



# Biodiversity and cultural ecosystem benefits in lowland landscapes in southern England



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## ABSTRACT

Evidence of the link between biodiversity and cultural ecosystem benefits (CEB) is scarce. Participatory workshops were used to explore perceptions of CEB attributable to biodiversity in lowland arable and semi-natural grassland landscapes in southern England. Increased biodiversity was found to be associated with greater perceived benefit, mainly at the habitat and landscape scale. It was, however, difficult to separate the effects of biodiversity from those of abiotic and human-made features, all of which combined to provide an important sense of place. Furthermore, CEB were strongly linked with supporting infrastructure, notably public access. It was observed that CEB were generated through socio-psychological 'pathways' as people interacted with environmental settings, such as acquiring knowledge, feeling regenerated and communicating with others. CEB were also attributed to provisioning and regulatory services, questioning the validity of partitioning cultural services. The findings have implications for practitioners designing programmes to enhance nature's contribution to people.

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## 1. Introduction

While there is general acceptance of the potential benefits to people of interacting with nature and wildlife (MacKerron & Mourato, 2013; Russell et al., 2013; Wheeler et al., 2015), the relationship between biodiversity and benefits is less well prescribed (Clark et al., 2014; Lovell, Wheeler, Higgins, Irvine, & Depledge, 2014; Sandifer, Sutton-Grier, & Ward, 2015). In the ecosystem services framework (MA, 2005; UKNEA, 2011), biodiversity is considered to be a supporting service that underpins a range of final services, usually classified into provisioning (e.g. food supply), regulating (e.g. flood control) and cultural (e.g. aesthetics) services. Various assessments (MA, 2005; TEEB, 2010; UKNEA, 2011; UKNEAFO, 2014) have helped to improve knowledge about the links between provisioning and regulating ecosystem services and human wellbeing. However, the relationships between ecosystems, cultural ecosystem services (CES), and cultural ecosystem benefits (CEB) are less well understood. More specifically, knowledge of the

extent to which variation in biodiversity, and therefore potentially biodiversity loss, affect CEB is particularly scarce and constitutes an area of active research (Bullock et al., 2011; Keniger, Gaston, Irvine, & Fuller, 2013; Lovell et al., 2014). This is partly due to the challenge of defining the concept of CES and formulating a definition of biodiversity relevant for the measurement of nature-culture interactions and benefits.

According to Church et al. (2014), CES comprise environmental spaces, customs and practices that define identities and underpin human capabilities and experiences. The nature-culture relationship (Fish, 2011) is mainly one of interpretation and interaction, shaped by the ideas, beliefs, values and knowledge that make up shared understanding at a point in time. Culture in the anthropological sense means 'shared modes of believing and doing' (Coates et al., 2014). Thus, the nature-culture nexus reflects a dynamic combination of inherited traditional and contemporary modern values, beliefs, understandings and behaviours, predicated on some interaction with the natural environment.

Despite the practical difficulty of valuation, CEB are perceived to be highly valued and present some of the most compelling reasons for conserving ecosystems (Calvet-Mir, Gómez-Baggethun, & Reyes-García, 2012; Chan, Satterfield, & Goldstein, 2012; Holt

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et al., 2011). CEB are diverse and include psychological restoration (Kaplan, 1995; Hartig, Evans, Jamner, Davis, & Garling et al., 2003; White, Pahl, Ashbullby, Herbert, & Depledge, 2013), improved physiological health (English, Wilson, & Keller-Olaman, 2008; Hanski, von Hertzen, & Fyhrquist, 2012; Jordan, 2009), better social relations (Kuo & Sullivan, 2001; Morris & Urry, 2006; O'Brien & Murray, 2006; Weinstein et al., 2015), and spiritual development (Bhagwat, 2009; Lewicka, 2011).

A particular challenge is to ascertain whether CEB are sensitive to variations in biodiversity. Biodiversity is formally defined as the “variability among living species from all sources ... and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems” (CBD, 1992; CBD 2013). From a cultural perspective the perception of value given to biodiversity is, as Church et al. (2014) suggest, likely to be strongly influenced by a plethora of environmental and human factors.

Various studies indicate that biodiversity plays a role in the appreciation of natural areas (Collar, 2003) and the provision of psychological stimulus (Fuller, Irvine, Devine-Wright, Warren, & Gaston, 2007). Different people have different preferences for scenery and landscape (Kaplan & Kaplan, 1989) and generally respond more favourably to natural settings that possess a high level of complexity (Han, 2007). More specifically for example, Lindemann-Matthies, Junge, and Matthies (2010) showed that members of the public can detect changes in species richness and evenness in arrays of grassland plants, and expressed a preference for more diverse arrays.

