

# MAPPING AND ASSESSMENT OF ECOSYSTEM SERVICES **FOR SITE MANAGERS**

Photo: Marina Škunca

This is the second leaflet in our series. It gives an overview of ecosystem services (ES), describes ES valuation methods, provides resources for further reading and gives an insight into the Eurosites Economics and Ecosystem services working group. It also serves as an introduction to our next leaflet, which will focus on different methods for accounting for ecosystem services.

In the last few years, the concept of ecosystem services (ES), i.e., the idea of direct and indirect contributions of ecosystems to human well-being, have firmly taken ground in scientific research and policy development. Some find the ecosystem services a valuable tool in spatial and management planning to communicate the importance of nature conservation to a wide range of stakeholders and to help secure funding for site management and/or ecosystem restoration.

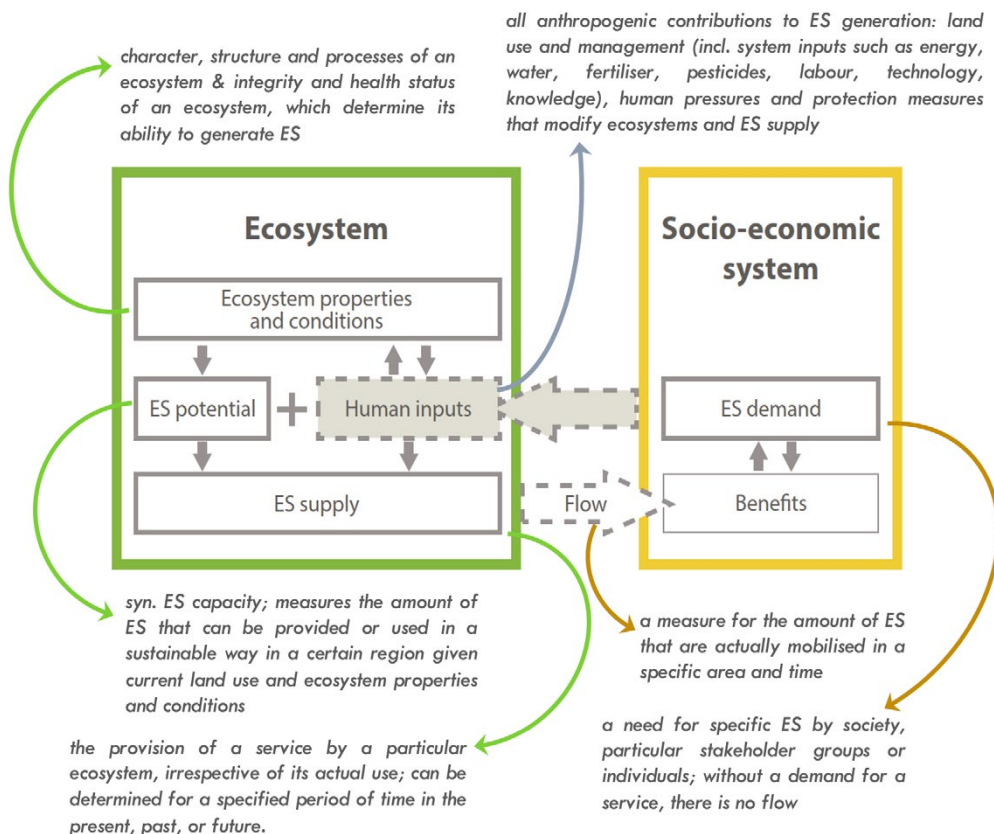
Others find the assessment of ecosystem services challenging or somewhat controversial when monetary valuation is used. To help dispel some of the myths and doubts surrounding different valuation methods, we've prepared a short introduction to mapping and assessment of ecosystem services for site managers. For more detailed information, please refer to the publications and websites in the "MORE TO READ UP!" section.



