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Introduction: Social-Ecological Resilience and Law

Ahjond S. Garmestani

U.S. Environmental Protection Agency, National Risk Management Research Laboratory, garmestani.ahjond@epa.gov

Craig R. Allen

U.S. Geological Survey-Nebraska Cooperative Fish & Wildlife Research Unit, callen3@unl.edu

Craig Anthony Arnold

University of Louisville, tony.arnold@louisville.edu

Lance H. Gunderson

Emory University, lgunder@emory.edu

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Introduction: *Social-Ecological Resilience and Law*

Ahjond S. Garmestani

U.S. Environmental Protection Agency, National Risk
Management Research Laboratory, Cincinnati, Ohio

Craig R. Allen

U.S. Geological Survey-Nebraska Cooperative Fish & Wildlife
Research Unit, School of Natural Resources, University of
Nebraska-Lincoln, Lincoln, Nebraska

Craig Anthony (Tony) Arnold

Louis D. Brandeis School of Law, University of Louisville,
Louisville, Kentucky

Lance H. Gunderson

Department of Environmental Studies, Emory University,
Atlanta, Georgia

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Introduction

Social-Ecological Resilience and Law

AHJOND S. GARMESTANI, CRAIG R. ALLEN,
CRAIG ANTHONY (TONY) ARNOLD, AND LANCE H. GUNDERSON

Environmental law is intimately connected to ecological concepts and understanding. The legal instruments, institutions, and administration of law in the United States are predicated on assumptions that nature is globally stable and that the inherent variability in ecological systems is bounded. This current legal framework is based upon an understanding of ecological systems operating near an equilibrium, or if disturbed, moving back toward an equilibrium. Such assumptions make much current environmental law ill-suited for many pressing environmental issues (Ruhl 1999; Garmestani et al. 2009; Craig 2010; Verchick 2010; Benson and Garmestani 2011). Emerging environmental challenges, such as cross-boundary water governance or climate change, are not easily addressed within the current legal framework, because although the problems may be easily identified, the solutions require frequent recalibration of the policy used to manage the environmental issue.

The legal system functions to create and sustain certainty and security in the distribution of resources among humans in society: power and authority, land and natural resources, financial capital and income, the fruits of transactions and innovation, physical safety, risk, etc. (Weber 1923; Unger 1983; Nedelsky 1990; Delgado 1991; Eagle 2006; Dick 2011). A dramatic paradigm shift in American law occurred in the 1970s, when Congress targeted hazardous waste, water pollution, and

balances its functions as a relatively conservative (i.e., change-resistant) institution with its principles and tools of equity, human rights, and social justice. When it does so, though, the legal system is focused either on nonenvironmental human interests or on human interests in their environment and natural resources, not on the well-being of nonhuman species or of nature's ecological features and processes. In the U.S. legal system, nonhuman species or ecosystems do not have rights or legal standing (Stone 1972). Few, if any, truly ecocentric principles are imbedded in current laws (Tarlock 2012). To the extent that the law protects or advances ecological health or welfare, it is a by-product of political choice through the enactment of legislation and its implementation through regulations. In essence, the law deems ecological health and welfare a subsidiary of human health and welfare. Science, though, demonstrates that the functioning of social systems are intricately interconnected with the functioning of ecosystems at multiple scales (Gunderson and Holling 2002; Walker and Salt 2006). The feedbacks between the two systems render elevation of either human welfare or nature's welfare, to the subordination of the other, an exercise in futility. Aldo Leopold made this point more than sixty years ago (Leopold 1949).

Throughout much of its history, the U.S. legal system has been an arena of contest between two competing ideas of instrumentalist choice: relatively autonomous, self-contained decision making based on a certain kind of deductive human reasoning from principles and theories of law, which we might loosely and perhaps a little imprecisely call "legal analysis" or "legal doctrine" (Wells 2010), versus contextual, fact-specific, pragmatic decision making based on mediation among different interests and ideas about human welfare, which we might call "legal pragmatism" (Grey 1996). However, natural systems and forces do not obey the laws of humans. Legal decision making disconnected from the underlying ecological and social context will likely produce unintended adverse consequences: solutions that are mismatched to problems; ineffective results due to uncooperative forces of nature and society; or even harm to people, ecosystems, or social institutions that could have been avoided by less abstraction and more concrete contextualism. Nonetheless, even contextual decision making based on pragmatic considerations puts too much faith in human capacity—including the capacity of legal institutions—to control nature and society. Human cognition and

action, whether individually or collectively through organizations and institutions, are bounded (Lindblom 1959; Holling 1978). Legal institutions cannot unilaterally stop hurricanes, prevent droughts, dictate sea levels, or alter changes in climate.

