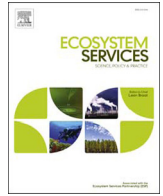




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Assessment and valuation of recreational ecosystem services of landscapes

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ABSTRACT

Recreational ecosystem services (RES), understood as the numerous benefits people obtain from landscapes and the natural environment, are a topical area of policy, research and society. This Editorial introduces the current state of RES research, provides an overview of the 21 contributions comprising this Special Issue of Ecosystem Services, and outlines opportunities for further research. This issue's publications employ diverse methods for assessing and valuing RES at different scales in Europe and beyond. The papers present advancements in mapping and valuation, provide evidence for the contributions of biodiversity and landscapes to the generation of RES and human well-being, and shed light on distributional effects across different beneficiaries. Taken together, contributions emphasize that RES may be a prime vehicle for reconnecting people with nature with positive effects on societal well-being. The diversity of approaches currently applied in RES research reflects much creativity and new insights, for example by harnessing georeferenced social media data.

Future research should aim towards harmonizing datasets and methods to enhance comparability without compromising the need for context-specific adaptations. Finally, more research is needed on options for integrating RES information in decision making, planning and management in order to enhance actual uptake in public and private decisions.

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1. Introduction

Recreation is one of the numerous benefits that individuals and societies gain from landscapes and natural environments. Whether it is the ability to hike through an alpine meadow, the joy of bicycling in an agricultural landscape, or the relaxation of taking a walk through an urban green space, nature provides an array of diverse recreational possibilities. Identified in the Common International Classification of Ecosystem Services (Haines-Young and Potschin, 2013) as an important class of cultural ecosystem services (CES),

recreational ecosystem services (RES) benefit people through improved physical health (e.g. exercise), and psychological and emotional well-being. Recreational opportunities also often provide an economic basis for communities and related businesses. Such social and economic benefits have resulted in numerous national and regional RES mapping and assessment strategies, and calls for advanced methodologies aimed at RES globally (e.g. Target 2, Action 5 of the EU Biodiversity Strategy¹, the EPA's EnviroAtlas² as well as efforts in Australia (Cork et al., 2008) and South Africa (UNEP-WCMC, 2016)).

Planning and management issues around outdoor recreation have been studied for decades (e.g. papers published in the Journal of Outdoor Recreation and Tourism or in the Journal of Leisure Research or Leisure Sciences), but these studies have rarely taken

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¹ <https://biodiversity.europa.eu/maes1>.

² <https://www.epa.gov/enviroatlas2>.

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an ecosystem services (ES) perspective. In a broad sense, RES can be viewed as the natural environment's contributions to the range of leisure and recreational opportunities and experiences enjoyed by human societies. Often the landscape's aesthetic quality and amenities associated with natural environments enhance outdoor recreation, while specific recreation opportunities like hiking, climbing, boating, bird watching, etc. require specific landscape elements (e.g. varied topography, appropriate habitats), and human-made infrastructure (e.g. historical monuments, trails).

Despite wide recognition of the value of RES, there are numerous pressures and barriers to the equitable availability of these services across societies. Increasing mobility, rising real incomes, and associated expanding leisure time have increased demands on existing recreational areas. Government austerity and land change driven by competing land uses (e.g. urbanization) may further degrade recreational potentials (Clough 2014). Tools that help in understanding perceptions, beneficiaries, recreational use locations, and the relationships between them would aid in monitoring and conserving the special places that benefit people recreationally, and help with prioritizing maintenance of existing areas and possible development of new areas that provide these important ecosystem services.

This paper provides an overview of the cutting-edge research featured in this Special Issue and provides a vision for future RES research. We have assembled 21 studies that shed light on three main themes: 1) advancements in mapping and assessment of RES (spatial and non-spatial); 2) investigating the links between landscapes, RES, benefits, and beneficiaries; and 3) recommendations for application in spatial planning and management. These topic areas were developed in a workshop on the assessment and economic valuation of RES, hosted by Leibniz Universität Hannover (Hannover, Germany, Sept. 2016). Recognizing the rapid and dynamic progress in the field of RES, we have also taken stock of recent research trends in RES. Here we provide an overview of the current state and trends in RES, followed by a characterization of the lessons learned from contributors to this issue. Finally, we discuss recommendations for future RES research.

