



Guest Editorial, part of a Special Feature on [Nudging Evolution? Critical Exploration of the Potential and Limitations of the Concept of Institutional Fit for the Study and Adaptive Management of Social-Ecological Systems](#)

Nudging Evolution?

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ABSTRACT. This Special Feature, “Nudging Evolution? Critical Exploration of the Potential and Limitations of the Concept of Institutional Fit for the Study and Adaptive Management of Social-Ecological Systems,” aims to contribute toward the development of social theory and social research methods for the study of social-ecological system dynamics. Our objective is to help strengthen the academic discourse concerning if, and if so, how, to what extent, and in what concrete ways the concept of institutional “fit” might play a role in helping to develop better understanding of the social components of interlinkages between the socioeconomic-cultural and ecological dynamics of social-ecological systems. Two clearly discernible patterns provide a map of this Special Feature: (1) One pattern is the authors’ positions regarding the place and role of normativity within their studies and assessment of institutional fit. Some place this at the center of their studies, exploring phenomena endogenous to the process of defining what constitutes institutional fit, whereas others take the formation of norms as a phenomenon exogenous to their study. (2) Another pattern is the type of studies presented: critiques and elaborations of the theory, methods for judging qualities of fit, and/or applied case studies using the concept. As a body of work, these contributions highlight that self-understanding of social-ecological place, whether explicit or implicit, constitutes an important part of the study object, i.e., the role of institutions in social-ecological systems, and that this is, at the same time, a crucial point of reference for the scholar wishing to evaluate what constitutes institutional fit and how it might be brought into being.

Key Words: *adaptive management; environmental governance; institutional change; institutional fit; meaning; Oran Young; protected areas; social-ecological systems; social norms; water governance; wildlife management*

BACKGROUND AND OBJECTIVES OF THE SPECIAL FEATURE

This Special Feature aims to contribute toward development of social theory and social research methods for the study of social-ecological system dynamics. It is the result of work that began in November 2010 at a workshop in Berlin, Germany, entitled “Toward an Integrated Study of Social-Ecological Systems, Interactions, and Dynamics: The Empirical and Conceptual Foundations of Fit,” 18 and 19 November 2010, which was cohosted by the Division of Resource Economics at the Humboldt-Universität zu Berlin and the Heinrich Böll Foundation. There, several of the contributors met to explore the potential usefulness of Young and Underdal’s (1997, Folke et al. 1998, 2007, Young 2002, 2008) concept of institutional “fit” as a guiding principle for studying socioeconomic aspects of social-ecological systems and dynamics. The central idea of institutional fit, i.e., “to be effective, institutional arrangements need to match the defining features of the problems they address” (Young 2008:20) including both the “biophysical and social domains in which they operate” (Young and Underdal 1997, as quoted in Folke et al. 2007:2), seems to us to provide a promising, although not unproblematic, framing for the topic and gives the contributions to this Special Feature their common point of departure. While noting substantial progress over the past decade, Folke et al. (2007) argue that there still remains considerable work to be done in this area, both in terms of

developing a better understanding of (1) what can be considered social-ecologically fit institutional configurations and in terms of understanding (2) how fit institutions emerge and (3) how they might be brought into being. Our objective is to help strengthen the academic discourse concerning these dynamics by exploring the following questions: If, and if so, how, to what extent, and in what concrete ways might the concept of institutional fit play a role in helping to develop better understanding of the social components of interlinkages between the socioeconomic-cultural and ecological dynamics of social-ecological systems (cf. Folke et al. 2007)? In keeping with that research agenda, the contributions toward this Special Feature focus on the selective pressure that ecological systems may exert on institutions and that institutions may exert on ecological systems, which we understand to be an important and undertheorized aspect of how humanity and nature coevolve (Young 2006, Folke et al. 2007, Olsson et al. 2007, Ekstrom and Young 2009).

All contributing authors were asked to take, as their initial point of reference, the following set of quotes from a recent paper on the topic:

To be effective, institutional arrangements need to be well-matched to the defining features of the problems they address. This makes it essential to recognize from the outset that environmental problems differ from one another in ways that have

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Table 1. Perspectives on normativity.

