

Biological diversity analysis and its implementation for community-based monitoring

Luciana Porter-Bolland, Federico Escobar, Matthias Rös, Emma Villaseñor Sánchez. Instituto de Ecología, A. C. Carretera antigua a Coatepec 351 El Haya, Xalapa, Veracruz. CP 91070. México.

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The current environmental crisis is resulting in rapid changes to ecosystems structure and function. It is widely recognized that biological monitoring efforts in tropical regions should be increased in order to understand how resource management, including that directed at conservation, is to adapt to these changes. As an example, at the international level, signatory parties to the Convention on Biodiversity are obliged to engage in monitoring activities for biodiversity assessment (article 7, CBD 1992). Monitoring is a process through which information about a biological system is gathered in order to detect changes over space and time with the objective of providing essential information for natural resource management. This information helps establish and evaluate conservation efforts and provides elements for environmental decision-making (Danielsen et al. 2000). Therefore, we consider that monitoring research should be conducted with direct involvement of local environmental decision-makers, implying local participation. Given that ecological processes are complex and operate at different temporal and spatial scales, developing appropriate monitoring approaches is challenging and requires long-term research aimed at understanding these complex processes (Ostrom and Nagendra 2006). Long-term monitoring is therefore expensive and the involvement of local participation allows for lowering operational costs and for more efficient data-collection (Danielsen et al. 2003). Moreover, local participation in monitoring activities can be useful both for assessing management efforts (i.e., community conservation initiatives), and for increasing capacities for future management within local contexts.

In this sense, we argue that it is important to implement a strategy for community-based monitoring that (1) generates information for the assessment of current community conservation efforts and (2) builds on current capabilities for future management. Empirical experimentation based on local knowledge systems provides an excellent starting point for local participation in biological monitoring. Local knowledge systems and the cultural practices of local producers (agriculturalists, agroforesters, hunters, fishers, beekeepers, etc.) are recognized to use constant experimentation; these can therefore contribute to the development of a solid foundation for integrating formal and systemic approaches to measuring biodiversity and relating it to management outcomes (Moller et al 2004). This can be achieved by developing (through a co-inquiry approach) quick and simple tools that merge scientific and local knowledge to monitor biodiversity and that can cover a wide array of ecosystem components and processes, ranging from the local to the landscape scales and over extended time frames. This strategy has the particular advantage of revealing which ecological components are influenced by human activity and how. Monitoring objectives, in this sense, can aid in the assessment of conservation outcomes as well as derive elements to help decision-making, particularly at the local level, regarding the design, management, and use of different conservation efforts (Danielsen et al 2005).

While we recognize that the most direct way to measure biological diversity in a given setting is through inventory techniques (Noss 1990), we acknowledge that describing, quantifying, and geopositioning different components of biodiversity - from genes and species to entire ecosystems - is not simple, especially in a limited time frame (Stork et al. 1997). Some of the most relevant questions in this regard are the following: What aspects of biological diversity should be measured? Which are the most urgent, and what methods should be employed? It is thus necessary to define the objects (units) to be measured as well as the methods and instruments to be employed. Finally, it is important to determine how the collected data will be used.

Our strategy will then be to integrate the above questions as part of the participatory research. Within this integrated assessment methodology, we seek the involvement of local community members, from the development of the methods to its implementation, and we recognize already existing community-based monitoring systems and local environmental management decision-making processes. This approach requires that monitoring activities

be simple and fit into the day-to-day work of local people, as this encourages their involvement.

Our approach therefore is based on the assumption that a co-inquiry approach can integrate local and scientific understanding in order to assess different aspects of biodiversity, and that the resulting assessment processes are powerful tools for management. For this, we follow Feinsinger et al. (2010) and frame the participatory monitoring research on the Inquiry Cycle (question, action, reflection, application, new questions arising from the process). Research becomes part of a process in which the starting point is the recognition and enhancement of the capacities of a group comprising both local community members and external researchers to 1) develop relevant questions regarding the management of natural resources for their conservation, 2) use adequate tools for gathering information to answer questions, 3) analyze that information and its implications for the question, 4) understand if and how that learning can improve our management practices, and finally, 5) generate new questions that derive from the learning experience. The phases described above belong to a co-inquiry process that engages local participation in biodiversity monitoring from the defining of objects and scales of research to be studied to the analyzing and contextualizing of results.

