRUTTON, COMMONS AND COMMON FIELDS 41 (Cambridge University Press 1887).
34. See NEESON, supra note 9, at 64-65.
36. Only in the years following the great plagues was there any significant geographical mobility among the English rural population. See J.L. BOLTON, THE MEDIEVAL ENGLISH ECONOMY, 1150-1500 at 236 (1980).
37. OSTROM, supra note 11, at 302-03.
38. See supra notes 17-22, and accompanying text.
39. OSTROM, supra note 11, at 308-12.
40. Id. at 312-14.
to the resource may vary over time.

II. Other Research

Ostrom's study of common-pool resources draws on a growing body of empirical research into current conditions in countries where common lands are the norm. In the 1980s, the institutions that finance development and conservation activities in third world countries began to express interest in these research results. Many of these countries had traditionally relied on common land as an important element in the local economy. Attempts by outside institutions to intervene in these countries without understanding the existing systems by which common lands were managed sometimes proved counterproductive.

In 1985, the National Research Council of the National Academies of Science and Engineering brought together a Panel on Common Property Resource Management to "assess systematically differing institutional arrangements for the effective conservation and utilization of jointly managed resources." The participants looked not only at common lands but water resources and "other jointly held resources that constitute the global commons." Ostrom's work on that panel was the foundation for her continuing research.

When Ostrom began her research into common-pool resources, she found that scholars from many disciplines had been studying the management of such resources with little awareness of similar work that was taking place in other fields. In preparing her 1990 book, Ostrom looked at hundreds of such studies and formulated some tentative hypotheses for identifying successful common property management systems.

The timeliness of this research is particularly apparent as we witness the

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42. For a vivid example, see Richard Moorehead, Changes Taking Place in Common-Property Resource Management in the Inland Niger Delta of Mali, in COMMON PROPERTY RESOURCES, supra note 41, at 256.


44. Id.

45. Elinor Ostrom, Issues of Definition and Theory: Some Conclusions and Hypotheses, in Id. at 597.

46. See Ostrom, supra note 12, at xiii.

47. Id. at 91-103.
breakdown of many common resource systems. For example, the rapid and continuing decline in the world's ocean fisheries is causing violent confrontations among otherwise peaceful countries, and in places like Albania, the depletion of agricultural resources is contributing to famine and mass migration.

Legal scholars are gradually beginning to realize the valuable implications of multidisciplinary research into common property resource management. Some of the early legal research addressed the issue of common rights to land and water under the English common law and the potential application of these common law concepts to modern problems. In addition, studies like Robert Ellickson's *Order Without Law* have focused on the ways in which cohesive groups are able to manage potential property-right conflicts through the development of informal norms. Like Ostrom's work, some of these studies conclude that success is achievable by a well-defined user group that anticipates its own permanence and develops good internal communication abilities. Most scholars who have analyzed these empirical studies have found no reliable correlation between any particular property rights regime and the maintenance of sustainable resources.

Outside of academia, procedural changes in legal systems parallel the research results. Proposals that stress the importance of the participation of well-defined interest groups in negotiated rulemaking involve a similar

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emphasis on clearly-bounded group participation. And dispute resolution mechanisms that train facilitators to encourage informal communication among potential adversaries within local communities underline the importance of communication networks in developing and implementing informal norms.

III. Methodological Utility

Are Ostrom's conclusions convincing? The idea that commons problems can be solved by cooperation among user groups is appealing, and certainly deserves both further study and actual experimentation. In an increasingly impersonal and alienated society, the goal of small group cooperation awakens nostalgic memories of village cohesion.

But if the communitarian idea is to prove acceptable in the United States, its compatibility with other basic American values needs to be demonstrated. Consider, for example, the value of social mobility. Most research suggests that those user groups that most successfully formulate and enforce informal norms for the management of common property resources are those groups that have a high degree of internal cohesion, often through kinship or similar ties. In a mobile and multicultural society, empowerment of such groups inevitably raises questions about the exclusion of non-members.

