

The End of Sustainability

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The Rio+ 20 United Nations (UN) Conference on Sustainable Development held in June 2012 resulted in a 44-page, nonbinding “Declaration” that is generally considered a failed document. While not surprising given the recent trend of international environmental negotiations (Gardiner 2011), this inability to establish binding requirements toward global sustainability is, of course, disappointing. Its failure, however, provides an opportunity to collectively reexamine—and we argue ultimately move past—the concept of sustainability.

The continued invocation of sustainability in international talks, development goals, and other policy discussions ignores the emerging realities of the Anthropocene (Biermann et al. 2012)—unprecedented and irreversible rates of human-induced biodiversity loss (Wolinsky 2011, Sala et al. 2000), exponential increases in per-capita resource consumption (Myers 1997), and global climate change (IPCC 2007). Combined, these and other factors are increasing the likelihood of rapid, non-linear, social and ecological regime changes (Barnosky et al. 2012).

They create an urgent need to move past our current state of denial and acknowledge that we are heading into the “no-analog future” (Fox 2007). From a policy perspective, we must face the impossibility of even defining—let alone pursuing—a goal of “sustainability” in a world characterized by extreme complexity, radical uncertainty, and unprecedented change. The realities of current and emerging social-ecological system (SES) dynamics warrant a new set of tools and approaches for governance (Griggs et al 2013, Liu et al. 2007).

Sustainability’s failure

The concept of sustainability dates back to early UN conferences in the 1970s and has become increasingly difficult to disentangle from sustainable development, although the two concepts are not necessarily the same. In general, “sustainability” refers to the long-term ability to continue to engage in a particular activity, process, or use of natural resources. This is the meaning often invoked in management regimes such as the Magnuson-Stevens Fishery Conservation and Management Act, which limits harvest of fisheries to the “maximum sustainable yield” (16 U.S.C. §§ 1801-1884).

In contrast, “sustainable development” reflects a broader societal goal of how economic and social development should proceed—namely, with sufficient consideration of the environment and natural resources to assure the continuing availability of natural capital and other ecological amenities. The international community embraced sustainable development at the 1992 UN Conference on Environment and Development in Rio de Janeiro, incorporating it into both the Rio Declaration and Agenda 21.

The pursuit of sustainable development has occurred in an emerging climate change era. The pursuit of sustainable development goals, however, has not resulted in effective mitigation of climate change. Greenhouse gas emissions have continued to increase, and SESs must now

adapt to climate change's impacts. Resource consumption patterns have proceeded since 1992 on similar trends in terms of pace and scale. In anticipation of Rio+20, the U.N. Environment Programme released a report that Executive Director Achim Steiner summarized by stating, "if current patterns of production and consumption of natural resources prevail and cannot be reversed and 'decoupled,' then governments will preside over unprecedented levels of damage and degradation" (UNEP 2012b). The report emphasized the increasingly likely possibility of large-scale irreversible change, concluding that as human pressures on the Earth system accelerate, critical global, regional, and local thresholds are quickly being approached or, in some cases, have already been exceeded (UNEP 2012a).

Despite this alarming and unpredictable situation, policy discussions remain framed by the goal of sustainability. This adherence to sustainability ignores the fact that the concept has failed to meaningfully change the human behavior that created the Anthropocene. We are losing in the struggle to sustainably govern the commons (Dietz, Ostrom and Stern 2003).

Sustain what?

It's not that sustainability is a *bad* idea. It remains valuable as an overarching principle for the broadest of global ecological ideals: leaving a living planet to future generations. The issue raised here is whether the concept of sustainability is still *useful* as an environmental governance goal. By definition, sustainability assumes that there are desirable states of being for SESs that humans can maintain (within a certain range of variability) indefinitely. In practice, sustainability-based goals proved difficult to achieve in many SESs even before climate change impacts became noticeable. Fisheries management, for example, has long been challenged by the difficulties of obtaining accurate estimates of fish stocks, unacknowledged yearly or longer variability in fish stocks, and often intense political pressure to allow fishers to fish. The result

has been collapsed, collapsing, and overfished stocks the world over. Imagine how much more difficult it will be to define—let alone to achieve—“sustainable fishing” when important fish stocks are changing their ranges, migratory patterns, and population numbers in response to rising global average sea temperatures, ocean acidification, sea-level rise, changing ocean currents, and attendant changes in marine food webs. Future management of other natural resources faces similar challenges. What constitutes sustainable use of water in a given region when we no longer can trust historical rainfall, snowfall, and snowmelt patterns? How much water pollution is “too much” when the historic flows and other ecological conditions (*e.g.*, temperature, chemical activity) of rivers, even major rivers, are changing? We face a future that requires us to admit that we have no idea what we can sustain (Milly et al. 2008).

