Environmental education indicators system for protected areas management

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ABSTRACT

A new perspective for the management effectiveness of protected areas needs the inclusion of social data for decision-making. In this process, environmental education (EE) plays a key role in catalyzing biological and social issues in the management process, but there are scarce data about this relationship. The objective of this paper is to develop, from an institutional bottom-up perspective, a proposal for a set of EE indicators that is easy to use by practitioners to measure the response of the EE program in relation to the conservation objectives of protected areas management plans. Using a combination of quantitative and qualitative techniques, a case study at the National Parks System of Colombia is presented, which is divided in five stages: 1. An EE evaluation survey on a national scale. 2. An interview phase with EE practitioners and NGOs. 3. EE objectives categorization. 4. Systematization process and 5. Focus group to evaluate the proposed set of indicators. A set of 5 EE indicators was developed to fulfill the identified needs: appropriation of information, articulation, participation quality, program implementation and continuity of EE process. We expect that this new approach for EE evaluation will hopefully be adopted in the update of management plans, as an innovative tool that contributes to the effectiveness assessment of protected areas, integrating a more social and participative focus.

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1. Introduction

A crucial step forward in the conservation field has been the moving beyond the establishment of protected areas to the assessment of management effectiveness (Hockings et al., 2004). Environmental indicators are essential tools in this progress, but the lack of social data is still a common problem that these protected areas face (Moon and Blackman, 2014; Popescu et al., 2014; Stephanson and Mascia, 2014). New integrated solutions must be developed, and environmental education (EE) could be a key piece to bridge the gap between people's needs and biological aims. This conservation practice can be useful for a better decision-making, communication and policy development, (Bearzi, 2007; Mascia et al., 2003; Meijaard et al., 2014), so a measure of its true scope is necessary.

Any measure of conservation is inadequate without education and a direct involvement of the different social actors (Mascia et al., 2003; Sherrow, 2010). Fortunately, a shift in conservation science is taking place and a need to include social research is increasingly growing (Fisher et al., 2005, p. 2, 15; Linton and Warner, 2003; Mascia et al., 2003; Moon and Blackman, 2014; Stephanson and Mascia, 2014). Therefore, conservation is related to people as much as it is to species or ecosystems.

From the First Intergovernmental Conference on Environmental Education Tbilisi in 1977, EE can be defined as a holistic approach, rooted in a broad interdisciplinary base, which acknowledges the fact that natural environment and man-made environment are profoundly interdependent. EE uses the findings of science and technology to play a leading role in creating awareness and a better understanding of rapidly evolving environmental problems. It should foster positive patterns toward the environment and the nations' use of their resources, to make intelligent, informed and well structured decisions (UNESCO, 1979, p. 24).

Inclusion of EE within management plans is still in its infancy (Muñoz-Santos and Benayas, 2012), and with the current environmental crisis, education must be considered as a principle for biological conservation and management (Abdulla et al., 2008, p. 132; Brewer, 2006). Assessments based on knowledge gain are already on the shelf (Kuhar et al., 2010; Ruiz-Mallen et al., 2009),

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however it is also important to move a step forward, and measure why and how EE works (Pomeroy et al., 2005; Stern et al., 2013).

The Organization for Economic Co-operation and Development (OECD) has long been a pioneer in the field of environmental indicators. It developed and published the first international set of environmental indicators in 1993, describing 12 main rules of what an ideal indicator should be in terms of policy relevance and utility for users, analytical soundness and measurability (OECD, 2006, p. 143). These first guidelines have been used as a reference point for benchmark organizations like the World Bank, International Union for the Conservation of Nature, and International Cooperation Agencies, among others, to develop environmental and sustainability indicators, with small variations according to their needs and objectives (Global Environmental Facility, 2010; IOC-UNESCO, 2006; Pomeroy et al., 2004; Segnestam, 2002; Tilbury et al., 2007).

Governance and socio-economic indicators found in evaluation manuals for protected areas often include EE issues, but they provide limited information about the appropriateness and effects of EE on the conservation aims of the protected area. Some examples of such indicators are: establishment of education and training programs, increased awareness of environmental issues or number and trained decision makers (Borrini-Feyerabend et al., 2013; IOC-UNESCO, 2006, p. 129; Marino et al., 2015; Pomeroy et al., 2005).

Kuhar et al. (2010), went further. They measured knowledge gain through EE programs in a quantitative way. The study compared the performance of an EE conservation program in Uganda, using pre-post tests after 30 days, 1 year and 2 years from the initial program. They demonstrated that knowledge gain was not transient, but did not guarantee that proper behaviors would be performed in a middle-long term time frame.

