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Analysis of the variety of education and outreach interventions in biodiversity conservation projects in Spain

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ABSTRACT

The Convention on Biological Diversity recognizes education and public outreach interventions as key tools for biodiversity conservation. Reviewing 85 biodiversity conservation projects supported by the Spanish Biodiversity Foundation, we used multivariate statistical analysis to develop an empirical detailed list of environmental communication, education and participation (CEPA) actions and define the main characteristics of these strategies. We found that one-way dissemination of information to mass audiences was the most frequent intervention. When implementing education strategies, schoolchildren were the most common audiences, although training key stakeholders was the second most frequent education activity. Moreover, these interventions were more likely to use teacher-led instructional formats than lessons that engage learners in exploration. Participation strategies were rare. Finally, we provided some considerations to funders to guide their request for proposals related to CEPA interventions.

Introduction

Biodiversity is essential for life maintenance, but over the past 50 years species and genetic diversity have decreased due to an unprecedented human impact on ecosystems (Foley et al., 2005; Millenium Ecosystem Assessment [MEA], 2005). The Convention on Biological Diversity (CBD, 1992) and the 10th Conference of the Parties held in Nagoya (Japan, October 2010), confirmed the need to raise awareness and educate society to understand the value of biodiversity and bring about change through the development of education and public outreach programs. Thus, Communication, Education and Public Awareness and Participation Actions (CEPA hereafter; Hesselink et al., 2007) have become important tools to support the implementation of the National Biodiversity Strategies and Action Plans developed under the CBD to conserve biodiversity. However, the real issue is not whether to use CEPA as a strategic tool for biodiversity conservation, but how to do so (Hesselink et al., 2007; Mascia et al., 2003).

There are several typical CEPA actions (i.e., communication, education or participation strategies; Salafsky et al., 2002) but each have a variety of connotations. For example, *environmental communication* actions can be thought as the process of exchanging messages among different social agents and aimed to promote environmentally friendly knowledge, attitudes and behaviors (Piñeiro, 2008). However, while some authors make a clear distinction between "one-way transmission" of messages (i.e., delivering information) and "two-way exchange" of messages (i.e., building understanding through personal interactions) (Fien et al., 2001; Scott & Gough, 2003), in the field, the term communication is used both as information dissemination (e.g., print materials) and exchange of messages (e.g., when a dialog among different sectors is established). Furthermore, two-way interaction may be considered *environmental education* when the issues are more disputed than agreed upon and direct interpersonal exchange occurs, since the role of educators is to engage learners and to facilitate learning (Scott & Gough, 2003; Piñeiro, 2008). *Environmental participation* is another amorphous term. On the one hand, it can be defined as a set of strategies to facilitate and to promote the involvement of citizens in making decisions related to the environment (Monroe et al., 2000). This can mean either increasing the efficiency of the conservation programs by engaging more people in targeting the conservation goals (Evely et al., 2011; Fazey et al., 2005b; Salafsky et al., 2002), or the fundamental right for all citizens to be able to be engaged in decisions (Chawla & Cushing, 2007; Oughton, 2008). On the other hand, *environmental participation* can refer to the way in which people are taught biological concepts, e.g., by participating

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in a role play, in collecting data or by exploring a concept (see, e.g., Ryan et al., 2001).

Therefore, the boundaries among environmental communication, education and participation actions in conservation projects could significantly overlap (Fien et al., 2001; Monroe, 1999), and as a result there is little clarity when discussions of CEPA actions are restricted to these terms. In this context the question is what are conservation practitioners actually doing related to CEPA actions? And for what purpose are they using them? Recognizing the importance of effectively involving people in biodiversity conservation (Bickford et al., 2012; Evely et al., 2011; Jacobson & McDuff, 1998; Mascia et al., 2003), we explored how practitioners implement CEPA actions in conservation projects and developed a detailed list of possible interventions (Salafsky et al., 2002). We think this may be a significant contribution to improve efforts in education and public outreach in support of biodiversity conservation.

This article therefore aims to analyze what is being done in communication, education and participation through funded biodiversity conservation projects in Spain. To achieve this goal, we used documents from the Spanish Ministry of Environment's Biodiversity Foundation to (1) analyze the main traits of current implementation of CEPA actions in conservation projects; and (2) develop a typology of CEPA actions, focusing on each of the three general actions: environmental communication, education and participation.

