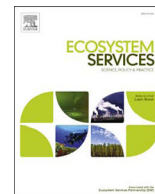




Contents lists available at ScienceDirect

## Ecosystem Services

journal homepage: [www.elsevier.com/locate/ecoser](http://www.elsevier.com/locate/ecoser)

## The means determine the end – Pursuing integrated valuation in practice

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## ARTICLE INFO

## Article history:

Received 14 January 2017

Received in revised form 29 June 2017

Accepted 26 July 2017

Available online xxx

## Keywords:

Values of nature

Integrated valuation

Operational requirements

Ecosystem services

Valuation methods

## ABSTRACT

In environmental valuation, although it is well recognised that the choice of method heavily affects the outcome, little is known on how existing valuation methods actually elicit the different values. Through the assessment of real-life applications of valuation of nature, this study tracks down the suitability of 21 valuation methods for 11 value types and assesses the methodological requirements for their operationalization. We found that different valuation methods have different suitabilities to elicit diverse value-types. Some methods are more specialized than others, but every method has blind spots, which implies risks of biased decision-making. We summarized different value-types according to three value dimensions: non-anthropocentric, relational and instrumental. No single valuation method is able to capture this full spectrum of values of nature. Covering all value dimensions requires careful selection of complementary valuation methods. This study also demonstrates that performing such an integrated valuation does not necessarily entail more resources, as for every value dimension, methods with low to medium operational requirements are available. With this study, we aim to provide guidance for selecting a complementary set of valuation methods in order to develop integrated valuation in practice that includes values of all stakeholders into environmental decision-making.

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<http://dx.doi.org/10.1016/j.ecoser.2017.07.011>

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*“The end cannot justify the means, for the simple and obvious reason that the means employed determine the nature of the ends produced”*

[Aldous Huxley]

## 1. Introduction

The policy relevance of valuation of nature is reflected in international initiatives such as the Millennium Ecosystem Assessment (MA, 2005), The Economics of Ecosystems and Biodiversity (TEEB, 2010), the Strategic Plan for Biodiversity and the first Convention on Biological Diversity (CBD) Target which aims at raising awareness on the value of biodiversity (SCBD, 2010). More recently, the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) has developed a guide to assess the multiple values of nature and its benefits, in order to acknowledge these in all on-going regional, global and thematic IPBES assessments (IPBES, 2015).

The dependence of our societies on nature has been well known and valued throughout history (Daily, 1997, pp. 5–6), although the field of environmental valuation is relatively young (e.g. Ridker and Henning, 1967). Since the 1970s, different scholars emphasized the controversies, risks and limitations of environmental valuation relying on one value type only (typically economic value; e.g. Kapp, 1972; Pearce, 1976; Martínez-Alier, 1987; see Baveye et al., 2013 for an overview). During the 1990s, monetary valuation has resurged due to its potential contribution to environmental decision-making (Bateman et al., 2013); although some authors have argued that its impact for influencing decision-making has not been demonstrated (Laurans et al., 2013; Laurans and Mermet, 2014). As a consequence, original criticisms have been

revived in an equally growing body of literature which argues that monetary valuation fails to capture the importance of nature beyond economic values (e.g. Martínez-Alier et al., 1998; Chan et al., 2012; Dendoncker et al., 2013; Boeraeve et al., 2014; Gómez-Baggethun and Martín-López, 2015). In fact, valuation approaches that target single value-types, be it economic, ecological or socio-cultural values, can only represent part of the society and its worldviews, interests and preferences. As a response, integrated valuation approaches are increasingly put forward (Dendoncker et al., 2013; Martín-López et al., 2014; Jacobs et al., 2016).

