

## Adaptation and resilience in the face of climate change: protecting the conditions of emergence through good governance

*Liette Vasseur (IUCN, Climate change adaptation group leader/Brock University) and Mikes Jones (IUCN, Resilience group leader/Swedish Biodiversity Centre)\**

### Introduction

Super wicked problems such as global climate change (Levin et al. 2012) and the extensive subsequent changes to the environment, biodiversity and human economies cannot be tackled with the usual disciplinary approaches that have long been the basis for policy making. Problems in social and environmental planning tend to become wicked because their causes are complex and subject to different interpretations according cultural values and beliefs. Consequently there are no objectively definable solutions to wicked problems and disagreement on what might be done to address a problem may be profound. In the case of climate change, the problem is super wicked because of the urgent need for solutions, lack of a central decision-making authority, and those responsible for solving the problem are also creating it.

The concept of resilience in complex adaptive social-ecological systems (SES) provides a relatively novel way of thinking about change at all scale levels from the local to the global. It enables people to develop strategies that either enhances the resilience of an existing system, so that it can absorb and recover from disturbance like fire, floods and disease outbreaks, or deliberately transforms the system into a new state that is better able to meet long term human needs. A SES resilience perspective recognizes that change in all biological systems (including all forms of human organization) begin with the very small and grows upwards.

This brief describes resilience concepts and argues that they provide a foundation for the development of adaptation policies based on a relatively simple

model of the drivers and feedbacks that define the change process at work in a system. It also makes some suggestions on how national policies might support the growth of resilience and adaptive capacity for coping with climate change.

### Resilience and Adaptation in Social-Ecological Systems

Resilience refers to the capacity of a system to continue to function despite disturbances, either by recovery to its original condition or by some degree of transformation that changes components in a system or the relationships between components in a system. A SES perspective of resilience acknowledges that changes are not linear and predictable but subject to unpredictable, random effects (Adger, 2000).

A social-ecological systems perspective of resilience recognizes that humans and nature are intricately interconnected (Cote and Nightingale 2012), each affecting the other, often in unpredictable ways. A SES resilience perspective recognizes that humans cannot survive without the environment and the ecosystem services that it provides.

Adaptation brings the idea of change in response to environmental change. In nature, genetic variation and environmental change drives evolution. In human society, innovation creates novel responses to environmental change. A SES perspective of resilience recognizes the importance of small-scale systemic failure as an opportunity for innovative ideas to flourish. The constant introduction and testing of novelty provides the foundation for resilience and

long term sustainability in response to environmental change.

These concepts challenge the current trend of thinking that top-down policy alone can solve wicked problems. The main reason is that humans, by their nature, are individualistic and pluralist at the same time, meaning that to overcome the current challenges, one must understand how to connect top-down national policies to the bottom-up development strategies. There are possibly many ways of achieving this but it is clear that linking solutions to livelihoods, well-being and good governance will have to be integral parts of future steps in this direction. For example, the MDGs refer to well-being, but its definition remains at the highest level of a country or a region, i.e. the common good. This has little meaning for local communities. Involvement and engagement of people at the local level are critical to move forward in the next decade in order to resolve the wicked problems that arise from high level, top-down interventions.

Discussions at the IUCN World Parks Congress (2014) demonstrated that protected areas and neighboring communities are already embarked in such a path. How did this happen? As many stated, limited resources and the realization that parks are not islands have pushed many park managers to reach out to neighboring local communities. On the communities' side, people recognize that their livelihoods and well-being are being impacted by changes and they need to better understand their ecosystem to ensure their sustainability. The actions of one always have implications on another. As Tanner et al. (2014) suggest, resilience and any adaptation strategies for this matter should consider whose needs are been looked after when making decisions or policies.

### **The need for adaptation and resilience**

Global climate change brings new uncertainties and risks that must be considered in any human activity. To respond to these challenges, many countries have developed national adaptation strategies or plans and have identified priority sectors. However, most strategies are responses based on general policies or

technical solutions. Adaptation must go further and especially reach the people locally.

A resilience approach recognizes that ecosystems are composed of a hierarchy of scales; a variety of temporal scales are involved in ecosystem processes. A resilience approach is applicable to protected and non-protected areas, seeing both as parts of larger integrated systems. It recognizes that crisis and reorganization are normal parts of ecosystem processes and evolution, creating variety and diversity over time as systems approach their limits.

A resilience based approach to ecosystem management is based on model of the change processes operating in the system developed and agreed among the people dependent on the system for their livelihood. Monitoring and adaptive management are used to test assumptions in the change model and learn how a system behaves at the edge of its limits, and what kinds of new system might evolve from the old. This provides society with a method for developing scenarios of the future and choosing between alternative pathways towards sustainable use of biodiversity and ecosystem services. The most important part of a resilience approach is the establishment of organizations and institutions that can conceptualize, anticipate, and learn from change over time. It develops models of change and adaptive management techniques that enable to balance ecosystem use for multiple outcomes in a changing environment. A changing environment implies the need to shift use across land and seascapes when necessary to maintain resilience.

### **From global to local**

National planning is required to present a uniform vision within a country. Often so-called adaptive management operates within the conventional governmental system and little trickles down to local actors. This approach ignores local variability in both social and ecological conditions to the extent that in some cases policy makes no sense. It devalues local knowledge and capacity for innovation and attempts to create uniformity for efficient management when diversity is required for resilience. Devolved management creates a diversity of smaller scale units

that can be managed to suit local social and ecological contexts as well as create redundancy where a number of similar management units are doing more or less the same thing. A distributed system along these lines enables managers to respond more rapidly to changing conditions than is possible when decision-making is centralized. Devolution is also a way of avoiding the problems associated with cultural values and beliefs that can make problems wicked, as local communities tend to be culturally more homogenous than communities lumped at regional or national levels and more able to negotiate and resolve differences. These advantages increase the capacity of each smaller SES to recover from disturbance and enable the larger scale system to evolve over time as the environment changes.

### **Emerging through improved governance**

Strengthening existing regional and local organizations and supporting the development of local institutions should become the focus of governments to improve resilience of communities. Such an approach should be as inclusive as possible to meet standards of good governance (Lockwood et al., 2010) and adaptive governance (Huiteima et al., 2012), for ecosystem management. Adaptive governance builds on the principles of good governance to add: networks of decision making at multiple scales to coordinate management of things like rivers that cross multiple jurisdictional boundaries. Adaptive governance is an essential part resilience approach would consider the cumulative long term consequences of climate change while responding to immediate needs.

Resilience thinking and adaptive governance represent a paradigm shift in the science that informs policy and in the manner in which governance is practiced. Science for the management of living systems of humans and nature is beginning to move away from prediction in recognition of the fact that living entities are constantly changing in complex and unpredictable ways. Governance needs to move from centralized command and control to devolved adaptive governance. These are major changes that will be slow in coming because it involves changes in

power relations and changes in beliefs about knowledge and societal structure. Major paradigm shifts like these are extremely difficult to bring about, but the sweeping environmental changes that will come about as a consequence of climate demand innovation on a large scale. It would behove national governments to experiment with these new approaches to evidence based decision making and adaptive governance as climate adaptation measures.

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