



Do charismatic species groups generate more cultural ecosystem service benefits?



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ABSTRACT

The relationship between nature and cultural ecosystem service (CES) benefits is well accepted but poorly understood, as is the potential role of biodiversity in the relationship. By means of a public questionnaire survey in Wiltshire, UK, the relationship between the presence of a range of common species groups, species group ‘charisma’, group abundance in the landscape, and the benefit that people felt that they derived from the species groups was investigated for a lowland multifunctional landscape.

Findings showed that species group charisma influenced the benefit reported by respondents for current abundance levels, and influenced their response to potential increases or decreases in abundance. Respondents reported high levels of benefit from species groups hypothesised to be charismatic (birds, flowering plants, butterflies) and there was high consistency in the pattern of response. Respondents reported less benefit from groups hypothesised to be less charismatic (beetles/bugs, brambles and nettles), the latter response patterns showing much greater variation. These results could be used to promote a more holistic understanding of the value of biodiversity by educating and informing the public so that they derive benefit not just from the charismatic, but also from the everyday, the commonplace and less obviously charismatic species.

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1. Introduction

The existence of a relationship between nature, wildlife, ‘green space’ or biodiversity on the one hand, and human well-being on the other is widely assumed and accepted (MacKerron and Mourato, 2013; Russell et al., 2013; Lovell et al., 2014a,b; Alcock et al., 2015; Wheeler et al., 2015). As a result, indicators of quality of life (level of human well-being) often include metrics such as composite trends of farmland bird species because of the assumed relationship between natural features and the benefits that humans derive from nature (BirdLife International, 2004). However, this relationship between the natural world and human well-being is not well characterised or understood (Church et al., 2011, 2014). Given that there is considerable concern globally about declining biodiversity (Burns et al., 2016; Butchart et al., 2010; Barnosky et al., 2011), it is unclear how changes in

biodiversity could affect our well-being and quality of life. In consequence, the potential impact of biodiversity loss or enhancement on human well-being is an area of concern and active research (Bullock et al., 2011; Keniger et al., 2013). Yet researching the relationship presents a range of challenges.

Firstly, there is limited understanding of how CES provision and benefit generation respond to variations in specific elements of biodiversity (e.g. within-species, between-species, and at the ecosystem-level), and of the mechanisms of benefit generation (Hooper et al., 2005; Costanza et al., 2007; Schneiders et al., 2012; Clark et al., 2014; Lovell et al., 2014a,b; Sandifer et al., 2015). This is therefore true of the importance of particular taxa or broad taxonomic groups to which conservation effort might be directed (e.g. Czech et al., 1998; Clergeau et al., 2001; Luck et al., 2011).

A further challenge is the variety of different definitions of cultural ecosystem services that have evolved as research has progressed, such that at the moment no clear consensus has been reached (Millennium Ecosystem Assessment, 2005; Chan et al.,

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2011; Church et al., 2011, 2014). Part of the problem is methodological, including the difficulty of quantifying CES-derived benefits, which is commonly based on self-reporting methods (Boerema et al., 2016).

The sheer diversity of types of potential benefits also complicates the quantification of CES-derived benefits. These can include: psychological restoration (Kaplan, 1995; Hartig et al., 2003; White et al., 2013), improved physiological health (English et al., 2008; Jordan, 2009; Hanski et al., 2012), better social relations (Kuo and Sullivan, 2001; O'Brien and Murray, 2006; Morris and Urry, 2006; Weinstein et al., 2015), and spiritual development (Bhagwat, 2009; Lewicka, 2011), among many others as defined by a range of authors. King et al. (in review) hypothesised a series of six 'interpretive repertoires' to interpret the processes by which the diverse range of benefits may be generated.

There is also the challenge of defining the public's perception of biodiversity both in terms of what they perceive (can detect with the senses) and how they perceive it (evaluation of what they are aware of). Studies of the former appear to be limited in number but wide ranging in scope (Iftekhar and Takarna, 2008; Bayne et al., 2012; Qiu et al., 2013; Coll et al., 2014; Kaltenborn et al., 2016; Silva-Andrade et al., 2016; Gundersen et al., 2017). Russell et al. (2013) see 'perceiving' as one of a series of 'channels' to CES benefits which are in effect modes of interaction from 'knowing' at the most detached form of interaction through to 'living within' as the most intimate and intense, with each channel being associated with different CES benefits. Working with groups of members of the public, King et al. (in review) found that the view of countryside biodiversity held by the public in a study in Southern England differed broadly from that of conservation specialists. The public tended to be most aware of diversity at the scale of landscape complexity, broad ecosystems and habitats, then at the scale of broader species groups such as birds, butterflies, wildflowers, mammals or spiders, and least at the level of individual species, though this varied according to prior knowledge and understanding.

