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Benefits of coastal recreation in Europe: Identifying trade-offs and priority regions for sustainable management

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ABSTRACT

This paper examines the welfare dimension of the recreational services of coastal ecosystems through the application of a meta-analytical value transfer framework, which integrates Geographic Information Systems (GIS) for the characterization of climate, biodiversity, accessibility, and anthropogenic pressure in each of 368 regions of the European coastal zone. The relative contribution of international, domestic, and local recreationists to aggregated regional values is examined. The implications of the analysis for prioritization of conservation areas and identification of good management practices are highlighted through the comparative assessment of estimated recreation values, current environmental pressures, and existing network of protected sites.

1. Introduction

The remarkable growth in coastal tourism and recreation in Europe in the past decades has consolidated the role of these sectors as major drivers for local employment and regional economic development. This is the case both in highly popular destinations in southern European countries as well as in large parts of the North and Baltic Seas and remote areas such as the Western Isles of Scotland (Jones et al., 2011; Hasselström, 2008). The converse side of this growth has often been an increase in the pressure and impacts on environmental quality, biodiversity, and overall health of the coastal and marine ecosystems. The Millennium Ecosystem Assessment identifies in tourism and recreation-related infrastructure development the second largest threat to the sustained provision of the ecosystem services generated in coastal habitats (MA, 2005). Given the high standing of a healthy natural environment among visitors' preferences, such trend may, if not reversed, ultimately backlash on coastal tourism demand, reversing the very factors that set it in motion in the first place (Onofri and Nunes, 2013). The European Union (EU) has long recognized the need for sustainable tourism management of its coastal margin. In September 2010, the European Council embraced the Integrated Coastal Zone Management Protocol of the Barcelona Convention,[1] which calls for rational planning management of the "irreplaceable ecological, economic and social resource[s]" that are associated with coastal zones. It encourages sustainable tourism, sporting, and recreational activities that "preserve coastal ecosystems, natural resources, cultural heritage and landscapes" (Protocol on Integrated Coastal Zone Management in the Mediterranean, 2009).

There is an increasing interest and understanding in the scientific literature regarding the economic values provided by marine protected areas and the possibility to combine nature conservation with the sustainable provision of valuable services, such as outdoor recreation and nature tourism (Kettunen and ten Brink, 2013). The evidence so far, however, is typically site- and context-specific, and there is a lack of analytical frameworks at the regional and national level for a comprehensive assessment of services value flows and

[1] Please consult www.unep.ch/regionalseas/regions/med/t_barcel.htm for more information.

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the distributional implications of different management options. Such knowledge is crucial for understanding the trade-offs of alternative policies and setting priorities for sustainable governance (Samonte et al., 2014).

From an economic perspective, policies for the sustainable governance of coastal recreation are founded on the thorough assessment of their impacts on human welfare. The economic valuation of the benefits of recreational activities is challenged by the fact that the associated welfare impacts are often not reflected in market transactions. Within the toolbox of valuation techniques that environmental economists have at their disposal to infer the value of non-market goods and services, one can distinguish two major categories: stated preference methods, which rely on the simulation of a market through a questionnaire administered to a sample of the affected population (e.g., contingent valuation method, choice experiments); and revealed preference methods, which seek to elicit preferences and implicit prices from actual, observed, market-based information that is indirectly linked to the ecosystem service in question (e.g., travel cost method, hedonic pricing).

