



## Review

## Social learning in the Anthropocene: Novel challenges, shadow networks, and ethical practices



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## ABSTRACT

The Anthropocene presents novel challenges for environmental management. This paper considers the challenges that the Anthropocene poses for social learning techniques in adaptive management. It situates these challenges with respect to how anthropogenic forcing on the Earth system affects the conditions required for: (1) The cooperative exercises of social learning; (2) The techniques used for assessing the fit of institutions to social-ecological systems; and, (3) The strategies employed for identifying management targets that are transformed by human action. In view of these challenges, the paper then examines how the practices of shadow networks may provide paths for incorporating a broader, more robust suite of social learning practices in the Anthropocene. The paper emphasizes how novel challenges in the Anthropocene demand increased attention to ethical practices, particularly those that establish center-periphery relationships between social learning communities and shadow networks.

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## 1. Introduction

Social learning is a canonical part of adaptive management. Central aspects of adaptive management—learning-by-doing, taking an experimental view toward policy, and conducting *ex post* evaluations—employ social learning to increase institutional capacity in preparation for the uncertainties and surprises inherent in

the management of complex, adaptive systems (Holling, 1978; Lee, 1993; Gunderson and Holling, 2002). Social learning is of particular relevance in view of the prospect that humanity has already, or is now on a trajectory to enter, the Anthropocene (see Waters et al., 2016). The Anthropocene is a “no analogue” situation (Steffen et al., 2004), in which human activity rivals “... some of the great forces of Nature in its impact on the functioning of the Earth system” (Steffen et al., 2011:843). Human transformation of the Earth system presents novel challenges regarding how previous markers of systems change, and previously successful adaptive strategies,

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are entangled with social-ecological crises (see [Homer-Dixon et al., 2015](#)). In terms of social learning, [Hamilton et al. \(2015: 5\)](#) argue the Anthropocene is so novel that no previous modes of “cultural learning or transmission” offer preparatory resources for adapting to this new epoch of geologic coevolution.

This paper responds to [Hamilton et al. \(2015\)](#) by showing how the form of social learning in adaptive management remains relevant to the Anthropocene. It then examines the novel challenges that the Anthropocene poses for social learning. These affect: (1) the difficulties of grounding cooperative experiments, (2) the influence of rapid change on how to assess the fit of institutions with social-ecological systems, and, (3) how adaptive management targets are not only moving, but also morphing under the pressure of anthropogenic forcing. The second half of the paper argues social learning in the Anthropocene sits at a nexus of scientific, social, and ethical considerations. It argues that geological novelty should prompt reflection on how learning communities themselves are understood. The paper contrasts two ways that learning communities have been framed with respect to the Earth system—one emphasizing the perspective of Earth system sciences in reconnecting to the biosphere and the other emphasizing how resolving social inequality should center perspectives towards the Earth system. Using this contrast, the paper identifies an alternative in which shadow networks are key to both responding to the novel challenges of the Anthropocene and to addressing structural social inequality. This alternative is both consistent with adaptive management’s search for an “ethical core” (see [Fennel et al., 2008](#)) and also presents a path for moving beyond theory to ethical practice. Further, it shows how claims regarding institutional norms must be grounded in communities of practice rather than in philosophical claims that frame the novel, quantitative aspects of the Anthropocene in ways that make a priori assumptions about the qualitative prospects for social learning.

## 2. The “nature” of social learning

[Hamilton et al.’s \(2015\)](#) rejection of all previous modes of cultural learning in the Anthropocene sits amidst calls to overhaul fields of history, economics, and governance—even university systems generally—given that western thought historically presumed that humans are qualitatively distinct from nature (e.g. [Biermann, 2014](#); [Brown and Timmerman, 2015](#); [Castree et al., 2014](#); [Lövbrand et al., 2015](#); [Rousell, 2016](#)). A common assumption in these calls is that the Anthropocene eliminates space for any conceptual dualism that separates humans from nature. Yet the implications of rejecting the society/nature dualism are far from agreed upon. For instance, there is considerable debate over how scientific determinations of geology intersect with the histories of social oppression that enabled anthropogenic impacts to accelerate at a geological scale (see [Chakrabarty, 2014](#); [Lewis and Maslin, 2015](#); [Finney and Edwards, 2016](#); [Malm, 2016](#)). Notwithstanding these debates, the knock-on effect of eliminating the society/nature dualism is that the “normative and ethical underpinning” of environmental management must also be reconsidered to the extent it relies on this dualism to justify management practices ([Schlossberg, 2016: 193](#)). Yet, even if the society/nature dualism is jettisoned, [Hamilton et al.’s \(2015\)](#) rejection of all previous modes of cultural learning does not follow since many cultural learning practices did not employ a society/nature dualism in the first place ([Schmidt et al., 2016](#)). Adaptive management presents one such case.

