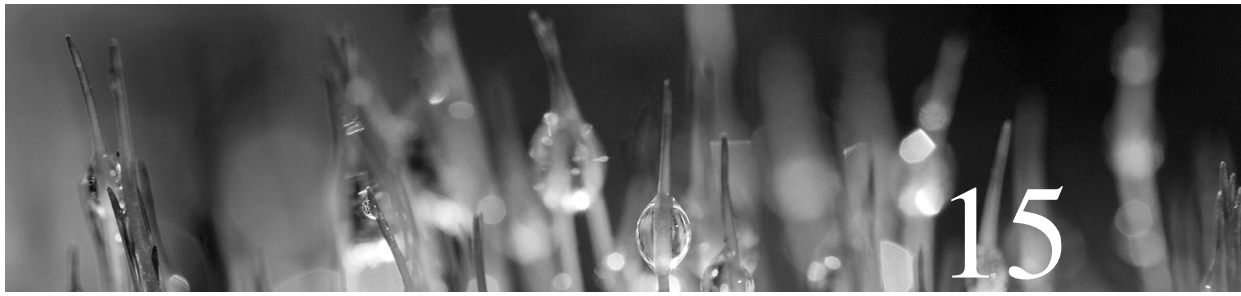

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Spacing Conservation Practice: Place-making, Social Learning, and Adaptive Landscape Governance in Natural Resource Management

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INTRODUCTION

Nature conservation constitutes an important realm of professional practice with strong connections to the discourses on nature and sustainability. In recent decades much of that discourse has taken an explicitly spatial turn, observable across numerous domains of ecological, social, and political thought (Williams et al., 2013; Wu, 2006). The aim of this chapter is to examine how spacing nature conservation, as a form of place-making, is transforming utilitarian natural resource management away from its formative roots in mid-nineteenth-century Newtonian and mechanistic explanations of natural processes and toward a geographically relational and networked view that better aligns with advances in the sustainability sciences and complex adaptive systems (CAS) thinking. The chapter builds on the premise that the geographic notion of place-making offers a valuable lens for addressing the unrelenting complexities and uncertainties inherent in CAS that otherwise make sustainability politics so intractable. Place-making helps to surface diverse sources of knowledge and differential and partial understandings and provides a framework for incorporating these different understandings into a more workable governance strategy. In the end, more adaptive and sustainable strategies for governing social-ecological systems can be realized by engaging diverse networks of human agents – variously positioned to

perceive and value different natures – in some process of collective sense-making of a particular context or landscape.

The emergence of a spatial turn in the science- and discourse-guiding conservation practice is also distinguished here from the long history of nature conservation in the form of state designated or politically established areas of high ecological significance. Instead the spatial turn discussed here is manifest in the increasing research attention being given to problems of landscape-scale heterogeneity, complexity, and systems thinking (Kates et al., 2001; Wu, 2006); in discourses on the historical, cultural, and symbolic significance of natural landscapes (Williams et al., 2013); in efforts to reconcile systematic, generalizable forms of knowledge with local, experiential, or indigenous knowledges (Raymond et al., 2010); and in what Mason (2007) describes as the 'quieter revolution' (i.e. less regulatory and more collaborative) in place-based land use planning.

At a fundamental level, this turn in conservation practice (as place-making in both a material and imaginative sense) constitutes a corrective reaction to disaffection with the Newtonian view of nature, space, and science for addressing increasingly complex conservation and sustainability problems. Whereas the Newtonian view handed down from Enlightenment-thinking builds on a monistic or unitary theory of knowledge (e.g. the notion of consilience as proposed by E. O. Wilson, 1998), spacing conservation responds to manifest heterogeneity in three discursive realms: the complexities of nature (ontological pluralism), the foundations of science and knowledge (epistemological pluralism), and the modes politics and governance (axiological pluralism). Despite the unavoidable uncertainties and controversies that come with acknowledging such pluralism, by recognizing the diverse ways human agents are geographically located or *positioned* relative to these pluralities empowers them to transcend their differences and begin to learn together and adaptively organize governance practices.