And how do we square the power of user groups with our tradition of individual rights? The legal literature has begun to explore ways of adapting communitarian institutions to a constitutional system of government that is


56. See, e.g., ELLICKSON, supra note 51.

based on the rights of individuals, but answers do not come easily.58

The empowerment of current user groups also raises issues of intergenerational equity. People in future generations will be users of common-pool resources in ways yet to be identified. Can we incorporate their needs into a system of rules based on the preferences of current user groups?59

The work of Ostrom and other students of common property systems offers hope that an accommodation among these disparate values can be accomplished.60 This work has great potential because many of the most valued elements of our quality of life, such as the amenities of a neighborhood or the beauties of nature, can be perceived as common-pool resources.61 If we can develop adequate methodologies for managing such resources, there are many unexplored possibilities for their application.

But some of our most pressing common resource problems involve user groups that are widespread and ephemeral, or groups whose members are not even conscious that the group exists.62 In the most extreme example, the user group may be the entire population of the world, as in the case of the "users" of biodiversity.63 And unfortunately, Ostrom's work supports the accuracy of Hardin's original insight—that the solution of common resource problems becomes both more difficult and more important as the scale of the resource grows.

As for Ostrom's game simulation methodology, I am skeptical of the idea that groups of college students can serve as an accurate microcosm for the population as a whole, given the tendency of students to band together against anything that seems like an institutional power structure. But in view of the authors' field studies suggesting that common property resource management is most effective when the user group is limited in number and has strong internal communication skills,64 the students may have been a more representative sample of successful user groups than might have been expected.


60. I have expressed elsewhere the view that our attitudes toward land spring from such divergent traditions that we can only hope to reach a rough accommodation among them. See Fred P. Bosselman, Four Land Ethics: Order, Reform, Responsibility, Opportunity, 24 ENVTL. L. 1439, 1510-11 (1994).

61. See Rose, Given-ness and Gift, supra note 50, at 12-13, 25-29.


64. See OSTROM, supra note 11, at 324.
But my difficulties with game simulations go deeper than the choice of participants, and undoubtedly reflect my own experience. Economists correctly point out that lawyers have been trained to think inductively. Having spent over half of my life practicing law, I now realize that much of that time was spent on what an academic would classify as inductive, empirical, but nonquantified research—trying to psych out the future behavior patterns of judges, legislators, my clients’ opponents, and so on. Practicing lawyers learn that people are motivated by a wide range of complex factors, and that knowing which buttons to push is a skill not reducible to simple theory.

Consequently, my eyes tend to glaze over when I confront descriptions of methodology that make such claims as “utility theory is a richly developed body of theory for how individuals assign a valuation—utility—to the outcomes of costs and actions.” People who have real cash on the line don’t often market their products by appeals to “utility” because they understand that buyers are motivated by appeals to prestige, power, sex, security, or a wide range of other triggers identified by specialists in motivation research. Even sellers of financial products, for which costs and benefits are readily quantifiable, such as life insurance or mutual funds, know how to push these emotional hot buttons.

It is quite possible that deductive theorists will eventually have more success understanding human behavior than lawyers and advertising agencies. Certainly such research is worth pursuing, but I will be skeptical of game theories until they begin to incorporate the understandings of modern psychology and biology. When boards of directors regularly hire game theorists to run companies, I’ll know it is time to rethink my attitude.

Despite the attention it lavishes on game theory, Rules/Games is a


66. OSTROM, supra note 11, at 33.


69. See, e.g., BEHAVIORAL SCIENCE FOUNDATIONS OF CONSUMER BEHAVIOR, supra note 68.

valuable book, largely because of the inductive conclusions based on the field studies. Given Ostrom’s mastery of the empirical data concerning common-pool resources, and her creativity in interpreting that data, I am confident that she and her colleagues will make increasingly valuable contributions to the study of this important topic as her work progresses.