To improve the evaluation process, the EE indicators should be quality based, embracing quantitative and qualitative measures, to provide additional details to understand not only if EE works, but also why and how it works (Stern et al., 2013). Attention must be focused to link EE activities, processes and evaluation to the park's conservation aims (Claudet and Guidetti, 2010; Muñoz-Santos and Benayas, 2012), starting a strategy of continuous assessment (Blumstein and Saylan, 2007). The new EE approach should be inclusive with stakeholders who have a direct impact on the achievement of management objectives and are directly influenced by management decisions (Himes, 2007; Zorrilla-Pujana and Rossi, 2014).

Through a revision of a wide environmental and sustainability indicators sets, the present study found that criteria used by the Global Environmental Facility (GEF) were the most suitable for the research. GEF works with 5 criteria denoted by the acronym SMART, meaning that indicators should be specific, measurable, achievable, relevant, and time-bounded (GEF, 2010, pp. 28–29).

With these indicators' guidelines established, we conducted an action-research guided by the critical theory paradigm (Crotty, 1998, pp. 139–159), which dictates how data collection and interpretation will be done. This branch of social research intends to challenge, induce and document a change in the reality studied (García and Sampedro, 2006; Sauvè, 2000). It looks to improve some practical aspects of reality as a means for developing our understanding of it, through a participative and empowering focus and praxis (Moon and Blackman, 2014; Winter, 2002).

Having selected this roadmap and following the pressure-state-response indicator framework, the objective of this action-research was to develop a theoretical EE indicator set proposal from an institutional bottom-up perspective that is easy to use by practitioners and induces a change in the EE evaluation system. These indicators will assist in measuring the influence of the EE programs on the conservation objectives of the Park's management plan, using the NPS of Colombia as a case study.

2. Methods

The action-research was conducted using a combination of qualitative and quantitative methodologies (Fig. 1). The use of both compatible and complementary methodologies provides a better understanding of the national and local context during the study, considering an approach that incorporates social variables in the evaluation of protected areas management (Benayas et al., 2003; Dillon and Wals, 2006; Gerson and Horowitz, 2002; Russell, 2006).

To avoid failures or misunderstandings in the written questionnaire, as well as in the semi-structured interviews, both questionnaires were validated at the central office of the NPS. During tool validation, members pointed out questions that were not consistent, difficult to understand or confusing and/or time consuming in order to adjust the tools before its application.

First, a quantitative methodology was used in the manner of a questionnaire; secondly, a qualitative methodology in the form of interviews, categorization process and focus groups. ATLAS.ti 6.2.27 supported qualitative data analysis, allowing us to use the same categories used in the interviews and surveys.

2.1. Survey – questionnaire

The questionnaire was developed through three main steps: content selection, structure-design and format. In first place, we developed questionnaires following the structure and functions of the EE program within the NPS (UAESPNN, 2005, 2001), which we divided into 5 categories: objectives of the program, institutional and coordination support, audiences and activities, participation and communication, and assessment (this last section is the one analyzed for this paper). In second place, questionnaire design and structure consisted of closed questions, where alternatives answers were given to respondents. We also included an open question in each section for comments and reflections ((Fernández, 2007; Himes, 2007). Questionnaire format was chosen through the formats developed by the webpage where surveys were designed (www.surveymonkey.com).

The questionnaire was sent to all EE teams in the NPS between 2011 and 2012. To obtain the most objective data from the work experience, we emphasized that the survey was not an evaluation of their work, and responses were for research use only.

The questionnaires were delivered to a total of 45 National Parks that have an EE program running (80% of National Parks at the time of the survey) and also to the NPS central office, where a total of 46 surveys were registered. A sample of 20 questionnaires from NPS (43%) at local, regional and national level was used for the research regarding EE evaluation (see supplementary material for geographical distribution of participation). The 26 remaining surveys (56%) were not included in the analysis because answers were not complete or were inconsistent.

The survey was used for the purpose of providing an insight into EE staff perceptions and the current situation relating to EE evaluation, through closed questions with an open comment section (see supplementary material).

Given the fact that in most cases there is only one person in charge of this area at local and regional level, we did not have to choose specific criteria to determinate a sample of surveyed educators. In cases where there was more than one, all the EE staff filled questionnaires when it was possible.

2.2. Interviews

Semi-structured interviews with 11 staff members from the central and local offices and environmental NGOs were performed during 2011–2012 to shed light on the process of investigation (Gerson and Horowitz, 2002). The time frame of the interviews