

Advancing the adaptive capacity of social-ecological systems to absorb climate extremes

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The recent and projected increases in climate variability and the frequency of climate extremes are posing a profound challenge to society and the biosphere (IPCC 2012, IPCC 2013). Climate extremes can affect natural and managed ecosystems more severely than gradual warming. The ability of ecosystems to resist and recover from climate extremes is therefore of fundamental importance for society, which strongly relies on their ability to supply provisioning, regulating, supporting and cultural services. Society in turn triggers land-use and management decisions that affect ecosystem properties. Thus, ecological and socio-economic conditions are tightly coupled in what has been referred to as the social-ecological system. For ensuring human well-being in the light of climate extremes it is crucial to enhance the resilience of the social-ecological system (SES) across spatial, temporal and institutional scales. Stakeholders, such as resource managers, urban, landscape and conservation planners, decision-makers in agriculture and forestry, as well as natural hazards managers, require an improved knowledge base for better-informed decision making. To date the vulnerability and adaptive capacity of SESs to climate extremes is not well understood and large uncertainties exist as to the legacies of climate extremes on ecosystems and on related societal structures and processes. Moreover, we lack empirical evidence and incorporation of simulated future ecosystem and societal responses to support pro-active management and enhance social-ecological resilience. In our presentation, we outline the major research gaps and challenges to be addressed for understanding and enhancing the adaptive capacity of SES to absorb and adapt to climate extremes, including acquisition and elaboration of long-term monitoring data and improvement of ecological models to better project climate extreme effects and provide model uncertainties. We highlight scientific challenges and discuss conceptual and observational gaps that need to be overcome to advance this inter- and transdisciplinary topic.