Normativity taken as exogenous to the study / study starts out with reference to a given set (or sets) of normative criteria concerning what constitutes fitting institutions	Normativity taken as endogenous to the study / the role of normativity within the process of determining fit is treated as a study object
Cox 2012 Herrfahrdt-Pähle <i>in press</i> Hukkinen 2012 Lebel et al. 2013 Petursson et al. 2013 Vatn and Vedeld 2012 Zikos and Roggero 2013	Bromley 2012 DeCaro and Stokes 2013 Haller et al. 2013 Hiedanpää 2013 Hukkinen 2012 (Lebel et al. 2013) Moss 2012 (Vatn and Vedeld 2012) (Zikos and Roggero 2013)

(brackets indicate a secondary orientation within the text)

fundamental implications for the nature of the arrangements required to solve or at least ameliorate them. (Young 2008:20)

The point of introducing these distinctions is not to argue that some environmental problems are harder to solve than others in some generic sense. Rather, the lesson to learn is that successful governance systems must be based on a recognition of the character of the problems at hand and feature the introduction of behavioral mechanisms crafted to address these problems. (Young 2008:21)

The essential step is to reach agreement on an appropriate structure of rights, rules, and decision-making procedures. Once that is done, it becomes timely to consider the nature of the organizations needed to administer these institutional arrangements. (Young 2008:21)

Although each author, or group of authors, developed the concept of institutional fit differently, in keeping with the specific aims of each contribution, there are at least two clearly discernible patterns across the papers (Tables 1 and 2) that reflect both the conceptual and the practical complexity of judging the social-ecological fit of institutions and the ways in which they come into being. The first pattern is in the authors' positions regarding the place and role of normativity within their studies and assessment of institutional fit. This pattern emerged from the process of putting together this Special Feature and seems to us to offer some useful insights into the particular constraints and requirements associated with conducting studies concerning the role and place of institutions within social-ecological systems. The second pattern, regarding the various types of studies being presented, namely, critiques and elaborations of the theory (Bromley 2012, Cox 2012, Hukkinen 2012, Moss 2012, Vatn and Vedeld 2012, Haller et al. 2013, Hiedanpää 2013), methods for judging

qualities (Bromley 2012, Cox 2012, Hukkinen 2012, Vatn and Vedeld 2012, DeCaro and Stokes 2013, Lebel et al. 2013), and/or applied case studies using the concept (Hukkinen 2012, Moss 2012, Zikos and Roggero 2012, Haller et al. 2013, Hiedanpää 2013, Petursson et al. 2013, Herrfahrdt-Pähle *in press*), reflects the original call for papers for the Berlin workshop and the subsequent composition of this Special Feature. For that workshop, the contributors were invited to explore the following: (1) epistemology and theory, by presenting theory-based critiques that explore the potential for the concept to serve as a tool for explaining institutional aspects of social-ecological system dynamics; (2) ontological and empirical questions, by presenting applications of the concept of institutional fit to specific social-ecological change cases, based on detailed empirical studies that can be used as testing grounds for evaluating the usefulness of the concept; and (3) methodological and action-oriented prospects. Their task was to explore how the concept of institutional fit might be used to inform theorizing, study, design, and implementation of social-ecologically desirable institutions.

THE PLACE AND ROLE OF NORMATIVITY IN THE STUDY OF INSTITUTIONAL FIT

Where social-ecological system analysis is focused on measuring institutional fit and on determining the potential for bringing fit institutions into being, decisions concerning what issue to investigate (Carpenter et al. 2001) must be informed by reference to (1) how normative human concerns about social-ecological systems come into being and (2) how they mediate the creation, maintenance, and revision of the study object, i.e., institutions. This means that decisions regarding what to investigate are made, in part, through reference to selected empirical characteristics of the social and ecological systems being studied and, in part, through reference to normative human concerns: whether of the researcher, the society being studied, others, or some combination of the three. When one is specifically concerned with the measurement and

Table 2. Types of studies.

Critiques and elaborations of the theory of institutional “fit”	Methods for judging the qualities of institutional “fit”	Applied case studies using the concept of institutional “fit”
Bromley 2012	(Bromley 2012)	Haller et al. 2013
Cox 2012	(Cox 2012)	Herrfahrtdt-Pähle <i>in press</i>
(Haller et al. 2013)	DeCaro and Stokes 2013	Hiedanpää 2013
Hiedanpää 2013	Lebel et al. 2013	Hukkinen 2012
Hukkinen 2012	Hukkinen 2012	Moss 2012
(Moss 2012)	Vatn and Vedeld 2012	Petursson et al. 2013
Vatn and Vedeld 2012		Zikos and Roggero 2013

(brackets indicate a secondary orientation within the text)

creation of fit institutions, which are constructed by societies to serve particular social purposes, “to what end” and “for whom” must be formally considered. These factors may be taken as given, e.g., to ensure access to food, to ensure democratic rule, to ensure these for all or the weakest members of a given society or for humans before other species if required, or they may be treated as study variables. However, they must somehow be specified and accommodated theoretically in any formal analysis concerning institutional fit. This is an ontological point that has arisen from this Special Feature, which we believe has significant implications for how institutional aspects of social-ecological systems can be studied effectively. To leave out formal consideration of these normative questions in the study of how institutions and ecological systems interact, for example, along a riverbed, is logically comparable to failing to include a discussion of fluid dynamics in the study of associated shifting siltification patterns.