Is resilience a more useful way to frame the challenges ahead?

We must begin to formulate ecological governance goals by some metric other than sustainability to conceptualize the management situations we face. The concept of resilience holds promise as new way of addressing the challenges ahead. While not inherently incompatible concepts, resilience and sustainability are not the same. The pursuit of sustainability inherently assumes that we: (a) know what can be sustained; and (b) have the capacity to hold onto some type of stationarity and/or equilibrium. In contrast, resilience thinking acknowledges disequilibrium and nonlinear change in SESs. Resilience can be characterized in three ways: (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 (Carpenter et al. 2001). The dynamics and complexities of SESs are embraced, certainty is not required, and the emphasis is on adaptive capacity and adaptive management rather than stationarity.

One critical component of a resilience orientation is the recognition that regime shifts can and will occur. As a result, a resilience orientation allows for a more realistic approach to management—especially in the Anthropocene—because it acknowledges nonlinear change and provides a way of thinking about how to foster the SES components and dynamics we value and want to protect. The identification and, generally, avoidance of critical thresholds becomes important management goals. Resilience thinking also offers a theoretical framework for assessing cross-scale dynamics, a facet of SESs that will become increasingly important given current rates of globalization and increasingly complex socio-ecological challenges. Consider, for example, the complex and interlinked relationships among global fisheries, offshore aquaculture, increasing coastal populations and associated land-based coastal pollution and loss

of coastal habitat, changing ocean currents and temperatures, ocean acidification, national concerns with food security, global trade regimes, and international human rights regimes (Gunderson and Holling 2002).

Shifting the governance focus from sustainability to resilience is not admitting defeat. Instead, a resilience approach would re-orient current research and policy efforts toward coping with change instead of increasingly futile efforts to maintain existing states of being. It would, for example, place increased emphasis on developing climate adaptation strategies. Similarly, research to develop baseline data retains importance moving forward—but not as a guide toward what we can “sustain.” Instead, such research would seek to locate historical tipping points that might provide insight into future regime change and help to identify critical ecological thresholds.

Another important aspect of resilience thinking is that a state of “system resilience” is not inherently good or bad. Human values will continue to dictate decisions regarding which system states we want to foster through governance and management regimes, and these values include considerations of equity. One of sustainability’s major contributions to environmental governance was its emphasis on both *intra-* and *intergenerational* equity. Resilience thinking has the potential to be more helpful than sustainability in this regard, because it requires a more transparent examination of social justice and other human development concerns through an assessment of not only which elements of an SES we value but also the extent to which those values are reflected in our policies and approaches. By contrast, sustainability discourse has morphed into an unhelpful “we can have it all” assumption about socio-ecological management based on green consumerism (Parr 2009).

Resilience thinking is at a critical stage, both in terms of its theoretical development and its practical application. From a theoretical perspective, important questions have been raised regarding whether the Holling school's construct of ecological resilience is appropriate for understanding social system dynamics (Davidson 2010). This has provoked a respectful yet spirited discussion in this journal related to the progression of the literature and its integration with related work in the social sciences (Davidson 2013, Ross and Berkes 2013). We agree with Davidson that, without more careful attendance to the role of human agency and capital, resilience will fail to capture the complexities and dynamics of social systems. As a result, resilience is then in danger of being dismissed by critics who claim resilience theory is yet another tool of neoliberalism (Pelling 2011, Walker and Cooper 2011).

On a practical level, the concept of resilience is already gaining the attention of natural resource managers and policy-makers (Benson and Garmestani 2011). In its current stage of integration and development, however, resilience is in danger of becoming—like sustainability—a rhetorical device with little influence on actual decision-making. We are at a critical point with regard to the challenge of integrating resilience thinking into environmental policies and approaches. Adaptive governance and adaptive management offer promise in terms of putting resilience thinking into practice but, to date, these ideas have not yet been integrated into legal and regulatory frameworks in enforceable ways. Key elements, currently lacking in many resilience-based approaches, are the mechanisms needed to provide the necessary accountability to ensure that adaptive approaches will actually work. Future environmental management will require *principled* flexibility (Craig 2010). Discussions among scientists, policy-makers and others are needed to design and implement environmental policies that promote and build adaptive capacity while also providing stronger, more legally enforceable and institutionally

supported goals—goals that reflect the adaptation strategies necessary to anticipate and negotiate the complex, non-linear, and rapidly changing world.

The time has come to move past the concept of sustainability. As an environmental management goal, sustainability is no longer appropriate, and it cannot be used to meaningfully address the challenges ahead. In order to reflect the scientific realities of the Anthropocene, new policies and institutions must be developed that accommodate uncertainty and anticipate non-linear alterations of SESs. The future demands a more adaptive yet principled approach to continual change.

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