EUROPEAN PARLIAMENT

Briefing

March 2015

Ecosystem services

Valuing our natural capital

SUMMARY

The concept of ecosystem services providing direct and indirect contributions to human wellbeing has been developed since the 1990s as a way to improve the effectiveness of biodiversity-protection policies. Ecosystem services can be categorised in four broad types: provisioning, regulating, cultural and habitat services. The status of most ecosystem services across the EU is either degraded or mixed, although some are showing improvement.

A global initiative on the economics of ecosystems and biodiversity, which started in 2007, has set a framework for valuing ecosystem services. The EU has launched a process aimed at increasing the knowledge base related to ecosystem services, with a view to mapping and assessing ecosystems and their services in the Member States.

Economic valuation of ecosystem services has made great progress over the past 25 years, although it is still largely based on approximations and incomplete knowledge. The valuation of ecosystem services can contribute to better-informed decision-making and market-based mechanisms promoting biodiversity protection (as in the case of schemes for payment for ecosystem services). However such cases are not widespread.

European Commission estimates show that the Natura 2000 network provides services worth between €200 and €300 billion per year.

Parliament has consistently called for ecosystem services to be an essential element of biodiversity protection.

Forests provide key services such as carbon storage.

In this briefing:

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Glossary

Ecosystem: a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Ecosystem services: the direct and indirect contributions of ecosystems to human wellbeing, sometimes also called 'ecosystem benefits.' They can be categorised in four main types: provisioning services, regulating services, habitat services, and cultural services (see table 1).

Green infrastructure: strategically planned natural and semi-natural areas with environmental features designed and managed to deliver a wide range of ecosystem services. May be situated in marine areas or on land (both in rural and urban settings).

Natural capital: the Earth's natural assets (soil, air, water, flora and fauna) and the ecosystem services resulting from them.

Background

Ecosystems provide direct and indirect contributions to human wellbeing. Although its origins are much older, the concept of ecosystem services was popularised by the UN Millennium Ecosystem Assessment in the early 2000s. The development of the concept appears to have been initiated by conservationists aiming to support more ambitious and more efficient biodiversity protection policies.

Ecosystem services can be categorised in four broad types: provisioning services, regulating services, cultural services and habitat services.

Table 1 – Examples of ecosystem services

Provisioning services	Regulating services	Cultural services	Habitat services
Providing food	Regulating local climate and air quality	Recreation	Providing species with habitat
Providing raw materials (e.g. wood)	Capturing and storing carbon	Tourism	Protecting genetic biodiversity
Providing fresh water	Protecting against impacts of extreme weather events (such as floods)	Spiritual experience	
Providing medicinal resources	Preventing soil erosion	Aesthetic value	
	Treating waste water		
	Pollinating		

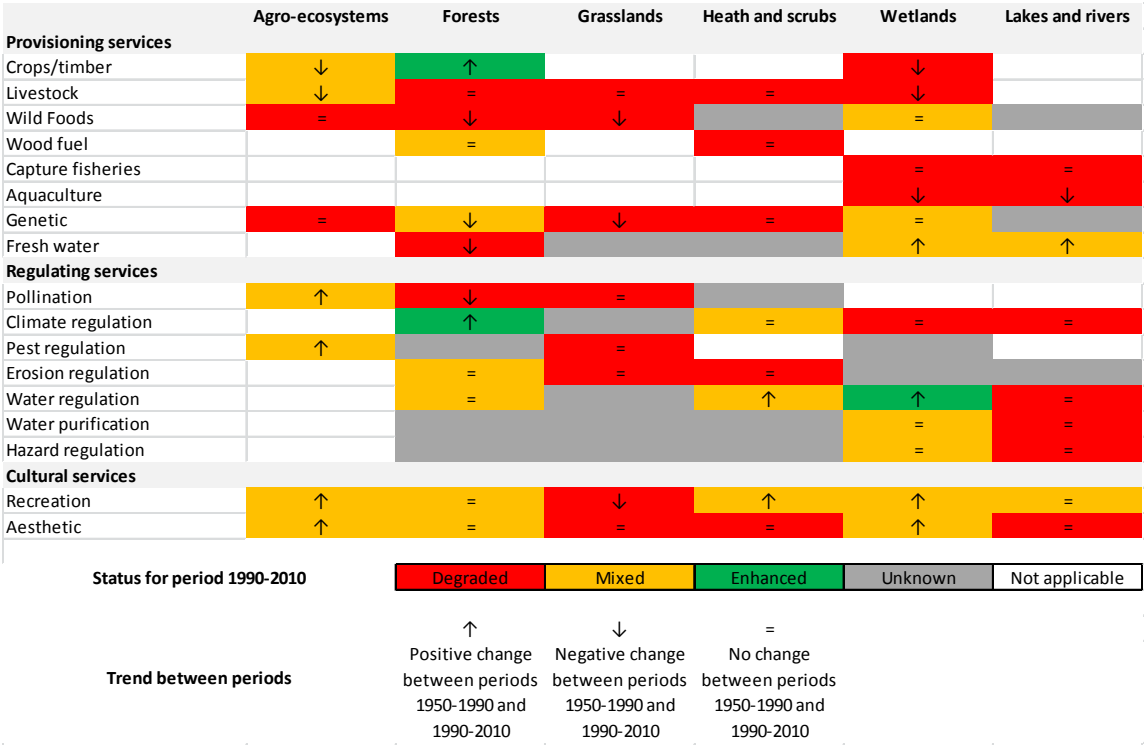
Source: The Economics of Ecosystems and Biodiversity (TEEB).