The philosophical concepts of pluralism and positionality figure prominently in the spatial reframing of conservation practice and the science of sustainability that supports it. First, the idea of spacing natures points toward a *critical-pluralist* standpoint, which holds that no one research theory or program can successfully capture all the various facets of natural systems and integrate them together into a single view of reality (Patterson & Williams, 2005; Williams, 2014). Thus, critical pluralism stands in contrast to Newtonian monism and the post-positivist view of science as objective but fallible truth-seeking, capable of converging on a singular reality. Critical pluralism takes a more skeptical stance that to expect convergence is untenable at least when dealing with CAS. While some may see this as a threat to the foundations of science by seemingly giving salience to any and all truth claims, there are two *critical* aspects of this approach that distinguish it from an 'anything goes' notion of pluralism. One is that looking at any phenomenon from multiple and often overlapping vantage points helps to reveal assumptions and partialities embedded in any particular theoretical or disciplinary perspective (Hayles, 1995). Another is that critical reflection must

be self-referential: internally applied to how well a given perspective, theory, or method is aligned with its own objectives for inquiry (Lauden, 1984; Patterson & Williams, 2005).

Second, with manifest pluralism in knowledge and understanding comes an inescapable *positionality* as opposed to 'gods-eye' objectivism of all observer-actors in the world (Hayles, 1995; Rose, 1997; Williams, 2014; Zellmer et al., 2006). The presence of multiple, partial, and often irreconcilable understandings are not just a product of different conceptual interests, but also a consequence of how observers are located in space as well as in time, culture, and experience. Positionality holds that only a partial comprehension of the world is ever attainable due to an observer's inevitable embeddedness within any particular province of spatial-temporal, socio-ecological reality. This applies both to so-called objective scientific observers who aspire to stand apart from the world they try to describe, as well as to practitioners and stakeholders embedded or working in specific places as they go about their everyday lives. In other words, our human-situated interactions with the world – whether by history, culture, geography, experience, discipline, or embodiment – condition how we can understand it (Hayles, 1995). Absent a unified standpoint from which all knowledge can be gathered and integrated into a single understanding (i.e. consilience), positionality offers useful leverage for transcending ontological and epistemological differences to advance social learning and promote adaptive governance. That is, by combining our individually different positionalities in a place-based collaborative learning network we can become collectively less partial in our understandings and actions.

In the following sections the discursive and practical moves toward spacing natures in conservation are examined relative to the ontologies of nature, the epistemologies of practice and social learning, and the axiologies of governance. Each of these domains is refracted through the lenses of pluralism and positionality to examine how spacing conservation practice helps to promote more adaptive, social learning-oriented approaches to the governance of natural landscapes.

ONTOLOGICAL POSITIONING: SPACING SOCIAL-ECOLOGICAL SYSTEM COMPLEXITIES

Ontological positioning examines pluralism and positionality in conceptions of nature itself. Ontological pluralism is typically associated with different and often competing systems of meaning and knowledge, in this case regarding the material and non-material qualities of nature as conceived across various domains of expertise, culture, community, and stakeholding. It represents differences in the contents of reality and the geographic location of those contents. Embracing ontological pluralism means accepting that no single theory is capable of capturing the full complexity of nature. Positionality in this context

involves, among other things, the question of whether humans are considered part of that nature or separate external agents to natural processes.

Historically speaking utilitarian-oriented conservation practice was built on a universal, Newtonian ideal of nature as something machine-like and reducible to a finite set of 'clockwork' parts. In effect 'utilitarian discourse replaces the term "nature" with the term "natural resources", focusing on those aspects of nature that can be appropriated for human use' (Scott, 1998, p. 13). This discourse simplified complex nature by reducing it to a storehouse of fungible commodities. The emergence of scientific forestry in late-eighteenth-century Europe, for example, sought to establish scientifically a precise level of 'sustained yield' in which the rate of timber extraction was designed to precisely match the rate of growth of new trees in a given time period. In the words of environmental historian, Donald Worster (1993, p. 144), this focus on precision yield management was 'based on a view of the natural world as a stable, enduring order, a view Newtonian in its roots, in which even the growth of a complex entity like a forest followed a steady, predictable cycle on a chart'. The same can be said of similar strategies applied to the production of other resources such as forage, fish and game, and more recently, in promoting precision agriculture, where micro-targeted crop management practices are used to optimize production at a very fine geographic scale.

For most of the twentieth century the ideas of nature and natural were similarly shaped by the prevailing ecological paradigm of that era, which presupposed an underlying harmony, balance, and equilibrium to nature as the way to reconcile human necessity and the integrity of the material system upon which humans ultimately depend. The balance paradigm assumed that ecological systems were self-regulating and self-contained systems directed toward singular equilibrium points, infrequently disturbed by natural processes, and separate from humans (Pickett & Ostfield, 1995). But with the rise of non-equilibrium (systems) theory in ecology in the closing quarter of the twentieth century (e.g. Botkin, 1990), the underlying Newtonian image of nature – unitary, mechanistic, stable, and harmonious – proved indefensible. In response, ecologists offered a view of nature as a CAS in which specific landscapes are 'open, regulated by events arising outside of their boundaries, lacking or prevented from attainting a stable point of equilibrium, affected by natural disturbance and incorporating humans and their effects' (Pickett & Ostfield, 1995, p. 275). Viewing nature in this way led 'to a rejection of nature as a norm or standard for human civilization and to an assertion of a human right and need to give order and shape to nature' (Worster, 1993, p. 151).

