Conservation for resilient and adaptive livelihoods

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In the current context of global environmental change and related unpredictable perturbations and risks, experts argue that socio-ecological systems (SES) need to be resilient (Folke et al. 2004; Adger 2006 and 2007). That is, the system has to be able to deal with disturbance, self-organize, learn, and adapt without changing its characteristics and losing control over its function and structure (Adger 2007). Because robust and optimal controls are not possible in SES that evolve under uncertain conditions, the dominant command-and-control, top-down management paradigm has failed in achieving SES long-term performance. Consequently, a bottom-up adaptive management approach is needed to deal with SES uncertainty, improve systems' response to unexpected events and shocks, and promote resilience (Anderies et al. 2006). Community-based conservation strategies developed by some rural and indigenous communities in Latin America are good examples of this approach, which is based on cooperation, risk-sharing, local ecological knowledge, and local institutions to achieve both biological conservation and rural development (Berkes 2004).

We advocate for the application of a resilience-based approach to understand the dynamics of community-based conservation and analyse communities' adaptive capacity to environmental and socio-economic change in the selected field sites of the COMBIOSERVE project. Specifically, we aim to analyse the dependence of community livelihoods on natural resources and ecosystem services, while examining their historical and present adaptive capacity to multiple stressors. We also aim to explore how individual and collective adaptiveness and resilience can vary in relation to different conservation and policy scenarios and, in doing so, we expect to advance understanding on the role that community-based conservation can play in enhancing individual and household adaptive capacity (i.e., collective action, networks) and socio-ecological resilience in the face of changing economic, social, and environmental conditions.

To meet such objectives, we will adapt, expand, and refine the participatory framework developed by Walker et al. (2002). This framework is based on four steps. The first step requires the representatives of stakeholder groups to establish the important attributes of the socio-ecological management for conservation at local, regional, and multi-regional scales as well as their associated cross-scale effects. Secondly, stakeholders identify i) controllable and unpredictable drivers of ecological and social change, ii) past and present households' adaptive strategies, and iii) households perceptions of future change. In sum, steps 1 and 2 generate two sets of information: major issues about future states of the system that are of concern to stakeholders, and major uncertainties about how the system will respond to drivers

of change. Thirdly, these outcomes are then used for more specialized, quantitative analyses of attributes that affect resilience through the development of simple models of the system's dynamics, taking into account current community-based conservation strategies, cross-scale governance issues, livelihood assets, adaptive capacity, and determinants of socio-ecological resilience. In the fourth and final step, an integrated evaluation of the relationship between community conservation and resilience in terms of management and policy implications is developed with inputs from both stakeholders and researchers.

Methodologically we will rely on secondary data, semi-structured interviews, and focus groups with stakeholders to develop a historical perspective of socio-ecological management at selected sites and document processes of environmental change (e.g., changes in rainfall) and extreme events (e.g., droughts) as well as social responses to them (e.g., migration). These exercises will also encompass questions directed towards mapping the institutional framework that determines the rules for ecosystem use, with particular reference to property or usage rights and the locus of decisions (Ostrom, 1999). We will also use information from household surveys to obtain accurate estimates of the importance of natural resources and the environmental services to local livelihoods. Specifically, we will collect data on household sources of income and other livelihood assets to assess the role of natural resources in shaping household adaptive capacity. Plausible scenarios of future environmental and socio-economic change under different, yet combined stressors will be defined and discussed with local communities to visualise and discuss pathways for local SES adaptiveness and resilience, as well as possible thresholds. Finally, to identify the effectiveness of conservation actions in reducing vulnerabilities and increasing resilience, we will also develop a virtual workshop. We will upload short videos of our members synthesizing the information collected in the local sites and the outcomes of the scenario-building exercises. Conservation managers and policy makers from our selected countries will be invited to watch the videos and address a number of related questions. At this final stage we will present outcomes of the research to local communities for open discussion and validation.

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