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Interrogating the Commons: Introduction to the Special Issue

Reflecting on a Legacy

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As Co-Editors of this Special Issue, Ed Araral and I have the privilege of introducing this collection of specially written pieces. This Special Issue marks what we feel is a critical moment in commons-inspired research: a chance to reflect on the present landscape of scholarship and imagine new directions for exploration. It is, after all, 45 years since [Garret Hardin's landmark piece on the tragedy of the commons \(1968\)](#). It is also an occasion to recall and celebrate the ideas and legacy of Elinor Ostrom.

In the second half of this introduction, Ed Araral and Dianne Araral share their memories of an esteemed friend and mentor. I was not among Professor Ostrom's students nor associated with any of her research groups, so my reflections are simply that of a distant admirer.¹

I remember picking up her book, *Governing the Commons* (Ostrom, 1990), as a doctoral student in the 1990s. It was, for me, a small epiphany that I appreciate more and more with time. I was impressed by her institutional acumen, specifically the admonition that institutions could not be so simplistically rendered as the yin-and-yang of market and state. It, along with the writings of Douglass North and some others, heralded the turn toward a new institutionalism.

But the deeper effect it had on me was both motivational and methodological. I beheld, maybe for the first time,

someone who traversed two hitherto disconnected fields: the game-theoretic treatment of collective action and the anthropology of community life, both of which appealed greatly to me. I remember thinking: I did not know you could do that. And this was, of course, a very short step away from the next realization: if she can do this, why cannot we? And there you have it, a fledgling researcher's career forever enchanted (and haunted) by the spirit of interdisciplinarity, the beginning of a career constantly having to deal with the question: "So you do *what* and *what*?" (the two 'whats' being narrative analysis and game theory).

There is something in her work that enchants us. "Community!" we intone with conviction. Someone adds, "Social capital!", and we murmur approvingly. I believe the communitarian ethic moved her, but to her credit, Ostrom did not romanticize community. The optimism of *Governing the Commons* notwithstanding, her subsequent writings revealed a willingness to turn a critical gaze upon community-based institutions. Whatever community is, it is not a panacea. Some community groups fare better than others in managing their space and resources. And, as soon as she proposed a set of general design principles that seemed to characterize more successful community-based institutions, she became keenly aware of circumstances that tested each of these principles.

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¹ I was, on the other hand, a student of another notable game theorist and Nobel prizewinner (Lloyd Shapley), but that is a story for another occasion.

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I believe that this is a critical intellectual moment for commons research. There are many occasions for self-doubt: unconvincing returns from the international development community's turn toward governance 'from the bottom-up', the stony intransigence of fundamentalist/conservative communities toward global action (on climate and other concerns), and the dwindling realities of glaciers, mangrove, and bluefin tuna. Being myself a student of community-based resource management, I know that there are far too many success stories touted about than can be believed. Increasingly, our inquiry has to start focusing on the limits and ambiguities of community. It is the 'tragedy of community' that is the most pressing question for us. Most of all, what new institutional arrangements are emerging, and how do we begin to evaluate them?

I have my own set of questions and conjectures. Now that the pendulum of development practice has swung from state to market to community, where might it swing next? (Yes, of course – networks, but that is not a real answer or, at least, not a very satisfying one.) How well does commons research cohere with the oceanic literature on social networks? Surely, there are points of difference and commonality between the two – if so, what are they? Do Ostrom's design principles for common-pool resources work for these emergent networks?

And, even now, I wonder how scholars of the commons are working in non-utilitarian modes of reasoning into their models – things like morality, tradition, compassion and, for lack of a better word, love. Surely, these have their place in institutional life and, if so, what do we make of institutional designs that leave them out or scholarship that automatically assumes them in? Are there ways to frame resource dilemmas other than tragedies of the commons (or their next of kin, prisoner's dilemmas and collective action problems), and how might this change the way we study these situations? What if the problem with natural resources lay not in their commonality but in the way we treat them as mere materiality? What if we understood the propensity to act collectively as an affective-relational, not rational, decision?

But rather than take this space up with my own questions, I would rather let the participating authors take up the questioning in turn. As the title of this issue suggests, our main focus is in asking new and critical questions, with the idea that such interrogation is, in the end, perhaps more valuable than the tentative answers we might offer at this point.