From this perspective the major challenge for developing a science of sustainability for the twenty-first century arises from the increasing complexification of nature, which is manifest on ontological, epistemological, and axiological levels and requires a systems approach (Gallopin et al., 2001). Over time CAS has come to represent a broad body of work, encompassing both natural and social systems. Unlike the Newtonian aim to reduce and isolate complexity by focusing on simple

cause–effect relationships that play out within a passive spatial surface, in CAS complexity is seen as arising from interactions, interrelationships, and interconnectivity among elements within a system and its environment. CAS approaches seek to understand these broader system patterns and interrelationships, which are characterized by complex, non-linear dynamics, uncertainties, and changes which never achieve equilibrium. Thus the CAS approach offers a way of thinking that emphasizes context, relationships, and networks in the face of high levels of complexity and uncertainty (Fischer et al., 2015; Zellmer et al., 2006).

In embracing CAS, sustainability science has come to accept as well that scientific methods are unlikely to cohere around singular solutions to conservation problems. Many natural systems (e.g. brains, immune systems, ecologies, societies, organizations, and markets) exhibit complex adaptive properties and behaviors that make them exceedingly difficult to understand, model, and control (Allen & Hoekstra, 2015; Allen & Varga, 2007; Gallopin et al., 2001; Jorgensen & Muller, 2000; Zellmer et al., 2006). First, CAS are non-linear such that the magnitude of cause–effect relationships need not be proportional, can generate a wide range of responses, and thus often produces surprises and unpredictability. Second, these non-linear qualities lead to the properties of emergence and self-organization in which the whole is greater than the sum of the parts and where interacting components cooperate, learn, adapt, and evolve. Third, because CAS are embedded in hierarchical multi-scale systems and therefore are coupled across scales, it is impossible to define a unique, correct, all-encompassing system, which makes plurality and uncertainty inherent features of CAS. Fourth, because an infinite number of systems can be identified in association with any given slice of reality, CAS research tends to produce a plurality of legitimate perspectives, as the specification of the system to be described is highly dependent on the particular interests and viewpoints of the observers. Finally, uncertainties in CAS are pervasive and largely unrelenting, especially for 'reflexive' systems (those that include human agents and institutional subsystems) where agents are not only capable of learning, adapting, and evolving to produce new repertoires of behavior, but also capable of making and remaking the system (i.e. making places) through imagination, discourse, and (material) action.

The rise of CAS thinking has thrust ontological pluralism to the forefront in ecology and sustainability science (Allen & Hoekstra, 2015; Fischer et al., 2015; Jorgensen & Muller, 2000; Wu, 2006). Ecologists increasingly recognize the necessity for adopting a pluralistic view that takes context seriously (Gallopin et al., 2001). In discussing the plethora of models in ecology, Jorgensen and Muller (2000), for example, argue that because ecosystem scientists 'can only give a partial description' using any one model, 'we need many models covering different viewpoints … if we want to get a comprehensive, pluralistic view of the ecosystem' (pp. 12–13). Allen and Hoekstra (2015, p. 391) take a similar perspective in discussing the managerial challenges of integrating the various 'facets' or 'categories' of ecology (e.g. population, community, biome, etc.):

> The different facets of ecology are not so much a matter of nature as they are a matter of divergence in human perception … By being forced to deal with several ecological categories at once, the manager comes face to face with the human subjectivity that makes ecology more of a soft than a hard science.

Viewing nature through a CAS lens also positions humans inside the system being described (hence these are often described as social-ecological systems). Calls for building more integrative frameworks to account for complexity, which include a human role in making and shaping social-ecological systems (e.g. Komiyama & Takeuchi, 2006) too often fail because they inevitably start with some abstract context-independent notion of the system (Flyvbjerg, 2001; Scott, 1998; Williams, 2017). Instead 'systems thinking [needs to be] "contextual" which is the opposite of analytical thinking [in other words] it is difficult to understand an adaptive system without also considering the context' (Gallopin et al., 2001, pp. 223, 225). This seems to be reflected in landscape ecology as well, where 'the dominant research mode is gradually shifting from plot-based and question-driven studies to place-based and solutions-driven investigations, with increasing subjectivity and uncertainty in system descriptions and prediction' (Wu, 2006, p. 2).

