

TOWARD A MEASURE OF SOCIAL-ECOLOGICAL RESILIENCE FOR HUMAN COMMUNITIES

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The purpose of this essay is to clarify the theoretical understanding of the concept of resilience in order to explore problems surrounding the empirical measurement and application of the concept, as well as to examine strategic examples of empirical measures and policy applications in the literature of several disciplines, fields, and professions. The examination of resilience occurs in two streams: one conceptual and one methodological. At the conceptual level, the focus will be on definitions, distinctions between resilience and related concepts, and the theoretical frameworks that underlie usage of the concept. At the empirical level, the examination of resilience will be centered on the methodological challenges associated with research on resilience as well as previous attempts to operationalize and measure resilience.

The Conceptual Problem

Due to the increasing interactions across scales and among even geographically distant systems, a result of escalating globalization (Liu et al. 2007; Young et al. 2006), I believe that the problems occurring at the intersection of human communities and natural environments represent some of the most challenging problems facing social and health policy analysts and scientists. Redman notes, “it is by working at the junction of these domains [“biotic”, “human”, “geologic”, and “built”] that processes can be best understood and the greatest scientific breakthroughs will be made” (1999:296).

Frameworks like social-ecological models¹ are valuable for putting the pieces together; these frameworks orient and integrate the multiple dimensions, levels, and causal pathways that are part of the broader context in which the problem has arisen. Krieger proposed a version of a social-ecological model as a way to “envision a more systematic integrated approach capable of generating new hypotheses, rather than simply reinterpreting factors identified by one approach (e.g. biological) in terms of another (e.g. social) (2001:673).

Attempts to work within a social-ecological model require concepts that extend between the two spheres, the social world and the ecological world, which have previously been separated by academic disciplines, research programs, and language. The result of this separation is that researchers have neglected the relationship between the two (Redman et al. 2004) until very recently, when it has become increasingly obvious that to study ecological and social systems in isolation from one another produces trivial or useless results, particularly when these results are used to shape policy (Gunderson and Holling 2002; Kinzig 2001; Low et al. 1999; Redman 1999).

The most parsimonious way to address this separation is to develop and clarify concepts that are already in existence and use by analysts and researchers from both perspectives (Michener et al. 2001; van der Leeuw and Redman 2002; Redman et al. 2004). Certain extant concepts can fill the theoretical gap, as well as fill gaps in practice by being applicable beyond metaphor: i.e. to be measurable and quantifiable in real world contexts versus useful in explaining the world in an abstract way. Social-ecological resilience serves as one such bridging concept.

The concept of social-ecological resilience emerges repeatedly from the examination of literature addressing linkages between a number of aspects of social and ecological systems. In fact, Brand and Jax (2007) argue that recent studies of resilience are increasingly focused on the social, political, and institutional dimensions of resilience and aim to address entire social-ecological systems, marking a departure from the purely ecological studies of the past. The link between social and ecological systems is particularly meaningful for social-ecological resilience research. The Resilience Alliance, a multidisciplinary research group comprised of scientists and practitioners from many disciplines, based in universities, NGOs, and government agencies in several countries exploring the dynamics of social-ecological systems using the concepts of resilience, adaptability and transformability, says the following: “Humans are part of the natural world. We depend on ecological systems for our survival and we continuously

¹ The term ‘social-ecological model’ is used to cover a broad array of frameworks, including eco-social theory (Krieger 1994), eco-epidemiology (Susser and Susser 1996), and social-ecological systems perspective (McMichael 1999), that provide a means of organizing both ecological and social systems while acknowledging the inherent complexity of multiple levels, dimensions, and causal pathways (Krieger 2001).

impact the ecosystems in which we live from the local to global scale. Resilience is a property of these linked social ecological systems” (RA 2009).

The Methodological Problem

A lengthy exploration of literature dealing with the general areas of human health and well-being, society, and environment was based on the social-ecological model, developed first in the discipline of sociology and used now primarily in epidemiology, other public health disciplines, and other fields. These models provide a means of organizing both ecological and social systems into a comprehensive framework with multiple levels, dimensions, and causal pathways (Krieger 2001; 1994; McMichael 1999; Susser and Susser 1996). The development of an integrated framework for the study of social-ecological systems, assumes that all social and ecological systems share a number of identifiable common properties, including resilience and complexity (Levin 1999; Gunderson and Holling 2002). Based on this assumption, literature that attempted to address the complexity of interacting systems, while dealing with problems of scale (organizational, spatial, and temporal), causality, and cross-scale mismatches was examined. Among the features repeatedly encountered within this body of work is significant concern with problems of empirical measurement. Despite the challenging work of researchers from a variety of fields and disciplines, few have successfully tackled the daunting task of measurement. Thus, much work remains at the level of metaphor and theory with occasional efforts to interpret a case study within the central metaphor or conceptual framework that is proposed (Carpenter et al. 2001). Carpenter et al. (2001) cite some cases where resilience has been operationalized in the context of a model of a particular system. Similarly, researchers have initiated the process of measure development for select aspects of the broader social-ecological system such as lagoons, grasslands, and lakes. The consequence of this work is a concept with limited applicability and low efficacy for policy impact.

Social-Ecological Resilience

This essay aims to demonstrate that social-ecological resilience serves an important and timely purpose. Research and policy are both in need of an agenda that more effectively links the social and ecological systems of the world together in a way that advances our understanding, planning, and response to major crises like climate change and human development (Redman 1999). While social-ecological resilience research does not make up the agenda, it significantly contributes to the advancement of inter- and multidisciplinary research focused on the intersection of social and ecological systems. Social-ecological resilience is a concept capable of operating in the social and ecological systems, as well as in the space between.

The concept of resilience has been altered with time and usage. The original concepts were already distinctly applied in fields of engineering (to mechanical systems) and ecology (to ecosystems) when a new direction emerged. The introduction of social resilience moved the concept away from its purely mechanical and ecological origins and applied the idea of resilience to social systems. And now, in an effort to bring the concept further along its evolutionary path, the ecological and the social have been brought together. The resulting concept is social-ecological resilience, a way of thinking about resilience as a state of an entire social-ecological system. The importance of this latest move is best captured in the integration of the social and ecological in a unifying concept that accounts for the state of a social-ecological system (e.g. community) as a whole.

Through an in-depth examination of the theoretical underpinnings of the conceptualization of social-ecological resilience the following working definition of social-ecological resilience has been generated. Combining elements of definitions developed by key resilience researchers, social-ecological resilience is defined here as the community’s ability to absorb recurring disturbances in a way that allows essential structures, processes, and feedbacks to be maintained. The defining characteristics of a resilient community include coping with change while retaining 1) the same controls on function and structure, 2) the capability for self-organization, and 3) the ability to build and thereby increase the community’s adaptive capacity for learning and adaptation to the changing conditions (RA 2009). In this context, the term ‘community’ will refer to a geographically founded, integrated social-ecological system of people and the natural environment. This should stand in opposition to a purely social sense of community, which typically lacks reference to the physical environment, natural or built (Brown 2003; Duncan 1964).

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