We have two engaging pieces to start the conversation. Jenny Mansbridge, in a short commentary, brings to light other, less appreciated, aspects of Ostrom's work that offer directions for progress on issues surrounding the global commons. Ed Araral takes a walk through Ostrom's work from a different angle, tempting us with a possibly revisionist history of her work. They are saying: look, again, at this work,

because it may not be exactly what you thought it was, and perhaps it is more.

The next two pieces draw linkages between the literature on social networks and that of the commons, trying to come to grips with the realization that networks exceed established (place-based or other) notions of community. Eungkyoon Lee, Chan Su Jung, and Myung-Kyoon Lee employ the notion of the boundary organization to explain how coordination is achieved in polycentric, international networks. Sarah Giest and Michael Howlett take up similar questions and study the role of network managers and network entrepreneurs in solving the higher-order problem of institution-building. One important question that they pose is what coordinating mechanism constructs a collaborative when there are no a priori communities to build cooperation around? In doing so, both pieces examine emergent networks around climate change advocacy.

Rebecca Gruby and Xavier Basurto then examine polycentricity and multi-scalar networks by bringing together a human geographic lens and Bloomingtonian institutionalism. In studying a marine protected area network, they examine the 'politics of scale' that determine how ecological boundaries are drawn up and new, nested institutions crafted to further the different actors' ends. The collective that emerges is a political one that is subject to ongoing processes of negotiation.

The next two pieces attempt, in very different ways, to more deeply inquire into how trust, reciprocity, and sanction emerge and operate in reality. Krister Andersson, Jean Paul Benavides, and Rosario León, in studying a large sample of forest protection initiatives, demonstrate how rulemaking, sanctioning, and monitoring can, to some extent, work independently of each other. In doing so, they argue for a closer look at institutional diversity. Francisco Fernandez de Castro and I, on the other hand, theorize a new model of collective action that incorporates the traditional but, also, allows for non-utilitarian ethics. In doing so, we highlight the need for institutional designs that increase the capacity for individuals to 'care' and to recognize connectivities with other, often remote, actors. This can lead to new ideas about program design.

We end the Special Issue with a closing note by Arun Agrawal, a discussion of questions and conjectures, methodological challenges, and promising directions forward in commons research.

On behalf of Martin Beniston, Editor-in-Chief, the other editors, and staff of Environmental Science & Policy, I express my sincere hope that this Special Issue might motivate colleagues around the world to take up, and add to, the questions posed herein. And, yes, let us commemorate the legacy of Elinor Ostrom, a most uncommon scholar.

A Note on Elinor Ostrom as a Person, Friend and Scholar

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Lin Ostrom was known for her work on governance of the commons and her critique of markets and states. However, there are many lesser-known facets of Lin as a person, a friend and scholar, which we discuss in this paper. We had a special bond with Lin and Vincent Ostrom. We had the privilege of living and working with them for four years (2002–2006), including having weekly dinner, endless conversations as well as weekend house and yard work. On the first part of the paper, we first share our experience with Lin up close and personal. In the second part, we present a different perspective of Lin's scholarship that is not widely known – its parallels with Darwin's theory of evolution.

Lin as a person and a friend

On top of our list of Lin as a person and a friend was her devotion to her husband Vincent. Vincent and Lin were intellectual soul mates, Vincent as the philosopher and Lin the theoretician and empiricist. They spent close to 40 years building the Workshop on Political Theory and Policy Analysis at Indiana University-Bloomington. Lin dedicated her 1990 book to Vincent “for his love and contestation” while Vincent dedicated his work to Lin. She took care of and cheered on Vincent, as he grew older, more sickly and frail. Bloomington Hospital had become Lin's third home, her second being the hotel. She often called Vincent to check on him whenever she was away to remind him of his medications. She would often rush home from her travels to make sure Vincent did not miss his medical appointments. On weekends during summer and fall, Lin and Vincent would usually stroll and watch the sunset.

The Ostroms were generous at heart. They supported graduate students and their families, including us, to study in the US. They donated their estate to the Tocqueville endowment fund to support students and scholars visiting the Workshop. They even donated to our college trust fund. However, the Ostroms were personally frugal. Lin would sew Vincent's socks repeatedly before getting a new one. She had the same small, old traveling bag, blazers and pair of shoes for more than 10 years.