Because the study of institutional fit is intended to contribute to humans’ knowledge about the place of humans within social-ecological systems (cf. Trosper 2005), it automatically implies not only technical choices concerning how these systems are to be described but also socially entailed choices concerning where, how, why, and whether humans fit well within them. This means that any analytical position regarding what constitutes a fit institution, how fit institutional configurations emerge, and/or how they might be brought into being is shaped by a set of normative preanalytical judgments, explicit or otherwise, regarding what is the appropriate place of humans within the social-ecological system under investigation. These may or may not be the same as, or compatible with, those of the society involved in building the institutions under investigation. In addition, as pointed out by several contributors (Vatn and Vedeld 2012, Zikos and Roggero 2012, Haller et al. 2013, Herrfahrtdt-Pähle *in press*), the concept, as introduced by Young, presumes a degree of normative homogeneity across the inhabitants of the social-ecological system in question. Although this may often be the case, these authors point out that normative heterogeneity, and

how it is managed by a society, plays a role in determining what type of institutions emerge. These authors have sought to build this into their discussions of institutional fit, thereby extending the concept.

Choices regarding what constitutes social-ecologically appropriate human behavior and how this should be regulated are the raw materials with which fit institutions may be “brought into being.” However, these choices are based on humans’ knowledge, flawed or otherwise, always somehow incomplete, always socially mediated, about the social-ecological systems within which they are embedded:

When humans are involved in an emergent structure, the knowledge of those humans matters, because it affects what humans do... [this] affects the structure, and thus human knowledge becomes part of the system’s relationships [, and t]his is the case whether or not the knowledge in question accurately models the system. (Trosper 2005:3)

This means that institutional fit is inescapably normative at its foundations as has been pointed out by Young (2002, 2008).

Across the contributions, we find two distinct approaches to the placement of social norms within the study of institutional fit. Some authors place them at the center of their studies, exploring their characteristics as phenomena endogenous to the process of defining what constitutes criteria for and what is involved in creating fit institutions, considering both how norms emerge within and how they impact social-ecological processes related to institutional fit (Bromley 2012, Hukkinen 2012, Moss 2012, DeCaro and Stokes 2013, Haller et al. 2013, Hiedanpää 2013). Others take the formation of norms as a phenomenon that is exogenous to their particular study, determined either through reference to previous political decisions, expert assessments, and/or some combination of the two (Cox 2012, Vatn and Vedeld 2012, Zikos and Roggero 2012, Lebel et al. 2013, Petursson et al. 2013, Herrfahrtdt-Pähle *in press*). Although these two approaches seem to us to highlight an important distinction, they are complemented by

a strong ontological consistency across the contributions; the creation, maintenance, and use of institutions is a process of social construction that takes place within and is heavily mediated by its physical and biological contexts. This means that neither the normative nor the empirical elements of this process can be left entirely to one side. Among the contributors, this relationship between normative propositions and their empirical referents, with which they may be understood to be coevolving, is either taken as given, for the purposes of a particular study, or taken up as an object of study. An exception is Janne Hukkinen (2012), who, in building his roller-coaster model of economic sustainability, mixes together exogenous reference points with theoretical propositions regarding how this endogenous coevolution is performed.

Whichever route is chosen, it would appear that the study of institutional aspects of social-ecological dynamics depends, and must depend, on reference to normative propositions concerning the purpose of the institutions being studied because these are the points of reference through which it is decided (1) what should constitute fit and (2) how its qualities can and should be measured. This is particularly relevant for planning and management, where one is concerned with trying to influence the trajectory of such development over time, because the epistemological task of understanding the dynamics of social-ecological systems is functionally related to the operational task of making decisions regarding how they should be managed and governed (Bromley 2012). Human agency, if not also free will and self-determination, needs to be formally addressed in such a context, as do potential unintended human and social consequences that may emerge, which may prove problematic for the social, ecological, and/or social-ecological system in question (Gunderson and Holling 2002). In keeping with the convention of this journal, we presume that social systems and institutions are also evolving systems and that there is no problem with a more or less direct transposition of the basic concept of adaptive fitness to their study. At the same time, there are some basic differences between social and ecological systems, particularly as regards the matter of intentionality, which are both analytically and methodologically important for the study of institutions.