Richness and coherency in environmental settings are shown to enhance the beneficial human experience of exposure to nature. Studies have indicated benefits associated with diverse nature views (Ulrich, 1984), nature smells (Burgess, 1995; Oreszczyn & Lane, 2000), nature sounds (Irvine et al., 2009; Yamada, 2006), taste (Weiss, 2011) and nature contact (Bell et al., 2003; Macnaghten, Grove-White, Weldon, & Waterton, 1998; Williams & Harvey, 2001). Exposure to ‘natural settings’ is known to help recovery from fatigue and stress (Kaplan, 1995).

Various psychological models attempt to explain human responses to the natural environment and its plants and animals (Gifford, 2014), identifying the extent to which these are inherited and/or learned. Cognitive models (Vaske & Manfredo, 2012) see human behaviour towards other species as formed by a hierarchy of beliefs, values, attitudes and norms. A range of typologies of attitudes, perspectives, and responses to nature and wildlife have been proposed (Kellert, 1996; Atfield, 2003; Teel and Manfredo, 2010). Similarly, Jacobs (2009; 2012) considered the origins and function of emotion-based responses to wildlife, and how these interact with cognitive processes to explain why people may like or dislike certain animals. Manfredo and Vaske (1995) had earlier developed a model of recreational interactions with wildlife-based motivational forces that people acted upon in order to derive satisfaction and utility.

A range of theories have been developed to account for preference at the landscape scale. For example, evolutionary theories see landscape preferences as mainly hereditary and innate (Appleton, 1975; Orians, 1980; Wilson, 1984), whereas cultural theories regard preferences as socially produced (Bell, 2012; Carlson, 2009; Tuan, 1974). Landscape preferences are also linked to the concept of ‘sense of place’, representing the social and psychological relationships between people and particular environmental settings (Acott & Urquhart, 2014; Castree, 2009; Gifford, 2014). The emotional meanings and attachment towards a particular place, often built up over time through processes of reciprocity (Eisenhauer, Krannich, & Blahna, 2000), influence the value attributed to place-specific landscapes, wildlife, heritage, memories, and activities. Furthermore, developing local identity and distinctiveness of place can help to support the sustainable

management of natural resources (UKNEA, 2011, p. 666; Forest of Bowland AONB, 2013).

It is clear from the foregoing that much has been achieved to conceptualise the social and psychological interactions between people and nature, both at the species and landscape scales. The cognitive and emotional processes that underpin this interaction strongly affect perceptions of value and the benefits derived from encounters with nature and biodiversity. However, while there is some evidence to show links between biodiversity and CEB, it is not yet regarded as sufficiently complete or robust to inform environmental or health policy (Cracknell, White, Pahl, Nichols, & Depledge, 2016; Lovell et al., 2014).

In this context, the UK Natural Environment Research Council has sponsored research on the relationships between biodiversity and ecosystem services through its Biodiversity and Ecosystem Service Sustainability (BESS, 2014) Programme. Within this, as part of the Wessex-BESS project (Wessex-BESS, 2015), we are assessing the links between biodiversity and the generation of a range of CEB in lowland calcareous grasslands and farmed areas in the Salisbury Plains Area of Wiltshire in southern England. We report here on a series of exploratory workshops held in the study area with local residents, the objectives of which were to answer the following research questions:

- RQ1: What understandings do people have of biodiversity?
- RQ2: What are the links between biodiversity and the generation of CEB?
- RQ3: Do CEB vary along a gradient of biodiversity?

We first describe the methods used to address our research questions, including the development of a conceptual framework and the organisation of our workshops. We then present our key results, discuss their implications and draw conclusions regarding the relationship between biodiversity and human wellbeing in managed landscapes.

The subject matter is of specific interest to researchers focussed on CES as a relatively new topic of enquiry. More generally it is of interest for those exploring the relationship between biodiversity and human wellbeing in the context of managed landscapes.

## 2. Methods and materials

### 2.1. Conceptual framework

Following an initial review of literature, we developed a conceptual framework to represent the links between ecosystems and CEB to people, with particular reference to biodiversity as a supporting service. Definitions of CEB vary mainly according to views about positioning and connectivity within the ecology-human interface. CES have been variously viewed as: non-material *benefits obtained by people from ecosystems* (de Groot et al., 2005 in the Millennium Ecosystem Assessment); a *contribution by ecosystems to non-material benefits* (e.g. capabilities and experiences) arising from human-ecosystem relationships (Chan et al., 2011 in the Natural Capital Project); *environmental settings* (Church, Burgess, & Ravenscroft, 2011 in the UKNEA); and environmental spaces and cultural practices *that give rise to material and non-material benefits* (Church et al., 2014 in the UKNEAFO).

With an emphasis on economic valuation, UKNEA (2011: p647) distinguished between environmental settings, defined as broad landscapes and habitat types, as the final ecosystem service and the flows of cultural goods that generate benefits for people, with consequences for wellbeing. The UKNEA typology of cultural goods includes: leisure, recreation and tourism; health, heritage, education and knowledge, and religious and spiritual goods. The UKNEA

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