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A comparison of cultural ecosystem service survey methods within South England

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ABSTRACT

Across all societies, humans depend on goods received from nature, termed ecosystem services. However, cultural ecosystem services (CES), the non-material benefits people obtain from ecosystems, are often overlooked in land-use decision making due to their intangible nature. This study aimed to evaluate three possible survey methods for site-based CES data collection; language-based supervised surveys (in which interviewers conduct surveys in real-time, recording verbal responses), language-based unsupervised surveys (respondents complete written surveys without an interviewer), and image-based unsupervised surveys (respondents complete surveys via image selection without an interviewer). Language-based supervised surveys were found to be more efficient in collecting CES data than language-/image-based unsupervised surveys, with a mean completion rate over 1.5-fold greater than either unsupervised survey; furthermore, survey completion was over twice as fast, and less than a sixth of the monetary cost per respondent compared to unsupervised surveys. The site-based assessment developed in this study provides robust data, and is shown to provide rapid and useful feedback to land-use decision makers. We recommend that rapid, site-based assessment methods are utilised to collect the information required to support CES-related decision making.

1. Introduction

All life on earth depends on support from ecosystems, however changes in land use across the globe are having a generally negative effect on ecosystem service (ES) supply (Church et al., 2011; MA, 2005). Both scientific and public awareness has increased over the past decade (Jax et al., 2013), but despite this, a robust methodology for measuring and monitoring ES has not been developed nor widely adopted (Verburg et al., 2016), although research into this has begun (Peh et al., 2013). Standardised methodologies are particularly hard to develop for cultural ecosystem services (CES; the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences'; MA, 2005) as CES are spatially and temporally distinct, intangible, subtle, mutable and intuitive in nature, based on ethical and philosophical perceptions; thus largely unique to the individual (Church et al., 2014). Culture-nature interactions are a relatively new concept (Darvill and Lindo, 2016), thus many social/economic data collection methods are not designed to examine key CES aspects. It is therefore apparent a multidisciplinary approach is required to improve understanding of CES, taking into account the dynamic nature of interactions between humans and the environment (Carvalho-Ribeiro et al., 2016).

There are many survey-based methods of collecting CES data (e.g. Anthem et al., 2015; Bark et al., 2016). Survey questionnaires are highly useful as they collect structured data about the same variables (and so are readily comparable) directly from the user and thus provide a promising approach for CES data collection (Raymond et al., 2014). They are often the only financially viable option for collecting information across a large spatial scale. However, surveys come in a variety of forms and their response rate (the proportion of individuals in a sample population that successfully completes a survey) and efficacy (see Pedersen and Nielsen, 2016) in the context of collecting CES information is not well studied, despite high stakeholder demand for such

Abbreviations: CES, Cultural Ecosystem Service; CI, Confidence Interval; ES, Ecosystem Service; GBP, Great British Pound; GLM, General Linear Model; MA, Millennium Ecosystem Assessment; SS, Supervised Survey; URL, Universal Resource Locator; US, Unsupervised Survey

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information (Willcock et al., 2016). Language-based surveys – defined here as surveys in which answers are provided in written or spoken word, e.g. text or oral surveys – are useful as language is able to clearly convey ideas thus leaves little ambiguity in meaning (Can and Walker, 2014). However, communication by language can be time consuming. Image-based surveys – defined here as surveys in which answers are given as an image, selected or created by the respondent – are useful as images engage the senses and emotions in a powerful way (Pink, 2011) and are able to rapidly communicate a variety of factors (Watson and Lom, 2008). However, there may be differences between individuals in ideas of what an image represents and the associated connotations (Watson and Lom, 2008). Thus, success of image-based surveys may be largely dependent on the quality of images used.

Surveys can be conducted in a supervised (defined here as surveys in which the respondent is guided by an interviewer in real time, e.g. in-person, via telephone or instant online communication) or unsupervised manner (defined here as surveys in which the respondent completes the survey independent of real time guidance; e.g. online). Sinclair et al. (2012) describe several advantages and disadvantages of unsupervised surveys (US) compared to supervised surveys (SS). US are useful as they can easily be distributed globally and are convenient for respondents to complete; additionally, the cost of running an US is commonly low (Casler et al., 2013; Weinberg et al., 2014). However, some US (e.g. online surveys) can only be completed by computer-literate individuals with online access, or may be perceived as junk mail resulting a low response rate (Sinclair et al., 2012). Despite a low response rate, US can still quickly collect a large sample size of completed surveys due to ease of distribution. SS can be completed without the use of technological aid and by individuals with no literary skills, as the interviewer is able to complete the survey on behalf of the respondent. SS generally provide clearer data as respondent queries can be addressed before survey submission (Szolnoki and Hoffmann, 2013). Furthermore, the response rate of SS is commonly higher than that of US as they seem more personal (Ansolabehere and Schaffner, 2014; Sinclair et al., 2012). However, SS are commonly more costly than US and may be subject to interviewer bias (Sinclair et al., 2012). Whilst each method has merit, there is debate over which method of data collection is the most effective (Casler et al., 2013).

