



Research

Resilience revisited: taking institutional theory seriously

Martin Sjöstedt¹

ABSTRACT. Resilience thinking has in recent decades emerged as a key perspective within research and policy focusing on sustainable development and the global environmental challenges of today. Originating from ecology, the concept has gained a reputation far beyond its original disciplinary borders and now plays a key role in the study and practice of environmental governance in general. Although I fully support the interdisciplinary ambitions of resilience thinking, I argue that if the resulting scholarly insights and policy advice are to be of any true added value, resilience thinking should take existing social scientific advances more seriously. In particular, I argue that resilience thinking does not give sufficient recognition to the already existing accounts of, for example, institutional change trajectories, the dynamics of path dependence, the distributional character of institutions, or the fundamental political determinants and drivers of institutional design and diversity. A resilience theory truly recognizing social scientific advances in these areas, however, has substantial chances of truly furthering our understanding of and practical abilities in facing the fundamental environmental challenges of today.

Key Words: *institutional change; institutions; resilience*

INTRODUCTION

The concept of resilience has in recent decades emerged as a key to furthering our understanding of sustainable development and the global environmental challenges faced by humanity. Although definitions differ, they tend to converge around the notion of a system's ability to cope with and adapt to external pressures (cf., Adger 2000, Gunderson and Holling 2002, Berkes et al. 2003, Folke 2006, Walker et al. 2009). Originating from ecology, the concept has in recent years gained a reputation far beyond its original disciplinary borders and is now a dominating perspective in the study and practice of environmental governance in general. In an attempt to address the true challenges of today, resilience thinking intends to break disciplinary boundaries and hence to bridge the gap between the social and the natural sciences.

The interdisciplinary ambition of the resilience perspective is commendable. I, however, argue that although resilience thinking has furthered our understanding of the complexity of social-ecological linkages, there is indeed potential to integrate insights from the social sciences even further. More specifically, my ambition is to spell out how resilience thinking can be further developed by taking into account a few specific insights from institutional theory, historical institutionalism in particular. I hold that resilience thinking's potential to contribute to our understanding of social-ecological systems and environmental challenges would be improved even further if it truly recognized path-dependent dynamics, the politics of institutional change, and endogenous sources of institutional change. Guided by these three institutional insights, I argue that resilience thinking has tended to focus too excessively on issues of design and diversity instead of dynamics and determinants. This implies that although resilience thinking has the ambition to conceptualize complexity and change, it does not always satisfactorily acknowledge the inherent complexity of institutional theory itself. For example, although resilience thinking certainly has contributed to our understanding of institutional dynamics at different scales (Gundersson and Holling 2002, Olsson et al. 2004, Janssen et al. 2006, Ostrom et al. 2007, Young 2010, Galaz et al. 2011), I hold

that it has the potential to contribute even further if more attention is paid to already existing accounts of, for example, institutional change trajectories (Thelen 1999, Kingston and Caballero 2009), the dynamics of path dependence (Pierson 2004, Mahoney 2000), the distributional character of institutions, or the fundamental political determinants and drivers of institutional design and diversity (Mahoney and Thelen 2010).

Admittedly, some of the potential shortcomings of resilience thinking highlighted in this paper might be more or less intentional and simply constitute avenues of research beyond the ambition and standard analytical approach of resilience thinking. Still, I hold that a resilience perspective truly recognizing social scientific advances within these areas has substantial chances of developing our understanding of and practical abilities in facing the fundamental environmental challenges of today even further. For example, recognizing path-dependent dynamics would help resilience thinking to shed light on how institutions governing resource use might be sustained and even further strengthened despite being far from optimal. In turn, recognizing the politics of institutional change would, among other things, help resilience thinking analyze the distributional struggles inherent in any attempts to reform institutions. Finally, a focus on endogenous sources of change would, for example, help resilience thinking understand processes of change or stability only indirectly linked to resource dynamics or changes in the system to be governed.

RESILIENCE THINKING AND INSTITUTIONS

Resilience thinking has its origins in ecology and the discovery of multiple basins of attraction in ecosystems. At its core, the resilience perspective emphasizes dynamic change and, as such, challenges the dominant stable equilibrium view. Instead of assuming that ecosystems are in equilibrium or tend to return to equilibrium after being exposed to shocks, the perspective instead focuses on "non-linear dynamics, thresholds and surprise, how periods of gradual change interplay with periods of rapid change and how such dynamics interact across temporal and spatial scales." (Folke 2006:253).

¹Department of Political Science, University of Gothenburg

Although resilience thinking has its origins in the natural sciences, ecology in particular, the social sciences are today increasingly being involved. Scholars within the broad resilience field have also contributed significantly to the social sciences in general, especially to institutional theory. Nobel laureate Elinor Ostrom is in this respect the most prominent example; her work on “commons” and “polycentric systems” (Ostrom 1990, 2010) has become known and respected also in mainstream political science and economics. The notion of institutional design and the design principles suggested by Ostrom (1990) have in fact inspired not only researchers within the resilience field but also a new generation of social scientists. This field of research has had great impact on environmental studies more generally, and a number of social scientists have followed in the footsteps of Ostrom’s interdisciplinary ambitions. For example, political scientist Oran Young has contributed greatly in this regard and has taken the resilience-inspired notion of complexity seriously in his seminal work on institutional fit, interplay, and scale (Young 2002, Young et al. 2008). Governance of complex systems is also at the core of the work of Duit and Galaz (2008), in which they aim to broaden the scope of traditional governance theory and apply it to processes characterized by nonlinear dynamics, threshold effects, cascades, and limited predictability. In addition, resilience thinking has contributed greatly to research on earth systems governance (Biermann 2007, 2012, Galaz et al. 2012), vulnerability (Adger 2000, 2003, Brooks et al. 2005), and local-level institutional dynamics (Anderies et al. 2004, 2006, Ostrom 2005, Janssen et al. 2006, Berkes and Ross 2013).