Lin and Vincent loved to bake turkey during Thanksgiving, inviting friends over and enjoying roasted marshmallows, corn and beer in their log cabin in the forested outskirts of Bloomington, Indiana. They would convert leftover turkey into a rich and creamy turkey-vegetable soup that would last for days. They both loved Chinese food (Sichuan and Cantonese) including fortune cookies. Their idea of celebration – including celebrating birthdays and the graduation for a PhD advisee – was to go to their favorite Chinese restaurant on the East side of town.

Lin loved plants and gardening. Cactus, tangerine plants and pine trees were among her favorites. She disliked chemicals and would rather pick, with her bare hands (and strain her back), stubborn weeds in between cobblestones in their driveway. She would prepare compost materials from kitchen refuse. Watering plants was her weekend therapy as was the treadmill. She loved birds, particularly woodpeckers and hummingbirds, which would regularly pay a visit to their well-stocked bird tray hanging by a maple tree overlooking their dining hall. They also had two cats at one time.

Lin was a highly disciplined scholar. Her day started at 4 am and ended at 10 pm. She would occasionally watch news (Jim Lehrer Show) with Vincent after a long day. At any one time, Lin would have numerous writing projects, reviews and proposals to finish, three research centers to co-manage, numerous PhDs to advise, a course to teach and dozens of weekly emails to respond to.

Her discipline was evident in her travels. Lin was a tireless globetrotter and a much sought after speaker, possibly clocking the most mileage by a social scientist. Her travel calendar was usually already full the year before. She visited us in Singapore a few months after winning the Nobel Prize, landing at the airport at 6 in the morning after a 20 h direct flight from New York. By 9 am, she was already visiting the Lee Kuan Yew School of Public Policy for a packed schedule – meetings, seminars, public lectures and late night dinners. Three days later, she was off to two other countries and back in Bloomington over the weekend. On the plane, she was finishing her article for the 100th year anniversary edition of the American Economic review. This was a normal itinerary for Lin at 75 years old.

Lin and Vincent loved native art, which they eventually donated to a museum in Arizona. They liked American Indian, Chinese and African paintings, carvings, prints, accessories and cloths. Lin collected (on Vincent's influence) gemstones and ethnic jewellery, some of which she gave away to us, including a figurine from Japan from World War II. Lin and Vincent were both craftsmen, in the literal and figurative sense of the term. They literally designed and helped build their house and furniture, including their dining table and chairs out of the maple trees in their woodlot. They also built their log cabin in Manitoulin Island in Canada off the coast of Lake Michigan, a two-day drive from Bloomington. There was no electricity or running water in the cabin. In this isolation, Lin would finish her projects. They did this for close to 40 years.

Finally, and most importantly, Lin was a warm friend with a cheerful spirit. She signed off her emails with “cheers” and greeted everyone with a hearty hello. She treasured her friends. She kept three shoeboxes full of birthday and Christmas cards from friends and students all around the

world. My daughter's school artwork – a wire sculpture – was kept in their dining hall along with other personal artwork from friends.

She had a keen sense of humor, optimism, infectious enthusiasm and an indomitable spirit. Lin soldiered on with what she loved to do. Three months before she passed away, weakened by chemotherapy and the ravages of cancer, she made sure she commented on a paper we were working on and gave encouragement for it to be finished. Lin also had her soft spot. When we finally left Bloomington in June 2006, the Ostroms bade us with a teary farewell and a heavy heart. This was the Lin Ostrom we knew of, up close and personal.

Ostrom, Darwin and the Evolution of Institutions

Apart from these remarkable personal traits, there is as yet another facet of Lin as a scholar that is not well known and appreciated in the literature. We argue that her interest in the commons is tangential to her larger interest on the evolution of institutions for collective action (and ultimately the possibility of self-governing, democratic societies). In particular, we show the significant parallels of her work to Darwin's theory of evolution, adaptation and natural selection.

To make our case, we will examine (1) why she chose to study the commons; (2) the basis for her choosing her case studies; (3) how her notion of institutional selection pressure is similar to that of Darwin's natural selection; (4) her focus on methodologies to study evolution of institutions such as agent based modeling (ABM), neural networks, evolutionary game theory, archival research, among others; and (5) her recent focus on the study of robustness, resilience and institutional diversity. We conclude our paper by outlining the implications of an evolutionary approach to institutional analysis and to environmental science, policy and governance in particular.