Ecosystem services are central to the EU's biodiversity strategy, presented by the European Commission in 2011 with the aim to stop their degradation in the EU by 2020 and to protect, value and restore biodiversity and the ecosystem services it provides by 2050. Under the strategy, maintaining and enhancing ecosystem services is one of the six priority targets to be met by 2020. To promote an approach based on ecosystem services, in 2013 the Commission presented a strategy on green infrastructure (natural and semi-natural areas designed and managed to deliver ecosystem services such as flood defences) in the EU.

The state of ecosystems tends to decline alongside the state of biodiversity, mainly as a result of human-induced pressures such as over-exploitation of natural resources, loss of viable habitats, pollution, climate change and invasive alien species.

At global level, nearly two thirds of ecosystem services have been degraded since 1950. According to data published by the European Environment Agency, the majority of ecosystem services across Europe have either a degraded or mixed[1] status. The status of ecosystem services by habitat type shows a contrasting picture (see figure 1): whereas all ecosystem services provided by grasslands are now degraded, ecosystem services provided by forests (especially timber production and climate regulation) have a better status. While the status of most provisioning services is worsening, the status of regulating and cultural services has generally been stable or has improved since the 1950s.

Figure 1 – Trends in the status of European ecosystem services (1950-2010)



Data source: European Environment Agency.

In 2007, a study on the economics of ecosystems and biodiversity (TEEB)[2] was launched in response to a proposal by the Environment Ministers from the G8 states and five major developing countries[3] to develop a global study on the economics of biodiversity loss. Over time, the study developed into an initiative involving regular publications on work done on various aspects of the economic valuation of ecosystems.

The valuation process defined by TEEB involves three levels:

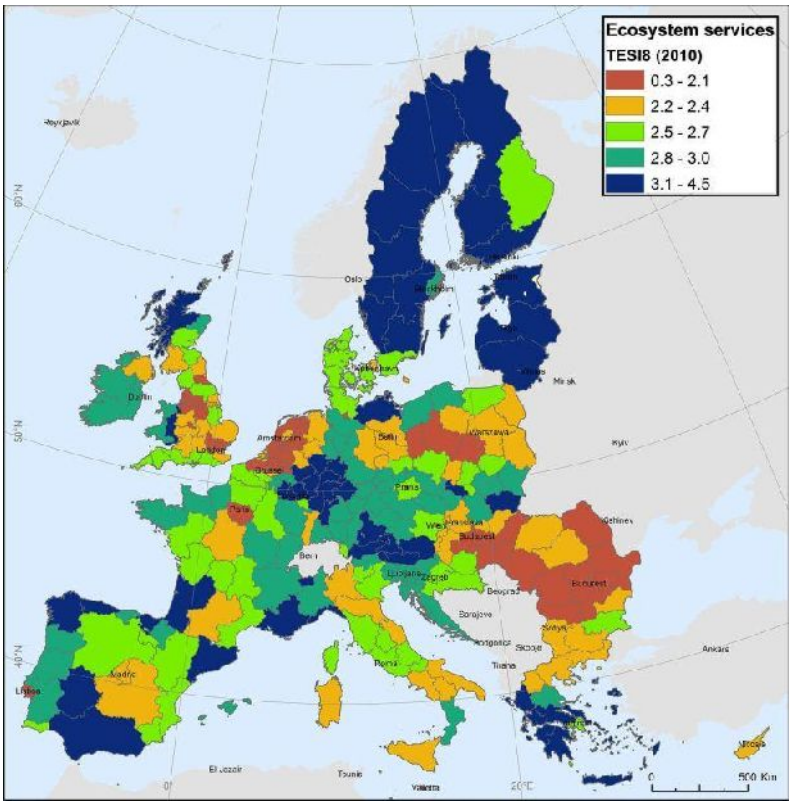
1. recognising value, i.e. identifying the wide range of benefits in ecosystems, landscapes, species and other biodiversity-linked aspects;
2. demonstrating value, i.e. using economic tools and methods to make nature's services economically visible;
3. capturing value, i.e. incorporating ecosystem and biodiversity benefits into decision-making through incentives and price signals.

