



Ecosystem potentials to provide services in the view of direct users



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ABSTRACT

The study aimed to determine how direct users of local ecosystems perceive the potentials of those ecosystems to provide services, and how their assessments are influenced by different factors (i.e. socio-demographic characteristics, the actual use of services and proximity to particular ecosystems). To elicit social values we carried out a door-to-door questionnaire survey among residents and visitors (N = 251) staying in Wigry National Park and its vicinity (the Suwałki Lakeland of NE Poland), a renowned area of high natural value. Respondents were asked to detail the frequency of use made of 45 different provisioning and cultural services, and then to evaluate 7 local ecosystem types as regards their capacity to supply 11 groups of services. Direct users of ecosystems were shown to possess a capacity to differentiate local ecosystems in terms of their potentials to provide services. Better education, multifaceted interaction with nature and frequent use of natural resources are all found to contribute to better understanding and more accurate assessments of potential. Between-group hierarchy variations also show clearly how personal experience influences the assessment of ecosystem potentials. The perception of cultural and regulating potential in particular appeared to be affected greatly by the frequency of use of cultural services.

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1. Introduction

The overall valuation of the services human beings obtain from ecosystems is the ultimate objective of research carried out within the ecosystem services (ES) concept (Braat and de Groot, 2012). Given possible applications in planning, priority status is now being given to assessments of not only actual flows of services, but also the potentials of ecosystems to supply ES (Bastian et al., 2013; Burkhard et al., 2014; Spangenberg et al., 2014). Knowledge about potentials that are available but still barely used can be applied in optimising land use and the acquisition of natural resources (Bastian et al., 2012). Also, as recent massive population movements and political instability, as well as climate change, may combine together to generate sudden and unexpected shifts in the way ecosystems are used, the only stable value would be that concerning potential.

The concept of economic landscape/ecosystem potential was first introduced by E. Neef (1966) and developed further by other researchers (see Bastian et al., 2012). In this study we adhere to the definition of ecosystem potential given by Burkhard et al.

(2012) – as the capacity of an ecosystem to deliver (supply) goods and services, linked to natural conditions and human impacts. In this understanding, ecosystem potential can be quantified by the same methods as ecosystem services, in many different ways. Besides the biophysical assessment whose importance has been highlighted frequently (Balvanera et al., 2005; Burkhard et al., 2014; Tsonkova et al., 2014; Van Oudenhoven et al., 2012), and the subjective (though scientifically-based) expert valuation (Carvalho-Ribeiro et al., 2010; Lamarque et al., 2011; Mononen et al., 2016), it is also possible to utilise views expressed by direct beneficiaries of ES. Social and economic valuations reflect the relative importance of ES to people (Scholte et al., 2015), and are crucial because ecosystem service flow is influenced, not only by the given ecosystem's capacity, but also by society's desired level of provisioning of given services. There is then an inseparable connection between the supply of, and the demand for, ES (Bastian et al., 2013). It is the direct users of ecosystems that are best able to evaluate the benefits derived from nature, and this is particularly true of highly subjective cultural services (Hernández-Morcillo et al., 2013).

Investigation of the social value of ecosystem services (i.e. the contribution ES make to the goals, objectives or conditions users specify – Van Oudenhoven et al., 2012) represents a relatively recent phenomenon typically incorporating several stakeholder groups (including local people, government decision-makers and industrial/scientific experts) (Smith and Sullivan, 2014). The need

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to understand how different stakeholders perceive and depend upon ecosystem services has also been identified as a key research challenge (Braat and de Groot, 2012; McNally et al., 2016; Pereira et al., 2005). Furthermore, social assessment yields information on community perceptions and preferences that is of use in the landscape-planning and decision-making process. Analysis represents a key step in the identification – and the resolution – of potential conflicts of interest (Castro et al., 2011), while the visualisation of ecosystem service trade-offs based on socio-cultural preferences can help identify the impacts of different management options on an ecosystem's capacity to deliver services, and offer a basis for decision-making (Martín-López et al., 2012). Public participation in ES management likewise encourages decisions satisfactory for more stakeholders, thereby helping with the development of more resilient communities that are aware of environmental issues (Felipe-Lucia et al., 2015).

Different groups, agents, stakeholders and cultures have different world views, and thus recognise different potential services (Spangenberg et al., 2014). As planning issues are addressed, it is important that opinions and preferences representative of the entire population of direct users of ecosystems (residents and visitors) be obtained and taken into account (Chan et al., 2012). Those surveyed should thus differ in terms of personal characteristics (age, gender, place of residence, profession, education, economic level, etc.), but also in regard to their role in public life in the given area and the use they make of its nature. The use of such an approach allows a diversity of knowledge sources, human-environment relationships and value systems to be encapsulated (García-Nieto et al., 2015).