Observers from nearly every discipline and ideological perspective have recognized the glaring, urgent need for U.S. law to improve its adaptive capacity and role in supporting the resilience of both social and ecological systems (Thompson 2000; Driesen 2003; Garmestani et al. 2009; Zellmer and Gunderson 2009; Craig 2010; Miller 2010; Benson and Garmestani 2011; Ruhl 2011; van Rijswick and Salet 2012). The maladaptive nature of law can allow, facilitate, or even mandate pathological choices and behaviors with respect to ecosystems. It can contribute to incidents of ecological collapse, which in turn lead to incidents of social collapse: humans and societies depend on resilient ecosystems if they are to survive and thrive (Gunderson et al. 2006). At regional scales, policies and actions that focus on ecosystem stabilization in order to optimize particular social goals (such as controlling floods through dams and levees on river systems), have led to ecosystems that are much less resilient and more vulnerable to various shocks—ecological or economic (Gunderson and Holling 2002). Take, for example, the levees that were constructed along the Mississippi River in New Orleans over the past 300 years; these structures have reduced the impact of minor flooding, yet increased the vulnerability to and cost of extreme events, such as Hurricane Katrina (Kates et al. 2006).

The term “resilience” has developed different meanings since Holling (1973) defined it as the capacity of an ecosystem to withstand a disturbance and maintain the same basic processes and structures. Since that time, ecologists have observed the degradation of resilience in many ecosystems (Folke et al. 2004). In most of these cases, resilience was eroded (mostly by human activities) to the point where these systems crossed a threshold that represents the limits of a particular system state, into an alternative state. That is, the processes and structures that characterize a system can rapidly change and self-organize around an alternate state characterized by a different set of processes and structures. It is the focus on alternative states that prompted Holling (1996) to distinguish between ecological resilience and engineering resilience. Ecological resilience is the amount of disturbance required to flip the

system into an alternative state, whereas engineering resilience is the capacity of a system to absorb a disturbance and return to a stable equilibrium state. With respect to social-ecological systems, resilience is the amount of disturbance a linked social-ecological system can absorb before reorganizing into a new state characterized by a different set of processes and structures. A resilient system may or may not be highly variable or may or may not be in a state that is desirable to humans, but it is defined by the ability to withstand disturbance. A disturbance could primarily affect the social domain or the ecological domain, but because social-ecological systems are linked, a disturbance in one domain will affect the other domain. Contributors to this book all follow the definition of social-ecological resilience with caveats and specifics particular to their needs. For example, Benson and Hopton use a definition of resilience from Carpenter et al. (2001) that states that resilience is: (1) the amount of change the system can undergo and still retain the same controls on function and structure; (2) the degree to which the system is capable of self-organization; and (3) the ability to build and increase the capacity for learning and adaptation. Cosens and Stow follow the definition offered by Walker and Salt (2006), which states that resilience is the ability of a system to provide or shift to a regime that can provide necessary ecosystem functions and services. Ebbesson and Folke define resilience as the capacity of a social-ecological system to absorb disturbances and reorganize, while retaining essential function, structure, identity, and feedbacks. Similarly, Eason and colleagues define resilience as the capacity of a system to remain within a dynamic regime and maintain system function (self-organization). According to this definition, human activities can erode the persistence of a favorable regime that provides essential ecosystem services. Regardless of these differences, the contributors address social-ecological resilience rather than the simpler, return time of a system following disturbance associated with engineering resilience.

This volume seeks to explore and perhaps offer solutions to what we see as the fundamental issue with respect to the law and social-ecological resilience: Can a legal framework be reformed or designed to accommodate regime shifts associated with social-ecological resilience while maintaining enforceability? Regime shifts are a type of change that has been proposed to describe system-level change. Other theorists

(Schumpeter 1942; Holling 1986; Gunderson and Holling 2002) use the phrase *creative destruction* to indicate a period of rapid, system transition in which some forms of capital are destroyed and new types of capital are created. Creative destruction is endemic to many systems (e.g., economic, ecological, and social) of particular concern to humankind and thus must be considered in the calculus of managing for social-ecological resilience. By attempting to stem the inevitable process of creative destruction, humans have created the conditions for change that has the capacity to far exceed the scale (spatial and temporal) of the naturally occurring pulses of change (Odum 2007). This presents great challenges for environmental governance as we attempt to manage environmental problems within the context of an outdated legal framework, because ecosystems are not readily managed with cookie-cutter, front-end management proscriptions (Benson and Garmestani 2011). This obviously presents problems from the legal perspective, and one of the ways in which this conflict can be resolved is through application of adaptive management to ecosystem management. Likewise, principles of adaptive governance could be applied to the broader field of environmental governance and policy.