Integrated valuation recognises that valuing nature to inform more sustainable decisions requires a broader definition of ‘value’ and ‘valuation’, and the inclusion of a plurality of values in decision-making. This realization is reflected in the growing critical mass of scientists from different disciplines engaging in the integrated valuation field (Jacobs et al., 2016). Instead of focusing on differences, critiques and academic opposition of single methods or schools, integrated valuation seeks to combine diverse approaches and methods, understand interdisciplinary differences, acknowledge different knowledge systems and interests of multiple social actors, and provide guidelines to integrate plural values in real-life decisions and problem solving (Gómez-Baggethun et al., 2014; Gómez-Baggethun and Martín-López, 2015). This emerging field of integrated valuation has percolated in various global science-policy interface initiatives such as IPBES (IPBES, 2015; Jacobs et al., 2016; Pascual et al., 2017).

The scientific understanding of the multiple ways by which different societies acknowledge and interpret the importance of nature has resulted in different value definitions, conceptions and categorizations (Kenter et al., 2015; Arias-Arévalo et al., in press, see Table 1). In this study, three partly overlapping, partly

**Table 1**  
Value classification according to three frameworks: value types according to TEV, TEEB (also called ‘domains’) and IPBES (called ‘dimensions’). Sources: Krutilla (1967), Farber et al. (2002), Turner et al. (2003), de Groot et al. (2010), Dendoncker et al. (2013), IPBES (2015) and Díaz et al. (2015). Value dimensions sensu IPBES are used for synthetic analysis.

Framework	Category of value	Short definition
Total Economic Value (TEV)	Direct use values (e.g. provisioning services)	Value derived from conscious use and enjoyment of nature, both extractive (e.g. wood, food) and non-extractive (e.g. tourism, appreciation of landscapes)
	Indirect use values (e.g. regulation of air pollution)	Value associated with regulating services, such as pollination, water purification or soil fertility, not necessarily being perceived as consciously as such by beneficiaries.
	Option values (e.g. preservation of forests for future use and other values)	Value associated with the potential to use and enjoy nature in the future
	Bequest values (non-use, e.g. natural heritage and cultural heritage for future generations, . . .)	Satisfaction that humans derive from the knowledge that future generations will use or enjoy nature
The Economics of Ecosystems and Biodiversity (TEEB)	Existence values (non-use, e.g. existence of diverse species and ecosystems)	Satisfaction derived by humans from the knowledge that nature (in its multiple forms) exists
	Ecological values (e.g. resilience, biodiversity or functioning ecosystem, . . .)	Nature’s capacity to provide ecosystem services (de Groot et al., 2002); related to resilience of ecosystems to ensure provision of services over time (Pascual et al., 2010)
	Sociocultural values (e.g. heritage, sense of place or spirituality)	Contributions of nature to cultural identity, sense of belonging, heritage, spirituality or sacredness, good social relationships derived from the use, enjoyment or management of nature (Chan et al., 2012; Martín-López et al., 2014)
Intergovernmental Platform of Biodiversity and Ecosystem Services (IPBES)	Monetary values (e.g. jobs, profits, costs or investments)	Contributions of nature to individual welfare, conceived as utility and represented through monetary metrics (Martín-López et al., 2014)
	Non-anthropocentric value dimension <sup>a</sup>	Values of nature independent of humans, and inherent value of nature, independently of any human judgement (Callcott, 1987; IPBES, 2015)
	Instrumental value dimension	Benefits of nature, contributions of nature to the achievement of human’s quality of life (Díaz et al., 2015; IPBES, 2015)
	Relational value dimension	Good quality of life, desirable relationships among people and between people and nature (IPBES, 2015; Chan et al., 2016)

<sup>a</sup> The non-anthropocentric value dimension sensu IPBES focuses on values of nature itself regardless instrumental or relational value to humans. This covers individual organisms, assemblages, processes, biodiversity, but also the intrinsic value, defined here as (adapted from Pascual et al., 2017) “referring to inherent value, that is the value something has independent of any human experience or evaluation. Such a value is viewed as an inherent property of the entity (e.g. an organism)” and can be respected/acknowledged, “but not ascribed or generated by external valuing agents (such as human beings)”. For a more thorough debate on the concept of intrinsic value, see Batavia and Nelson (2017).

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