First, Lin chose to study the commons mainly because they represent a natural experiment to study the evolution of institutions for collective action. This is because the commons are embedded with three inherent problems of collective action, namely: (1) the problem of supply; (2) the problem of credible commitment; and (3) the problem of mutual monitoring. These three problems in turn arise from the inherent features of a common pool resource, i.e. rivalry in consumption of resource units and difficulty in the exclusion of the resource system. Indeed, when asked why she chose to study irrigation as her unit of analysis, her thoughtful reply was that "irrigation is to the political theorist what the fruit fly is to the evolutionary biologist."

Her interest in the study of evolution was evident in her 1990 book "Governing the Commons: The Evolution of Institutions for Collective Action" in which she chose two types of case studies. The first set represented examples of long enduring common pool resources whose resource users had devised governance systems that have evolved and survived for long periods of time, in situations characterized by significant change and uncertainty.

These cases include the Alpines in Switzerland, mountain meadows in Japan and irrigation in Spain and the Philippines. These cases, she argued, demonstrate the feasibility (but not likelihood) of robust, self-governing institutions for managing

complex CPRs overtime. The second set of cases were examples of failure or fragile institutions governing the commons such as the groundwater in California and fisheries in Turkey and Sri Lanka. These two sets of case studies enabled Ostrom to deduce eight design principles for long enduring commons. Although these design principles were meant to describe long enduring commons, this aspect of her work had been overshadowed by their more popular counterparts- particularly, her rebuttal of Hardin's Tragedy of the Commons and her critique of markets and Leviathan solutions.

Second, outside of the commons literature, Ostrom was a keen student of evolutionary biology and biodiversity. She subscribed to and keenly read scientific journals such as *Nature*, *Science* and *Christian Science Monitor* to keep her abreast of the latest developments in the field. In her graduate seminars, she would screen videos showing how primates have evolved simple governance arrangements to provide for a rule ordered primate society.

Her interest on the implications of biodiversity was evident in her last major book on institutional diversity in which she provided a coherent method to analyze how context matters to how institutions are formed, how they operate and evolve over time and how they influence the behavior of actors. To Lin, institutional diversity is synonymous with polycentricism – overlapping and multiple centers of power, which are formally autonomous from each other.

Third, her larger interest in Darwin's theories of evolution was evident in the readings she prescribed her graduate students. She would insist that all her advisees take a seminar on game theory and study evolutionary game theory. She could have prescribed one of many textbooks on game theory but she specifically prescribed evolutionary game theory, particularly that of [Gintis \(2000\)](#).

In fact, there are many parallels to Ostrom and Gintis' core ideas. They include the development of models of altruistic and cooperative behavior, which incorporate behavior such as empathy, reciprocity, punishment of free-riders and norm violators, which have not been well handled by conventional game theoretic models of selfish agents. Reciprocity and punishment of norm violators particularly occupied an important place in Ostrom's argument that actors are conditional cooperators rather than simply selfish agents as implied in non-cooperative game theory ([Ostrom, 1998](#); [Ostrom and Ahn eds, 2003](#)).

Reciprocity is one of three core variables – the others being trust and reputation – that Ostrom argues to be the determinants of cooperation ([Ostrom, 1998](#)). Reciprocity in turn, argues Ostrom, is a function of two factors, the development of shared norms and the actor's discount rate (length of time horizon) both of which requires an evolutionary approach to analysis i.e. norms evolve over time, depending on the costs of arriving at agreements, and the possibility for actors to have face to face communication and develop norms of behavior.

Fourth, Ostrom started to use Agent-Based Modeling (ABM) as a way to better understand how agents learn and adapt, as well as how institutions evolve in controlled laboratory settings. As described by [Bonabeau \(2002\)](#), at the simplest level, "In agent-based modeling (ABM), a system is modeled as a collection of autonomous decision-making entities called