## WHAT CAN BE MAPPED AND ASSESSED?

The first question to answer, indeed, is what exactly are we mapping and assessing: will it be, perhaps, the potential for a site to provide certain ecosystem services, the current services available or provided, or the amount of services requested? While the selection depends on the purpose of the exercise and the available data, multiple components of ES provision could be mapped and/or analysed (Figure 1).

Mapping and assessment of ecosystem services can be both simple and somewhat complex. Based on why one would like to map and assess ecosystem services, services in question, the availability of data and the expert's proficiency, a choice can be made on which valuation method, but also which approach can be taken. Types of valuation methods are described in the following subchapter. At the same time, Burkhard and Maes (2017) distinguish three different tiers, depicted in the box below.



**Figure 1.** Components of ecosystem services provision that could be mapped and/or analysed. Source: Adapted from Syrbe, Schröter, Grunewald, Walz and Burkhard 2017 (In: Burkhard & Maes ed. 2017) (Legend: bold grey: subjects relevant for mapping; dashed: may be mapped; thin: additional aspects for which mapping could be developed).

### TIER 1

ES mapping using available indicators, where most indicators can directly be derived from land use and land-cover data, biodiversity monitoring maps, national forest inventories, etc. and thus represent proxies for a certain ES.

Only a rough overview of ES in space is needed.

Data and resources are limited.

#### Look-up tables

(e.g. linking ES values to land-cover classes)

#### Expert knowledge

(e.g. Delphi survey: experts rank land-cover types)

#### Casual relationship

(e.g. BBN: incorporate combined knowledge about ES)

#### Extrapolation of primary data

(e.g. field survey data linked to spatial information)

#### Regression and socio-ecological system models

(e.g. field and statistical information linked to spatial data)

### TIER 2

ES mapping linking different indicators with land use data, where land use data is linked to different datasets according to known relationships between land use and ES provision and supplemented with local, regional or national data.

A deeper understanding and analysis of underlying socio-economic and/or geo-bio-physical processes is needed.

Data are available in sufficient quality, quantity, scale and resolution to conduct an assessment in this tier. There are enough technical, human and financial resources available.

### TIER 3

Model-based approaches to map ES, which enable modelling biophysical processes in a GIS or some other software, instead of linking indicator data through simple relationships.

## WHAT TYPES OF VALUATION METHODS ARE AT OUR DISPOSAL?

There are several types of methods at our disposal to assess the ecosystem services:

1. biophysical quantification, which all site managers are pretty familiar with;
2. socio-cultural valuation that is more often used in social sciences; and
3. somewhat controversial economic (monetary) valuation.

For example, a biophysical quantification reveals the amount of drinking water stored in a nature reserve. A socio-cultural valuation might help us understand the ways in which visitors feel connected to the place. In contrast, the monetary valuation might tell us the monetary value of, e.g., the wood harvested at the site, or the value of drinking water stored.

Figure 2 provides a detailed description and more examples of these methods.

Moreover, some quantifiable metrics (indicators) are commonly used, which reflect a state or trends of ecosystems and the delivery of their services within a specific time frame. Selection of both the methods and indicators will heavily depend on the following aspects:

- the purpose of the assessment and target audience,
- chosen spatial and temporal scale,
- selected ecosystem services and
- availability of data.

