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Understanding mental constructs of biodiversity: Implications for biodiversity management and conservation

Anke Fischer[a,*], *Juliette C. Young*[b]

[a]*Macaulay Land Use Research Institute, Socio-Economics Group, Craigiebuckler, Aberdeen AB15 8QH, UK*
[b]*Centre for Ecology and Hydrology, Hill of Brathens, Glassel, Banchory AB31 4BW, UK*

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ABSTRACT

The participation of the public in environmental decision-making and management is increasingly seen as essential for the success of conservation initiatives. Ecological scientists and conservation practitioners have, however, argued that a lack of understanding of biodiversity issues by the public is a barrier to their effective participation in decision-making processes. These arguments are often based on studies where scientific knowledge is used as the sole measure of public understanding of biodiversity, and therefore fail to account for individuals' constructs of biodiversity and related issues such as biodiversity management.

We examined individuals' mental constructs of biodiversity, and their conceptual contexts, through a series of focus group discussions with members of the general public in Scotland. To gain a fuller picture of public understanding of biodiversity, we distinguished between mental associations with the term 'biodiversity', and the meanings associated with biodiversity-related concepts independent of scientific terminology.

We found participants to express rich mental concepts of biodiversity, irrespective of their scientific knowledge. These included notions of balance, food chains and human–nature interactions, and showed strong normative dimensions that were used to define desirable or ideal states of nature. These concepts of biodiversity were, in turn, strongly related to their attitudes towards how best to manage biodiversity.

This study highlights that a better understanding of individuals' mental constructs of biodiversity, which are linked to their attitudes towards biodiversity management, is essential for the design of biodiversity-related policies that are supported by the public.

1. Introduction

With the tailwind of the sustainability debate, views of the general public on the management of species and habitats have recently been gaining importance in the development of environmental policies (UNECE, 1998; Renn, 2006). Public consultation and participatory approaches are now frequently considered as central elements in identifying conservation priorities (SNH, 2006; Stewart, 2006) and in the management of protected areas (Martin et al., 2000; Mulongoy and Chape, 2004; Barber, 2004; CNPA, 2006). However, despite increasing efforts in the social and interdisciplinary sciences to shed light on the way members of the public perceive and evaluate biodiversity-related issues (Hull et al., 2001; Stoll-Kleemann, 2001; Kaczensky et al., 2004; Christie et al., 2006), the understanding of public views on biodiversity management remains limited, often leading to serious doubts about the significance of public opinion (Parsons and Daniel, 2002).

Previous studies have often been limited to an analysis of public knowledge and concern about biodiversity against the

* *Corresponding author:* Tel.: +44 1224 498200; fax: +44 1224 311556.
E-mail addresses: a.fischer@macaulay.ac.uk (A. Fischer), jyo@ceh.ac.uk (J.C. Young).
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yardstick of scientific intelligence (Spash and Hanley, 1995; DEFRA, 2002; Hunter and Brehm, 2003), qualifying individuals' knowledge as either 'correct' or 'incorrect' in relation to scientific definitions. In contrast, we follow here the lines of sociological and psychological research on related issues such as wildlife and landscape management that suggests that public views are best understood in their cultural, social and individual contexts (Kellert, 1979; Schultz, 2001; Skogen, 2001; Ericsson and Heberlein, 2003). In particular, our research is influenced by the theory of concepts (e.g., Graf, 1989; Medin, 2005). We assume that mental concepts as held by individuals are complex constructs that may include (i) specific terms that label a concept, (ii) definitions of a concept, and (iii) prototypical images that encapsulate typical examples for representatives of the concept. While some of these elements may often be missing, the main body of a construct will consist in its other connotations. The term 'connotations' is here used to refer to mental associations that relate a concept to other ideas and evaluations. These can take various forms and may include normative aspects that capture what should or ought to be, own experiences, and emotional evaluations. For example, previous studies suggest that members of the general public may hold rich mental concepts of biodiversity although they might not be familiar with the scientific terminology (Elder et al., 1998; Menzel, 2004; Holl, 2005). In particular, there is some evidence that paradigms such as 'interconnectedness' and systemic thinking are important elements of mental constructs related to biodiversity; however, this has so far not been analysed in detail (Elder et al., 1998; Menzel, 2004). Other potential components of mental constructs related to biodiversity include the value judgements implicit to conservation biology (Harrison, 1993; Barry and Oelschlaeger, 1996; Matsuda, 1997; Fischer and Van der Wal, 2007) and individuals' ideas of nature, which have been found to underlie attitudes towards wildlife and landscape management (Fulton et al., 1996; Buijs et al., 2006; Van der Windt et al., in press). However, little is still known about the way in which individuals' concepts of biodiversity and nature are related to their attitudes with regard to these issues (Henwood and Pidgeon, 2001; Clayton and Brook, 2005), a crucial aspect with regard to public acceptance and support of biodiversity management measures.