Methods

Data collection

We collected data from the Spanish Ministry of Environment's Biodiversity Foundation (http://www.fundacion-biodiversidad.es). This foundation has played a key role in supporting the preservation of biodiversity in Spain (see, e.g., Martín-López et al., 2009) by co-financing biodiversity conservation projects implemented by regional and local entities all over the country (e.g., NGO's, foundations, universities, research centers or councils). Additionally, Biodiversity Foundation has promoted CEPA initiatives, as it requires that conservation projects include an education or public outreach intervention (e.g., *Dune recovery in the beach of Sa Mesquida of Mallorca* was a project which provided a brochure to share information about the initiative).

We used project reports from a total of 85 biodiversity projects developed from 2005 to 2008 to conduct this analysis. These reports create an ideal record for analysis, because they describe the CEPA actions that were conducted in moderate detail, providing a snapshot of the biodiversity conservation education and outreach initiatives all over Spain.

Data analysis

Content analysis of biodiversity conservation projects

We used content analysis for the systematic examination of the biodiversity conservation projects (see Hale, 2010; Jacobson et al., 2012; Norris & Jacobson, 1998; Perez & Sanchez, 2009). To use these technique, which identify patterns and draw valid inferences about their meaning (Riffe et al., 1998), three elements are necessary (White & Marsh, 2006): sampling units (identify the population and establish the basis for sampling), data collection units (units for measuring variables), and units of analysis (basis for analysis).

In this study, the sampling units are biodiversity conservation reports ($n = 85$) co-funded by the Biodiversity Foundation. The data collection units are a set of 311 CEPA actions identified in the 85 reports (as there may be several CEPA actions in a single conservation project) which were assigned to either environmental communication, education or participation actions (see Fig. 1). These 311 reported actions were categorized and grouped into 73 items (the units of analysis) and then organized into 11 variables (Appendix A), based on the literature related to CEPA actions assessment (Benayas et al., 2003; Fien et al., 2001; Heras, 2002; Palavecinos et al., 2008; Piñeiro, 2008; Scott & Gough, 2003). Other items and variables were derived inductively (e.g., *Stakeholders-type of audience*) by categorizing the first 100 CEPA actions. Once the items and variables were adequately selected and described, the first analyzed CEPA actions were re-examined. Finally, each CEPA action ($n = 311$) was checked for meeting each one of the 73 items featured in Appendix A.

Main characteristics of CEPA actions implementation

To analyze the main traits in the implementation of education and outreach interventions in biodiversity conservation projects (Objective 1), we first used descriptive statistics to characterize communication, education and participation actions on the basis of three variables (see Appendix A). The first variable was *Topic*, which describes the content conveyed by the activities (i.e., natural sciences, social sciences, wider context of conservation, skill-buildings and project objectives/results). The second variable, *Main stakeholders*, identified the audiences of the CEPA activity (e.g., general audiences, schoolchildren, NGO's, government staff.). And the third variable, *Type of activity*, described the programs or materials that were developed (e.g., festivals, workshops or forums).

A typology of CEPA actions

To define a typology of CEPA actions (Objective 2), we carried out a Multiple Correspondence Analysis (MCA) followed by a Hierarchical Cluster Analysis (HCA) for each of the three CEPA actions: communication, education and participation. MCA is employed as a principal component analysis for categorical data, providing quantitative variables (Bardat & Aubert, 2007) and guaranteeing a standard measurement system (Greenacre & Blazius, 2006) for performing the HCA. HCA used Ward's linkage method with Euclidean distances (Ward, 1963) performed on the action coordinates of the main axes of the MCA. We used decreasing eigenvalues to select the axis with a greatest contribution. The combination of MCA and HCA allows us to define the main characteristics of the empirical types and account the frequency of each group. This approximation has been used in several studies, such as Bardat and Aubert (2007), García-Llorente et al. (2011a, 2011b), and Jiménez et al. (2014), to discern and characterize groups across large datasets. Appendix A shows the 11 variables considered in the analysis.

Results

Main traits of the educational and outreach actions

For the 311 CEPA actions described, 78% were defined as environmental communication actions, 12% were environmental education actions and 10% were environmental participation actions.

Of the topics addressed by environmental communication actions, 45% disseminated project objectives or results. The rest aimed to disseminate natural science information (21%), social sciences information (17%), conservation skills (11%), or a broad awareness of biodiversity conservation issues (6%), e.g., climate change, urban ecology, consumption, etc. The main stakeholders for these actions were a general audience (50%), followed by environmental professionals (15%) and government staff (15%) (Fig. 2). Overall, communication activities focused on developing materials for information dissemination (59%), e.g., flyers, posters, panels, brochures, radio or television campaigns, promotional items, of which 13% used information and communication technologies (ICT;

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