We agree with the position expressed by Folke et al. (1998, as quoted in Folke et al. 2007) “that evolving systems require policies and actions that not only satisfy social objectives but also achieve a continually modified understanding of the evolving conditions and provide flexibility for adaptation to surprises.” However, as Daniel Bromley (2012) points out in his contribution, this work requires that we confront a range of epistemological and normative issues that are often taken for granted in other academic studies. Institutions, which are humanly constructed, may or may not include provisions for taking social-ecological system structures and dynamics into

account. Where they do so, the structures and dynamics taken into account depend not on the characteristics of that system, per se, but on what that society knows about the system, including how it understands its own place within that system. This self-understanding of social-ecological place, whether explicit or implicit, constitutes an important part of the study object, i.e., the role of institutions in social-ecological systems. At the same time, it is also a point of reference for the scholar wishing to evaluate what constitutes institutional fit and how it might be brought into being.

OVERVIEW OF THE CONTRIBUTIONS AND THEIR DIFFERENT APPROACHES

We conclude with a brief overview of ways in which the contributions differ from one and other, to give the reader some indication as to what specific kinds of conceptual and methodological resources they might expect to find within each of the respective texts. Beginning with the common feature that all authors explicitly consider the role that social norms play in both the specification and assessment of the quality of institutional fit, there is, as mentioned previously, with the exception of Hukkinen (2012), a clear distinction to be made between those who place the formulation of social norms squarely within their focus (Bromley 2012, Hukkinen 2012, Moss 2012, DeCaro and Stokes 2013, Haller et al. 2013, Hiedanpää 2013) and those who focus, instead, on how established norms influence, whether in theory or in practice, the specific criteria and social practices that may give rise to institutional fit (Cox 2012, Hukkinen 2012, Vatn and Vedeld 2012, Zikos and Roggero 2012, Lebel et al. 2013, Petursson et al. 2013, Herrfahrtdt-Pähle *in press*; Table 1).

Cox (2012), Herrfahrtdt-Pähle (*in press*), Petursson et al. (2013), and Zikos and Roggero (2012) all start out by taking the specification of the criteria against which institutional fit is to be measured as more or less given and proceed, in their respective studies, to explore means for evaluating whether institutional fit is present or possible in a given situation. Cox (2012), whose text is intended to contribute toward the development of theory and the design of modeling methodologies, concentrates on providing a set of standardized but semantically open analytical tools, based on principles drawn from relational database management and programming, that can accommodate the processing of the specific social norms observed within a given society. Herrfahrtdt-Pähle (*in press*), Zikos and Roggero (2012), and Petursson et al. (2013), whose texts are all based on case studies, i.e., of water management in South Africa and on the divided island of Cyprus, and of protected area management at the border between Uganda and Kenya, focus instead on evaluating if and, if so, to what extent the environment-related social norms that they observe do or could facilitate achievement of institutional fit. Of these three, Zikos and Roggero (2012) also give some attention to the dynamics of norm creation as a process endogenous to the specification

and realization of institutional fit, proposing that the politically divided status of the island of Cyprus has given rise to a social-ecologically complex set of normative positions concerning both the purposive object of and the objectives associated with achieving institutional fit. Focused on evaluating the potential and limitations of the concept of institutional fit as a tool for understanding and explaining social aspects of social-ecological change, Vatn and Vedeld (2012) implicitly treat the normative specification of fitness criteria as exogenous to their study. However, in the elaboration of their critique, they also bring up the place of norm creation within the process of determining the criteria for institutional fit, arguing that a key weakness in Young's position is a lack of sufficient attention to relationships between human agency, normativity, and the creation of norms as a social process. They propose that this leads to ambiguities in the distinction between the central concept of institutional fit and the associated factors of scale and interplay, arriving at a recommendation that complements the contributions of both Cox (2012) and Lebel et al. (2013): "We think a conceptual framework that includes the core variables influencing fit, interplay, and scale issues is needed" (Vatn and Vedeld 2012). Similarly, Lebel et al. (2013), although treating the specification of criteria used to determine institutional fit as given and, like Cox (2012), Herrfahrtd-Pähle (*in press*), Petursson et al. (2013), and Zikos and Roggero (2012), taking up the adjudication of the institutional fit of specific cases as their main analytical objective, also take into account the ways in which these specifications are contingent on the judgments of experts and of the affected communities. Finally, Hukkinen (2012), although he explicitly treats the formation of social norms as endogenous to the process of specifying criteria for institutional fit, nonetheless takes the norms "economic growth is good" and "adaptive ecosystems are sustainable" as givens, using them then as exogenous points of reference for his normativity experiment with the development of a new, theory-based norm for sustainable human-environment interactions, which he calls the roller-coaster blend.

