Symposium: The Human Place in Ecological Systems

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The idea that humans importantly affect the distribution and dynamics of life on Earth is certainly not new. Yet the science of ecology has been slow to fully embrace this fact. For most of its history, scientific ecology has undertaken the study of the relationship of non-human organisms and their natural environments. Human societies have thus for the most part been left out of ecological theories and models. Some ecologists did introduce the human component in their studies, but often as a mere negative counterpart – as an external source of noise in the data, or the major factor responsible for an ongoing environmental crisis. To be fair, not all ecologists adopted a "humanless" view of ecological systems. For example, in 1950s and 60s, Eugene Odum and his brother Howard T. Odum developed a holistic notion of ecosystem and repeatedly attempted to apply their framework to the analysis of the over-consumption (by humans) of natural resources. Yet even then, the human factor remained to a large extent alien in the scientific analysis of the functioning of ecological communities. The presentations in this symposium will offer reflections on how ecological sciences can put humans back into nature, both theoretically by taking account of human activities in ecological models, and practically, by investigating how human communities can seek to live sustainably. This will raise questions on the relationships between natural fact and human values, and between ethics and science in environmental thinking.

The first two contributions focus on adaptive ecological management and the question of the place of humans (including their values or valuing) in ecosystems conceived as social-ecological systems. The first looks at conceptual and practical implications of conceiving of ecosystems as Social-Ecological Systems. The second pursues further questions about adaptive ecological management and the place of humans, investigating the issues of what counts as a good ecosystem outcome and whether this is determined by nature or by human judgments or social processes. The third contribution addresses the issue of defining good ecosystem functioning by investigating the normative notion of "ecosystem health." This also requires investigating the relationship between conceptions of such norms as natural or as imposed by human preference. Finally, the fourth contribution examines the notion of symbiosis between humans and ecosystems to fill out another way of thinking about the place for humans in a well-functioning social-ecological system, bringing out more explicit links between environmental issues and ethical thought.

Contribution 1: Adaptive Management of Social-Ecological Systems

Eric Desjardins

The tendency of theoretical ecology to maintain a firm distinction between nature and human societies contrasts vividly with the discourse that emerged in the late 1980s early 1990s in the fields of conservation biology and restoration ecology. One of the central claims of these recently developed fields is that we need to conceive of ecological systems as Social-Ecological Systems (SESs). Despite the popularity of this proposal, the notion of a "SES" remains poorly developed. Moreover the philosophical analysis of its implications for biological conservation and ecological restoration has yet to be explored. The main objective of this talk is to begin to redress these lacks. It will look at the meaning(s) that the notion of SES takes in management ecology, focusing essentially on the work of C.S. Holling, Lance Gunderson, Brian Walker and Garry Peterson. During the last 30 years, these authors have had an enormous influence in management ecology by arguing that in order to truly achieve sustainability, it is important to improve the *resilience* of SESs, *i.e.*, their capacity to maintain their integrity in the face of perturbations, and that this objective can be better realized if we use flexible and iterative management strategies that embrace and reduce uncertainty (such as *adaptive ecological management* and *scenario planning*).

This talk will argue that despite the vagueness surrounding the notion of "SES", adopting the view that successful management ought to conceive of ecosystems as SESs has had a profound effect in ecological management. In particular, it has enabled us to develop management strategies that are centred on both people and natural goods—by contrast to more traditional management strategies that merely look at natural resources. This profound shift enables us to think that managing nature is (also) managing people and their institutions. Moreover, this talk will suggest that the shift needs to be more than a mere conceptual innovation. According to recent case studies, the successful management of SESs ought to involve the different stakeholders in substantial ways in the development and implementation of management plans. Without a deep involvement of the public in management projects, it seems very difficult to effectively modify the social components of SESs, which can in turn jeopardize the success of the projects on the longer run.