	BIOPHYSICAL QUANTIFICATION	SOCIO-CULTURAL VALUATION	MONETARY VALUATION
EXPLANATION	Measurement of ecosystem services in biophysical units.	Methods that aim to analyse individual and collective perceptions of ecosystem services in non-monetary units.	Measures the human welfare derived from the use or consumption of ecosystem services by using a common unit of account – money.
METHODS	<b>direct measurements</b> (e.g. recording the yield of a certain crop); <b>indirect measurement</b> (e.g. vegetation indices obtained through the remote sensing); <b>(numerical) modelling</b> (e.g. complex ecological models which simulate the planetary water cycle)	<b>some of the popular ones:</b> preference assessment; photo-elicitation surveys; narrative methods; participatory mapping of ecosystem services; scenario planning etc.	<b>primary valuation methods</b> - methods that produce new or original information mostly using primary data, (e.g. replacement or restoration cost); <b>value transfer methods</b> - methods that use existing information in a new policy context (e.g. unit value transfer)
USE	<b>primarily:</b> assessment of ecosystem structures, processes, functions and service flows; <b>sometimes:</b> derived benefits and values assessment	contribution of ecosystems in terms of cultural, therapeutic, inspirational, educational, spiritual or aesthetic values; support in decision-making and prevention and/or minimizing social conflict	easier direct comparison of values across all the goods and services and their importance; easier communication to decision-makers

Figure 2. A detailed description and more examples of three valuation methods.

One needs to be careful while selecting the valuation method most suitable to a particular situation and a problem context, as well as during the interpretation and implementation of the valuation results. All the uncertainties need to be considered and transparently reported. Furthermore, the following should be kept in mind:

- Preserved biodiversity is a vital component of resilient and stable ecosystems. Only “healthy” ecosystems (i.e. ecosystems in good condition) can fully provide multiple services.
- Certain ecosystem services cannot always be expressed in a linear relationship since they depend on interactions of multiple ecosystem types or even on different temporal stages.
- Recognising the concept of ecosystem services doesn’t negate the assumptions that nature has immeasurable intrinsic value and needs to be conserved through preserving overall biodiversity. Indeed, intrinsic and bequest values are both recognised as cultural services ecosystems provide.
- While some cultural services could be easily assessed using monetary quantification (e.g. nature-based tourism and recreation), the valuation of others is considerably more complicated and riddled with methodological challenges and might require more data and/or resources. Moreover, monetary non-market valuation in certain cases, such as the valuation of symbolic species, spiritual interactions, bequest or existence values, is highly controversial and most often strongly criticised.
- Spatially explicit valuation of ecosystem services is still a relatively complex process. However, most of the methodological challenges can be solved, generally on a case-by-case basis, by a multi-disciplinary team (e.g. expertise from the environmental and ecological science, socioeconomics and geographic information systems).
- Specific operational challenges, however, need to be considered while devising and conducting the research (i.e. mapping and assessment):
  - resources (experts, time, finances) for the desired analysis, both available and required;
  - suitable use of existing tools and methods;
  - availability and precision of the data;
  - uncertainties, both innate and generated.

## REMARKABLE EXAMPLES!

### Take a look at the results of the OpenNESS project!

Funded by the European Union (FP7-ENV.2012.6.2-1), the overall objective of the OpenNESS project was to translate the concepts of ecosystem services and natural capital into operational frameworks based on applying the concepts in 27 real-life case studies covering different social-ecological systems in 23 European and 4 non-European countries. The experience from testing 43 methods resulted in an integrative assessment framework, a set of decision trees to help structure and guide the process of selecting individual methods and several method fact sheets, all available via **Oppla Marketplace**. To take a closer look, follow this [link](#).

### Find out what's been happening in the Danube Region!

Finalised in 2018, the blue's Study on Ecosystem Services in the Danube Region analysed more than 60 documents, all results from ecosystem services assessments or overview reports about the implemented assessments. If you are interested in how the concept was used in certain Danube region countries, what was assessed and how, or how to consider ecosystem services within different decision-making levels, follow this [link](#).

### Did you hear about the Pennine PeatLIFE project and UK Peatland Code?

Our colleagues at the North Pennines AONB Partnership are working with their partners to trial innovative Payment for Ecosystem Services (PES)

methods to inform future peatland restoration funding streams. Since the Pennine PeatLIFE project (LIFE16 NAT/UK/000725) started in 2017, they've been demonstrating and evaluating Sphagnum-based methods to determine the most cost-effective and widely applicable solution(s) to blanket bog restoration, as well as the basis for a PES instrument. Through 'Concept to Contract' trials, they also demonstrated the UK Peatland Code financial instrument as a viable PES approach for upland peatlands. If you want to learn more, start your journey on the following [link](#)!