Among the remaining authors, DeCaro and Stokes (2013), Haller et al. (2013), and Moss (2012) all take judging the quality of situations of institutional fit as their main analytical objective. However, for these authors, the process through which normative fitness specifications are generated also takes a central place in their considerations. For DeCaro and Stokes (2013), the main concern is how public participation in the process of institution building can be researched and designed so as to ensure that those institutions adopted in practice are socially accepted and ecologically appropriate. In contrast, Haller et al. (2013) and Moss (2012), although taking a more distanced position regarding that relationship, propose that the continuous and repeated revision of social norms regarding both the objective context and purpose of institutional design are inherent to the process of designing social-ecologically fit institutions. This coevolutionary view of the process of

institutional design is based on the presumption that both social and ecological fitness criteria inevitably change over time, not least because new human practices become institutionalized. Both Hiedanpää (2013) and Hukkinen (2012) also take up the pliability of environment-related norms as a central object of study, although each in a different way. For Hiedanpää (2013), whose work is concerned with the failed reintroduction of wolves into the Finnish countryside, the main object of study is how a combination of retained and forgotten social norms regarding what constitutes appropriate human-wolf relationships led first to ill-informed reintroduction strategies and then to their subversion. His conclusion, i.e., that the establishment of fitting institutions for the management of this relationship may be possible if social norms are revised and brought into closer harmony with the current situation, has strong resonance both with the coevolutionary viewpoints of Haller et al. (2013) and Moss (2012) and with Hukkinen's (2012) project of imagining cognitively palatable new normative positions that might be able to help inspire the creation of new institutions. Finally, Bromley (2012), who is perhaps the least enthusiastic of the contributors regarding the potential usefulness of the concept of institutional fit, closes the circle by asking how the normativity implicit in the concept itself, which is, of course, a construct, influences both judging and imagining what counts as institutional fit in the first place. Developing a pragmatic critique of the epistemological foundations of the idea, he argues that the concept of institutional fit, in spite of acknowledging the central role played by social norms in specifying the criteria used by societies in building institutions, disregards its own normative stance, which is associated with the specific ontology and epistemology of the epistemic community of ecologists. He argues that unless the implications of this inherent normativity, which resides within the concept of institutional fit itself, are also placed within the analytical frame and subjected to formal consideration, little good is likely to come from its application.

As a compliment to distinctions based on how the authors have chosen to position their studies, with respect to the role of social norms in defining and creating fit institutional configurations, the contributions to this Special Feature can also be distinguished using the more conventional categories of theory, method, and application, as shown in Table 2. With respect to the critique and further elaboration of theory concerning institutional fit, the contributions from Bromley (2012), Hiedanpää (2013), and Vatn and Vedeld (2012) are most explicit. Cox (2012) and Hukkinen (2012), in spite of being focused, respectively, on the methodological questions of how fitting institutions can be measured and how they can be created, also concern themselves directly with questions of theory.

Bromley (2012), Cox (2012), and Vatn and Vedeld (2012) each begin by engaging directly with Young's writings on the

concept of institutional fit, addressing ontological, epistemological, and to a degree also methodological questions regarding its formulation and applicability to the study and design of institutions that foster sustainable human–environment interactions. Bromley (2012) takes issue with the concept on first principles, pointing out that the ecology theory from which the fitness metaphor is drawn itself presumes a degree of coevolution between social and ecological systems (cf. Holling and Meffe 1996) that is logically inconsistent with the idea that specific institutional configurations can be pronounced, once and for all, fit. Vatn and Vedeld (2012), taking a more sympathetic position, as regards the applicability of the concept for institutional analysis, nonetheless highlight both the need to clarify how the motivations behind human actions are theorized and how this is related to the role of institutions within social systems. They also raise concerns regarding the problem of distinguishing between fit and interplay. Although endorsing, generally speaking, the use of the concept, they outline recommendations for future research, to clarify what precisely is meant by institutional fit and the related concepts of scale and interplay. Cox (2012), in contrast, leaves to the side these epistemological questions, focusing instead on the ontological modeling problem of how to formalize the semantically open use of the concept in a way that is sufficiently flexible to accommodate various different dimensions of fit and diverse conceptualizations of what this might mean in practice, based on an iterative modeling process. His suggestion, to adopt a formal programming language to unpack the relational character of fit and build an interdisciplinary database to test more general knowledge claims, moves toward the domain of methods, while remaining focused at the level of theory.