Rather than searching for all-encompassing context-independent transdisciplinary frameworks focused on uncovering objective realities, what is needed in nature conservation are strategies for context-dependent learning and governing that take advantage of knowledge pluralism and partial understandings of diverse place-embedded stakeholders. One such strategy may be to build on the geographical ontology of place-making as it focuses on the particular and integrating contexts within which the actions of nature and culture overlap (Entrikin, 1991; Sack, 1997). Taking a geographical approach involves trying to understand conceptually and empirically how people fashion their world into places. This fashioning is comprised of both material practices by which people physically control and transform landscapes to extract goods and services, as well as social/discursive practices such as describing, experiencing, naming, planning, and protecting places. Place-making is a relational, networked, fluid, and materially and politically constituted phenomenon: 'the set of social, political, and material processes by which people iteratively create and recreate the experienced geographies in which they live' (Pierce et al., 2011, p. 54). Places are made and remade through social actions, which can vary from the everyday acts of individual consumers (e.g. as nature tourists) to the deliberate acts of communities, corporations, and government agencies (e.g. in developing a conservation area or promoting a tourist destination). The fact that these actions come together in myriad combinations means 'places do not have single, unique "identities"; they are full of internal differences and conflicts' (Massey, 1993, p. 67) which somehow need to be reconciled in practice. The following sections examine contextualizing practices of knowledge production, social learning, and environmental governance that help to reveal and reconcile diverse understandings and values.

EPISTEMOLOGICAL POSITIONING: SPACING KNOWLEDGE PRODUCTION AND SOCIAL LEARNING

Moving from the Newtonian view of nature to the pluralism associated with CAS and place-making seems to have changed not only our understanding of what there is to know (ontology) but also how we come to know what we know (epistemology). With respect to epistemology, much of the postmodern critique of Newtonian-Enlightenment thought revolves around its restricted conception of reason. For example, one characterization of the Enlightenment (attributable to Hegel) interprets it as 'insufficiently enlightened about the limitations of its own conception of reason' (Schmidt, 1998, p. 420). Peet (1998) similarly notes how some critics (e.g. Habermas) find fault with the Enlightenment project, not because of an overreliance on rationality but for the lack of the right (communicative) kind of rationality. To Newtonian critics, unreflective reason was too narrowly conceived as a tool for addressing technological questions and dominating nature. In addition, with science serving primarily utilitarian, universal, and reductionist ends, the value of local knowledge and expertise was often marginalized if not discredited altogether (Scott, 1998; Wynne, 1992). Thus as Allen and Varga (2007) note, when dealing with complex systems, questions concerning ontology and epistemology can no longer be considered as separable.

What then are the prospects for bringing together diverse pluralistic conceptions of reason to advance conservation science and practice and how might this be achieved? One response has been to recognize and value critical (epistemological) pluralism in the practice of conservation science (Patterson & Williams, 2005). In contrast to Kuhn's (1962) notion of scientific progress as resulting from revolutionary science replacing one paradigm with another, critical pluralism suggests that different scientific paradigms should be welcomed within a field or discipline because all paradigms have inherent boundaries and limitations that define and circumscribe the types of problems for which they are applicable. In place terms, critical pluralism suggests that what we take to be universally true is often partial, bounded, and more local than we are inclined to admit.

In addition to bringing the ontological shift in thinking about nature noted earlier, sustainability science also calls for changes in the way science is practiced (Kates et al., 2001; Wu, 2006). These changes include broadening methods of knowledge creation and integration emphasizing collaborative networks and social learning to include scientists, stakeholders, and citizens (Carrozza, 2015; Steelman et al., 2015) and greater attention to place, scale, and context (Bremer & Funtowicz, 2015; MacGillivray & Franklin, 2015). Regarding the former, ideas such as knowledge co-production (Wyborn, 2015), civic science (Haywood, 2014), communities of practice (Cundill et al., 2015), transdisciplinary science (Steelman et al., 2015), and post-normal science (Funtowicz & Ravetz, 1993) 'share a common point of departure [in the] recognition that there are certain sustainability challenges that defy a "normal" approach to scientific

management' (Bremer & Funtowicz, 2015, p. 48). Put another way, a common feature of these approaches is that they all involve the democratization of expertise (Carrozza, 2015).

