

Elinor Ostrom: Fighting the Tragedy of the Commons

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Among the recipients of the 2009 Nobel Memorial Prize in Economics was Elinor Ostrom, for her analysis of economic governance, especially in relation to the commons. While this choice took many in the profession by surprise, her life-long quest for an understanding of successful common property resource management holds important lessons for our future.

Elinor Ostrom (1933-2012) was born in California during the depths of the Great Depression. Her parents were artistically inclined—her father a set designer and her mother a musician—and neither had graduated from college. Ostrom attended Beverly Hills High as a “poor girl in the rich kids’ school” as she would later put it, and went on to major in Political Science at UCLA. She would subsequently get her doctorate there in the same field, after having been rejected for admission to the economics graduate program.

Her first academic job was a part-time teaching position at the University of Indiana, where she had moved to accompany her husband Vincent Ostrom. A tenure track position would eventually follow, and then a string of accolades: the Presidency of the American Political Science Association in 1996, election to the National Academy of Sciences in 2001, and the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel in 2009. She was the first female president of the APSA, and remains the only woman—and the only Political Scientist—to have won the Economics Nobel.

Challenging the Tragedy of the Commons

Ostrom’s entire academic career was focused on a concept that plays a central role in economics but is seldom examined in much detail: the concept of *property*. Ronald Coase had already alerted the profession to the importance of clearly delineated property rights when one person’s actions affected the welfare of others. But Coase’s main concern was the boundary between the individual and the state in regulating such actions. Ostrom sought to explore that nebulous middle ground where communities rather than individuals or formal governments held property rights.

PROPERTY RIGHTS

Both Ronald Coase and Elinor Ostrom were concerned with the manner in which property rights affect the allocation of resources. To illustrate the differences in their approaches, consider the following simple example. An author who values peace and quiet lives in an apartment building. His neighbors are a group of young college students who enjoy parties with loud music. They own the rights to their apartment and the author owns the rights to his. But neither has a property right over the amount of noise that flows between the apartments. The level of tranquility that these two apartments share is a common good. In this situation, it is quite possible that the level of noise will reach levels that are inefficient, in the sense that a reduction in noise will benefit the author to a far greater degree than it will inconvenience the students. But how could such a reduction be brought about?

For Coase, the problem arose because of poorly defined property rights over the level of noise. If the judicial system were to clearly assign the right to one or other party, then efficient allocation would arise through negotiation. If the author had the right to choose the level of noise, the students would pay for permission to party, to the extent that their gains from doing so exceeded the costs imposed on the author. If the students had the right, the author would pay them to lower the noise level, to the extent that their losses from doing so were less than his gains. Coase pointed out that as far as resource allocation was concerned, it did not matter who was given the property right in such situations, provided that it was clearly defined and the costs of making transactions was negligible. This has come to be called the Coase Theorem.

Ostrom's approach to such situations was quite different. She understood that in many environments the external imposition of usage rights was infeasible or undesirable. Yet, individuals with access to shared resources could reach tolerably efficient allocations through social norms backed by the implicit threat of decentralized sanctions. They could develop formal rules or rely on informal ones, thus engaging in what she called *self-governance*. The author and the students, for instance, could reach an agreement that was acceptable to both parties, guided by shared norms, and enforced by the possibility that other neighbors would punish violations. Attempts by an external authority to interfere with this process could result in a breakdown of local rules and norms, with counter-productive effects¹.

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The conventional wisdom at the time was that such informal collective ownership of resources would lead to disaster. In an influential paper published in 1968, the American ecologist Garret Hardin argued that when multiple users had access to the same valuable resource, the result would be a “tragedy of the commons” to which no technological solution could be found. Using the example of grazing lands to illustrate, Hardin argued that each herder would keep adding cattle to his stock as long as it remained privately profitable, neglecting the costs of this activity on others sharing the commons. The consequence would be depletion and eventual destruction of the pasture. Only through division of the land into private lots, or regulation by the state could the tragedy be averted.

It is in large measure through the painstaking research of Elinor Ostrom that this is no longer a consensus view.