The contributions from Hiedanpää (2013) and Hukkinen (2012) are without doubt the most abstract works within the Special Feature. Hiedanpää (2013) ventures into the realms of philosophy, through his application of the works of the American pragmatist Charles Peirce to the study of how fit emerges, or not, in the management and protection of wild wolf populations in Finland. Taking up Peirce’s theory of categories as a heuristic to explore the different normative positions that local sheep farmers have regarding the place of wolves within their social–ecological context, he explores how local habits of feeling about the wolves, reactions to their presence, and continuities within the situation help to determine what types of institutions emerge and how they are used. Starting also with attention to the epistemological question of how humans understand the world around them, Hukkinen (2012) uses the concepts of “cognitive blending” and “primary metaphors” to experiment with combining the widely recognized but ecologically problematic norm that growth is a good with the concepts of resilience and the adaptive cycle. He introduces a sort of cognitive fit of ideas and then uses it to blend together normative and scientific thinking about ecological economics relationships. His end

result is both a reflection on and a dynamic engagement with the phenomenon of social norms construction, offering an alternative *Leitbild*, or guiding principle, for economic development, intended to be compatible with both the established norm, i.e., growth is desirable, and the referenced scientific knowledge, i.e., the adaptive cycle. Mixing together theory, method, and an applied case, Hukkinen appears in all three columns of Table 2.

Lebel et al. (2013) and DeCaro and Stokes (2013) are, in contrast, more directly concerned with the methodological question of how the concept of institutional fit can be employed effectively as a tool to help organize and inform empirical investigation of the dynamics of social–ecological systems. However, both also begin with the ontological question of how the knowledge of experts is related to the specification of criteria for measuring institutional fit. Lebel et al. (2013), working with data drawn from studies of 28 river basins across the world, develop an integrated metamodeling approach for reconciling expert opinions in the assessment of diverse water governance strategies across a wide range of geographically, culturally, and legally distinct regions. This allows them to assess the relative importance of basin-specific institutions and contextual issues in terms of what they call “basin-specific fit.” DeCaro and Stokes (2013), whose main objective is to review and develop methodology that is attentive to the place of public participation in social–ecological systems research, are concerned instead, with how to embed the specification of criteria for judging institutional fit within the knowledge and cultural systems of the communities relevant for its assessment. Employing initial criteria derived from Ostrom’s (2009) social–ecological systems framework, they propose a research agenda aimed toward developing methods for organizing public participation in the study of institutional fit. This is intended to lead to the specification of criteria for designing institutions that are both compatible with their social–ecological context and acceptable to the communities that will ultimately be responsible for employing and elaborating them.

Moss (2012), Herrfahrtd-Pähle (*in press*), and Zikos and Roggero (2012), like Lebel et al. (2013), are also concerned primarily with the relationship between the concept of institutional fit and the applied problem of water governance. Moss (2012) begins from a theoretical position, providing an extensive review of the existing literature on the topic of institutional fit and water management, then tightening his focus to present a detailed evaluation, based on a single case study of the Wupper Sub-basin, in Germany. Not unlike Lebel et al. (2013), he also finds that multiple ontologies of spatial fit exist alongside one another, even within a single river basin, which need to be conceived of in a relational way. He also draws attention to the challenges associated with the implementation of spatially fitting institutions under such conditions, where human agency is employed differently by

