



Review

A framework and indicators for evaluating policies for conservation and development: The case of wildlife management units in Mexico



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ABSTRACT

The Mexican government has an innovative policy model for biodiversity conservation and rural development that includes permissible use of wildlife within a System of Land Management Units (SUMA, by its Spanish acronym). This co-management approach has been successful in terms of landowner participation, since the SUMA currently covers 38.2 million hectares (nearly 20% of Mexican territory). However, after 18 years of implementation, there has been no comprehensive evaluation by which to assess its effectiveness at national level. This article introduces the SUMA policy, its implementation and outcomes, and proposes a framework for conducting institutional monitoring and evaluation within an adaptive co-management approach. Our methodology comprised analysis of the achievements and challenges reported through interviews with stakeholders, journals and grey literature, and a review of the SUMA Information System (SIS) and its decision-making information needs. As result we have developed a set of 40 environmental, social and economic indicators grouped into five distinct but complementary dimensions within a sustainability framework: (I) Biodiversity conservation, (II) Wildlife management, (III) Economics, (IV) Social welfare and (V) Administration. These indicators can be incorporated into the SIS in order to support program evaluation and strengthen decision-making. Our article provides specific pathways for developing policy-oriented evaluation systems for worldwide biodiversity and conservation initiatives.

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1. Introduction

Over the last two decades, incentive-based policy instruments have become established as developmental models worldwide, promoting sustainable activities that acknowledge biodiversity conservation and local livelihoods. A commonly referenced example is the Community-Based Natural Resource Management approach originally promoted in southern Africa (Barnes and de Jager, 1996; Baker, 1997). Such policy models address complex interrelationships that exist between society, economics, politics and the environment, and try to incorporate sustainability principles. While centralized top-down approaches to natural resource management have historically prevailed, these are now evolving into arrangements of participatory governance (Sampford, 2002; Roe et al., 2009). This change emerged because

societies began to demand greater community participation in decision-making (Berkes, 2009; Brink et al., 2011). However, capacity limitations prevail in resource management command-and-control systems (Brunner and Steelman, 2005; Armitage et al., 2007), particularly in developing countries. Co-management arrangements added complexity and uncertainty because of the increased number of stakeholders and because improved community capacities are necessary in order to implement policies locally. Governments that attempt to implement co-management strategies require institutionalized monitoring and evaluation (M&E) mechanisms for effective management revision (Davies et al., 2013). Global initiatives therefore seek to integrate knowledge, practical experience and empirical evidence of policy and institutional models for biodiversity conservation and development (Ferraro et al., 2012). Policy evaluation is necessary in order to recognize prior interventions and estimate the degree to which objectives have been met (Susskind et al., 2001). However, it is difficult to determine and enhance the sustainability and conservational benefits of biodiversity use, since such approaches are poorly understood. In view of this complexity, it is necessary to

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further the knowledge of how all aspects affect the formulation, implementation and impacts of biodiversity management. However, analysis of policy instruments remains poor, especially in developing countries where community-based projects are more common (Miteva et al., 2012; Davies et al., 2013). A more recent call urges conservationists to generate knowledge regarding dual conservation and development systems, known as 'biodiversity mainstreaming' (Redford et al., 2015).

Initiated in 1997, the system of management units for wildlife conservation (SUMA, by its Spanish acronym) is a major environmental policy in Mexico for biodiversity management and conservation, a responsibility for the Ministry of Environment and Natural Resources (SEMARNAT). However, its complexity has been challenging in terms of governmental evaluation. Currently, the available information regarding performance and effectiveness is incomplete due to the lack of systematized information and evaluation, and only administrative assessments have been conducted to date. It is therefore necessary to consolidate the substantial body of knowledge and evaluate the SUMA at a national scale (CONABIO, 2012).

The objective of this study was to provide insights of the various issues and dimensions necessary to develop appropriate M&E indicators for initiatives that combine objectives of conservation and development. Our SUMA study provides pathways to address the need for indicators for the Aichi Biodiversity Targets and the Strategic Plan for Biodiversity 2011–2020 of the Convention on Biological Diversity (CBD). Our investigation also offers insights into resource co-management approaches, institutional governance and participatory evaluation systems that may enrich the knowledge and practice of such initiatives worldwide. This study is presented in three parts: The first (Section 2) describes the conceptual framework and methodology. The second (Section 3) describes the SUMA institutional governance and program implementation. Program objectives, anticipated benefits and documented outcomes of the SUMA are summarized, and monitoring information and policy evaluation requirements are identified. The third part (Section 4) proposes an institutional M&E framework and a set of environmental, social and economic indicators that may strengthen the SUMA Information System (SIS) and support systematic evaluation. We conclude with an appraisal of the applicability of the SUMA M&E framework and proposed indicators for global conservation arenas such as the CBD Strategic Plan for Biodiversity 2011–2020.