A first step in building her analytical framework was to make a clear distinction between resources held as common property and those subject to open access. Common property involves a well-defined community of users, and an associated set of rules and norms that allow them to regulate each other’s behavior. Those in the community act—either individually or in concert—to prevent outsiders from exploiting the resource, even if the formal laws of the larger political entity within which they are embedded expressly prohibit such exclusion. Examples include many inshore fisheries, grazing lands, and forest areas. Open access, by contrast, refers to resources from which exclusion is difficult or impossible without formal state action. Ocean fisheries and the global atmosphere as a carbon sink are examples.

Ostrom was not alone in stressing the importance of this distinction, but she was unique in the vast range of methods she drew upon to try and understand the circumstances under which the tragedy of the commons could be averted. These included historical and ethnographic case studies, statistical methods, game-theoretic models with unorthodox ingredients and laboratory experiments. The goal was to understand the problem and answer the key questions, no matter which tools had to be learned along the way, or which disciplinary boundaries had to be crossed in doing so.

One example of her willingness to immerse herself into the communities she studied comes from Chicago in the 1970s, where—in collaboration with Vincent Ostrom—she was interested in the effects of a proposed policy to combine smaller police departments into larger units with greater geographic jurisdiction. The goal of the policy was to increase professionalization and specialization in law enforcement, along with lower bureaucratic costs of management. Ostrom rode in patrol cars with officers on the night shift in order to observe first-hand the routines that were involved in the provision of public safety, in order to understand the trade-off between policemen that were closer to the communities they served, and the economies of scale of such metropolitan consolidation.

Along similar lines, she used innovative methods to gather data when investigating the provision of public goods such as road maintenance and street lighting. In collaboration

with Roger Parks, she designed a portable device that allowed ordinary citizens to rate their perceptions of the quality of lighting on their streets, and compared these to actual measures of luminosity. She and Parks also placed sensors on cars—similar to those used on airport runways—to measure the bumpiness of roads in an effort to quantify the quality of maintenance by local authorities.

One of Ostrom's greatest strengths was the creation of networks to collect and consolidate data collection by countless individuals scattered worldwide. In 1992 she founded the International Forestry Resources and Institutions (IFRI) initiative through which a network of 14 Collaborative Research Centers around the world have been collecting data on thousands of forest plots in about 250 communities in 15 countries to understand the relationship between trees, people, and livelihoods. In these forests plots, local researchers in collaboration with forest users monitor several variables over long stretches of time to detect changes in ecological conditions as well as social, economic and institutional structures.

Ostrom felt that an adequate understanding of the behavioral and institutional determinants of local public good provision and common-pool resource use required access to data from a diverse set of sources. To accomplish this, she conducted fieldwork in communities whose survival depended on the effective management of shared resources, including some with centuries of experience in self-governance. For example, she visited small-scale irrigation systems in Nepal with her colleague and coauthor Ganesh Shivakoti, in order to better understand why farmer-managed systems were performing better than state-managed ones.

Ostrom believed firmly in the complementarity of distinct research methods. She examined topographical and other geographic data, using satellite images long before it was a common practice in the social sciences. And she conducted laboratory experiments meant to simulate the environments under study. All of these different methods were deployed, for instance, in a study with Harini Nagendra on forests, where she sought to determine which property regime—state, private or community—was best able to support sustainable resource use.

Based on her own research as well as the thousands of case studies that she carefully assembled and examined, Ostrom was led to the position that there was a great diversity of experience in the management of common property. Some communities were able to devise rules and draw upon social norms to enforce sustainable resource use, while others failed in their attempts to do so. She spent much of her career trying to identify the empirical determinants of success, and to understand the mechanisms through which success was attained.

The generalizable insights that she extracted from this mass of disparate evidence were collected together in her enormously influential 1990 book *Governing the Commons*. Here she proposed a set of principles that were associated with sustainable resource management—clear boundaries, explicit rules, effective monitoring, graduated sanctions for violators, mechanisms for conflict resolution, broad participation in governance, and

relative autonomy from higher-level authorities. Successful governance typically required a nested hierarchy of procedures, with rules regulating routine actions at the base, collective choice procedures for altering these rules at a higher level, and mechanisms for constitutional choice at the top. These multilevel decision-making procedures she called *polycentric games*.