Contribution 2: Adaptive Ecological Management: Left and Right

Gillian Barker

Adaptive ecological management (AEM) has been widely advocated and adopted as a method for addressing "wicked problems" in ecological management—those where uncertainty is inescapable, change is endemic, values are contested and interests clash. Two broad types of AEM have emerged, distinguished in part by the kinds of stakeholder participation they incorporate. This contribution to the symposium reconsiders the divide between the two forms of AEM, arguing that it reveals a serious challenge for the justification and evaluation of applications of AEM.

The difference between the two forms of AEM is reflected in divergent descriptions of the relationship between AEM and early 20th-century "scientific management" in industry. Some accounts describe scientific management as a precursor of AEM, while others characterize it as the misguided paradigm that AEM overthrew. Scientific management combined empirical methods with centralized control of all components of the production process to identify and realize the "one best way" for production to proceed. It presumed a single clear objective—to maximize productive efficiency. Classical resource management was modeled closely on this approach: natural systems were centrally managed to achieve the maximum sustainable yield of particular outputs. AEM was initially articulated by C.S. Holling and others in direct contrast to classical resource management, as an approach that embraced the complexity of social-ecological systems: their instability, unpredictability and uncontrollability, and the impossibility of simultaneously maximizing the multifarious goods that they supply.

Two versions of AEM take different paths from this starting point. One version is conservative (Right-AEM), striving to recapture the main features of scientific management within the limits imposed by modern conceptions of ecological functioning: minimizing uncertainties, managing resources for reliable balance among key outputs, and using stakeholder participation as a tool for assisting expert decision-making and political management. It adheres to the ideal of the "one best way," but recognizes that this may be complex and difficult to discover. The other version (Left-AEM) is more radical. It accepts that there can be no "one best way," for uncertainty cannot be overcome and neither the "balance of nature" nor a single dominant resource user can determine what counts as a good configuration for a given ecological system. This leads to a much more substantial role for stakeholders, as their diverse and shifting aims shape the goals of management, and their diverse and changing understandings of the social-ecological system shape the means adopted in pursuing those ends.

Right-AEM is more widely adopted, but evidence suggests that Left-AEM, though difficult to realize, is more effective. Taking the social component of social-ecological systems seriously suggests why this might be. But Left-AEM faces an unresolved challenge in determining and justifying its goals. Two views appear in the Left-AEM literature: one sees the goal as determined by nature (maximizing resilience); the other sees it as socially-determined (achieving the best balance among stakeholders' aims.) Each of these raises difficult questions. (Is all resilience good? What is good about it? What is the 'best balance' among conflicting aims?). Several responses to this challenge are discussed.

Contribution 3: On the Normativity and Holism of Ecosystem Health

Antoine C.-Dussault

The concept of ecosystem health offers resources to account for two important facts about the ecological world: 1) that the ecological world is changing, and 2) that human beings are part of (and not isolated from) nature. By accounting for these facts, ecosystem health goes beyond both the *balance of nature* paradigm in ecological science and the *wilderness* approach to environmental policy, and so offers scope for thinking appropriately on how human beings should live in a changing ecological world. Unfortunately, however, the concept of ecosystem health has not yet been articulated in a satisfactory way, leading many ecological scientists and philosophers to be skeptical about its scientific appropriateness, on the grounds of its supposed failure to be value-free, and its alleged implicit commitment to an organicist view of ecosystems. Because the concept is *normative*, indicating the *good* state(s) of ecosystems, it has been thought to inescapably involve ethical values and so lie beyond the scope of scientific assessment. Moreover, because ecosystem health is a property claimed to exist at the ecosystem level, it has been said to presuppose the naïvely holistic ontology of ecosystems discredited by the recent demise of the balance of nature paradigm in ecology.