different actors, resulting in trade-offs and political reshuffling. Herrfahrdt-Pähle (*in press*) starts out, instead, from the empirical, with the aim of evaluating the spatial institutional fit of the recent reform of water governance in South Africa. In the process, she comes to the conclusion that the empirical case is characterized, in large part, by the multifaceted nature of conflicting claims regarding the appropriate specifications for institutional fit. In particular, she finds that trade-offs between different notions of spatial, functional, and dynamic fit appear inevitable when efforts are made to undertake institutional design at such a large scale, across areas with significant ecological, geologic, and cultural heterogeneity. Zikos and Roggero (2012), also starting from an empirical case, focus mainly on the descriptive work of trying to understand how the divided status of the island of Cyprus has shaped both the external and normative points of reference against which institutional fit can be judged. They conclude that, although there are clear ecological and social grounds for adopting an island-level orientation when specifying the criteria against which fitness can be judged, a combination of historical factors and processes of social-ecological coevolution appears to have led to a situation where the water governance institutions on the island are oriented, instead, toward what they call patronage fit, which looks to the policies and practices of the respective patron states of the north and south of the island, Greece and Turkey, for its divided orientation.

Also working with the question of how the institutional fit applies, or not, in cross-border environmental management contexts, Petursson et al. (2013) explore the case of international collaborations in protected area management through the case of Mt. Elgon, which spans the border between Kenya and Uganda. Their main aim is to employ the concept to evaluate the potential usefulness of a transboundary protected area regime for managing this forested water catchment and wildlife reserve. Based on a detailed review of the ecological and social situations on either side of the border, they find that the current social-ecological system of Mt. Elgon is substantially influenced by the divided history and different management regimes to be found on the Ugandan and Kenyan sides. They propose that these differences in history have influenced not only human behavior but also the ecology of the two areas, making it more appropriate to speak about two distinct social-ecological systems, with important links because of their coincidence on Mt. Elgon. Using the concepts of fit and interplay, as introduced by Young (2002) and elaborated by Vatn and Vedeld (2012), they suggest that rather than forcing a transboundary management approach onto what has, over time, become two decidedly distinct social-ecological systems, the aim of coordinating protection across Mt. Elgon would be better served by identifying those management issues that are truly transboundary in nature and constructing specific transboundary governance structures to

address them directly. Again, with a focus on land-use management on the African continent, Haller et al. (2013) present a meta-analysis of results from a series of long-term studies of the social and ecological dynamics of changing relations among pastoralists and settled communities in Zambia, Cameroon, and Tanzania. By contextualizing their use of the concept within the changing political economy of pre- and postcolonial Africa, they explore processes through which changing political contexts have served to render long-established indigenous institutions no longer fitting. They then proceed to consider, based on further case comparison, under what kinds of circumstances and with what types of institutional results local communities have been able to create new institutional arrangements that fit these changed conditions. In the course of their review, they argue that the coevolution of social and ecological systems should be explicitly taken into consideration when studying fit, illustrating how what might objectively be understood as ecological degradation can often be attributed to the degradation of long-established social-ecological institutional practices that have helped to shape the environment in the first place.

Finally, Hiedanpää (2013) and Hukkinen (2012), although both working at a fairly abstract level, also give considerable attention to the application of their work to the empirical world. Hiedanpää's main concern is, ultimately, to provide an explanation for the problem of policy implementation failure. Hukkinen, with his roller-coaster *Leitbild*, within the application context of the work of the social-ecological systems researcher, presents an alternative approach to the study of normativity within institutional theory, by formalizing attention to the role of the researcher in the process of creating the kinds of social-ecologically fitting norms that are required to build social-ecologically fitting institutions.

Responses to this article can be read online at:
<http://www.ecologyandsociety.org/issues/responses.php/5945>