In fact, the list of examples of resilience thinking’s novel and innovative interdisciplinary contributions to our general understanding of humanity’s interaction and interplay with nature can certainly be made long (see Carpenter and Gunderson 2001, Gunderson and Holling 2002, Berkes et al. 2003, Colding et al. 2003, Steffen et al. 2004, Adger 2006, Cash et al. 2006, Smit and Wandel 2006, Biermann 2007, Walker et al. 2009, Galaz et al. 2011). However, although resilience thinking has inspired researchers within social science, and although social science and social scientists are becoming increasingly integrated in resilience thinking, I argue that there is certainly room for improvement when it comes to acknowledging existing social scientific advances. Although both institutions and the concept of dynamic change are of crucial importance to scholars within the resilience field, the social scientific insights concerning dynamic institutional change can be more strongly integrated. Although the literature on resilience thinking has made very important contributions to our understanding of resource dynamics and institutional challenges, it is my firm belief that resilience thinking would be even stronger if it incorporated insights regarding path-dependent dynamics, the politics of institutional change, and endogenous sources of institutional change. The argument developed here holds that some critical aspects of institutional theory need to be taken seriously if resilience thinking is to fulfill its potential as truly coupling the natural and social sciences, as well contributing with robust policy advice and knowledge about social-ecological systems and environmental governance.

PATH-DEPENDENT DYNAMICS AND NONLINEAR CHANGE

To start with, although resilience thinking has dynamic change at its core, the perspective partly overlooks existing social scientific research on institutional change dynamics. In fact, although

resilience thinking emphasizes system dynamics and complexity, the way in which institutional theory is conceptualized tends to be somewhat simplified. For example, although resilience thinking focuses on incremental or abrupt changes, tipping points, thresholds, and cascading effects, it does not fully recognize that the concept of dynamic change has been at the core of institutional theory for quite some time (North 1990, Snyder 1992, Knight 1995, Thelen 1999, 2004, Greif and Laitin 2004, Streeck and Thelen 2005, Ostrom and Basurto 2011). More specifically, although it might be true that large parts of social science are still guided by a linear, scale-free, and static worldview (cf., Duit and Galaz 2008), there are also important exceptions, especially within the branch of institutional theory called historical institutionalism.^[1] Consider, for example, the concept of institutional path dependence with its emphasis on feedback loops, formative moments, and unexpected and unpredictable outcomes. In a nutshell, path dependence emphasizes that choices made during so-called critical junctures or formative moments determine much of the future development trajectories. Under these circumstances, new conditions disrupt or overwhelm the specific mechanisms that previously reproduced the existing behavior (Hall and Taylor 1998). Path dependence is often used to conceptualize stability rather than change and gives an underlying logic to why particular paths can be extraordinarily difficult to reverse. Path dependence states that a range of outcomes is often possible, even when starting with similar conditions, and large consequences can result from small or contingent events (Pierson 2004). Consequently, as argued by Levi, “Once a country or region has started down a track, the costs of reversal are very high. There will be other choice points, but the entrenchments of certain institutional arrangements obstruct an easy reversal of the initial choice” (Levi 1997:28).

However, although the concept of path dependence seems to explain institutional stability and rigidity, the concept is in fact dynamic rather than static in character. More specifically, path dependence emphasizes self-reinforcing sequences characterized by the formation and long-term reproduction of a given institutional pattern. Thus, it does not describe a steady state but rather a process where feedback makes every step taken in a particular direction increase the cost of reversal. Therefore, the relative benefits of the chosen development path increase over time compared with once-possible options (Mahoney 2000). In his seminal 2004 book, Pierson states that this can be understood in terms of the idea that:

New institutions and policies often generate high fixed costs, learning effects, coordination effects, and adaptive expectations. Institutions and policies may encourage individuals and organizations to invest in specialized skills, deepen relationships with other individuals and organizations, and develop particular political and social identities. These activities increase the attractiveness of existing institutional arrangements relative to hypothetical alternatives. (Pierson 2004:35)

Path dependence is thus not about traditional linear sequences of causally connected events, or about simplistic and static arguments such as “history matters” or “the past influences the future,” but instead emphasizes how contingent events set into motion institutional patterns or event chains in which outcomes are related stochastically to initial conditions (Mahoney 2000).

