

Assessing the sensitivity of ecosystem services to changing pressures



Tara Hooper^{a,*}, Nicola Beaumont^a, Charly Griffiths^b, Olivia Langmead^{b,c}, Paul J. Somerfield^a

^a Plymouth Marine Laboratory, Prospect Place, The Hoe, Plymouth PL1 3DH, UK

^b The Marine Biological Association, Citadel Hill, Plymouth PL1 2PB, UK

^c The Marine Institute, Plymouth University, Drake Circus, Plymouth PL4 8AA, UK

ARTICLE INFO

Article history:

Received 1 July 2016

Available online 1 March 2017

Keywords:

Ecosystem services

Sensitivity assessment

Subtidal sedimentary habitats

ABSTRACT

The ecosystem services approach is widely recognised as a concept, but more attention must be given to the development of tools to facilitate practical implementation if the approach is to become more widely used to support decision-making. A key component of natural resource management is understanding the implications of changing levels of pressures on ecosystem components, which is achieved through sensitivity assessment. This paper examines how sensitivity assessment could be applied to ecosystem services, as opposed to the underlying habitats and species, by considering the relationship between the sensitivity of a service to the sensitivity of the habitat responsible for its supply. The method is illustrated using a UK case study of supporting and regulating services provided by subtidal sedimentary habitats within the UNESCO Biosphere Reserve in North Devon.

© 2017 Elsevier B.V. All rights reserved.

1. Introduction

The assessment and valuation of ecosystem services (ES) is widely advocated as a tool to support natural resource management in situations ranging from natural capital accounting (NCC, 2014) to marine planning (Börger et al., 2014). To date, much effort has been focused on the development of conceptual frameworks, but increasing the use of ES assessment in decision-making requires further examples that demonstrate techniques for practical application in a management context. A case in point is that conceptual frameworks recognise that pressures (impacts on the environment from human activity) affect ES delivery (e.g. TEEB, 2010; UKNEA, 2011; MAES, 2013). However, little attention has been given to developing tools to understand how changing levels of pressure may enhance or diminish the delivery of services and benefits in real terms.

Techniques already exist within natural resource management that have the potential to be adapted for use in determining the relationship between changing pressures and ES supply. Sensitivity assessments involve the collation of existing information on key characteristics of a species or habitat and its response to environmental change, and the presentation of this information in a format that is accessible to decision makers (Hiscock and Tyler-Walters, 2006). They have been applied in a variety of contexts including: identifying species and habitats in need of protection

(OSPAR, 2003); supporting the selection of Marine Protected Areas (Tillin et al., 2010); in marine planning (MMO, 2012); and as part of the Environmental Impact Assessments of coastal developments such as marina construction (ABPmer, 2010).

This paper extends the concept of sensitivity assessment to consider the sensitivity of specific ES to pressures, rather than the underlying habitats and species. An approach for assessing the sensitivity of ES to pressures at the local scale is proposed, utilising available information on i) the sensitivity of these habitats to certain pressures, and ii) the ecosystem services provided by particular habitats. We trial this novel and generic methodology in a case study of the marine transition zone of the UNESCO Man and Biosphere Reserve in North Devon, demonstrating its application as a tool to assess the risk to ES posed by different pressures.

2. Method

2.1. General approach

Sensitivity assessments have been carried out for different species and habitats in a range of contexts (e.g. Mainwaring et al., 2014; Pecl et al., 2014). As ES delivery can be linked to habitat or species type (e.g. Potts et al., 2014) existing information and sensitivity assessments for those species or habitats are an appropriate starting point for the assessment of ES sensitivity. These assessments can be combined to provide an insight into the sensitivity of ES to specific pressures at a given site. This overarching frame-

* Corresponding author.

E-mail address: tarh@pml.ac.uk (T. Hooper).