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LITERATURE CITED

- Bromley, D. W. 2012. Environmental governance as stochastic belief updating: crafting rules to live by. *Ecology and Society* 17(3): 14. <http://dx.doi.org/10.5751/ES-04774-170314>
- Carpenter, S., B. Walker, J. M. Anderies, and N. Abel. 2001. From metaphor to measurement: resilience of what to what? *Ecosystems* 4(8):765-781. <http://dx.doi.org/10.1007/s10021-001-0045-9>
- Cox, M. 2012. Diagnosing institutional fit: a formal perspective. *Ecology and Society* 17(4): 54. <http://dx.doi.org/10.5751/ES-05173-170454>
- DeCaro, D. A., and M. K. Stokes. 2013. Public participation and institutional fit: a social-psychological perspective. *Ecology and Society* 18(4): 40. <http://dx.doi.org/10.5751/ES-05837-180440>
- Ekstrom, J. A., and O. R. Young. 2009. Evaluating functional fit between a set of institutions and an ecosystem. *Ecology and Society* 14(2): 16. [online] URL: <http://www.ecologyandsociety.org/vol14/iss2/art16/>
- Folke, C., L. Pritchard, F. Berkes, J. Colding, and U. Svedin. 1998. *The problem of fit between ecosystems and institutions*. IHDP Working Paper No. 2, International Human Dimensions Programme on Global Environmental Change (IHDP), Bonn, Germany.
- Folke, C., L. Pritchard, F. Berkes, J. Colding, and U. Svedin. 2007. The problem of fit between ecosystems and institutions: ten years later. *Ecology and Society* 12(1): 30. [online] URL: <http://www.ecologyandsociety.org/vol12/iss1/art30/>
- Gunderson, L. H., and C. S. Holling, editors. 2002. *Panarchy: understanding transformations in human and natural systems*. Island Press, London, UK.
- Haller, T., G. Fokou, G. Mbeyale, and P. Meroka. 2013. How fit turns into misfit and back: institutional transformations of pastoral commons in African floodplains. *Ecology and Society* 18(1): 34. <http://dx.doi.org/10.5751/ES-05510-180134>
- Herrfahrdt-Pähle, E. *In press*. Applying the concept of fit to water governance reforms in South Africa. *Ecology and Society*.
- Hiedanpää, J. 2013. Institutional misfits: law and habits in Finnish wolf policy. *Ecology and Society* 18(1): 24. <http://dx.doi.org/10.5751/ES-05302-180124>
- Holling, C. S., and G. K. Meffe. 1996. Command and control and the pathology of natural resource management. *Conservation Biology* 10(2):328-337. <http://dx.doi.org/10.1046/j.1523-1739.1996.10020328.x>
- Hukkinen, J. I. 2012. Fit in the body: matching embodied cognition with social-ecological systems. *Ecology and Society* 17(4): 30. <http://dx.doi.org/10.5751/ES-05241-170430>
- Lebel, L., E. Nikitina, C. Pahl-Wostl, and C. Knieper. 2013. Institutional fit and river basin governance: a new approach using multiple composite measures. *Ecology and Society* 18(1): 1. <http://dx.doi.org/10.5751/ES-05097-180101>
- Moss, T. 2012. Spatial fit, from panacea to practice: implementing the EU Water Framework Directive. *Ecology and Society* 17(3): 2. <http://dx.doi.org/10.5751/ES-04821-170302>
- Olsson, P., C. Folke, V. Galaz, T. Hahn, and L. Schultz. 2007. Enhancing the fit through adaptive co-management: creating and maintaining bridging functions for matching scales in the Kristianstads Vattenrike Biosphere Reserve, Sweden. *Ecology and Society* 12(1): 28. [online] URL: <http://www.ecologyandsociety.org/vol12/iss1/art28/>
- Ostrom, E. 2009. A general framework for analyzing sustainability of social-ecological systems. *Science* 325:419-422. <http://dx.doi.org/10.1126/science.1172133>
- Petursson, J., P. Vedeld, and A. Vatn. 2013. Going transboundary? An institutional analysis of transboundary protected area management challenges at Mt. Elgon, East Africa. *Ecology and Society*. 18(4): 28. <http://dx.doi.org/10.5751/ES-05729-180428>
- Trosper, R. L. 2005. Emergence unites ecology and society. *Ecology and Society* 10(1): 14. [online] URL: <http://www.ecologyandsociety.org/vol10/iss1/art14/>
- Vatn, A., and P. Vedeld. 2012. Fit, interplay, and scale: a diagnosis. *Ecology and Society* 17(4): 12. <http://dx.doi.org/10.5751/ES-05022-170412>
- Young, O. 2006. Vertical interplay among scale-dependent environmental and resource regimes. *Ecology and Society* 11(1): 27. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art27/>
- Young, O. R. 2002. *The institutional dimensions of environmental change. Fit, interplay, and scale*. MIT Press, Cambridge, Massachusetts, USA.
- Young, O. R. 2008. The architecture of global environmental governance: bringing science to bear on policy. *Global Environmental Politics* 8(1):14-32. <http://dx.doi.org/10.1162/glep.2008.8.1.14>
- Young, O. R., and A. Underdal. 1997. *Institutional dimensions of global change*. IHDP Scoping Report, International Human Dimensions Programme of Global Environmental Change (IHDP), Bonn, Germany.
- Zikos, D., and M. Roggero. 2012. The patronage of thirst: exploring institutional fit on a divided Cyprus. *Ecology and Society* 18(2): 25. <http://dx.doi.org/10.5751/ES-05442-180225>