2. Methodology

The conceptual framework for our policy analysis was to design a case study with a systems perspective, where the phenomenon under study is understood as a complex system that is greater than the sum of its parts (Maani and Cavana, 2007). We thus gathered data on multiple aspects of the SUMA, assembling a comprehensive picture of policy structure, interconnections and dynamics (Patton, 2002). System analysis and development of indicators were framed by the principles of sustainability in order to appraise the environmental, social, economic and institutional dimensions that should be balanced as subsystems (de Vries, 2013). We addressed the diversity of issues that may be included as proxies and metrics for evaluation. These pertained to the ecological subsystem, natural capital, social and institutional structures and function, and economic values and transactions. We also highlighted idiosyncrasies of the SUMA as a policy model of biodiversity conservation and development.

The case study was built on a combination of primary and secondary data sources. Primary data were obtained from 57 structured and unstructured interviews with a range of SUMA stakeholders including direct beneficiaries such as landowners,

wildlife businesses and wildlife professionals, as well as SUMA staff, federal and state government officials and scholars. The interviews explored the perceived benefits and challenges faced by SUMA stakeholders in relation to ecological, socioeconomic, administrative and operational aspects. Strengths and weaknesses from a policy perspective were identified, determining major management issues and potential information to cover evaluation. Secondary data were originated from analysis of official statistics and documentation and SIS databases. This was complemented with a review of relevant literature within the Web of Science (©Thomson Reuters, USA) and SCOPUS (©Elsevier, The Netherlands) databases. We searched articles with the words "wildlife management AND co-management", "extractive conservation" AND "biodiversity conservation AND co-management policy" in the title, abstract and/or keywords. Search identified 379 articles which were subsequently filtered to 125 after reviewing the abstracts. Finally; only 59 were considered in our analysis on the basis of explicitly reporting biodiversity management schemes and land co-management structures within a policy framework. The list of articles is in the Appendix of online supplementary material. Indicator formulation followed the 'theory of change' and 'program logic' models by which we outlined the policy process of the SUMA (Mertens and Wilson, 2012). These models are complementary; since the former is conceptual and helps to create a representation of SUMA interventions and assumptions of change; while the latter is operational and helps to visualize the causal relationships between SUMA enterprises and expected outcomes and impacts. We assessed short-, mid- and long-term impacts and elicited linking indicators for monitoring. Firstly, we harmonized indicators with four dimensions of sustainability: natural, social, economic and political. We then added a fifth to separate the natural dimension into two: (1) "Biodiversity conservation", which addressed indicators for the strict objectives of conserving genes; species and ecosystems; and (2) "Wildlife management", which included indicators for monitoring activities related to wildlife exploitation and business.

Once all of the information elements were visualized, captured and interpreted, we established a set of draft M&E indicators and metrics. We conducted this analysis in a systematic and iterative process, identifying and incorporating new sources of information, revising and interpreting emerging ideas and assumptions, and updating thematic categories until the data added nothing new, a process known as "indexing categories" (Ritchie and Lewis, 2010). As result, five distinct but complementary dimensions and 40 indicators and metrics were established. We aimed to define indicators and metrics that could help identify factors likely to contribute to successful or unsuccessful delivery of program objectives, while demonstrating its utility to M&E information needs. We validated this through interviews with SUMA staff. We do not claim that the proposed indicators are complete and finalized; our aim is to provide a roadmap of the dimensions that could be considered for M&E of the SUMA and similar biodiversity conservation and wildlife management schemes. Other useful sets of indicators have already been applied to performance assessments of individual wildlife management units (UMA) (García-Marmolejo et al., 2008; Ávila Foucat et al., 2009; Ávila-Foucat and Pérez-Campuzano, 2015). However, our study goes further by defining a set of indicators to meet the institutional M&E needs of the SUMA as a contribution for policy-making and management.

3. The SUMA as a market-based instrument for biodiversity conservation

In past decades, the Protected Areas System (PAS) of the National Commission of Protected Areas (CONANP) sustained most

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