A manifesto for theory in environmental studies and sciences

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Abstract Environmental studies and sciences (ESS), an in-
herently practical field, nonetheless demands greater attention
to its theoretical assumptions as a necessary step toward
continued intellectual and pedagogical development and
real-world relevance. This need for theory arises from the
status of ESS as an integrative interdiscipline—one practi-
tioners of ESS celebrate, yet with considerably greater chal-
lenges in achieving inclusivity and coherence than other
interdisciplinary fields face. Three examples are briefly raised
here: the definition of environment in ESS, how environmen-
tal actors are conceptualized, and the identity of ESS as a
problem-oriented field. These three examples are initial prior-
ities requiring better theorization, with many intellectual re-
sources ESS can draw upon to address them. We close by
reminding the reader that theories are ideas that take us places,
not just idle speculation, and by advocating "theory across the
(ESS) curriculum." In addition to the three examples we
cover, we invite the reader to join us in identifying and
evaluating other current theoretical assumptions in ESS, in
reframing ESS on more robust theoretical grounds, and in
integrating this work into the curriculum.

Keywords Theory · Interdisciplinarity · Environment ·
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Introduction

Environmental studies and sciences (ESS) is without question
a critical area of scholarly inquiry, as environmental issues
loom large in our world. Yet whether this inherently applied
field will fully achieve its promise is, in our view, a matter not
only of practice but of *theory*. We call for greater attention to
the theoretical assumptions underlying ESS as a necessary
step to its continued intellectual and pedagogical development
and real-world relevance, and urge ESS to weave more theory
into its undergraduate and graduate curricula. In this brief
manifesto we argue that this need for theory arises from the
status of ESS not as one among many *disciplines*, but as an
integrative *interdiscipline*. We provide three priority examples
of problematic theory in ESS that derive from its complex
nature as an interdiscipline: (a) our understanding of environ-
ment, (b) our assumptions about human and nonhuman actors,
and (c) the notion of ESS as an inherently problem-oriented
field. In all three cases, we contend that more theoretically
informed scholarship exists that could better ground our as-
sumptions regarding environment, environmental actors, and
problem solving in ESS. We close by considering curricular
implications and inviting the reader to join us in this venture.

The term "theory" immediately conjures up notions of
impracticality, no wonder it has received relative inattention
in ESS. Indeed, the Oxford English Dictionary etymology
dates this theory/practice duality back as far as the Greeks,
with θεωρία meaning not only theory but also speculation.
Rather than agree with the Greeks that theory involves gazing

at the world from afar rather than engaging in it, we follow the lead of Ostrom (2011), for whom models, theories, and frameworks reflect increasing levels of abstraction, each of practical significance in tracing the effective contours of scholarship. We are less interested here in theories as specific explanatory hypotheses (e.g., "I have a theory for how *x* relates to *y*") than more generally in theory as a vehicle: theories are ideas that take us places. The former approach is commonly and justifiably deployed in the environmental sciences; the latter notion of theory defines the broad trajectory of ESS as an interdiscipline. This latter approach resonates with Ostrom's broader notion of frameworks as "identify[ing] the elements and general relationships among these elements that one needs to consider…and how they organize diagnostic and prescriptive inquiry" (p. 8). If theories (as in Ostrom's frameworks) are vehicles, then some get you farther than others, across more varied terrain, and with greater grace and beauty. We call for greater attention to theory in ESS precisely because we want our field to accomplish these eminently practical ends. We are aware, however, that discussing theory is inevitably an abstract exercise, and solicit the reader's patience as we assess this important conceptual terrain underlying ESS.

ESS as an interdisciplinary field

The challenge ESS faces is, at its heart, a challenge of credible and actionable *interdisciplinarity*, and this is precisely why greater attention to theory is needed. The term is overused: many academics have adopted the label and self-identify as interdisciplinary, without much theoretical clarity. Yet interdisciplinarity matters in ESS. Undoubtedly, contributions from related fields in the sciences and humanities such as natural resource economics, conservation biology, and environmental history (along with many others) are crucial. But there is an inherent recognition—among not only ESS scholars but also broader lay and elite actors—that environmental issues are not simply matters of getting the economics right, or of settling relevant biological details, or of appreciating history. We could simply place these contributions alongside each other in multidisciplinary fashion; if so, ESS would essentially be shorthand for environmental economics and biology and history and so forth. But ESS commonly proclaims itself as an integrative interdiscipline, one that weaves together these and other disciplinary contributions into a more synthetic perspective on environmental issues. Indeed, the lead article in the inaugural issue of the AESS (Association for Environmental Studies and Sciences) newsletter from 2008 states:

> Environmental scholars and scientists inevitably discover that the challenges we face transcend the disciplinary knowledge many of us practice.…A major aim

of AESS will be to encourage interdisciplinary understanding of environmental science, policy, management, ethics, history, and all of the other vital contributions of traditional disciplines. The Association is envisioned from the start as a community of environmental scholars and scientists, not a confederation of disciplines.[1]

Yet interdisciplinary integration is theoretically demanding. Its complexities involve issues of *inclusivity* and *coherence*, i.e., the breadth and integrity, respectively, of the interdisciplinary mix. For all the challenges inherent in interdisciplinary fields such as biochemistry or cultural studies, they rightly include a far narrower swath of contributing disciplines than does ESS—one study ambitiously estimated over 1,300 related fields (Trompf 2011)! Which, then, among this plethora of related fields merit inclusion? Consider ESS curricula, for instance: while some broadly emphasize natural science, social science, and humanities contributions, many focus primarily on natural-science fields with a smattering of policy-related social sciences, and still others emphasize social science and humanities fields (Vincent and Focht 2011). These differing forms of inclusivity are typically justified based on a desired ESS curricular outcome; Vincent and Focht derive three from their empirical analysis, including systems science, policy and governance, and adaptive management (pp. 22 ff.). But this instrumental approach—add whatever you need to achieve an ESS curricular outcome—dodges the question of inclusivity. Are there indeed no core precepts, no core processes that all ESS scholars must learn? Are they of relative importance only in the context of curricular training? The challenge of inclusivity demands that ESS practitioners clarify which disciplinary fields are requisite elements in our interdisciplinary mix—a demand that cannot be addressed without taking some sort of theoretical stance on the relevance of the natural sciences, social sciences, and humanities.

Inclusivity, however, is not enough. Once we admit a variety of disciplines into the ESS mix, we need to integrate them in some coherent fashion, and the greater the inclusivity the greater the challenge of coherence. Coherence is often achieved in the academy via shortcuts such as E.O. Wilson's consilience, which privileges certain sciences in its unification of knowledge (Wilson 1998; cf. Berry 2000). Unfortunately, ESS has not yet provided a clear, widely recognized alternative to these partial approaches to coherence. Many in ESS are enamored of a systems approach, in which coherent integration would result in some sort of super-system; but this too has theoretical problems (can disparate systems be readily integrated? can the objects of all scholarly fields be reasonably represented as systems?). We in ESS purport to offer a more synthetic view of

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[1] AESS Newsletter 1(1), Summer 2008, p. 2 (author unattributed).

environmental issues, and we laud Barry Commoner's famous dictum (Commoner 1971) that everything is connected to everything else. Yet simply rubbing a few disciplinary sticks together may not produce interdisciplinary fire, and the relatively settled epistemological frameworks of contributing scholarly fields such as economics, biology, and history do not readily converge. Here, too, any attempt at coherence is heavily theory-laden.

In short, as exciting as our identity as an integrative interdiscipline may be, we have a considerably more difficult set of theoretical challenges to address than most disciplines, and we had better get started.

The "environment" of ESS

Certain core assumptions in ESS follow from this point of departure as an interdiscipline and require greater clarification given the many ways they can be approached. We recommend three as priorities. One is what we mean by "environment"—often understood as an integrative meeting point for the contributing fields of ESS, yet an increasingly challenged concept in the sciences and humanities. Arguably, the entry of environment into the scholarly and political arena in the U.S. in the mid- to latter twentieth century proved crucial in raising awareness of vital connections between humans and nonhumans. But these received notions of environment as the physical and biological processes on which we depend, the "nature we need"—clean air and water, abundant biodiversity, healthy food supplies, stable climate, etc.—have been subjected to scrutiny in fields ranging from ecology to geography to history. These challenges take two general approaches: the first argues that natural processes are less natural than many believe, while the second focuses on our knowledge of environment *qua* nature as socially constructed.