Although the number of applications of non-market valuation techniques to coastal recreation is steadily growing, valuations typically have a limited geographical and socio-economic scope. As a consequence, the use of value transfer is increasingly regarded as a practical way of valuing ecosystem services without pursuing an *ad hoc* primary valuation study (Brouwer, 2000; Troy and Wilson, 2006). Value transfer refers to the procedure of drawing inferences on the unobserved monetary value of an ecosystem good or service by borrowing existing valuation estimates from comparable sites. Although it is recognized as a second-best strategy when primary research is not possible or plausible due to time or budget limitations (Liu et al., 2011), several international initiatives have highlighted its attractiveness to assess environmental change at large geographic scale, where primary valuation is unlikely or impracticable (Stern, 2007; Braat and ten Brink, 2008; TEEB, 2010). Several application of meta-analytical value transfer – i.e., resulting from the statistical analysis of a collection of previous individual primary valuation studies – to the investigation of recreation benefits are available in the literature (Rosenberger and Loomis, 2000), including studies with a focus on coastal ecosystems (Brander et al., 2007; Liu and Stern, 2008; Ghermandi and Nunes, 2013; Londoño and Johnston, 2012). The integration of meta-analytical value transfer and Geographic Information Systems (GIS) has emerged as particularly suitable to scale up values from localized changes in individual ecosystem sites to multiple ecosystem sites within a large geographic or administrative area (Brander et al., 2012).

This paper implements GIS tools and meta-analytical transfer techniques to investigate the spatial distribution of economic values of recreational services provided by coastal ecosystems in the European coastal zone and analyze the implications thereof from a planning and management perspective. After presenting the meta-analytical framework and using econometric techniques to identify the drivers of coastal recreation values, a value transfer function is applied to estimate the flow of recreation values in each of the 368 regions of the European coastal zone. The role of international, domestic, and local beneficiaries to the formation of the aggregate regional values is assessed. The spatial overlap of the estimate values with extant environmental pressures and the established network of protected areas allows for the identification of twenty-one priority regions for improved environmental management. In addition, twelve regions are singled out and recommended for further investigation, where high recreation values are associated with high protection status, possibly as a result of good coastal recreation management practices.

2. Material and methods

2.1. Valuation dataset and effect-size estimate

A research for both published and unpublished primary valuation studies of coastal recreation was conducted using a variety of resources. Studies were retrieved from online databases, websites of academic journals and through keyword searches online search engines. Unpublished working papers, reports, conference proceedings and dissertations were obtained from working paper series of academic and research institutions, governmental and environmental organizations. The search was limited to studies written in English, French, German, Italian or Spanish.

The criteria for the final selection of studies were as follows. Only studies focusing on actual use values were considered, i.e., estimates of passive, option and quasi-option values or mixed estimates of use and non-use values were excluded. No benefit transfer estimate was selected. Non-market value estimates from both outdoor recreation activities (i.e., activities undertaken as part of daily or weekend routines) and nature tourism were included (i.e., activities that people enjoy while on holiday and usually include an overnight stay) (Bell et al., 2007). Valuation methodologies that were included are: stated preference methods (contingent valuation and choice experiment); revealed preference methods (travel cost method); and combined stated and revealed preference methods (contingent behavior). Only studies from Europe and North America (USA and Canada) were included in order to limit the heterogeneity across socio-economic and cultural contexts (Nelson and Kennedy, 2009). All observations in the dataset ought to fulfill the requirements for the effect-size and moderator variables of the meta-regression model. The final dataset is composed of 38 studies, from which 177 separate value observations could be extracted.

The effect-size used in this study is the value of an individual coastal recreation trip, expressed in international dollars (I$) relative to the year 2007.[2] The majority of observations reported per-person values rather than per-household estimates. Values expressed in currencies other than US$ or referring to years other than 2007 were standardized by means of Purchasing Power Parity (PPP) factors from the Penn World Table 6.3 (Heston et al., 2009) and GDP deflator indexes from the US Economic Research service (www.ers.usda.gov/data/macroeconomics). The standardized recreation trip values were found to range between 0.1 and 1000 I$/person/trip, with a majority of values clustered between 3 and 100 I$/person/trip. The median effect-size is 22.41 I$/person/trip.

Table 1 gives an overview and graphical summary of the primary valuation studies in the dataset, including number of observations extracted, size of the usable survey sample and average effect-size estimate per study.

2.2. Moderator variables and model specification

The moderator variables of the model were selected based on

[2] Based on the average conversion rate in 2007: US$1 = €0.7308. For Sandström et al. (2000) and Landry et al. (2003) the value of a recreation trip was calculated from a total yearly value, based on the number of individual recreation trips as reported in the study.