In particular the idea of 'post-normal science' has been proposed to address complex science–policy interface conditions marked by high uncertainty, a plurality of scientifically legitimate perspectives, high stakes, and great urgency (Funtowicz & Ravetz, 1993). Again these conditions are contrasted with Kuhn's (1962) idea of 'normal' science to describe the routine and non-revolutionary application of Newtonian puzzle-solving by which science makes incremental advances within existing scientific paradigms. The difference between normal and post-normal science is primarily tied to 'situations where the lines between science and politics, facts and values, truth and perspective have become blurred' (Farrell, 2005, cited in Carrozza, 2015, p. 111). In effect, the post-normal approach offers an epistemological compromise that opens up deliberations over facts and values at the science–policy interface without resorting to the nihilism and unrestrained relativism often associated with postmodern epistemologies (Funtowicz & Ravetz, 1993).

One central strategy behind post-normal science is to establish the quality of scientific inputs into the policy process by 'extending the peer community' beyond the usual tight circle of scientific peers to include those with other forms of knowledge and/or a significant stake in the outcomes of the policy. This is especially important when there are both high system uncertainties and high decision stakes (Funtowicz & Ravetz, 1993; Wynne, 1992). In such cases efforts to extend the peer review processes:

> through the development of participatory science methods can be understood as attempts not to give up on but rather shore up the integrity and quality of the associated scientific work … making it possible to explicitly discuss who is advancing or being silenced by an argument that needs to be evaluated, according to both [system] adequacy and value criteria. (Farrell, 2011, p. 354)

Within sustainability science some have traced a close connection between the ideas of 'post-normal' science and concepts of place and place-making. For example, in their study of the controversy surrounding mangrove management in the Waikaraka Estuary in New Zealand, Bremer and Funtowicz (2015, p. 48) describe how local places have 'different meaning for different social groups, resulting in multiple narratives of sustainability that each appeal to a different sense of place, epistemology and values'. They argue that for science to be useful for local sustainability it needs to be produced with close collaboration among scientists, practitioners, and local communities. In another example, Williams (2017) draws together post-normal science and the epistemology of place-making in human geography to argue that knowledge complexity, plurality, and uncertainty persist and even grow over time because science, as traditionally practiced, seeks to produce context (place)-independent knowledge whereas conservation practice ultimately relies on a

high degree of context-dependent synthesis. He describes how the viability of endangered species often depend on protecting a mosaic of varying habitat rather than the imposition of some single ideal type, because the long-term viability of species depends on dynamic spatial variation across habitat patches. To achieve protective heterogeneity on the landscape, however, requires local managers to coordinate their actions with the managers of other nearby patches in a way that produces the desired mosaic of landscape conditions when viewed from a larger scale. This kind of context-dependent coordination capitalizes on the spatial interdependencies among diverse local knowledge-holders, which can be shared and refined within the network of embedded, partially informed agents (an extended peer community of managers). In this view, knowledge represents the accumulated and continuously revised wisdom that comes from shared learning in actual places; as practical knowledge that emerges and grows within a community of practice.

Such a spatial or relational view of knowledge accepts the inherent *positionality* of observer-actors who are ineluctably embedded in the world rather than standing apart from it (Hayles, 1995; Williams, 2014). For geographers, positionality is at the core of what they do. They see most knowledge of the world as necessarily contextual, informed by the particular cultural, experiential, temporal, and spatial positions that we happen to occupy (Cresswell, 2004; Entrikin, 1991; Rose, 1997; Sack, 1997). Given the inevitably varied positioning of each observer there will always be multiple forms of knowledge and competing understandings of particular situations. Rather than viewing this pluralism of knowledge as a problem, in post-normal situations, extending the peer community may actually enrich the various perspectives and expose assumptions that may have otherwise remained hidden, especially to those with dominant roles in mapping knowledge (Hayles, 1995). In other words, by conceiving knowledge as co-produced in a spatial-relational network of human agents, knowledge pluralism can be more readily reconciled through real-world practice in actual places.

A growing body of research on place-based communities of practice (Cundill et al., 2015), social learning (Cheng & Mattor, 2010; Collins, 2014), co-production of knowledge (Armitage et al., 2011; Klenk & Meehan, 2015; Wyborn, 2015), and formation of knowledge networks (Hauck et al., 2015; Lejano & Ingram, 2009) shows how conservation profits from the practical and informal knowledge that exists within networks of diverse occupants/users of places and emplaced professional practitioners (Goldstein & Butler, 2010). For example, as understood in the field of knowledge management, practice communities constitute groups of people who share a concern or interest in some domain of activity and learn how to do it better through regular interaction (Wenger, 1998). According to Wenger, community members develop a shared repertoire of resources, experiences, stories, tools, and ways for addressing recurring problems. What distinguishes such communities from the academic disciplines is their relatively greater emphasis on learning from real-world

practice. Professional practitioner knowledge builds much more on inductive, situational, bottom-up learning than top-down, deductive extension of theory to practice. Practice communities draw from members' knowledge and experience to advance context-specific problem-solving.