This contribution to the symposium is aimed at rehabilitating the concept of ecosystem health by clarifying the type of normativity and holism it involves. It will attempt to do this, first, by integrating conceptual work by bioethicists on the concept of *health* and by neo-Aristotelian ethicists on the concept of *goodness for*, in order to show that the normativity involved by the concept need not engage ethical values. Secondly, it will discuss whether and to what extent the concepts of *health* and *goodness for* can be extended to non-organismic entities such as ecosystems without requiring dubious ontological commitments. Thirdly, it will attempt to determine whether, under the account just provided of the normativity and holism involved by the concept, *vigor*, *organization* and *resilience* can be defended as the three ecological parameters constitutive of ecosystem health, as they are conventionally established to be. And finally, it will explain the relationship between ecosystem health and the sustainability of social-ecological systems, by showing how the goal of maintaining ecosystem health leaves room for a plurality of social values and lifestyles, while still providing a substantive and adequate criterion to evaluate their ecological soundness.

Contribution 4: Sustainability as Symbiosis: What Would It Take?

Kent A. Peacock

It is hard not to be impressed with the clarity and scope of Aldo Leopold's vision and the elegant, compressed, almost mathematical way he sets it forth in the first few pages of his great chapter, "The Land Ethic." In fact, Leopold's ultimate statement of his "land ethic" is highly debatable in ways that are obvious to those who know this literature, and this paper will not delve deeply into that aspect of his thought. Rather, attention will be

drawn to Leopold's central insight. It is two-fold: first, in order for our species to have a future we must have a *symbiotic* relation with what Leopold called "the land" (but which in fact includes the seas and all structures and systems on this earth either living or affected by life); second, for reasons having to do with the highly adaptive and complex neurology with which we humans are either blessed or cursed, an absolutely indispensible component of any symbiotic relation we can hope to have with the "land" must include an *ethic*. So among other avenues, Leopold's few pregnant phrases open up a large inquiry into an ecological-evolutionary view of the nature of ethics in general.

A common response to Leopold's ideas is that that any talk of human-land symbiosis could only be metaphorical. However, Leopold and other ecologists who have spoken this way (such as Eugene Odum) meant that human beings need to be *literally* in a symbiotic relationship with the land, just as we are largely *literally* parasitic right now. In order to explicate and defend this view one must think about the nature of symbiosis in general, which can be understood from a physical point of view. This gives a basis for a response to well-meaning but confused arguments against the possibility of human symbiosis given by a number of authors who can be dubbed the "lifeboat thermodynamicists." Such a biophysical understanding of symbiosis is an outgrowth of a line of thought going back to Tansley and Lotka if not much earlier, according to which an ecological association can be thought of abstractly as a dissipative structure which absorbs energy from an external source (such as the sun) and circulates this energy like a sort of living storage battery. Living organisms maintain internal low entropy by means of active, constructive processes which "pump" entropy out, and a mutualistic symbiosis is then a thermodynamic state in which organisms share free energy, the raw currency of survival (Lenton), for their mutual benefit.

We humans have accomplished our (perhaps temporary) dominance of the earth system by means of two things, technology and social organization. As many have observed, our primary mode is parasitical: we use our special skills to leverage resources from the land and sea, usually with little thought for the morrow. The result is that we are now, as Thomas Homer-Dixon has put it, "on the cusp of a planetary-scale emergency". Our only way out of it must be through a combination of technological ingenuity and what Homer-Dixon has called *social* ingenuity. If we want humanity to have a future on this planet then we must somehow find a sustainable modality of life, and that implies a symbiotic mode of life. As Odum put it, "the present-day concept of 'unlimited exploitation of resources' will give way to 'unlimited ingenuity in perpetuating a cyclic abundance of resources'."

It is known that fairly small, low-technology hunter-gatherer and agrarian societies (e.g., Tikopia) can be to some degree symbiotically sustainable, though at great cost to their possibilities for human aspiration (and thus ultimately long-term human survival). The question now is whether it is possible, both technologically and socially, to construct a planetary-scale, *high-technology* mutualistic symbiosis. I will discuss some key prospects and requirements for this ambitious aim.