Importantly, in this conceptualization, the processes responsible for the genesis of an institution are different from the processes responsible for the reproduction of the institution. This in turn has implications for how institutional design and evolution are understood. For example, if path-dependent institutions persist in the absence of the forces responsible for their creation, resilience thinking needs to pay closer attention to the mechanisms of reproduction rather than assuming stability and rigidity or only focusing on external sources of change. According to Mahoney (2000), the mechanisms responsible for institutional reproduction can be understood in terms of utilitarian, functional, power, and legitimation explanations. These different explanatory modes in turn identify different mechanisms of institutional reproduction. Each explanation also contributes with different mechanisms for reversing self-enforcing processes.^[2]

The importance of complexity and nonlinearity is also emphasized in a broader social science literature. For example, Bennett and Elman argue:

Qualitative methodologists tend to believe that the social world is complex, characterized by path dependence, tipping points, interaction effects, strategic interaction, two-directional causality or feedback loops, and equifinality (many different paths to the same outcome) or multifinality (many different outcomes from the same value of an independent variable, depending on context).
(Bennett and Elman 2006:457)

Although perhaps not within the absolute mainstream of political science, such logical scientific inquiry stands in sharp contrast to modes of argument and explanation that only attribute large outcomes to large causes, that emphasize the prevalence of unique predictable outcomes, or that see timing and sequence as irrelevant. Although a general linear model assumes that “cause can never flow from small to large, from arbitrary to the general, from the minor event to the major development” (Abbott 1983:173), the underlying logic of many social scientific inquiries is in fact instead that causation flows from contingent historical events to general development processes (Mahoney 2000).

Although resilience thinking may be generally right that the above insights do not characterize large parts of the study of society and politics, there are at least important exceptions. If it does not recognize these exceptions, resilience thinking might run the risk of being accused of relabeling and reselling the message. For example, a central concept in resilience terminology is threshold effects, characterized by small events that might trigger changes that are difficult or even impossible to reverse (Gunderson and Holling 2002, Folke 2006, Kinzig et al. 2006). But given the reasoning above, this is really neither a controversial nor innovative statement. It in fact corresponds perfectly with the logic of path dependence and its emphasis on contingent events and unexpected outcomes. Similarly, given the reasoning about contingent events, the central role resilience thinking gives to surprises and the fact that a system’s behavior differs substantially from what was initially expected (cf., Folke 2006) is far from new for social scientists. That things do not turn out as expected is hardly a surprise for scholars of society and politics (cf., Lindblom 1959, Pressman and Wildavsky 1973). In fact, if social systems were linear and predictable, we probably would have solved a number of societal problems by now. Finally, resilience thinking

argues that thresholds and surprises are said to cascade across scales (Folke et al. 2004, Kinzig et al. 2006). The specific meaning of such a statement for social science is somewhat elusive, but it means that there are multiple, nested layers of governance, it adds little to our previous understanding (cf., Pierre and Peters 2005). In sum, some of the defining characteristics used to describe complex adaptive systems within the resilience perspective are in fact characteristics inherent in many analyses of politics.

In conclusion, taking institutional change dynamics seriously by moving away from assumptions about institutions as static and linear has the potential to contribute greatly to the understanding of social-ecological systems. As recognized by Anderies et al. (2006:867), taking path-dependent dynamics into account “adds considerable value by capturing institutional and social constraints to management action typically not considered.” For instance, this would potentially help resilience thinking further understand not only institutional stability and rigidity but also the underlying self-reinforcing mechanisms sustaining, and even strengthening, particular institutional arrangements although those institutional arrangements might in fact be far from optimal.

THE POLITICS OF INSTITUTIONAL CHANGE

Institutional change has been analyzed from a number of different perspectives within the social sciences. For example, many authors treat institutional change as a process in which purposefully designed institutions are subject to a collective-choice process whereby actors bargain or compete to try to implement institutional changes beneficial to their immediate interests (Ostrom 2005, Mahoney and Thelen 2010). Others, however, conceptualize institutional change as an evolutionary process occurring spontaneously through an uncoordinated selection process involving many different agents (Williamson 2000). Finally, some scholars try to combine these two approaches in what can be labeled an equilibrium view of institutions (Greif 2006, Kingston and Caballero 2009).

Let us for a moment focus on the collective-choice perspective and spell out the potential implications for resilience thinking. Institutions are here seen as an outcome of a centralized collective-choice process in which actors lobby, bargain, vote, or compete to implement the changes most beneficial to themselves. Ostrom’s logic of institutional change, for example, emphasizes the process by which each actor weighs the expected costs of an institutional change against the benefits. If a minimum coalition necessary to effect change agrees to it, then institutional change can occur (Ostrom 2005). Similarly, Mahoney and Thelen (2010) see institutional change patterns as being determined by distributional struggles occurring when problems of rule interpretation and enforcement open up space for actors to implement existing rules in new ways. Institutions, in this account, are conceptualized as being fraught with tensions. Because any given institution has implications for resource allocation (some are even designed with the purpose of distributing resources to particular groups of resource users), institutions can thus be described as “distributional instruments laden with power implications” (Mahoney and Thelen 2010:8). Accordingly, institutions are changed not only in response to exogenous shocks but also through ongoing struggles regarding the meaning, application, and enforcement of institutionalized rules.