The perceived potentials of ecosystems to provide services stem from individual experience, demand and actual use of services. Several studies have demonstrated that an understanding of which ES are important to people and perceived as available requires identification of activities ES users actually engage in (Calvet-Mir et al., 2012; Carvalho-Ribeiro and Lovett, 2011; Casado-Arzuaga et al., 2013; Maass et al., 2005; Scholte et al., 2015). Perceptions are also shaped by socially constructed concepts of landscape linked with cultural identities and tradition (Terkenli, 2001). Moreover, people may assign high values to a particular landscape or ecosystem because of emotional ties reflecting their social relations, roots or experiences (Soini et al., 2012). On the other hand, lack of knowledge limits people's ability to evaluate ecosystems (Gundersen et al., 2017). Where information on a given ES is lacking, that service may go unperceived, and may not be considered important as a result (Bingham et al., 1995).

Though subjective, the opinions of direct users of ES are based on long-term experience with the use of the goods and services local ecosystems provide (García-Nieto et al., 2015). And, while the assessment of a single person does not tell us much about actual ecosystem potential (being based on individual experience stemming from personal characteristics and history), the mean value from a representative, adequate sample of direct beneficiaries can provide an irreplaceable source of information of even greater reliability than other valuations. This regularity concerns all types of ecosystem services: provisioning, regulating and cultural, as research on social awareness of ES and their identification by direct users shows how people easily recognise the vast majority of goods and services nature offers, even where these are regulating services seemingly hard to grasp (Affek and Kowalska, 2014).

While varied methods are used to elicit social preferences, we in general distinguish between techniques that collect public opinion by asking directly for what are called “stated values”, and techniques that collect so-called “revealed values” indirectly, e.g. by observing behaviour or analysing written texts or other types of media (Scholte et al., 2015). In obtaining state values, it is questionnaires that are resorted to most frequently. The key to fair

and democratic accountability is then appropriate sample selection, based on specified features of respondents. This then places the emphasis on the recognition of those individual characteristics that influence the assessment of ecosystem potential, with an adequate research sample taken into account.

Against this background, this paper presents the results of questionnaire research carried out among residents of – and visitors staying in – north-eastern Poland's Suwałki Lakeland area, in the vicinity of Wigry National Park. The social perspective was adopted to assess the potentials to provide various services attributable to ecosystems of seven different types. The selected services from the provisioning and cultural sections generally embraced all significant CICES groups and classes (see Haines-Young and Potschin, 2013), while regulating services, known to be more difficult to assess, were confined to those concerning the retention and purification of water.

The work aimed to determine how direct users of local ecosystems perceive the potentials of those ecosystems to provide services, and how such assessment is influenced by different factors. Specifically, we looked into how socio-demographic characteristics, frequency of usage and physical distance from ecosystems influence perception of their potentials.

2. Materials and methods

2.1. Study area

To elicit social values for ecosystem potentials we searched for sites at which:

- a local community and visitors are highly dependent on the natural capital, and services provided by nature,
- the natural environment is diverse enough to allow respondents to interact with and benefit from several different ecosystems.

Expectations of this kind proved to be met by Wigry National Park (WNP) and its vicinity, a renowned area of high natural value within the Suwałki Lakeland of NE Poland. Wigry NP (53°56'N, 22°58'E) covers 15,086 ha and protects a range of different lowland habitats of temperate climate, including coniferous, mixed and deciduous forests, as well as grasslands, wetlands and waters (www.wigry.org.pl). The surveyed area encompasses three rural municipalities (units of administration at local level) around Wigry NP (Fig. 1). The landscape here is a rural, postglacial one, comprising semi-natural forests (60%), grassland (18%), cropland (13%) and waters (7%). Population density is as low as 12 inhabitants/km² (Central Statistical Office, 2016).

2.2. Questionnaire survey

The anonymous questionnaire survey was carried out over two seasons (summer 2014 and spring 2015) among residents living – and tourists staying – in the vicinity of Wigry National Park. Our target was to reach representatives of the entire population of ecosystem users, including dwellers and part-time visitors (tourists), men and women, young people and the elderly, rich and poor. This accounted for the use of a time-consuming door-to-door method of collecting data, given that our earlier experience and observations with open participatory workshops, meetings or remote surveys (delivered via the Internet or traditional post) failed to reach a considerable part of the ecosystem users, not least the elderly or tourists (see also Scholte et al., 2015). Every door of first and second houses in selected localities was thus knocked on, at different times of the day during working days and holidays, with those found to be in asked to participate in the study. To

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