If environmental law is to be improved, there are at least three non-exclusive general approaches available. First, laws could be developed that foster resilience in systems of people and nature. Second, current law could be made more flexible and adaptive to changing ecological or social conditions. And third, law could be made to facilitate adaptive management, both as a framework for the generation and testing of laws themselves and as an approach to the management of our natural resources and heritage. Adaptive management is a key aspect of managing for social-ecological resilience. However, under the current administrative law paradigm, which is focused on the “front end” of policy, adaptive management is very limited. Part of the problem with the application of resilience theory is that it is difficult to translate fluid concepts into law, as there are aspects of social-ecological resilience that are not directly observable (Carpenter et al. 2005).

Shapiro and Glicksman (2004) suggest that in order to better accommodate adaptive management, “back-end” adjustments to regulation could serve as a more effective mechanism. They argue that administrative law would need to be amended via deadline extensions, exceptions, waivers, or variances for back-end adjustments to be incorporated into

the regulatory framework. A notice and comment process is the recommended mechanism for back-end adjustments with the caveat, noted by Shapiro and Glicksman (2004), that in addition to a notice and comment process, Congress would also need to require agencies to establish electronic dockets and create annual reports on the back-end adjustment process. The back-end adjustment process is viewed as an improvement to the “considerable guess work that is involved in rationalizing regulations at the front-end of the process” (Shapiro and Glicksman 2004). Glicksman and Shapiro (2004) recognize that a regulatory system that has some flexibility, in appropriate cases, has the potential to generate the necessary conditions to manage for social-ecological resilience. This idea has great promise, as resilience-based management requires an iterative process that improves management as the process unfolds.

An adaptive system of law will need to focus on maintaining the resilience and adaptive capacity of both social and ecological systems, including such subsystems as institutions and communities. The failure of legal institutions to value and facilitate the resilience of ecosystems will likely reduce the sustainability of social systems that depend on ecosystems. At times, the legal system seems to operate as though its primary function is to promote the robustness and resilience of the legal system itself (e.g., Arnold 2010). Alternative conceptions of law focus too narrowly on the resilience of ecosystems, without adequate attention to the vitality and adaptability of the social systems and institutions that often seem to be at odds with the natural environment. For example, legal changes that give primacy to ecosystems or biodiversity, particularly if they require substantial transformations to social systems and institutions, may produce a variety of unintended consequences, including political backlash, nonimplementation or underimplementation of reforms, political and social conflict, and fiscal or economic hardships (e.g., Doremus and Tarlock 2008). Also, disturbances to social systems and institutions often adversely affect ecosystems and biological communities, while ecocentric legal reforms may fail to address the most significant pathologies of the interconnections among nature, society, and law. In contrast, an adaptive legal system aims for structures, methods, and processes that build the resilience and adaptive capacity of both nature and society—a range of ecosystems, social systems, and institutions. In order to manifest a transition to a sustainability paradigm,

we must develop a better understanding of resilience, as sustainability is dependent upon social-ecological resilience. By this, we mean that sustainability is not a static state or an end point, but rather a dynamic process. Such processes have the capacity for nonlinear change and cross-scale interactions, and presents a tremendous challenge to laws based upon the conception of systems existing in a “balance of nature.” In essence, the law will need to be reformed or new law will need to be crafted in order to allow us to manage for social-ecological resilience.

This book is primarily concerned with trying to explore our capacity to manage for social-ecological resilience within the context of existing laws and organizations. Sandi Zellmer and Marty Anderies investigate the historical role of and provide an assessment of the current state of wilderness preserves in the United States, characterizing wilderness laws and policies within the context of resilience theory. Zellmer and Anderies argue that adaptation will sometimes require active intervention in “untouched” wilderness preserves. Melinda Harm Benson and Matt Hopton analyze the legal frameworks and institutions that can accommodate a resilience-based approach to biodiversity protection; they accomplish this by conducting an overview of the history and the current state of wildlife management and biodiversity protection in the United States. Benson and Hopton conclude that the current legal framework in the United States is in need of reform, and they provide recommendations for legal and institutional reform allowing for resilience-based management of biodiversity. Rob Glicksman and Graeme Cumming provide an analysis of the management of parks, refuges, and preserves for resilience, and a review of U.S. laws that have perpetuated a preservation paradigm for nature. They argue that there is now broad consensus that resource management laws need to shift to fostering and managing for resilience. Glicksman and Cumming conclude that while some of the flexibility in current law is being utilized, the existing legal framework, developed under the assumption of a “balance of nature” not in concert with ecological reality, is still too rigid in its approach. Robin Craig and Terry Hughes explore the governance of the oceans as it relates to marine protected areas, spatial planning, and resilience. Craig and Hughes review the threats to marine ecosystems and identify the fragmentation of regulatory authority as the critical governance challenge for these systems. They conclude that coastal nations could