These struggles in turn imply that “where we expect change to emerge is precisely in the ‘gaps’ or ‘soft spots’ between the rule and its interpretation or the rule and its enforcement” (Mahoney and Thelen 2010:14). This conceptualization “emphasizes the interaction between features of the political context and properties of the institutions themselves as crucially important for explaining institutional change” (Mahoney and Thelen 2010:31). More specifically, Mahoney and Thelen discuss the concepts of displacement, layering, drift, and conversion. Although displacement is defined as the removal of existing rules and the introduction of new ones, layering is a process characterized by the introduction of new rules on top of or alongside existing ones. Drift, on the other hand, describes a process where the impact of existing rules changes because of changes in the surrounding environment. Finally, conversion describes the changed enactment of existing rules because of their strategic redeployment (Mahoney and Thelen 2010). Therefore, the collective-choice approach can help us understand why apparently similar transactions are governed by very different institutional arrangements. Although generally not recognized within the resilience field, this perspective on institutional change gives an underlying rationale for and further substantiates the notion of institutional diversity often put forward by resilience thinking.

Although the different accounts of institutional change all emphasize its inherently political nature, resilience thinking on many occasions displays only a very crude understanding of political processes in general and the policy process in particular, and as such runs the risk of being politically naïve. However, as argued by Duit (2015), decades of research within the social sciences shows that reform processes are very difficult to initiate and sustain (Pressman and Wildavsky 1973), policy reforms seldom work as intended (Lindblom 1959, Scheffer 2009), participatory processes are sensitive to power asymmetries and elite capture (Ribot 2006), and the outcome of collective decision making is to a large extent determined by veto players (Tsebelis 2002), policy coalitions, and agenda-setting dynamics (Sabatier 1999, Kingdon 2003). All things considered, politics is “considerably more messy and ugly than SES resilience thinking recognizes” (Duit 2015:10), and the recognition of this would potentially provide resilience thinking with a more accurate understanding of governance in general, and institutions in particular.

ENDOGENOUS SOURCES OF CHANGE

Despite the different perspectives on institutional change and the politics of institutional change in particular, I argue that resilience thinking tends to emphasize a functional and voluntaristic account of institutional change. That is, institutional change is within resilience thinking often conceptualized as an intentional design exercise in which rational actors purposefully create or change institutions to serve a specific purpose. In other instances, institutional genesis and evolution are explained in a more or less functionalistic way by the effects of institutions (Ostrom and Janssen 2004, Paavola 2007, Duit and Galaz 2008, Berman et al. 2012; cf., Pierson 2000). Therefore, there are many calls for “better-designed institutions” (Walker et al. 2009) or calls for finding the “optimal design for capable institutions” (Reischl 2012). However, the search for optimality is highly questionable, not least because optimality only can be assessed in retrospect.

The retrospective and functional analysis of institutions is also clearly visible in the very common, almost therapeutical, exercise of creating typologies, which by and large are functionalistic (see Lemos and Agrawal 2006, Duit and Galaz 2008, Engle and Lemos 2010). As such, resilience thinking tends to hold unrealistic expectations about the possibility of rational and purposeful institutional design achieving sustainability-enhancing changes in governance systems. Duit (2015) labels this a “governability paradox,” meaning “if it was indeed possible to design, guide, and control processes of social change to the extent that is assumed in many of the policy prescriptions emanating from the resilience literature, then there probably would not be any environmental problems to begin with” (Duit 2015:10).

These shortcomings are in part symptoms of a more general weakness: namely, the almost exclusive emphasis on external sources of change rather than on endogenous institutional dynamics. Although in many cases these endogenous dynamics might only be the outcome of internal distributional struggles, they might also be closely related to changes in the biophysical world. That is, a focus on endogenous dynamics does not exclude studying the interplay between social and ecological systems, and hence does not necessarily constitute a focus on institutional change in isolation. For example, Duit et al. (2010) explicitly focus on both rapid and incremental social-ecological change, and explore multilevel governance challenges posed by the behavior of dynamic and complex systems. However, although they acknowledge that previous research has been too static and failed to conceptualize change, and that it was functionalistic in the sense that system functions were tautologically explained in terms of their usefulness for maintaining equilibrium in the greater systems, the origins of change are still basically framed as exclusively exogenous to “cope with and adapt to a constantly dynamic and changing environment” (Duit et al. 2010:364). In the same special issue of *Global Environmental Change*, Young (2010), on the other hand, more clearly recognizes that governance systems or resource regimes are dynamic. However, although the interplay between social and ecological systems is said to be of primary interest in resilience thinking, Young’s account mostly emphasizes the effects of changes in the external, natural world on the social systems. It does not, for example, recognize that social systems affect what happens in the natural world nor that internal dynamics might make some institutions less efficient or more vulnerable than others. Instead, Young argues that change can be understood as responses to events occurring in biophysical and socioeconomic settings in which regimes operate. However, by arguing that institutions often develop in the sense that they move toward realizing their potential or make adjustments needed to maintain their compatibility with changing biophysical or socioeconomic circumstances, Young ends up with a more or less functionalistic typology. This could clearly have been avoided if endogenous dynamics had also been recognized. Thus, although the exclusive focus on the interplay between social and ecological systems or on changes in the system to be governed might indeed be intentional, resilience thinking clearly has the potential to more strongly integrate insights regarding endogenous institutional dynamics.