### What about the Netherlands?

Another good example is the case of the Haringvlietdam (1970), which transformed the Haringvliet from a natural estuary into a mainly freshwater coastal lake. In 2019, a radical decision was taken to allow some inflow of saltwater from the North Sea. The same year, the Institute for Environmental Studies, Blueconomy and Wageningen University jointly prepared the study 'Haringvliet the dynamic delta', which showed that the combination of an even more open dam and nature restoration measures would enhance the provision of highly demanded ecosystem services, resulting in improved recreational opportunities and a better quality of life in the region. The societal and economic impacts of the mapped and assessed ecosystem services were made visible using known methods of social cost-benefit analysis and accounting for uncertainty in the available data. To take a closer look, follow this [link](#) [Only available in Dutch].

## MORE TO READ UP!

**A short introduction to ecosystem services for site managers** (2018) by the Eurosite Economics and Ecosystem Services Working Group (2018).

**ESMERALDA Project** (Enhancing ecoSystem sERVICES mApping for poLicy and Decision mAKing) aims to deliver a flexible methodology to provide the building blocks for pan-European and regional assessments.

### Mapping and Assessment of Ecosystems and their Services (MAES):

Action 5 of the EU Biodiversity Strategy to 2020 called for Member States to map and assess the state of ecosystems and their services in their national territory with the assistance of the European Commission.

**Mapping Ecosystem Services** (2017) by Benjamin Burkhard and Joachim Maes (Eds), provides a perfect conceptual background for the concept of ecosystem services and gives a comprehensive overview of different approaches and tools for mapping and assessment of ecosystem services at different levels.

**Oppla** is a knowledge marketplace where the latest thinking on ecosystem services, natural capital and nature-based solutions is brought together.

**Co-benefits (ecosystem services) of measures to consolidate the Natura 2000 network** (2021) by Theo van der Sluis highlights the connection between ecosystem services and pan-European Natura 2000 network, while providing some great basics and showcasing the relevance of the concept of the ecosystem services for site managers.

## TUNE IT - NATURE BENEFITS: FROM THEORY TO PRACTICE

The Eurosite Economics and Ecosystem Services Working Group is involved in developing a training programme on the application of the concept of ecosystem services, named 'TUNE IT - Nature's benefits: from theory to practice'.

Due to specific innovations in vocational training for nature conservationists, a funding application has been submitted to and accepted by the Belgian National Agency of the EU's Erasmus+ Programme. Natuurpunt (active in Flanders, north Belgium) leads the project's consortium, with 9 implementing partners from 5 European countries, including two international networks.

The project's main objective is to develop a course and provide training for site managers and local (regional) authorities responsible for managing natural areas. This will enable them to use existing knowledge and tools on the natural benefits and translate them into their daily working practice. This, in turn, will ensure that vital nature benefits are maintained and increase the opportunities for natural areas to contribute to society's needs.

The course will be developed in five languages (English, Dutch, Croatian, Ukrainian, and Turkish). Joint training for the staff of the implementing organisations and local stakeholders managing the protected areas will be organised as part of the project. For more information, subscribe to our newsletter or contact us at [info@eurosite.org](mailto:info@eurosite.org).



### The Eurosite Economics and Ecosystem Services Working Group

Formed in 2013, the Eurosite Economics and Ecosystem Services Working Group's mission and goal are to support site managers and other stakeholders (policymakers, practitioners, other experts etc.) in learning the basics of ecosystem services and integrating them in planning, decision making, and day-to-day management of nature areas. The Working Group meets regularly over the year and holds annual demand-driven workshops on relevant topics.

Visit [www.eurosite.org](http://www.eurosite.org) for more information.



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