Biological Conservation 169 (2014) 258–267

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

Perspective

Commonalities and complementarities among approaches to conservation monitoring and evaluation

Michael B. Mascia [a,*,3], Sharon Pailler [a,1,3], Michele L. Thieme [a], Andy Rowe [b], Madeleine C. Bottrill [c], Finn Danielsen [d], Jonas Geldmann [e], Robin Naidoo [a], Andrew S. Pullin [f], Neil D. Burgess [a,e,2]

[a] Conservation Science Program, World Wildlife Fund, 1250 24th St. NW, Washington, DC 20037, USA
[b] ARCeconomics Inc., 160 Westcott, Salt Spring Island, BC V8K 1C2, Canada
[c] Conservation International, 2011 Crystal Drive, Suite 500, Arlington, VA 22202, USA
[d] Nordisk Fond for Miljø og Udvikling, Skindergade 23-III, DK-1159 Copenhagen, Denmark
[e] Center for Macroecology, Evolution and Climate, Department of Biology, University of Copenhagen, Ole Maaløes Vej 5, DK-2200 Copenhagen, Denmark
[f] Centre for Evidence-Based Conservation, School of Environment, Natural Resources and Geography, Bangor University, Bangor, Gwynedd LL54 2UW, UK

ARTICLE INFO

Article history:
Received 24 April 2013
Received in revised form 30 October 2013
Accepted 14 November 2013

Keywords:
Ambient monitoring
Management assessment
Performance measurement
Impact evaluation
Systematic review

ABSTRACT

Commonalities and complementarities among approaches to conservation monitoring and evaluation (M&E) are not well articulated, creating the potential for confusion, misuse, and missed opportunities to inform conservation policy and practice. We examine the relationships among five approaches to conservation M&E, characterizing each approach in eight domains: the focal question driving each approach, when in the project cycle each approach is employed, scale of data collection, the methods of data collection and analysis, the implementers of data collection and analysis, the users of M&E outputs, and the decisions informed by these outputs. *Ambient monitoring* measures status and change in ambient social and ecological conditions, independent of any conservation intervention. *Management assessment* measures management inputs, activities, and outputs, as the basis for investments to build management capacity for conservation projects. *Performance measurement* assesses project or program progress toward desired levels of specific activities, outputs, and outcomes. *Impact evaluation* is the systematic process of measuring the intended and unintended causal effects of conservation interventions, with emphasis upon long-term impacts on ecological and social conditions. *Systematic review* examines existing research findings to assess the state of the evidence regarding the impacts of conservation interventions, and to synthesize the insights emerging from this evidence base. Though these five approaches have some commonalities, they complement each other to provide unique insights for conservation planning, capacity-building, adaptive management, learning, and accountability. Ambient monitoring, management assessment, and performance measurement are now commonplace in conservation, but opportunities remain to inform conservation policy and practice more fully through catalytic investments in impact evaluations and systematic reviews.

Contents

* Corresponding author. Tel.: +1 (202)293 4800; fax: +1 (202)293 9211.
E-mail addresses: michael.mascia@wwfus.org (M.B. Mascia), spailler@clark.edu (S. Pailler), michele.thieme@wwfus.org (M.L. Thieme), andy.rowe@earthlink.net (A. Rowe), mbottrill@conservation.org (M.C. Bottrill), fd@nordeco.dk (F. Danielsen), jgeldmann@bio.ku.dk (J. Geldmann), robin.naidoo@wwfus.org (R. Naidoo), a.s.pullin@bangor.ac.uk (A.S. Pullin), neil.burgess@wwfus.org (N.D. Burgess).
[1] Present address: Department of Economics, Clark University, 950 Main Street, Worcester, MA 01610, United States.
[2] Present address: United Nations Environment Programme World Conservation Monitoring Centre, 219 Huntingdon Road, Cambridge CB3 0DL, UK.
[3] These authors contributed equally to this work.

0006-3207/$ - see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.biocon.2013.11.017

1. Introduction

Monitoring and evaluation (M&E) has a long history in conservation, with diverse approaches developed for diverse purposes (Stem et al., 2005). In recent years, scholars have advocated M&E as a means to facilitate the wise use of scarce conservation funds (Ferraro and Pattanayak, 2006; Sutherland et al., 2004), respond to the environmental implications of ineffective management (Hockings et al., 2006), promote accountability (Christensen, 2003; Jepson, 2005), and track progress towards broader conservation goals (Gratwicke et al., 2007). These aspirations for widespread and effective use of conservation M&E have become increasingly codified in policy (e.g., DANIDA, 2006; USAID 2011), technical guidance (e.g., Hockings et al., 2006; Kapos et al., 2008; Margoluis and Salafsky, 1998), and practice (Miteva et al., 2012), as scholars, practitioners, and donors have sought to target conservation investments, track progress, foster adaptive management, ensure accountability, and catalyze learning within the conservation sector.