This therefore begs the question of how changes to CES benefits are affected by changes to aspects of biodiversity that people tend not to notice or perceive, and how they derive such benefits from the broader species groups that most people appear to recognise. Lindemann-Matthies et al. (2010) demonstrated that members of the public were able to distinguish the level of diversity of grassland swards, and that they evaluated the more diverse swards more favourably, although Qiu et al. (2013) found that for parks, higher biodiversity was not necessarily positively associated with higher preference. Otherwise, however, studies to date that clarify the association between scale of biodiversity (from gene to ecosystem), the role of perception thereof, and CES benefits do appear to be limited with a tendency to focus on the larger scale (ecosystem) (Botzat et al., 2016).

As regards people's evaluation of what they perceive, studies generally consider the public's or farmers' preferences regarding aspects of nature and wildlife, such a species or ecosystem attributes and characteristics (Belaire et al., 2015; Botzat et al., 2016; Grilli et al., 2016; Silva-Andrade et al., 2016; Gundersen et al., 2017). Czech et al. (1998) consider the way in which eight broad taxonomic groups are 'socially constructed' by the public in terms of the way they are positively or negatively evaluated and how this relates to the political power associated with their conservation. They found for example, that plants, birds and mammals were valued significantly higher than fish, reptiles, amphibians, invertebrates and micro-organisms along a spectrum of preference. They also noted in people's responses an 'aesthetic perspective' that favours 'charismatic megavertebrates'.

A range of factors are seen to influence people's perceptions of species and their attributes. Previous research (Lorimer, 2007;

Fischer et al., 2011; Ducarme et al., 2013; MacDonald et al., 2015) has identified three broad groups of factors that appear to influence the evaluation by people of species and species groups, namely: intrinsic attributes relating to the species of interest (e.g. size, behaviour, visual appearance, defence mechanisms); context- and status-dependent factors (e.g. rarity, vulnerability, nativeness, previous population change) and; relational and cultural factors (nature of human-species interactions, cultural familiarity, fame, reputation, intellectual interest). In reality, many of these factors overlap or interact. For example, aesthetic appeal represents a subjective appraisal by the observer, during an interaction incident, of the objectively verifiable external appearance of the species. Is also likely to be influenced by prior knowledge and familiarity with, as well as attitudes towards the species. Aesthetic appeal would therefore be the outcome of an interaction with the species which is affected by the range of factors mentioned.

Amongst the species-related attributes found to influence public appraisal of a change in species abundance, Fischer et al. (2011) identified again both contextual factors relating to the species' conservation status (previous population change, rarity, vulnerability, nativeness), and intrinsic species-related attributes as appraised by humans (harmfulness, value, attractiveness). Furthermore, Fischer et al. (2011) found that knowledge of previous population status was a significant factor in how people viewed current species' abundance, suggesting that knowledge and perception of past and present abundance are of importance. Lack of such knowledge, however, may lead to 'shifting baseline syndrome' (Pauly, 1995; Papworth et al., 2009; Steen and Jachowski, 2013) and a difference between how the public and conservation specialists view current species abundance and any changes.

In their study of the relative charisma of a range of mammals, MacDonald et al. (2015) found that significant factors influencing charisma included rarity, visual appearance, size, and dangerousness, as well as cultural familiarity. Ducarme et al. (2013) notes that, unlike other related terms that are widely used in nature conservation such as 'flagship' or 'keystone', charisma is not a clearly defined concept, whilst Lorimer (2007) identified two main aspects of charisma relevant to biodiversity conservation: ecological and affective, whilst the latter could be further divided into aesthetic and corporeal charisma.

Here we consider how the public responds to a number of commonly recognisable species groupings, without the need for specialist or detailed species-level knowledge. More specifically, we seek to answer the following research questions:

- 1) Is it possible to quantify the satisfaction and associated CES benefits that members of the general public feel that they get from the presence of particular groups of species in the landscape?
- 2) Is it possible to detect the variation in benefits between different species groups, and due to changes in a given species group's abundance? and if so,
- 3) Can such variation in benefit be related to the charisma of species groups?

Such findings can contribute to understanding aspects of biodiversity of value and potential cultural benefit to the public, how CES provision to the public may respond to changes in biodiversity provision in the landscape, thereby helping to inform and support policy options to enhance ecosystem service benefits. They may also provide insights on the factors that affect the public's willingness to accept the conservation of species that they do not find attractive or valuable.

As with Ecosystem Services (ES) and CES, there is a range of definitions for the various related associated concepts, such as

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