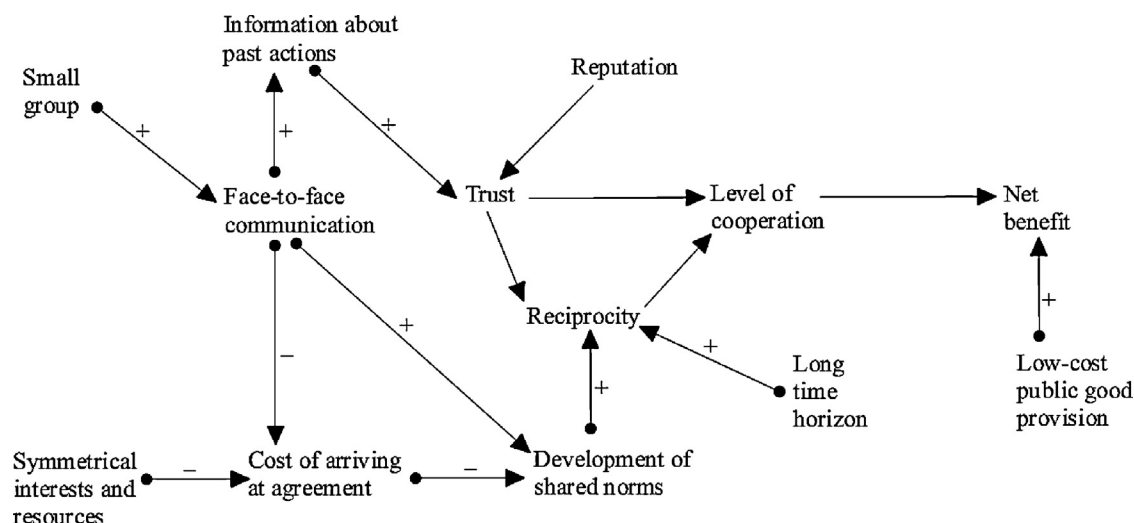


Fig. 1 – Ostrom’s determinants of collective action in the commons.

Source: Ostrom (1998).

agents. Each agent individually assesses its situation and makes decisions on the basis of a set of rules. Agents may execute various behaviors appropriate for the system they represent—for example, producing, consuming, or selling. Repetitive competitive interactions between agents are a feature of agent-based modeling, which relies on the power of computers to explore dynamics out of the reach of pure mathematical methods.” For Ostrom, the appealing feature of ABM is its ability to model rule ordered behavior in a strategic setting to observe how agents learn to adapt and evolve new rules over time. In short, for Ostrom, ABM can be a useful tool to study the evolution of norms and formal institutions among agents in a strategic setting.

Fifth, Darwin is closely associated with the theory of natural selection. Ostrom offered a similar notion to explain how institutional context creates different selection pressures. Instead of debating whether or not human beings are rational, Ostrom argued that scholars should instead pay attention to the institutional context of the situation the actor finds herself in. For instance, actors who survive and prosper in a highly competitive setting with strong selection pressures—such as Wall Street—are presumed to be utility maximizing (selfish agent) in the sense postulated by rational choice theory. Otherwise, they would not survive the selection pressure. Conversely, if the same actor behaves similarly (in a selfish fashion) in the context of a community where “other regarding” behavior is a strong norm, then the selfish behavior is unlikely to survive in a long run.

However, unlike Darwin, Lin did not argue for the survival of the fittest but instead argued that actors try to adapt to uncertain circumstances depending on how structural variables (summarized in Fig. 1 below) affect the three core variables (trust, reciprocity and reputation) posited to affect the likelihood of cooperation in the commons. Thus, for Ostrom, it is the selection pressure induced by the institutional context that influences motivation and behavior rather than assume that motivation is intrinsic.

Sixth, Lin would untiringly motivate her graduate students to study the evolution of governance of the commons over time by revisiting earlier studies on the subject or undertaking a historical approach. This is evident in the dissertation projects of her students involving types of resources— from pasture and irrigation to groundwater and forests.

For instance, Mwangi (2007) studied the evolution of property rights of the Maasai tribe in Kenya from collective to private ownership. She argues that Maasai cattle herders supported private ownership (subdivision of land) in order to capture gains in a new property assignment and to reduce distributional disadvantages within the status quo. The demand for private or subdivided rights can be understood as a form of adaptation strategy in response to internal and external threats to Maasai land claims.

Araral (2013) also revisited irrigation sites in the Philippines, which have been studied in the 1980s and were included in Lin’s (Ostrom, 1990) five examples of long-lived commons, to study why and how they have changed. He finds that these systems have been adapting in response to population pressure and uncertainties caused by climate change.