A good deal of scientific research now supports the reality of the Anthropocene, a new geological epoch of the earth as dominated by humans (Crutzen and Stoermer 2000; see also Zalasiewicz et al. 2010). Knowledge of human impacts on the earth dates back several millennia (Thomas 1956; Glacken 1967; Turner et al. 1990), but the increased scope and magnitude of human transformations of nature as reflected on these deliberations over the Anthropocene force us to rethink basic philosophy and policy questions in ESS, given the "nature we need" has rarely been, nor will be, entirely natural (Shellenberger and Nordhaus 2011; Lorimer 2012; Proctor 2013). In addition, scholarly and popular knowledge of environment *qua* nature has been part of a larger battle over science and objectivity sometimes known as the "science wars" (e.g., Haraway 1988; Gross 1994; Weinberg 2001). On the one side are realists, who generally believe in the reality of the physical world and the

possibility of scientific knowledge. On the other are constructivists, drawn primarily from the humanities and interpretive social sciences, who generally approach concepts of nature as revealing much more about the knower than the thing known. The terms of debate between the two have been fractious and perennial (Proctor 1998). Both are amply represented in ESS and its contributing fields, thus suggesting that environment is not the ready meeting point for contributing ESS disciplines that many have imagined.

If indeed we live in the Anthropocene, and epistemological approaches to environment differ across the sciences and humanities, what does this mean for ESS? Clearly, there is a need to reformulate "environment" with eyes wide open to this vast range of contemporary scholarship. Thankfully, there have been many laudatory attempts to re-theorize environment in ways that can incorporate recent critiques without declaring the term meaningless. As one interesting alternative, environment is approached less as a *category* comprising a wide range of processes—whether exclusive or inclusive of humans—and more as a network of *connections* defining one's relationships with surroundings (Ingold 1993; Hayles 1995; Proctor 2009). Implications for the scope and trajectory of ESS are profound, yet have barely been explored, given that much of this interesting work is currently being done outside the field of ESS. But more of this work needs to be included in ESS curricula given the fundamental salience of "environment" in our field.

Environmental actors

Another core assumption underlying ESS that emerges as a priority for theoretical advancement concerns how we model environmentally relevant action. The interdisciplinary breadth of ESS means that we study a diverse array of agents: individuals, communities, and other kinds of collectivities, corporations, states, even nonhuman animals and ecosystems. But because social science contributions to ESS have come primarily from the fields of economics and political science, both of which are heavily influenced by rational choice theory, we often begin with the assumption that individual human beings are the relevant environmental actors that their behavior is rational, and that "rational behavior" consists of pursuing individual interests. This is the model on which Garrett Hardin's highly influential "tragedy of the commons" (Hardin 1968) is based. His actors, faced with a common pool resource (like a village commons), use the resource for their own private benefit until it is so degraded that no one can benefit from it. Absent strong government regulation, Hardin concludes, individual self-interested behavior will lead to resource depletion. It is a powerful theory, but many scholars have challenged the underlying assumption that individuals (without government regulation) actually behave in this self-

interested fashion. Historical evidence suggests that individuals in some traditional communities developed social norms and cultural practices that restrained individual interest and promoted sustainable commons management. The rational actor model obscures the role of these social and cultural norms models on behavior. In fact, Hardin's critics note that the assumptions of unrestrained consumption underlying the tragedy of the commons scenario are more appropriately applied to *corporations* in a system of global capitalism. Corporate actors, they note, are often freed from the social norms that constrain individuals managing common resources in local communities (Rowe 2008; Ostrom 1990).

But simply switching our focus from individuals to corporations may not get us where we want to go. Individual behavior is embedded in and shaped by larger ecological, cultural, economic, and social systems, and a central task of ESS is to understand how those systems interact. Thus systems theory—already widely influential in the environmental sciences—may deserve a more central place in ESS generally. Of course, this suggestion brings us to the reductionism/holism debate familiar to both social and natural scientists—i.e., whether we should explain phenomena as resulting from the behavior of individual organisms or focus on the properties of the system of which the individuals are a part. Our aim is not to take a stand in this debate but to suggest that insights from that conversation are crucial to developing the theoretical foundations of ESS.

A related and perhaps more challenging question faced by ESS is whether we need to reconceptualize agency itself. Traditionally, the social sciences and moral philosophy have agreed that agency involves some level of rational intention, and therefore only humans can have agency. As a result, social scientists typically model nonhuman nature as a passive resource that human actors can use, manipulate, and interpret at will. But this conception of nonhuman nature is at odds with models used in earth systems science, where the nonhuman world is a collection of extremely dynamic and interrelated systems and stochastic processes that respond to human behavior in a variety of complex and sometimes unpredictable ways. It is challenged even more deeply by the suggestion above that "the environment" might be understood not as a collection of resources but as a network of connections (see, e.g., Latour 2005). And scholarship in environmental ethics suggests that we need to revise moral theory as well, to recognize that nonhuman nature includes beings with varying kinds of moral status and different degrees and kinds of agency (Taylor 1986). (Hardin's tragedy of the commons, for example, might play out very differently if the livestock grazing the commons were understood as actors to which the humans had moral obligations.)