Integrated biodiversity assessment can be implemented through mapping, taking into account current knowledge and management practices, both of which can help us understand the ecological processes and elements of ecosystems that need monitoring. That is, after information has been derived from participatory analysis, with an emphasis on participatory mapping (NGO Programme Karnataka-Tamil Nadu 2005), it is possible to determine, with local participants, the geographical scale and ecosystems to be included, for the study of either one or several focal taxonomic groups or ecological processes of interest to local communities. Sampling protocols comparable under different conditions or Community Rapid Biodiversity Assessments (CRAB) are used to derive base-line information and train local experts (WWF 1998, IUCN 2008). Data analysis and interpretation of results, carried out in collaboration with local communities, help to derive management recommendations (Danielsen et al. 2005). Based on this co-enquiry methodology, the COMBIOSEERVE project case studies will allow a co-learning experience regarding the management and conservation of biocultural diversity.

Cited literature

CBD. (1992). Convention on Biological Diversity, 1992. Convention on Biological Diversity: Text and Annexes. In <www.biodiv.org>, pp. 1–34.

Secretariat of the Convention on Biological Diversity, Montreal, Canada
Danielsen, F., D. S. Balete, M. K. Poulsen, M. Enghoff, C. M. Nozawa, and A. E. Jensen. 2000. A simple system for monitoring biodiversity in protected areas in developing countries. *Biodiversity and Conservation* 9:1671-1705.

Danielsen, F, Marlynn M. Mendoza, Phillip Alviola, Danny S. Balete, Martin Enghoff, Michael K. Poulsen and Arne E. Jensen. 2003. Biodiversity monitoring in developing countries: what are we trying to achieve? *Oryx* 37(4), pp 1-3.

Danielsen F., Jensen A.E., Alviola P.A., Balete, D.S., Mendoza, M. Tagtag, A., Cistodio C., y Enghoff M. 2005. Does monitoring matter? A quantitative assessment of management decisions from locally-based monitoring of protected areas. *Biodiversity and conservation* 14:2633–2652

Feinsinger, P, Pozzi, C, Trucco, C, Leny Cuellar, R, Laina, A, Cañizares, M y Andrew Noss, A (2010). Investigación, conservación y los espacios protegidos de America Latina: una historia incompleta. *Ecosistemas* 19, 1-15.

International Union for Conservation of Nature and Natural Resources (IUCN) Lao PDR. 2008. A Rapid Participatory Biodiversity Assessment, Stora Enso Eucalypt Plantation in Southern Lao PDR.

Moller, H., F. Berkes, P. O. Lyver, and M. Kislalioglu. 2004. Combining science and traditional ecological knowledge: monitoring populations for co-management. *Ecology and Society* 9(3): 2.

NGO Programme Karnataka-Tamil Nadu (2005) Participatory Monitoring and Evaluation: field Experiences NGO Programme Karnataka-Tamil Nadu Series 1 Intercooperation Delegation, Hyderabad, India. 46 pp.

Noss, R. 1990. Indicators for Biodiversity Monitoring: A hierarchical approach. Conservation Biology 4(4), pp.355-364.

Ostrom and Nagendra 2006. Insights in linking forests, trees and people from the air, on the ground, and in the laboratory. PNAS 19224-19231.

Stork NE, Boyle TJB, Dale V, Eealey H., Finegan B., Lawes M., Manokaran, N., Prabhu R., y J. Soberon. 1997 Criteria and Indicators for Assessing the Sustainability of Forest Management: Conservation of Biodiversity. Working Paper No. 17. CIFOR.

World Wildlife Fund. 1998, Dong Phu Vieng NBCA Rapid and Participatory Biodiversity Assessment (BIORAP) Final Report, Forest Management and Conservation Program National Biodiversity Conservation Areas Sub-Program, Burapha Development Consultants, Lao PDR.