2. Current state and trends in RES research

RES have commonly been the main CES assessed in ES evaluations, due primarily to the wide availability of tourist visitation data. Once a neglected category of ES, an increasing number of studies aimed at RES has broadened the scope of RES research. RES research has increasingly acknowledged the many complementary non-material benefits that enhance recreational opportunities, including inspiration, cultural heritage, aesthetic, educational, and the spiritual qualities of landscapes. A search of relevant literature on the Web of Science revealed a total of 1356 publications covering CES, with 153 addressing recreation³. (Fig. 1a). Our search was limited to the key terms “cultural” and “ecosystem” and “services” (in TOPICS). We filtered this compiled literature for publications addressing recreation (supplement 1) by searching the title, abstract and keywords for derivatives of the term recreation (e.g. recreationalist, leisure) and by carefully reading and assessing their relevance as empirically-based RES studies (i.e. omitting reviews and studies that were not directly related to ES).

Our assessment of RES literature revealed innovation in data collection and analytical techniques driven by the need for timely, spatially, and socially representative data. For example, the majority of RES research leverages surveys and official censuses of visitation to parks and protected areas (Fig. 1b; N = 75), or stakeholder (N = 32). While these new approaches have improved on the previ-

ously dominant mode of RES studies, which relied on expert-based evaluation (N = 42), these new techniques require costly, and time-consuming, data collection. They may also suffer from sample bias related to who is surveyed when, and where. New techniques for data collection via mining social media, citizen science (Fig. 1c; N = 8; 5%), and participatory PPGIS/PGIS⁴ (N = 12; 8%) hold promise to at least partially solve social and geographic representative biases, but have yet to be thoroughly evaluated (Fig. 1). Analyses of RES data have also advanced in the last decades drawing and building on geographic (Gee and Burkhard, 2010; van Berkel and Verburg, 2014), economic (Stynes, 2005), and social science techniques (Fagerholm et al., 2012; Gee and Burkhard, 2010). Spatial analyses have been prominent within this literature (Fig. 1d; N = 50) in an ongoing search for proxies that accurately identify RES for mapping the locations and qualities associated with outdoor activities. These are often based on statistical analysis of spatial relationships (N = 28) and other spatial representations. Social science techniques include Q-methodology (N = 3), photographic evaluation (N = 6) and a diversity of qualitative and participatory methods (N = 22). While a majority of RES analytical methods are based on non-monetary estimates (Fig. 1e; N = 122), there is a portion of studies employing monetary approaches (N = 31). These studies use econometric methodologies including contingent valuation (N = 12), travel cost (N = 1), benefit transfer (N = 7) and other techniques. Finally, these studies are often done at local and regional scales (Fig. 1f), as challenge exist for larger scale studies.

3. Insights from the Special issue contributions

The variety of studies in this issue represents a growing global interest in RES. While a majority of studies were located in Europe (11 of the 21), North America (n = 3), South America (n = 1), Africa (n = 1), Asia (n = 2), and Australia (n = 2) were also represented (Supplement 2). Studies were mostly conducted at regional (n = 8) and local scales (n = 7). However, the number of national (n = 2), supranational (n = 3), and global (n = 1) scale assessments suggests increasing interest at these larger spatial extents (Fig. 2a). The spatial resolution of the studies was likewise diverse, with some spatially explicit and comprehensive assessments with high granularity (e.g. 100 m resolution maps), and others summarized by geographic extent (e.g. a protected area) or relating to less discrete spatial characteristics like forest sites, or wildlife.

The specific location of RES was considered in 10 studies using mapping or spatial relationships between landscape attributes and recreational use. Preferences for certain landscape elements and features or for recreational activities were assessed most frequently (n = 13), followed by the demand and/or flow of RES from service providing areas to beneficiaries (n = 12) (Fig. 2b). A monetary estimate of the value of RES was found in 10 studies; the non-material benefits of RES were assessed in eight studies. The supply of RES (including landscape potential and anthropogenic inputs) was assessed in nine studies (for definitions of this ES related terminology such as flow or supply see Albert et al., 2016)

Surveys or interviews were the most frequently used methodology for data collection, with eight studies relying entirely on this approach, and four using it in conjunction with another collection technique. Five studies used expert- or literature-based approaches, three in combination with other methods. Four studies employed social media data; census or observation data were analyzed in four studies, usually to supplement survey results. Only one study was based on census or observation data exclusively.

⁴ “PPGIS/PGIS refers to spatially explicit participatory mapping methods and technologies for capturing and using spatial information in participatory planning processes” (Brown and Fagerholm, 2015).

³ We further specified RES literature and orientation for a total of 157 papers.

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