foster resilience in marine ecosystems by incorporating place-based marine management (e.g., marine protected areas) into their governance regimes. Barb Cosens and Craig Stow conduct an analysis of water governance and how it affects water allocation and water quality. They assert that there are two areas of the law that be must reformed if the goals of the Clean Water Act are to be met: fragmentation of policy and addressing uncertainty in data that policy is based upon. They conclude that integration of water governance and creating the capacity for adaptation requires new approaches to environmental management. Olivia Odom Green and Charles Perrings describe transboundary water agreements and the role they play in social-ecological resilience. Their analysis of social-ecological resilience concludes that treaties must create the institutional capacity to manage conflicts and integrate iterative governance mechanisms. J. B. Ruhl and Terry Chapin integrate resilience theory and ecosystem services theory. They highlight that the resilience of ecosystems and the resilience of policy are two different animals and that the resilience of one does not, nor should it necessarily, guarantee the resilience of the other aspect of sustainability. Ruhl and Chapin conclude by offering suggestions on where ecosystem services theory is useful for supporting the resilience of ecosystems and the resilience of ecosystem policy. Alex Camacho and Doug Beard offer a chapter that considers the interaction between resilience and climate change. They conclude that existing government institutions lack the adaptive capacity to effectively manage a problem as complex as climate change. Regulators and managers lack information on effects of and management strategies for climate change, as well as the institutional infrastructure to obtain this critical information. Jonas Ebbesson and Carl Folke make the observation that legal scales and jurisdictions do not align well with the complex nature of social-ecological systems, and this mismatch erodes resilience. Ebbesson and Folke argue that the distinction between national and international needs to be demoted in order to manifest transboundary cooperation in environmental matters. The chapter by Tarsha Eason, Alyson Flournoy, Heriberto Cabezas, and Michael Gonzalez incorporates resilience and innovation into American law and policy via two proposed new laws: the National Environmental Legacy Act (NELA) and the Environmental Competition Statute (ECS).

The authors provide an analysis of both model laws based upon recent sustainability research in the United States. Eason and coauthors view the problem of resilience and law as one that will require new law in order to manifest a transition to sustainability. Tony Arnold and Lance Gunderson undertook the herculean task of creating a system of adaptive law, which is necessary, because legal decision making detached from the dynamics of social-ecological systems is likely to result in adverse consequences. They conclude that an adaptive system of law: has multiple goals, is multimodal and integrated, has the capacity to adapt to context, and has iterative legal processes with accountability. Garmestani and colleagues conclude with a chapter that integrates lessons learned from the book and synthesizes our current understanding of the interaction between social-ecological resilience and law.

The rigidity of our current legal framework is not well-suited to the complexity of social-ecological systems (Garmestani et al. 2009). In order to account for resilience in social-ecological systems, environmental law likely must evolve in response to changing environmental conditions (Garmestani et al. 2009). Law is incremental by design, and broad-scale change is therefore unlikely (Lazarus 2004). Thus, the law will likely have to evolve in an incremental manner, interspersed with dramatic change, in response to environmental problems. The chapters in this book emphasize different aspects of law and governance and highlight the features of law that allow for and hinder the capacity to manage for social-ecological resilience.

The authors in this book have analyzed the law specific to their chapter topic and suggested legal reform (see Zellmer and Anderies; Benson and Hopton; Glicksman and Cumming; Camacho and Beard), reform in governance (Craig and Hughes; Cosens and Stow; Ebbesson and Folke), reform to treaties (Green and Perrings), integration of theories (Ruhl and Chapin), and new law (Eason et al.; Arnold and Gunderson) as the means to deal with the tension between social-ecological resilience and law. It is our hope that by teaming top legal scholars with leaders in resilience science, we have contributed to a step forward in creating improved understanding of the barriers and bridges to resilience-based governance, illuminating the interaction between social-ecological resilience and law.

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