Blomquist (1992) likewise revisited for his dissertation the groundwater case studies in California, which Lin studied in the 1960s. He studied how governance regimes for the groundwater have evolved since the 1960s. What he found was a polycentric i.e. multiple, overlapping but formally autonomous source of authority over the ground water resources rather than a chaotic form of water governance as was then the conventional wisdom. He argues that the problems facing groundwater are better addressed with political entrepreneurship rather than more administrative mechanisms. Blomquist argues that political entrepreneurship is central to a functioning polycentric form of groundwater governance, which in turn is central to enabling various competing stakeholders to adapt, learn and evolve governance mechanisms to sustainably manage the groundwater resource.

In the case of forests, [Ostrom and Nagendra \(2006\)](#) used GIS (geographic information system) to study the evolution of land use and forest patterns as a result of different forest property rights over time. The study used satellite imageries, ground measurement, as well as a long term, inter-disciplinary, multi-scale and multi-national approach to assess the impacts of various forms of forest tenure rights. They find that there is no one single governance arrangement that can effectively control overharvesting of forest resources. Instead, they find diverse governance forms – more characterized by polycentric arrangements – which enable resource users to devise and monitor rules better than when rules are imposed by a single authority. This suggests – as [Blomquist](#) suggested for groundwater – that institutional diversity in the form of polycentric governance can provide a robust and stable governance solution to the problem of overharvesting.

Seventh and finally, in the last decade or so, Lin had devoted more attention to the study of the resilience or robustness of socio-ecological systems and how they adapt and evolve over time. She reworked the IAD framework into the Socio-Ecological System (SES) framework to enable scholars to study the institutional configurations that affect the interactions among resources, resource users, public infrastructure providers, and public infrastructures to identify potential vulnerabilities of SESs to disturbances.

With colleagues ([Anderies et al., 2004](#)), they hypothesized that the link between resource users and public infrastructure providers is a key variable affecting the robustness of SESs that has frequently been ignored in the past. They then showed the implications caused by a disruption in this link. To promote the study of robust socio-ecological systems, Lin spent a great deal of time and effort in her last few years to establish the Center for the Study of Institutional Diversity (CSID) in Arizona State University. The aim of the center – which is now run by her former students and colleagues – is to promote the study of institutional diversity and resilience of socio-ecological systems, two subjects closely related to her larger interest on the evolution of institutions for collective action.

Conclusion and implications

In conclusion, we have shown two lesser-known traits of Lin as a person, friend and scholar. We showed that Lin was a warm, generous and remarkable person. We argued that as a scholar, her work has significant parallels to Darwin's theory of evolution, adaptation and biodiversity and that her work on the commons is tangential only to the study of the evolution of institutions to test the possibility of self-governance.

In this last part of the paper, we explore three implications of an evolutionary approach to environmental science and policy. First, in terms of methodological implications, Ostrom has shown that studying the evolution of institutions can be productively undertaken with multiple methods, including: comparative and periodic studies of long enduring and failed commons; large n-studies; archival research, game theory; laboratory experiments; agent based modeling and geographic information systems, among others. These methods can easily fit the tool kit of scholars of environmental science and policy, particularly the use of agent-based modeling.

Second, in terms of theoretical implications, an evolutionary approach opens up the possibility of innovative theorizing for environmental science and policy as it did to economic geography. For instance, [Boschma and Frenken \(2006\)](#) argue that innovative theorizing “currently occurs at the interface between neoclassical and evolutionary theory (especially in modeling) and at the interface between institutional and evolutionary theory (especially in ‘appreciative theorizing’).” Modeling the interaction of the components of a socio-ecological system such as the characteristics of the resource, resource users and institutions over time and comparing performance of different resource systems over time with different institutional variables is one promising implication.

Finally, in terms of practical implications, an evolutionary approach would enable environmental policy makers to ask three important questions in assessing the efficacy of alternative governance mechanisms and their tradeoffs, namely:

- 1) To what extent does this alternative mechanism provide information and allow for learning regarding the state of the environment compared with the current governance mechanism?
- 2) To what extent does it deal with conflict and induce compliance with rules?
- 3) To what extent does it encourage adaptation and change?

We argue that these are the sorts of questions that scholars of environmental governance would have to address to advance the second-generation research agenda. The collection of papers in this Special Issue in honor of Lin Ostrom is one attempt to answer these questions.

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