[Holling’s \(1973:21\)](#) classic work on resilience contrasted forms of management that seek to “harvest nature’s excess production” from those that do not presume to know a priori what constitutes “nature’s excess” and instead seek to prepare for the surprise events characteristic of complex, adaptive systems. Since then,

cognates of “nature” (i.e. “natural variation”) have frequently been mobilized in adaptive management, such as in the Golden Rule of adaptive management to “... strive to retain critical types and ranges of natural variation in ecosystems” ([Holling and Meffe, 1996: 334](#)). In contrast to dualistic formulations of society and nature, however, [Holling and Meffe \(1996\)](#) followed [Leopold’s \(1966\)](#) arguments regarding the interdependence of ecological communities to argue in favor of understanding social-ecological systems as interdependent.

Adaptive management’s interdependent view of nature rejects society/nature dualisms in favor of an approach in which shared processes affect, and are affected by, social-ecological systems ([Holling and Meffe, 1996](#)). Views of nature as process have several antecedents: [Hannah Arendt \(1958:150\)](#) argued that both the Latin and Greek roots of nature have processual elements where what is natural “... come[s] into being without the help of man, and those things are natural which are not ‘made’ but grow by themselves into whatever they become.” [Alfred North Whitehead \(1957:53\)](#) famously refused modern dualisms before claiming that, “nature is a process.” In a processual view, “nature” and its cognates refer to processes that operate independently of human manufacture. In adaptive management, the persistence of such processes is part of what creates the possibility of surprise, such as when relationships transform in non-linear responses to disturbances ([Holling, 1986](#)). Thus, while social-ecological systems exhibit high-degrees of interdependence, numerous processes persist independent of direct or full human control. A second aspect of adaptive management’s processual view of nature is its flexibility regarding alternate social ontologies that refuse society/nature dualisms, such as the incorporation of indigenous knowledge regarding social-ecological dynamics such as fire ([Berkes, 1999](#); [Berkes et al., 2000](#); [Armatas et al., 2016](#)). Of course, the fit of adaptive management with indigenous knowledge is neither straightforward nor uncontested given the historical, structural, and political dynamics of knowledge production (see [Nadasdy, 2005](#); [Cameron, 2012](#)). These difficulties, however, are not due to a society/nature dualism per se.

A processual view best explains three aspects adaptive management’s approach to nature and its cognates. First, a processual view both rejects society/nature dualisms and maintains that complex, adaptive systems are characterized by change—processes can operate independently of, and be affected by, human activity ([Holling, 1986](#)). Second, a processual view befits resilience-based approaches to ecology by connecting social and ecological systems through processes that affect interdependent relationships ([Holling, 1973](#)). Once seen in processual terms, defining resilience as the capacity of a system to respond to disturbances while still retaining its functions and feedbacks orients attention to the processes that may cease or shift due to human interference ([Folke, 2006](#)). Third, processual views approach “nature” empirically, at temporal and spatial scales relevant to experimental approaches to environmental management ([Folke, 2003](#); [Folke et al., 2005](#)).

A processual view of nature is also critical to understanding social learning in adaptive management, which began from the premise that, “... however intensively and extensively data are collected, however much we know of how the system functions, the domain of our knowledge of specific ecological and social systems is small when compared to that of our ignorance” ([Holling, 1978:7](#)). As [Walters \(1986:8\)](#) argued, social learning is an iterative ideal that, “... probably never converges to a state of blissful equilibrium involving full knowledge and optimum productivity.” Indeed, identifying the mismatch between the known and the unknown has been a constitutive aspect of how adaptive management distanced itself from ‘command-and-control’ approaches to resource management and their: (1) dualistic treatments of

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