Despite previous reviews (e.g., Birnbaum and Mickwitz, 2009; Kapos et al., 2008; Stem et al., 2005), the commonalities and complementarities among current approaches to conservation M&E are not well articulated. This absence of clarity creates the potential for confusion, misuse, and missed opportunities to inform conservation policy and practice through M&E (Stem et al., 2005). Misuse of M&E tools and approaches poses a number of risks (Oral History Project Team, 2007), including misallocation of M&E resources, unreasonable expectations of M&E activities, inaccurate assessments of conservation interventions, and misguided allocation of conservation resources (Ferraro and Pattanayak, 2006; Stem et al., 2005). If conservation M&E fails to realize its potential because of misuse and missed opportunities, the perceived value of M&E may decline and its use may be limited further. Effective use of M&E, by contrast, may catalyze a virtuous cycle of wider adoption across the conservation community, as predicted by social theories of innovation diffusion (Rogers, 1995).

To foster more effective application of M&E approaches within the conservation sector, we examine commonalities and complementarities among five approaches to conservation M&E: ambient monitoring, management assessment, performance measurement, impact evaluation, and systematic review. We define each approach and characterize each in eight domains: the focal question driving the approach, when in the project cycle the approach is employed, the scale of data collection, the methods of data collection and analysis, the implementers of data collection and analysis, the users of M&E outputs, and the decisions informed by these outputs. We then explore the relationship of these five approaches to established frameworks for conservation planning and analysis, and highlight the implications for conservation science and policy. By providing conservation scholars and practitioners with a framework for understanding the relationships among approaches to conservation M&E, we hope to empower better informed "consumers" and "producers" of M&E.

2. Concepts and terminology

The abundance of jargon, much of it ill-defined, contributes to confusion regarding conservation M&E. In this analysis, we adhere to the concepts and terminology within the established literature on program evaluation (Table 1), as studied and practiced by members of the American Evaluation Association (www.eval.org). *Monitoring* is an ongoing function that systematically collects data on specified indicators, whereas *evaluation* is the systematic and objective assessment of an ongoing or completed project, program, or policy, often in order to determine the merit or worth of the intervention (DAC, 2002). (*Merit* is the impact attributable to the intervention; *worth* is the value of these changes to decisionmakers and key stakeholders.) The distinctions among *inputs*, *activities*, *outputs*, *outcomes*, and *impacts* allow clear differentiation among approaches to conservation M&E (below). Similarly, *projects*, *programs*, and *policies* represent distinct scales of human action at which conservation M&E may occur. Some approaches to conservation M&E strive to document and measure progress against an intervention's *theory of change*, which articulates and graphically illustrates the assumed logical and causal relationship between an intervention and its anticipated outcomes (Weiss, 1995). Of the five approaches to conservation M&E that we examine, impact evaluation and systematic review attempt to explicitly test or examine the validity of these theories of change. Ambient monitoring, management assessment, and performance measurement, by contrast, do not explicitly test – and often assume – the validity of the underlying program logic (i.e., implementation of an intervention will lead to desired outcomes).

3. Approaches to conservation M&E

3.1. Ambient monitoring

Focal question: What is the state of ambient social and/or environmental conditions, and how are these conditions changing over time and space?

Ambient monitoring is the process of systematically observing the state of social and/or environmental conditions over time, independent of any conservation intervention. Sometimes referred to as "status assessment" (Stem et al., 2005) or "surveillance monitoring" (Nichols and Williams, 2006), *ambient monitoring is not intended to measure the attributes or consequences of conservation interventions*, but, rather, to characterize the broader social and ecological context within which conservation occurs. Depending upon the spatial and temporal scale of ambient monitoring, *however, data derived from ambient monitoring efforts can be repurposed to inform M&E efforts that directly examine conservation interventions*. Ambient monitoring may measure variables such as human demography (e.g., Hobbs and Stoops, 2002), human health (e.g., ZIMSTAT and ICF, 2012), patterns of natural resource use and other human behaviors (e.g.,