Within sustainability science, research on communities of practice is often linked to the concepts of knowledge co-production and social learning, which constitute critiques of the Newtonian 'command-and-control' approach (Rodela, 2013). For example, Collins and colleagues (Collins, 2014; Collins et al., 2009) equate communities of practice to forms of social learning that occur through contextually situated and collective engagement with others. In their studies of water management, they have sought to design and evaluate 'learning catchments' in which learning processes attend to the shared geographic context of the stakeholders as well as the ecological and social conditions associated with a specific water catchment. Specifically they argue that post-normal conditions of complexity, uncertainty, and controversy require an epistemic reframing of knowledge co-production to embrace new forms of social learning that explicitly recognize and make sense of the partial understandings and varying norms and values of the stakeholders embedded in a given situation or context. In this work, Collins describes social learning as system-level *collective* learning involving the co-creation of knowledge; a convergence of goals, purposes, criteria, and knowledge that contributes to awareness of mutual expectations and relational capital; and changes in behavior and understanding gained through doing, that leads to concerted action. In the end, social learning is an emergent 'process of multiple stakeholders socially constructing an issue in which their understandings and practices change so as to transform a situation or concern' (Collins, 2014, p. 238).

Finally, the tools of social network analysis have become increasingly popular in sustainability science for identifying and mapping stakeholders and their interrelationships, and facilitating strategic network formation within and across multi-scale conservation initiatives (Bodin & Prell, 2001). Network mapping helps to identify and integrate different sources of knowledge, competencies, and values that promote social learning among diverse stakeholders and across multiple scales (Goldstein & Butler, 2010; Hauck et al., 2015; Jedd & Bixler, 2015). As we have seen with catchments, place-based networks create potential learning systems by organizing various stakeholders, each differently positioned and possessing partial understanding of the situation, into learning communities. By linking together place-based actors in a network, stakeholders can take advantage of their partial understandings and different positioning to advance social learning and the co-production of knowledge. Thus, this epistemological positioning of conservation as place-making promotes a shift from hierarchical top-down approaches for information transmission and learning, to place-based knowledge networks as an essential means for understanding and adaptively managing complex social-ecological systems.

AXIOLOGICAL POSITIONING: SPACING ADAPTIVE GOVERNANCE

The same epistemological impulse for context-independent knowledge that historically narrowed what counted as scientific knowledge and marginalized context-dependent (local) knowledge, has also limited the methods for adjudicating the diverse axiological positions and competing values and preferences that guide conservation policy and practice (Koontz et al., 2015; Raymond et al., 2014; Williams & Watson, 2007). A key premise behind the utilitarian resource management paradigm was that science could eliminate politics by applying operational and outcome-oriented 'decision science' as the most rational method for ordering values (Williams, 2002). But as Ludwig (2001, p. 758) announced in 'The Era of Management is Over': 'The ideologies of our time (economism, scientism, and technocracy) [that] support the progressive view that experts using scientific methods can manage the world's problems by objective and efficient means … are no longer tenable.' Or as Challenger (1994, p. 211) wrote: 'We would all do well … to quit acting as if the work of science and the work of governing our lives can be done without conversation about values and ideals.'

With the management era seemingly over, research on environmental governance is rapidly emerging as a field aimed at 'the broader processes and institutions through which societies make decisions that affect the environment' (Armitage et al., 2012, pp. 245–6). In particular, adaptive governance has been described as a move away from an approach to governance as a system of rule-based, formal, and fixed institutions with clear boundaries (Koontz et al., 2015) and toward an approach 'capable of confronting landscape-scale problems in a manner both flexible enough to address highly contextualized SESs [social-ecological systems] and dynamic and responsive enough to adjust to complex, unpredictable feedbacks between social and ecological system components' (Chaffin et al., 2014, p. 1). For adaptive governance to succeed it needs the capacity to accommodate diverse non-state actors, especially those who have been traditionally marginalized by dominant power structures, and coordinate governance across multiple jurisdictional boundaries. In other words, adaptive governance needs to be able to reconcile pluralistic conceptions of values as well as facts, and foster multi-scale or polycentric political systems that can embrace complexity, plurality, and adaptation (Koontz et al., 2015; Wyborn, 2015).