Ostrom and the Field of Economics

Ostrom's approach may be contrasted with that of most economists, whose understanding of cooperation in groups is derived from an analysis of repeated games. A major result in this theory states that if interactions are repeated with sufficiently high likelihood, and individuals are sufficiently patient, then cooperative outcomes can be sustained in equilibrium even if all individuals care only for their own material interest.

To see the intuition behind this result, consider a simple situation in which each of two individuals can take a costly action that delivers a large benefit to the other person. If this situation arises just once, and both individuals care only about their own material interest, neither will take the action and both will be denied the benefit. But if the situation arises frequently, they may both adopt a tit-for-tat strategy under which each takes the action provided that the other has also done so in the past. Deviation from such a strategy involves a loss of material welfare if players place sufficient weight on future rewards, so cooperation can be sustained indefinitely.

But this was not a satisfying explanation for Ostrom, for a variety of reasons. To begin with, the repeated game model said that virtually any outcome could be an equilibrium: for example, sustainable extraction of a common resource was possible but so was rapid depletion, and the theory did not provide any guidance as to which outcome would arise. But there was a more important concern: Ostrom knew that sustainable use was enforced in practice by actions that appeared quite clearly to deviate from the hypothesis of material self-interest. In particular, individuals appeared to willingly bear considerable costs to punish violators of rules or norms. As Paul Romer put it in an appreciation of her work, she recognized very early on the need to "expand models of human preferences to include a *contingent taste for punishing others*."

So she turned to developing simple game theoretic models in which individuals have unorthodox preferences, caring directly about trust and reciprocity. And she looked for the ways in which people faced with a social dilemma avoided playing out the logic of the tragedy, by changing the rules so that the strategic nature of the interaction was transformed.

She then took these theories to the laboratory, joining forces with economists to run a pioneering series of experiments. A turning point in the literature came with her 1994 book *Rules, Games and Common-Pool Resources*, co-authored with James Walker and Roy Gardner, where a comprehensive collection of field and laboratory evidence was compiled to explain how resource users could achieve collective action in a controlled

laboratory setting. These confirmed the widespread use of costly punishment in response to excessive resource extraction, and also demonstrated the power of communication and the critical role of informal agreements in supporting cooperation. The philosopher Thomas Hobbes (1588-1679) had asserted that agreements had to be enforced by governments: Covenants without a sword are but words, he wrote. Ostrom took issue with this. As she put in the title of an influential article, covenants—even without a sword—made self-governance possible.

Ostrom's more recent work concerned two major and vexing issues of critical contemporary importance—climate change and the digital commons. The effectiveness of polycentric governance systems for local commons gave her hope that similar structures could be designed at a global scale, with transnational institutions regulating the behavior of component entities. And her most recent work—collaborative with Charlotte Hess—concerned the production and sharing of knowledge in the digital age. This too could be studied as a kind of common-pool resource, for which governance structures are essential to proper functioning.

When Ostrom was named a co-recipient—with Oliver Williamson—of the 2009 Nobel Memorial Prize in Economics the choice took many in the profession by surprise. After confessing that he had no knowledge of her work, and “no recollection of having ever seen or heard her name mentioned by an economist,” University of Chicago professor Steve Levitt predicted that “the economics profession is going to hate the prize going to Ostrom even more than Republicans hated the Peace prize going to Obama.”

But there were also some prominent defenders of the decision, including two former recipients of the award. The experimental economist Vernon Smith congratulated the Nobel Committee for recognizing Ostrom for her pioneering and original work, and applauded her “scientific common sense” and willingness to listen “carefully to data”. And Douglass North endorsed the selection on the grounds that she had enriched economics by bringing in insights from outside the discipline, in particular through her pioneering research on voluntary organizations for managing common-pool resources.

One reason for this strangely inconsistent response from the community of economists may have been the deeply eclectic nature of Ostrom's work. The evidence she amassed was obtained using a variety of qualitative and quantitative methods. The patchwork of models she developed were not nested in some grand and professionally accepted mathematical framework. She did not surrender to the illusion of precise knowledge that characterizes much work in economics, preferring not to conceal the vagueness and ambiguity that characterizes our current state of knowledge. It takes a certain kind of professional courage and self-belief to part from accepted academic practice in this manner. She was fearless in doing so, and leaves behind a great and inspiring legacy.

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