I argue that institutional analyses within the resilience field tend to focus too excessively on external sources of change. In fact,

although the general ambition is to link social and ecological systems, the exclusive focus on the effects of the natural system on the social systems' adaptive capacity or flexibility actually risks decoupling the social from the natural. By also incorporating a focus on endogenous sources of change, resilience thinking could provide a more thorough understanding of social-ecological systems when societal responses are not primarily driven by resource dynamics or when the feedback from the biophysical part of the system is weak or severely delayed (cf., Duit 2015).

Institutional theory proper, however, has made great progress when it comes to conceptualizing endogenous change. Greif and Laitin (2004), for example, set out to develop a game-theoretic perspective on institutions by extending it as a product of an historical process in which institutions change endogenously. Similarly, Thelen (1999) argues that to understand the processes of change, a thorough understanding of internal mechanisms of reproduction is needed. Thelen also argues that institutional change not only occurs in critical junctures during which exogenous shocks produce path-departing transformations but also tends to occur because of endogenous mechanisms of change.

Institutions and institutional change can be conceptualized as being driven by endogenous dynamics in the sense that all motivation is endogenously provided. A self-enforcing institution simply means that each actor involved in a transaction governed by the institution behaves in a way that helps motivate, constrain, guide, and enable others to behave in a way that reinforces the way in which the transaction is governed (Greif 2006). Such an analysis requires that each actor's incentives to act in an institution-reinforcing way are explicitly taken into consideration. However, resilience thinking by and large overlooks such endogenous incentives and instead conceptualizes institutions as politically determined rules that often are imposed exogenously. However, institutions are more than rules, and a narrow institutions-as-rules focus tends to ignore important institutional dynamics. In fact, without incentives to comply, rules and contracts are merely instructions. Instructions can be ignored. Incentives to abide by rules should thus not necessarily be viewed as exogenous or as a product of third-party coercion. Instead, a thorough analysis must consider the incentive structure facing each party involved in the interaction. Institutions and the behavior they generate constitute an equilibrium: Institutions mirror the actions of the interacting agents but also constitute the structure influencing each agent's behavior. Taking these factors into account would in turn help resilience thinking conceptualize the dynamic character of social-ecological systems and institutional change even more accurately.

The logic of endogenous institutional change also highlights the importance of informal institutions. Although a focus on formal rules is by far the most common, "informal institutions shape even more strongly political behavior and outcomes" in many contexts (Helmke and Levitsky 2004:725). Careful attention to informal institutions is hence critical to understanding the incentives that enable or constrain political behavior. Just as informal institutions affect the workings of formal institutions, they also play a crucial role in endogenous change processes. More specifically, Helmke and Levitsky (2004) define four patterns in which informal institutions affect formal institutions:

complementary, accommodating, competing, or substitutive. Informal structures endogenously shape the performance of formal institutions in important and often unexpected ways and would, as such, add substantially to resilience thinking's understanding of social-ecological dynamics and institutional change.

CONCLUSION

Given the severe environmental challenges of today, scholarly effort within the areas of sustainable development and management of natural resources is urgently needed. Resilience thinking has contributed greatly in this regard, especially by avoiding disciplinary myopia and helping us to understand the way in which social and ecological systems are interlinked. The perspective has also gained significant policy influence and is to some extent replacing sustainable development as the key concept for environmental decision making. However, I argue that the research and policy advice stemming from resilience thinking would bring even more added value if it takes existing social scientific advances, especially from the field of historical institutionalism, even more seriously. More specifically, resilience thinking should abandon presumptions about social science as static and linear, and instead recognize that dynamic change is at center stage in many social scientific inquiries. For example, concepts such as path dependence and its dynamic mechanisms of reproduction, reversal, and change have the potential to contribute significantly to a coupled analysis of social-ecological systems. Moreover, resilience thinking should recognize the fundamental political nature of institutions. Institutions are subject to distributional struggles, and issues such as power and legitimacy heavily influence the way they function. Therefore, the reliance on purposeful, rational, and optimal design of institutions, as well as the functionalistic mapping of institutional diversity, should be replaced by studies explicitly investigating the dynamics, drivers, and determinants of institutions. Such an endeavor would benefit from abandonment of the almost exclusive focus on external sources of change and instead also acknowledge endogenous, and often informal, dynamics.

In conclusion, resilience thinking is probably right in its assertion that the environmental challenges we face today "cannot be understood, let alone managed or controlled, through scientific activity organized along traditional disciplinary lines" (Berkes et al. 2003:2; cf., Jasanoff et al. 1997). However, although such an interdisciplinary ambition should be applauded, it still needs to take the disciplinary contributions seriously. Of course, the responsibility also sits heavily with social scientists, who need to engage in more collaborative and interdisciplinary research that focuses on real-world problems rather than inquiries explaining politics with politics and who should aim to publish in journals with impact beyond their social scientific subfields.

