



## Review article

## Current role of social benefits in ecosystem service assessments

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## HIGHLIGHTS

- Social benefits are linked to all ecosystem services.
- Social benefits link ecosystem services to human well-being more explicitly.
- Not all studies that assessed ecosystem services explicitly link them to benefits.
- Social benefits have been assessed with monetary and non-monetary techniques.
- Inclusion of stakeholder views favours the assessment of social benefits.

## ARTICLE INFO

## Article history:

Received 13 February 2015  
 Received in revised form 20 January 2016  
 Accepted 22 January 2016

## Keywords:

Literature review  
 Non-monetary valuation  
 Monetary valuation  
 Social valuation

## ABSTRACT

Ecosystem services have a significant impact on human wellbeing. While ecosystem services are frequently represented by monetary values, social values and underlying social benefits remain under-explored. The purpose of this study is to assess whether and how social benefits have been explicitly addressed within socio-economic and socio-cultural ecosystem services research, ultimately allowing a better understanding between ecosystem services and human well-being. In this paper, we reviewed 115 international primary valuation studies and tested four hypotheses associated to the identification of social benefits of ecosystem services using logistic regressions. Tested hypotheses were that (1) social benefits are mostly derived in studies that assess cultural ecosystem services as opposed to other ecosystem service types, (2) there is a pattern of social benefits and certain cultural ecosystem services assessed simultaneously, (3) monetary valuation techniques go beyond expressing monetary values and convey social benefits, and (4) directly addressing stakeholder's views the consideration of social benefits in ecosystem service assessments. Our analysis revealed that (1) a variety of social benefits are valued in studies that assess either of the four ecosystem service types, (2) certain social benefits are likely to co-occur in combination with certain cultural ecosystem services, (3) of the studies that employed monetary valuation techniques, simulated market approaches overlapped most frequently with the assessment of social benefits and (4) studies that directly incorporate stakeholder's views were more likely to also assess social benefits.

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## 1. Introduction

The ecosystem services approach has initially been established to recognize the central role that ecological processes and natural capital play in supporting human well-being and to integrate their values into decision-making (Daily et al., 2009; MA, 2005). Assessments of ecosystem services aim to evaluate the impact of policy decisions and identify benefits as well as trade-offs within environmental management (de Groot, Alkemade, Braat, Hein, & Willemen, 2010; Hauck, Görg, Varjopuro, Ratamáki, & Jax, 2013). Ecosystem service assessments have been found useful in communicating benefits of environmental conservation among stakeholder groups and particularly effective in extending biodiversity conservation beyond its extent of protected areas (Hauck et al., 2013). They could potentially contribute largely to environmental planning and management (von Haaren & Albert, 2011).

The valuation of these benefits bears various challenges and to date remains controversial within the research community. Though the Millennium Ecosystem Assessment (2003) proclaims very broad terms of ecosystem service value as “the contribution of an action or object to user-specified goals, objectives, or conditions”, allowing for ecological, economic or social interpretations (de Groot et al., 2010, Chapter 1; Gomez-Baggethun & Groot, 2010), the ecological and economic value domains prevail over social implications in ecosystem services valuation applications (Nieto-Romero, Oteros-Rozas, González, & Martín-López, 2014; Sherrouse, Semmens, & Clement, 2014; Vihervaara, Rönkä, & Walls, 2010).

The monetary valuation of ecosystem services, often referred to as “economic valuation”, is found to be limited due to methodological uncertainties. Not all services provided by ecological systems are marketable goods that directly imply a monetary value. Non-utilitarian benefits (mostly provided by regulating and cultural services) are often assessed with indirect valuation approaches (Chan et al., 2012). These methods are commonly applied where there are no explicit markets for services (de Groot, Wilson, & Boumans, 2002). Methods of indirect revealed preferences often fail to reveal the full value of ecosystem services or provide only lower bound value indications respectively, especially if the service lacks an adequate proxy (cf. Daily et al., 2000). Also the validity of stated preference methods (Hausman, 2012; Kahneman & Knetsch, 1992), incommensurability, and the dynamics of people’s values (Satz et al., 2013) are discussed critically. Several authors point out the limitations of monetary valuation of ecosystem services and suggest to explore different valuation methods to match the broad diversity of values (Baveye, Baveye, & Gowdy, 2013; Chan, Satterfield, & Goldstein, 2012; Kumar & Kumar, 2008; Martin-Lopez et al., 2012; Quintas-Soriano et al., 2016).

Though it may not be the focus of the better part of valuation endeavors, the consideration of social benefits of ecosystem services is subject to a variety of studies. Chan et al. (2012) propose

a framework that allows for the valuation of ecosystem services in general and that is particularly attentive to complications originating from cultural values and benefits, e.g. the intangibility of values, ecological and social change, etc. Other studies confirm the correspondence of social benefits and cultural ecosystem services (Daniel et al., 2012; Sherrouse et al., 2014). Bryan, Raymond, Crossman, and Macdonald, (2010) conduct a study on environmental management and identify areas with social values for ecosystem services of high abundance, diversity, rarity and risk. Furthermore, Sherrouse, Clement, and Semmens (2011) provide a GIS-based tool, i.e. Social Values for Ecosystem Services (SolVES), to assess, map, and quantify the perceived social values of ecosystem services by deriving a non-monetary Value Index from responses to a public attitude and preference survey. Scholte, van Teeffelen, and Verburg (2015) provide an overview of methods which assess socio-cultural values of ecosystem services in recent studies. Other research directly addresses current policy implementation, such as the European Landscape Convention, where the social valuation of residents largely contributes to the landscape character assessment (Baas, Groenewoudt, & Raap, 2011). Terminology of ecosystem benefits and values has previously been applied inconsistently, using the terms “cultural values and benefits”, “social values”, and “cultural ecosystem services”.

In this study, we aim to provide very clear definitions and interpretations of benefits, values, social valuation, and human well-being. Benefits, here also referred to as social benefits, represent the final outputs from ecosystems that directly affect human well-being (Haines-Young & Potschin, 2013b), see Chapter 4.1. Values can either refer to cultural ideas about what are desirable goals and appropriate standards for judging actions (held values) or to the relative importance that people assign to objects (in this study: to benefits provided by ecosystem services) by rating or ranking them (assigned values) (Brown, 2002; Rokeach, 1973). In this study, we refer to ecosystem service values in terms of the latter interpretation, namely the relative importance that people assign to benefits provided by ecosystem services, typically in monetary units, rating or ranking schemes. Social valuation describes the act of the valuation by people as opposed to using extant proxies, such as market values or costs. Benefits and values of ecosystem services are the key focus of the study. Human well-being is generated by access to the basic materials of a good life required to sustain livelihoods, sufficient food, shelter and access to goods, as well as health, good social relations and freedom of choice and action (MA, 2003), all of which social benefits of ecosystem services contribute to. Thus, benefits link ecosystem services closely to human well-being, because they specify in what ways humans benefit from ecosystem services (e.g. therapeutic benefits, economic benefits, see Table 2). In the next step, which has commonly been conducted in ecosystem service research without necessarily referring to individual benefits, the value assigned to these benefits is quantified. These

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