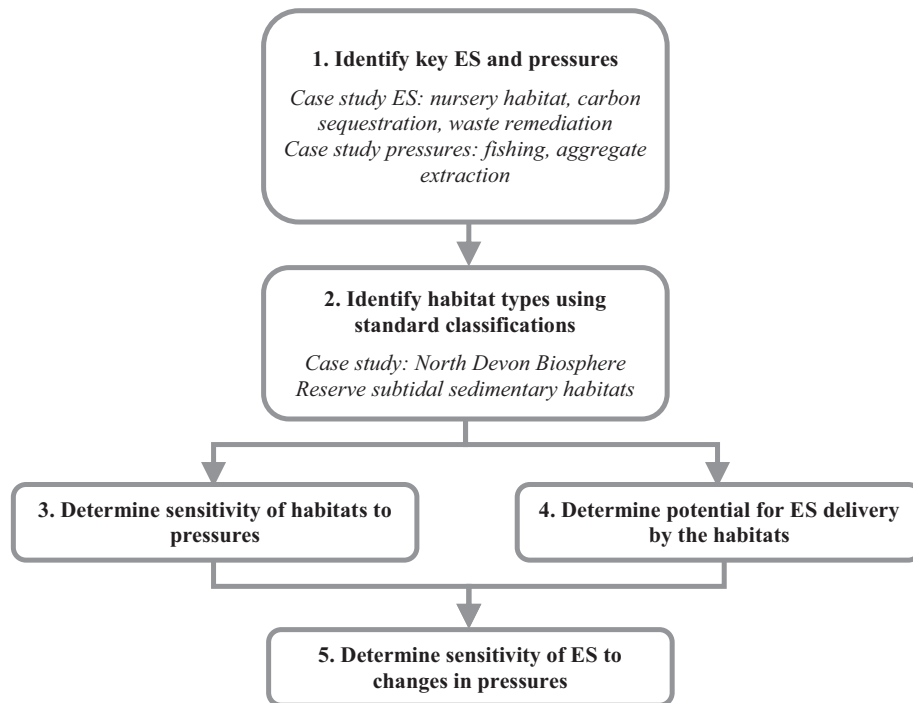


Fig. 1. A schematic for the process of combining knowledge of ecosystem services (ES) delivered by particular habitats with habitat sensitivity assessment to allow the sensitivity of ES to be determined, including the examples provided by the case study.

work (Fig. 1) was applied in the North Devon Biosphere Reserve (NDBR) case study site (Fig. 2).

2.2. Identify key ES and management issues (Step 1)

Stakeholders were consulted to determine which management issues and ES were considered of greatest importance through questionnaires with representatives of different marine interest groups identified through the NDBR Marine Working Group (Pendleton et al., 2015). The study was framed around local concerns to ensure the outputs would be of practical use and had management relevance, and also to increase local ownership of the

research. Subsequently, scenarios were developed with the stakeholders during a series of workshops to identify potential future management options for the NDBR, which would potentially impact on these ecosystem services (Langmead et al., 2015) and these became the focus for application of the proposed methodology.

2.3. Identify habitat types using standard classifications (Step 2)

The subtidal sedimentary habitats present within the NDBR were determined using benthic survey data where this was available (RWE npower, 2011; Mackie et al., 2006; Warwick and

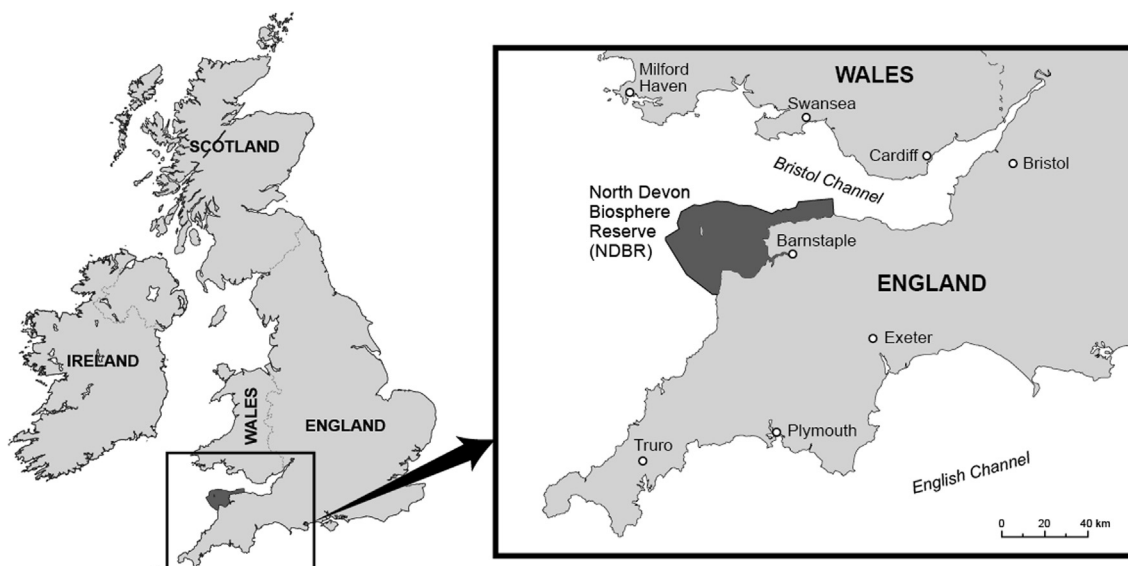


Fig. 2. Location of the marine transition zone of the North Devon Biosphere Reserve.

Download English Version:

<https://daneshyari.com/en/article/6463630>

Download Persian Version:

<https://daneshyari.com/article/6463630>

[Daneshyari.com](https://daneshyari.com)