Responses to this article can be read online at:

<http://www.ecologyandsociety.org/issues/responses.php/8034>

LITERATURE CITED

- Abbott, A. 1983. Sequences of social events: concepts and methods for the analysis of order in social processes. *Historical Methods: A Journal of Quantitative and Interdisciplinary History* 16(4):129-147. <http://dx.doi.org/10.1080/01615440.1983.10594107>
- Adger, W. N. 2000. Social and ecological resilience: are they related? *Progress in Human Geography* 24(3):347-364. <http://dx.doi.org/10.1191/030913200701540465>
- Adger, W. N. 2003. Social capital, collective action and adaptation to climate change. *Economic Geography* 79:387-404. <http://dx.doi.org/10.1111/j.1944-8287.2003.tb00220.x>
- Adger, W. N. 2006. Vulnerability. *Global Environmental Change* 16(3):268-281. <http://dx.doi.org/10.1016/j.gloenvcha.2006.02.006>
- Anderies, J. M., M. A. Janssen, and E. Ostrom. 2004. A framework to analyze the robustness of social-ecological systems from an institutional perspective. *Ecology and Society* 9(1):18. [online] URL: <http://www.ecologyandsociety.org/vol9/iss1/art18/>
- Anderies, J. M., P. Ryan, and B. H. Walker. 2006. Loss of resilience, crisis, and institutional change: lessons from an intensive agricultural system in Southeastern Australia. *Ecosystems* 9:865-878. <http://dx.doi.org/10.1007/s10021-006-0017-1>
- Bennett, A., and C. Elman. 2006. Qualitative research: recent developments in case study methods. *Annual Review of Political Science* 9:455-476. <http://dx.doi.org/10.1146/annurev.polisci.8.082103.104918>
- Berkes, F., J. Colding, and C. Folke, editors. 2003. *Navigating social-ecological systems: building resilience for complexity and change*. Cambridge University Press, Cambridge, UK. <http://dx.doi.org/10.1017/cbo9780511541957>
- Berkes, F., and H. Ross. 2013. Community resilience: toward and integrated approach. *Society & Natural Resources* 26(1):5-20. <http://dx.doi.org/10.1080/08941920.2012.736605>
- Berman, R., C. Quinn, and J. Paavola. 2012. The role of institutions in the transformation of coping capacity to sustainable adaptive capacity. *Environmental Development* 2:86-100. <http://dx.doi.org/10.1016/j.envdev.2012.03.017>
- Biermann, F. 2007. 'Earth system governance' as a crosscutting theme of global change research. *Global Environmental Change* 17:326-337. <http://dx.doi.org/10.1016/j.gloenvcha.2006.11.010>
- Biermann, F. 2012. Planetary boundaries and earth system governance: exploring the links. *Ecological Economics* 81:4-9. <http://dx.doi.org/10.1016/j.ecolecon.2012.02.016>
- Brooks, N., W. N. Adger, and P. M. Kelly. 2005. The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation. *Global Environmental Change* 15:151-163. <http://dx.doi.org/10.1016/j.gloenvcha.2004.12.006>
- Carpenter, S. R., and L. H. Gunderson. 2001. Coping with collapse: ecological and social dynamics in ecosystem management. *BioScience* 51:451-457. [http://dx.doi.org/10.1641/0006-3568\(2001\)051\[0451:CWCEAS\]2.0.CO;2](http://dx.doi.org/10.1641/0006-3568(2001)051[0451:CWCEAS]2.0.CO;2)
- Cash, D. W., W. N. Adger, F. Berkes, P. Garden, L. Lebel, P. Olsson, L. Pritchard, and O. Young. 2006. Scale and cross-scale dynamics: governance and information in a multilevel world. *Ecology and Society* 11(2):8. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art8/>
- Colding, J., C. Folke, and T. Elmqvist. 2003. Social institutions in ecosystem management and biodiversity conservation. *Tropical Ecology* 44:25-41.
- Duit, A. 2015. Resilience thinking: lessons for public administration. *Public Administration*. Early view. <http://dx.doi.org/10.1111/padm.12182>
- Duit, A., and V. Galaz. 2008. Governance and complexity—emerging issues for governance theory. *Governance* 21:311-335. <http://dx.doi.org/10.1111/j.1468-0491.2008.00402.x>
- Duit, A., V. Galaz, K. Eckerberg, and J. Ebbesson. 2010. Governance, complexity, and resilience. *Global Environmental Change* 20:363-368. <http://dx.doi.org/10.1016/j.gloenvcha.2010.04.006>
- Engle, N. L., and M. C. Lemos. 2010. Unpacking governance: building adaptive capacity to climate change of river basins in Brazil. *Global Environmental Change* 20:4-13. <http://dx.doi.org/10.1016/j.gloenvcha.2009.07.001>
- Folke, C. 2006. Resilience: the emergence of a perspective for social-ecological systems analyses. *Global Environmental Change* 16(3):253-267. <http://dx.doi.org/10.1016/j.gloenvcha.2006.04.002>
- Folke, C., S. Carpenter, B. Walker, M. Scheffer, T. Elmqvist, L. Gunderson, and C. S. Holling. 2004. Regime shifts, resilience, and biodiversity in ecosystem management. *Annual Review of Evolutionary Systems* 35:557-581. <http://dx.doi.org/10.1146/annurev.ecolsys.35.021103.105711>
- Galaz, V., F. Biermann, B. Crona, D. Loorbach, C. Folke, P. Olsson, M. Nilsson, J. Allouche, Å. Persson, and G. Reischl. 2012. 'Planetary boundaries'—exploring the challenges for global environmental governance. *Current Opinion in Environmental Sustainability* 4(1):80-87. <http://dx.doi.org/10.1016/j.cosust.2012.01.006>
- Galaz, V., F. Moberg, E.-K. Olson, E. Paglia, and C. Parker. 2011. Institutional and political leadership dimensions of cascading ecological crises. *Public Administration* 89(2):361-380. <http://dx.doi.org/10.1111/j.1467-9299.2010.01883.x>
- Greif, A. 2006. *Institutions and the path to the modern economy*. Cambridge University Press, Cambridge, UK. <http://dx.doi.org/10.1017/cbo9780511791307>
- Greif, A., and D. D. Laitin. 2004. A theory of endogenous institutional change. *American Political Science Review* 98(4):633-652. <http://dx.doi.org/10.1017/S0003055404041395>
- Gunderson, L., and C. S. Holling. 2002. *Panarchy: understanding transformations in human and natural systems*. Island Press, Washington, D.C., USA.
- Hall, P. A., and R. C. R. Taylor. 1996. Political science and the three new institutionalisms. *Political Studies* 44:936-957. <http://dx.doi.org/10.1111/j.1467-9248.1996.tb00343.x>
- Hall, P. A., and R. C. R. Taylor. 1998. The potential of historical institutionalism: a response to Hay and Wincott. *Political Studies* 44(5):936-957. <http://dx.doi.org/10.1111/1467-9248.00178>
- Helmke, G., and S. Levitsky. 2004. Informal institutions and comparative politics: a research agenda. *Perspectives on Politics* 2(4):725-740. <http://dx.doi.org/10.1017/S1537592704040472>