The aim of our study is thus to contribute to a better understanding of the ways members of the general public reason about issues of biodiversity change and management, to shed light on the factors that determine public acceptance of concrete biodiversity management measures, and to facilitate the development of suitable ways to communicate these.

We applied qualitative group discussions that involved members of the general public from the Cairngorms area in Scotland, Britain's largest national park, to obtain insights into the ways in which individuals form their attitudes towards biodiversity in relation to their constructs of biodiversity, particularly focussing on the values they hold and their views on nature. Following the concept theoretical approach mentioned above, we first describe individuals' mental associations with the term 'biodiversity', and then focus on their connotations with biodiversity issues independent from technical terminology, addressing (a) participants' own perceptions of diversity in nature, (b) connotations relating to other concepts, (c) normative evaluations of these connotations, and (d) connotations concerning the relationship between humans and nature. We then provide evidence on how these constructs are linked to individuals' attitudes towards biodiversity management.

2. Methods

2.1. Study site

Our study centred on the Cairngorms National Park in central Scotland, established in 2003 and currently undergoing a process of public consultation to develop a park management plan. The Cairngorms National Park covers an area of 3800 km^2, and is Britain's newest national park. The Cairngorms massif constitutes one of the largest and most unspoilt upland areas in Britain (Warren, 2002) and is considered to be the most important mountain area in Britain for nature conservation. It contains a number of rare habitats, including the largest expanse of Old Caledonian pine forest in the British Isles (Curry-Lindahl, 1990), covering approximately 12,000 ha and home to the endemic Scottish crossbill (*Loxia scotica*), the crested tit (*Parus cristatus*) and capercaillie (*Tetrao urogallus*) (Dennis, 2002). Other priority habitats include Northern Atlantic wet heath containing *Erica tetralix*, European dry heaths, Alpine and Boreal heaths, blanket bogs and bog woodland (JNCC, 2006). The National Park was chosen as a thematic focus and common reference of our group discussions to allow participants to relate to their own experiences of biodiversity in the area, and to gather information on their attitudes towards biodiversity management. Discussions thus centred on local biodiversity rather than on global biodiversity issues.

2.2. Focus group approach

We used a qualitative approach to explore the context in which biodiversity-related issues are perceived by members of the general public. Qualitative research methods include, for example, ethnographic or participant observation, qualitative interviews, focus groups, and discourse and conversation analysis. These do not aim to produce quantitative data and test hypotheses in a strict sense but to explore phenomena in depth.

Focus group discussions are a form of group interview using a relatively open, non-directive qualitative technique to explore topics as perceived by the participants (Merton, 1987; Fontana and Frey, 2000; Madriz, 2000). As well as understanding interactions between the members of the group, an important aspect of the focus group is to examine the joint construction of meaning (Bryman, 2004).

This technique is increasingly applied to understanding participants' views on environmental issues (Gobster, 2001; Henwood and Pidgeon, 2001; Hull et al., 2001). We adopted this method to allow an identification of the issues important to participants and a qualitative analysis of their understandings of biodiversity and attitudes towards biodiversity management and change. As the aim of the study was to understand the way in which the participants reasoned rather than to obtain a representative overview of attitudes held or to compare the views of sub-groups with statistical means, this approach was considered most appropriate.