Happily, we are not without resources for developing new ways of thinking about agency. Inter- or transdisciplinary fields such as systems theory and information theory can help us to connect individual and systems levels of analysis. The rational actor model is being rethought, thanks to promising work on bounded rationality, norm-driven behavior, and group dynamics. This research brings insights from neurology, psychology, and anthropology into economics and political science (Simon 1957; March 1994; Kahneman 2011). Actor–network theory goes even further, analyzing social phenomena as networks that include both human and nonhuman (animal, machine, text, etc.) "actants" (Latour 2005). Most of these theoretical innovations are happening where the social and natural sciences intersect, suggesting that interdisciplinarity is not only a challenge in ESS but is key to developing more effective ESS theory—provided we pay attention to and apply these innovations. Without prioritizing better theory on environmental actors and action, however, the natural and social science dimensions of ESS will continue to be understood by our students and practitioners as separate (hence separable) domains.

Problem solving in ESS

A final assumption, one easily as fundamental in priority for theoretical reflection as the above two, embodies a key purpose of ESS as an integrative interdiscipline and asks: what is ESS for? The most common answer is that ESS exists ultimately as a practical, problem-solving field. But even this noble impulse requires clarification: problem solving toward what end(s)? One commonly mentioned goal in ESS is sustainability, yet other goals for this problem-solving field are possible such as human dignity (Clark et al. 2011a, b). How we are to decide among or integrate these desired practical outcomes of ESS as a problem-solving field?

In addition, problem solving itself is poorly theorized in much of ESS. Existing standards for effective problem solving include five tasks: clarifying goals, mapping trends, elucidating the conditions underlying trends, making projections, and devising and assessing alternatives (Lasswell and McDougal 1992; Clark 2011). Recognizing the importance of these problem-solving tasks and developing the skill to attend to them in real-world, contextual ways using multiple methods require a kind of meta-cognition in which problem solvers are aware of their own thinking, methods, and relationships to the problem at hand (see King 2009).

Truly integrative, interdisciplinary problem solving is much more challenging than most scholars and practitioners of ESS perceive or acknowledge (as recognized by Foster 1999, Pickett et al. 1999, Dovers 2005, and many others). A problem-oriented approach to ESS strives for integration through interdisciplinarity: it welcomes all methods, models, and theories, from whatever discipline, and helps organize them in a comprehensive, yet selective and targeted way. The theory and methods are specific, building on a

scholarly literature that reaches back more than a century (e.g., Dror 1970; Lasswell 1971). Problems provide the forum in which theoretical interdisciplinarity becomes practical integration (e.g., Brewer 1999; Benda et al. 2002).

The iconic problem of climate change is a useful illustration because of its effects at multiple scales, from local to planetary. The number of disciplines needed to understand the "climate problem" only hints at the challenges of interdisciplinary integration—challenges that are underscored by the narrowness of many approaches to climate problem solving. We all have colleagues who "see" climate as a disciplinary problem, involving (for example) chemistry, economics, or ethics, among many other disciplines. It is the linkages between the disciplines that are as ill-defined as they are scarce in our collective theoretical and practical training in environmental problem solving. These linkages are necessary to develop prescriptive integrative strategies. And yet they are subject to a dizzying array of determinative criteria, illustrated by the many scales at which geography and society intersect with climate. The key is for ESS to embrace its existence at the interstices of the disciplines, and to understand the demands that such an existence requires. Possessing a theoretical framework for problem orientation is ultimately essential to the success of ESS (Clark et al. 2011b).

To achieve a common view of both the meaning of integration and the means for achieving it will require overcoming both internal (to ESS) and external obstacles. These include establishing a collective identity for ESS that includes problem-oriented integration, and growing our social capital—the scholars, practitioners, and students necessary to establish a self-perpetuating community with broadly shared ideals, knowledge, and history. If ESS is to maintain its academic reputation as an inherently problem-based field, then we need better theory on what exactly this means in practice.

Theory across the ESS curriculum

If our argument above—that greater attention is needed to theory in ESS—is compelling, it is worth considering whether, above and beyond obvious venues such as academic conferences, curricular venues for theory also exist. We want to argue that they do, and that theory can be integrated into the undergraduate and graduate ESS curriculum without major modifications—but with significant consideration to ensuring that skills in conceptual analysis and critique become a key curricular outcome.