- Janssen, M. A., Ö. Bodin, J. M. Anderies, T. Elmqvist, H. Ernstson, R. R. J. McAllister, P. Olsson, and P. Ryan. 2006. Toward a network perspective of the study of resilience in social-ecological systems. *Ecology and Society* 11(1):15. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art15/>
- Jasanoff, S., R. Colwell, M. S. Dresselhaus, R. D. Goldman, M. R. C. Greenwood, A. S. Huang, W. Lester, S. A. Levin, M. C. Linn, J. Lubchenco, M. J. Novacek, A. C. Roosevelt, J. E. Taylor, and N. Wexler. 1997. Conversations with the community: AAAS at the millennium. *Science* 278:2066-2067. <http://dx.doi.org/10.1126/science.278.5346.2066>
- Kingdon, J. W. 2003. *Agendas, alternatives, and public policies*. Longman, New York, New York, USA.
- Kingston, C., and G. Caballero. 2009. Comparing theories of institutional change. *Journal of Institutional Economics* 5 (2):151-180. <http://dx.doi.org/10.1017/s1744137409001283>
- Kinzig, A. P., P. Ryan, M. Etienne, H. Allison, T. Elmqvist, and B. H. Walker. 2006. Resilience and regime shifts: assessing cascading effects. *Ecology and Society* 11(1):20. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art20/>
- Knight, J. 1995. Models, interpretation and theories: constructing explanations of institutional emergence and change. Pages 95-120 in J. Knight and I. Sened, editors. *Explaining social institutions*. University of Michigan Press, Ann Arbor, Michigan, USA.
- Lemos, M. C., and A. Agrawal. 2006. Environmental governance. *Annual Review of Environmental Resources* 31:297-325. <http://dx.doi.org/10.1146/annurev.energy.31.042605.135621>
- Levi, M. 1997. A model, a method, and a map: rational choice in comparative and historical analysis. Pages 19-41 in M. I. Lichbach and A. S. Zuckerman, editors. *Comparative politics: rationality, culture, and structure*. Cambridge University Press, Cambridge, UK.
- Lindblom, C. E. 1959. The science of "muddling through." *Public Administration Review* 19(2):79-88. <http://dx.doi.org/10.2307/973677>
- Mahoney, J. 2000. Path dependence in historical sociology. *Theory and Society* 29:507-548. <http://dx.doi.org/10.1023/A:1007113830879>
- Mahoney, J., and K. Thelen. 2010. *Explaining institutional change. ambiguity, agency, and power*. Cambridge University Press, Cambridge, UK.
- North, D. C. 1990. *Institutions, institutional change and economic performance*. Cambridge University Press, Cambridge, UK. <http://dx.doi.org/10.1017/cbo9780511808678>
- Olsson, P., C. Folke, and T. Hahn. 2004. Social-ecological transformation for ecosystem management: the development of adaptive co-management of a wetland in southern Sweden. *Ecology and Society* 9(4):2. [online] URL: <http://www.ecologyandsociety.org/vol9/iss4/art2/>
- Ostrom, E. 1990. *Governing the commons: the evolution of institutions for collective action*. Cambridge University Press, Cambridge, UK. <http://dx.doi.org/10.1017/CBO9780511807763>
- Ostrom, E. 2005. *Understanding institutional diversity*. Princeton University Press, Princeton, New Jersey, USA.
- Ostrom, E. 2010. Polycentric systems for coping with collective action and global environmental change. *Global Environmental Change* 20:550-557. <http://dx.doi.org/10.1016/j.gloenvcha.2010.07.004>
- Ostrom, E., and X. Basurto. 2011. Crafting analytical tools to study institutional change. *Journal of Institutional Economics* 7 (3):317-343. <http://dx.doi.org/10.1017/s1744137410000305>
- Ostrom, E., and M. A. Janssen. 2004. Multi-level governance and resilience of social-ecological systems. Pages 239-259 in M. Spoor, editor. *Globalization, poverty and conflict*. Springer, Dordrecht, Netherlands. http://dx.doi.org/10.1007/1-4020-2858-x_13
- Ostrom, E., M. A. Janssen, and J. M. Anderies. 2007. Going beyond panaceas. *Proceedings of the National Academy of Sciences of the United States of America* 104(39):15176-15178. <http://dx.doi.org/10.1073/pnas.0701886104>
- Paavola, J. 2007. Institutions and environmental governance: a reconceptualization. *Ecological Economics* 63:93-103. <http://dx.doi.org/10.1016/j.ecolecon.2006.09.026>
- Pierre, J., and B. G. Peters. 2005. *Governing complex societies: trajectories and scenarios*. Palgrave MacMillan, Basingstoke, UK. <http://dx.doi.org/10.1057/9780230512641>
- Pierson, P. 2000. The limits of design: explaining institutional origins and change. *Governance* 13(4):475-499. <http://dx.doi.org/10.1111/0952-1895.00142>
- Pierson, P. 2004. *Politics in time: history, institutions, and social analysis*. Princeton University Press, Princeton, New Jersey, USA.
- Pressman, J. L., and A. B. Wildavsky. 1973. *Implementation: how great expectations in Washington are dashed in Oakland; or, why it's amazing that federal programs work at all*. University of California Press, Berkeley, California, USA.
- Reischl, G. 2012. Designing institutions for governing planetary boundaries—lessons from global forest governance. *Ecological Economics* 81:33-40. <http://dx.doi.org/10.1016/j.ecolecon.2012.03.001>
- Ribot, J. C. 2006. Choose democracy: environmentalists' socio-political responsibility. *Global Environmental Change* 16:115-119. <http://dx.doi.org/10.1016/j.gloenvcha.2006.01.004>
- Sabatier, P. A. 1999. *Theories of the policy process*. Westview, Boulder, Colorado, USA.
- Scheffer, M. 2009. *Critical transitions in nature and society*. Princeton University Press, Princeton, New Jersey, USA.
- Smit, B., and J. Wandel. 2006. Adaptation, adaptive capacity and vulnerability. *Global Environmental Change* 16:282-292. <http://dx.doi.org/10.1016/j.gloenvcha.2006.03.008>
- Snyder, R. 1992. Explaining transitions from neopatrimonial dictatorships. *Comparative Politics* 24(4):379-399. <http://dx.doi.org/10.2307/422151>
- Steffen, W., R. A. Sanderson, P. D. Tyson, J. Jäger, P. M. Matson, B. Moore, III, F. Oldfield, K. Richardson, H. J. Schellnhuber, B. L. Turner, and R. J. Wasson. 2004. *Global change and the earth system: a planet under pressure*. Springer, New York, New York, USA.