The emergence of 'post-utilitarian' thinking in conservation practice has inspired greater recognition of the varying political theories or axiological systems that provide normative guidelines for directing collective decision-making (Raymond et al., 2014; Williams, 2002). Philosophically, axiological systems range from the technical-managerial lenses of economics and decision science (e.g. utilitarian ethics); to legal-political systems and institutions of the state and moral-ethical systems embedded in culture, religion, and local custom; to moral philosophies (virtue ethics, deontology). In conservation practice, axiological systems have begun to turn from managerial and liberal-pluralist models, which

emphasize individual autonomy and fixed competitive interests, toward communitarian and deliberative or forum models (including critical-pluralist models), which emphasize dialog and the transformation of individual preferences through collaborative social learning (Williams & Watson, 2007).

The managerial and liberal-pluralist models are sometimes referred to collectively as liberal models because they emphasize, albeit in different ways, the expression and aggregation of interest-based preferences. In other words, they both take the realm of values to be the province of individuals who hold sovereign, if not immutable, policy preferences or interests. The function of politics is to aggregate efficiently the divergent interests of an autonomous civil society. In the managerial version of liberalism, the search for correct public policies is likened to the search for Newtonian scientific knowledge, where there is an assumed single, technically correct policy solution. Public preferences in the managerial tradition of nature conservation are often accounted for, using the surrogate tools of economics and the decision sciences, allowing managers to evaluate choices through technical procedures that presumably reflect such individual sentiments. In the pluralist version of liberalism, the goal of democratic decision-making is to decide among policies by maximizing individual welfare with the assumption that individual citizens are best able to define and judge their own interests (much like markets assume).

In contrast, deliberative democracy presumes that values are endogenous to policy deliberations rather than exogenous inputs into policy decisions. Deliberative democracy 'revolves around the transformation rather than simply the aggregation of preferences' (Elster, 1998, p. 1). These models focus on high-level communication processes, which occur within both parliamentary bodies and the informal networks of the public sphere. Deliberative (forum) models come in at least two varieties, communitarian and critical-pluralist approaches. The communitarian approach presumes, and seeks to identify, some pre-existing unity or shared identity among community members that would order social values or preferences. In the critical-pluralist approach social differences and conflict are ubiquitous, so this approach makes no presumptions about value consensus, and postulates only episodic agreement. Though critical pluralists resemble liberal pluralists 'in that they begin from a variety of ways [by which] it is possible to experience the world' (Dryzek & Niemeyer, 2006, p. 636), critical pluralists regard social differences and varying positionality as resources for improving public reason (Young, 1996). As Haidt (2012, p. 105) explains:

> We should not expect individuals to produce good, open-minded, truth-seeking reasoning, particularly when self-interest or reputational concerns are in play. But if you put individuals together in the right way, such that some individuals can use their reasoning powers to disconfirm the claims of others and all individuals feel some common bond or shared fate that allows them to interact civilly, you can create a group that ends up producing good reasoning as an emergent property of the social system. This is why it is so important to have intellectual and ideological diversity within any group or institution whose goal is … to produce good public policy.

Though the environmental governance literature generally sees deliberative approaches as increasingly favored in contemporary practice, disagreements persist as to whether some form of political unity (shared identity) is a necessary precondition for democratic discourse or merely a possible outcome of such discourse (Barnett & Bridge, 2013; Dryzek & Niemeyer, 2006). Young (1996) identifies several problems with assuming a pre-existing unity as the basis of democratic politics. First, much like CAS thinking, the technological complexity and social pluralism characteristic of modern society cast doubt on the possibility of a common understanding of a given policy question. In fact, in many policy situations, including collaboration among experts, differences in world views and vocabularies are often impediments to collective action (Sarewitz, 2004). Second, if discussion succeeds primarily when it applies only to what the discussants all share, then none of the participants need revise their viewpoints in order to take account of the perspectives (positionalities) of others. Third, viewing consensus as the central feature of collaborative processes tends to enfranchise those already empowered and perpetuates any differences in social position, power, and resources. Benhabib (1996, p. 8) goes even further, noting that the challenge is not just a pluralism of values and world views, but 'pluralism "at the axiological level" which recognizes the impossibility of ever adjudicating without contest and without residue among competing visions of the good, of justice, and of the political'. At its best, democratic consensus is ephemeral and episodic.