This study quantifies the number and value of CES at 11 ecosystems within south England (Brownsea Island, the Cerne Abbas Giant, Durdle Dor, Figsbury Ring, Lyme Regis, the New Forest National Park, Richmond Park, Runnymede, the South Downs National Park, Stonehenge, and the Uffington White Horse; Fig. 1; Table 1; Table S1). We investigate which survey methodologies are best suited to CES measurement at these sites. We perform and critique language-based SS, language-based US and image-based US; hypothesising that SS would record more respondents per survey invitation than US and US would record more respondents per unit time than SS.

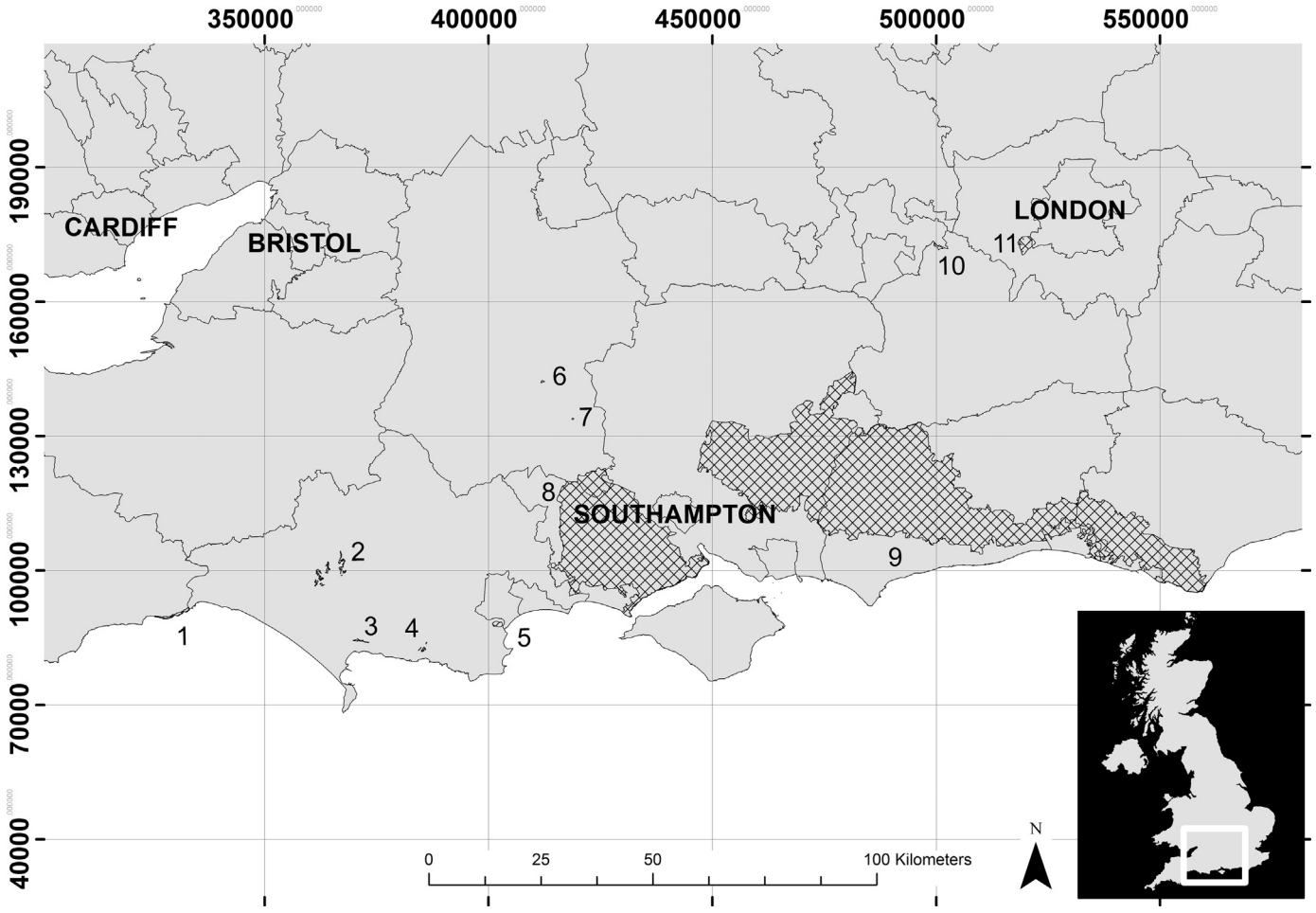

Fig. 1. The geographic location of our study sites within the United Kingdom (inset) and South England (1. Lyme Regis; 2. the Cerne Abbas Giant; 3. Uffington White Horse; 4. Durdle Dor; 5. Brownsea Island; 6. Stonehenge; 7. Figsbury Ring; 8. the New Forest National Park; 9. the South Downs National Park; 10. Runnymede; 11. Richmond Park).