Streeck, W., and K. Thelen, editors. 2005. *Beyond continuity: institutional change in advanced political economies*. Oxford University Press, Oxford, UK.

Thelen, K. 1999. Historical institutionalism in comparative politics. *Annual Review of Political Science* 2:369-404. <http://dx.doi.org/10.1146/annurev.polisci.2.1.369>

Thelen, K. 2004. *How institutions evolve: the political economy of skills in German, Britain, the United States, and Japan*. Cambridge University Press, New York, New York, USA. <http://dx.doi.org/10.1017/CBO9780511790997>

Tsebelis, G. 2002. *Veto players: how political institutions work*. Princeton University Press, Princeton, New Jersey, USA. <http://dx.doi.org/10.1515/9781400831456>

Walker, B., S. Barrett, S. Polasky, V. Galaz, C. Folke, G. Engstrom, F. Ackerman, K. Arrow, S. Carpenter, K. Chopra, G. Daily, P. Ehrlich, T. Hughes, N. Kautsky, S. Levin, K.-G. Mäler, J. Shogren, J. Vincent, T. Xepapadeas, and A. de Zeeuw. 2009. Looming global-scale failures and missing institutions. *Science* 325:1345-1346. <http://dx.doi.org/10.1126/science.1175325>

Williamson, O. E. 2000. The new institutional economics: taking stock, looking ahead. *Journal of Economic Literature* 38:595-613. <http://dx.doi.org/10.1257/jel.38.3.595>

Young, O. R. 2002. *The institutional dimensions of environmental change: fit, interplay, and scale*. MIT Press, Cambridge, Massachusetts, USA.

Young, O. R. 2010. Institutional dynamics: resilience, vulnerability and adaptation in environmental and resource regimes. *Global Environmental Change* 20:378-385. <http://dx.doi.org/10.1016/j.gloenvcha.2009.10.001>

Young, O. R., L. A. King, and H. Schroeder, editors. 2008. *Institutions and environmental change*. MIT Press, Cambridge, Massachusetts, USA. <http://dx.doi.org/10.7551/mitpress/97802-62240574.001.0001>