PLACE-MAKING AND ADAPTIVE GOVERNANCE

The debate about the role of political unity comes back to questions about positionality and the power of place to create a sufficient sense of shared fate, if not a common bond, to organize political dialog. Whatever positional differences exist among stakeholders (by culture, training, etc.), some argue that place provides at least a minimum of common positionality to initiate political dialog because stakeholders find 'themselves in geographic proximity and economic interdependence such that the activities and pursuits of some affect the ability of others to conduct their own activities' (Young, 1996, p. 126). Thus, a key resource for transcending different positionalities may be simply the result of people having to co-exist in a shared space (or acknowledge that they are co-dependent in some way on that space) even if they share little else. In these contexts, adaptive, place-focused collaboration promotes finding commonality among diverse stakeholders by encouraging them to 'make sense together' (Healey, 1997) despite their different, often conflicting, values and ways of life. Whatever social differences exist regarding local uses and values for a landscape, the possibility of a shared concern for particular places may empower new governance structures to emerge (Chapin & Knapp, 2015; Edge & McAllister, 2009). At a local level, co-dependence or shared habitation in a geographic space

helps to establish a workable polity because decisions begin to matter to local constituencies in ways that at a larger (e.g. national) scale are often too remote and obscure to engage any but the most organized interest groups (Williams & Matheny, 1995). For this reason liberal-pluralist models that emphasize interest-group bargaining often dominate at larger scales precisely because they attract only the most committed interests. But they break down at local levels because important actors at that scale were not present in the larger-scale decisions.

Some form of interconnectedness or propinquity seems essential for promoting the emergence of adaptive governance, particularly when dealing with large-scale ecological disturbances (e.g. wildfire, invasive species, or climate change) where the magnitude and complexity of these disturbances exceed the capacity of any one organization or institution to address the problem on its own (Wyborn, 2015). By emphasizing plurality, diverse positionality, wider public participation for building knowledge networks and learning communities, and an enlarged social capacity and flexibility to respond to unplanned change, adaptive governance facilitates a shift from the Newtonian world view of top-down, expert-driven decision-making structures to multi-level and polycentric approaches that emphasize inclusiveness, collaboration, and local knowledge and identities (Armitage et al., 2012; Koontz et al., 2015; Wyborn, 2015).

In the end post-Newtonian, post-normal conditions necessitate institutional designs and practices that encourage more bottom-up forms of adaptive governance where emergent networks of individuals, organizations, agencies, and institutions at multiple organizational levels come together into learning communities to transform conservation practice. These networked learning communities draw on various forms of knowledge, expertise, and experience to produce shared understandings and policies. Sustainability in this context is not so much a matter of getting policies correct, but the capacity for continuous learning. Over time greater sustainability is attained by advancing efforts to monitor the outcomes of adaptive governance regimes both in specific contexts and at higher levels of scale, which can provide feedback to embedded actors who can learn from this feedback and adapt in light of new insights.

CONCLUSION: POSITIONING SUSTAINABILITY

The spatial turn in conservation science and practice has begun to re-*place* the historic privilege given to Newtonian, context-independent knowledge, which limited the ontological, epistemological, and axiological consideration of nature. Spacing natures undercuts the monistic assumptions that have long-served as foundations for the science and practice of conservation and instead embraces pluralism in research, practice, and governance. This, in turn, gives greater legitimacy to a spatial structuring of knowledge production itself, particularly forms of local, indigenous, and experiential knowledge tied to specific places or

landscapes. It also challenges the Newtonian image of space as a passive surface, a container rather than maker of nature. With CAS, space is more akin to a network of interrelated agents capable of learning, adapting and, therefore, making and remaking places. At the same time, place-making, as understood in human geography, helps to draw critical attention to pluralism and observer positionality and engage CAS thinking and 'post-normal' approaches to science in a way that underscores the value of emplaced practitioners learning and operating in real places to co-produce context-specific knowledge.

A more sustainable and politically viable approach to nature conservation may be found in adopting a spatial and relational view of nature to address the dynamic complexity of SESs and provide practical strategies for participatory governance of a complex, dynamic, and uncertain world. With the Newtonian view of nature giving way to CAS thinking, sustainability can no longer be conceived of as finding the proper balance between human needs and the material system. With the emergence of a non-equilibrium view of SESs, sustainable place-making involves social learning and adaptive governance as a means for continually adjusting conservation practices to the particulars of a given place. In other words, governance practices need to be continuously informed and refined through social learning at multiple scales. To deal effectively with post-normal complexity and pluralism, conservation practice requires the cultivation of the capacity or habit for collective sense-making that moves beyond the mere application of science and technical know-how. In the end continuous learning and adaptive practice linked to actual places enable partially informed, differentially positioned agents embedded in complex systems to deal with pluralism and value differences in an adaptive way.

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