

## **Integrating hedonic and psychometric approaches for assessing effects of conservation, renewables and aquaculture on marine cultural ecosystem services**

### **Summary**

This study develops a novel approach that integrates monetary valuation of CES on the basis of hedonic pricing, and non-monetary valuation on the basis of a psychometric subjective well-being (SWB) instrument. The approach is developed using a case study that looks at the value of CES in the Scottish marine environment, and how it may be influenced by marine conservation, aquaculture and renewable energy developments. Hedonic approaches indirectly value the environment by looking at how different environmental features affect house prices. The psychometric approach reflects different CES in a set of indicators and the assumed structure of CES can then be tested empirically. Integration of hedonic and SWB approaches provides decision-makers and marine spatial planners with a combination of tools that provide a more comprehensive picture of how different types of development in the marine environment affect CES benefits.

### **Extended abstract**

Cultural ecosystem services (CES) constitute a growing academic field, with a rapid increase in the number of publications over recent years. The concept has substantial potential as a tool to bridge environmental, social, economic and cultural research communities, to foster new conceptual links, and to help address real-world problems around managing the environment (Milcu et al, 2013). However, monetary and non-monetary approaches to valuing CES are often juxtaposed, with economic approaches seen by cultural scholars as reducing the plurality of cultural values to a single, meaningless indicator, or leading to commodification, while economists have argued that monetization is essential for decision-makers to take values seriously. Some researchers have highlighted the benefits of both and called for integrated approaches to valuation (e.g. UK NEA 2014), but there have been few empirical examples of this yet.

This study develops a novel approach that integrates monetary valuation of CES on the basis of hedonic pricing, and non-monetary valuation on the basis of a psychometric subjective well-being instrument. The approach is developed using a case study that looks at the value of CES in the Scottish marine environment, and how it may be influenced by marine conservation, aquaculture and renewable energy developments.

Empirically, 'hedonic' price models have been previously used to explain the variation in property values determined by location characteristics, and the built environment effects on housing prices (Cao and Cory, 1981; Diao and Ferreira, 2010). Estimating the level of capitalization of local attributes and amenities allows researchers to capture local contextual differences related to spatially-variant or endogenous characteristics of the observation (Brown and Yarnell, 2013). For example, Song and Knaap (2004) have identified increasing prices for houses located closer to public parks. Because these models use and deconstruct market values, results can be used to test the validity of preferences in the context of market transactions such as house sales.

Subjective well-being (SWB) is another way of understanding benefits related to the experiences associated with the use of and relations with and within environmental settings. The design of indicators to understand what might influence well-being in society is an important focus in research and government policy. Nature is known to be an important element of human well-being as evidenced by many studies that have found links between the proximity of green space and well-being. Having access to the natural

environment has been shown to have restorative benefits for psychological well-being and cognitive function (e.g. Wells, 2000) and use or engagement with nature facilitates multiple dimensions of well-being (e.g. Irvine *et al.* 2013). There is some evidence that greater biodiversity enhances psychological well-being through the benefits of peoples' relationship with such places over time, ability to reflect on their lives and sense of personal identity; all reported to be heightened where perceived or real species diversity was greater (Dallimer *et al.* 2012; Fuller *et al.* 2007).

As yet, there is little known about the SWB benefits derived from marine CES. Kenter *et al.* (2013, 2014) developed a new SWB instrument to consider the relative SWB associated with different potential marine protected areas across the UK to divers and sea anglers. The instrument consisted of 15 indicators, which were reduced to six factors (place identity, therapeutic value, engagement with nature, spiritual value, transformative and memory value). A particular advantage of SWB is that different aspects of CES (spiritual, aesthetic, identity, restorative etc.) can be reflected in a set of indicators, and that the assumed structure of CES can be tested and validated through factor analysis. Alternatively a new factor structure can be determined that better fits the data. Thus, the way that CES benefits are structured and categorized in terms of how they deliver SWB can be empirically validated. It may be possible to develop an instrument that performs well across different studies, and which can then be used as a standardized instrument to inform decision-making at least where cultural contexts are relatively similar. In this study the instrument from Kenter *et al.* (2013, 2014) will be further developed to level out the number of indicators per factor, and to add additional indicators for dimensions of SWB that focus group work suggests appear to be missing from the current instrument.

The hedonic and SWB methodologies will be integrated by a target sample of approximately 300 households on the Scottish west coast. Data gathering and analysis will have been complete by the time that this paper is presented. Respondents will be surveyed for the year and price at which their house was sold, and by calculating distances between households and features that characterize settings, in particular protected areas, renewable energy installations and fish farms. This will allow us to consider whether conservation or energy developments have benefits or disbenefits in both economic terms, and whether they affect the SWB of respondents. Ultimately, this provides decision-makers and marine spatial planners with a combination of tools that provide a more comprehensive picture of how different types of development in the marine environment affect CES benefits.

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