One common principle in curriculum design is reinforcement of priority concepts and skills: anything deemed essential cannot be ghettoized into one course if indeed students are to master it. This, for instance, is one of the main justifications for writing across the curriculum, thankfully evidenced in a wide range of academic fields (Russell 2002). Of course, there are dedicated writing classes in many undergraduate institutions, but the very notion of writing across the curriculum is that it is best developed in practical and disciplinary contexts. Similarly, given the point above that theory and practice are intimately woven and that theory is a vehicle toward practical ends, a plethora of existing courses provides the perfect opportunity to inject theory into the ESS curriculum.

Consider a few examples from our above-recommended priorities. What better place to discuss "environment" than, say, a course on ecological restoration, where the notion of some natural baseline, and of the optimal human role in managing nature, are key conceptual questions? Or, how about the possibilities of examining the varied capacities, connections, and consequences of key environmental actors in an environmental policy dispute, and then of attempting to theorize these characteristics more broadly in other policy areas? Finally, cannot the problem-solving nature of ESS be well scrutinized by posing the question of what the problem is, and as framed by and for whom, in the context of courses that cover one or a variety of environmental problems?

If it is easy to see how theory can readily be brought into a variety of ESS courses, it is also easy to see how theory could be introduced into lower-division undergraduate courses and continued through graduate-level seminars. Indeed, there is no better way to cultivate a theoretical imagination among our students than by making sure that they appreciate the theoretical challenges of our interdiscipline starting with their first ESS course, which would then lead to more advanced skills in theoretical analysis and critique for upper-division and graduate students.

Perhaps the greater challenge in integrating theory into the ESS curriculum is not the existing curriculum, but the training of our existing educators. How many ESS faculty would claim a reasonable degree of expertise not simply in the theories attendant to their respective discipline, but those underlying and at the forefront of our ESS interdiscipline? How many would claim reasonable expertise on the key issues of environment, environmental action, and problem solving explored above? It is likely that this is the weak link we need to first address—e.g., via a series of short courses at the annual AESS Meeting and other interdisciplinary academic conferences—if we wish to ensure adequate attention to theory across the ESS curriculum.

An invitation

There is a great deal of value in what we already do in ESS. The continued need for environmental scholars as producers of basic and applied knowledge, and as watchdogs over shortsighted management and policy decisions, will not go

away. But as we look to a future of ever more complex environmental interactions, impacts, decisions, and conflicts, the field of ESS must theoretically evolve or it will soon become a backward-looking fossil. The theoretical assumptions we covered above—including interdisciplinary integration and derivative challenges in conceptualizing environment, environmental actors, and problem solving—should be important priorities as we move forward, but are only a few of those we in ESS must revisit; indeed, theoretical reflection must become more diffuse throughout our many subfields.

It would, admittedly, be easier to neglect theoretical reflection altogether as intellectual flotsam, given the ubiquity and urgency of environmental problems. We hope to have suggested above that this would be a shortsighted mistake: theories are ideas that take us places, not idle speculation. And there is little doubt that ESS will need to extend its reach in future. With due respect to our inheritance of Leopold, Carson, McKibben, and other classic figures in twentieth century ESS, the theoretical vehicles they offer us may not be sufficient for the uncertain path that lies ahead. Calls for environmental scholarship to face this uncertain future are now ubiquitous (e.g., Lubchenco 1998); whether this scholarship will find a suitable home in ESS is up to us.

We thus call broadly for a more theoretically informed approach to ESS, and invite ESS scholars to join us in this venture. The first step involves putting our cards on the table: what are our fundamental ESS assumptions about the world, how we know it, and what we are to do? Without immediate judgment, it would be well worth our collective time to suggest the frameworks on which ESS has been built. The next step is to consider whether these framework elements are reflective of the best available scholarship, flexible enough to support a variety of contributing disciplines, and help guide ESS toward its scholarly and practical goals now and in future. Following these descriptive and critical steps, the ultimate need is to reframe ESS on more robust theoretical grounds.

Each of the above steps—descriptive, critical, and reconstructive—is one in which we invite ESS practitioners to join us. At this point, we could all benefit from a frank discussion on where we are at, whether we should be concerned, and what we should do. We the contributors represent just four voices in a burgeoning ESS movement, and any deeper inquiry into theory would benefit from a variety of perspectives. We expect that this and subsequent publications will allow the ESS community to move forward with theory, and we look forward to joining the process.

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