In this process, valuation is not seen as an end in itself; it is rather meant to provide a framework for better-informed decision-making.

Identifying ecosystem services in the EU

Action 5 of the EU biodiversity strategy sets out that 'Member States will, with the assistance of the Commission, map and assess the state of ecosystems and their services in their national territory by 2014, assess the economic value of such services, and promote the integration of these values into accounting and reporting systems at EU and national level by 2020.' The Commission has set up the 'Mapping and assessment of ecosystems and their services' initiative aiming to provide policy-makers with the best information available on ecosystem services so as to guide land-use planning decisions. This in turn is expected to ease the pressures on habitats and species.

Figure 2 – Total ecosystem services index (TESI8) based on eight ecosystem services indicators (2010)



Data source: Joint Research Centre, European Commission, 2014.

Based on six thematic pilot projects, a Commission report published in 2014 provides guidance to Member States on how to map and assess ecosystems and their services. The work remains in a preliminary phase, and to date few detailed maps and assessments of ecosystem services have yet been produced in the EU.[4] A study published in 2014 identified discrepancies between European ecosystem services maps, highlighting methodological uncertainties.

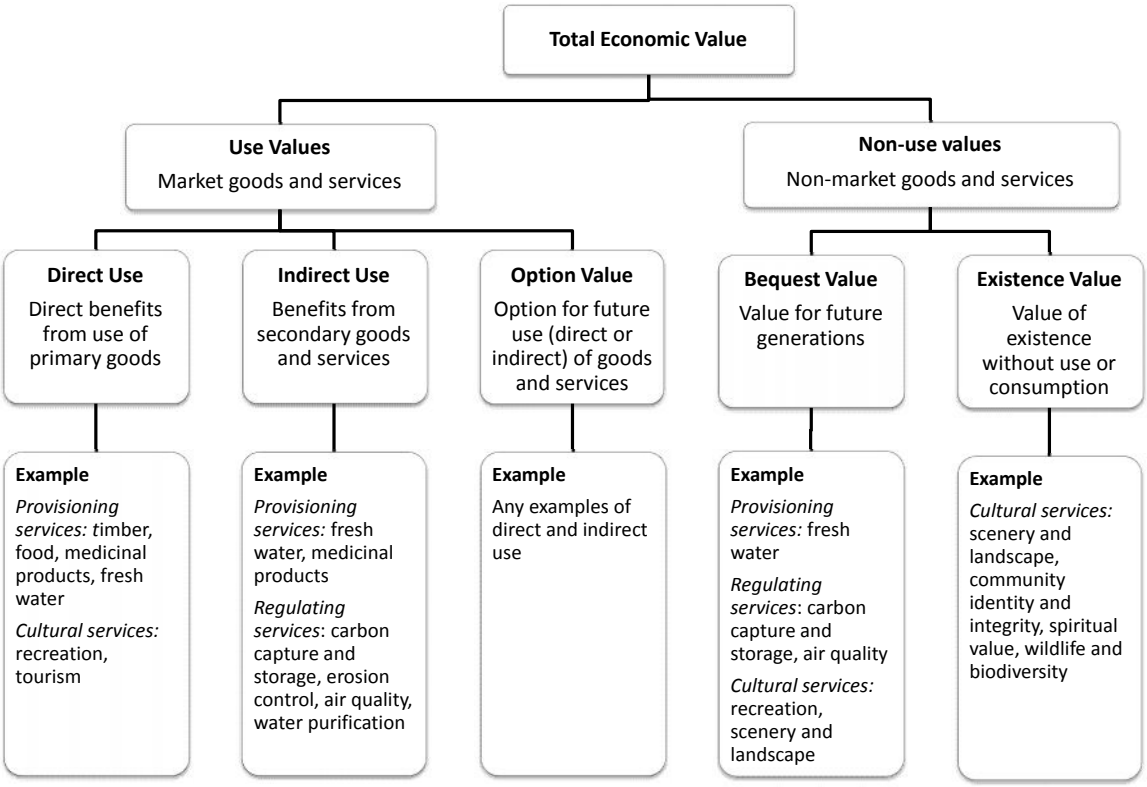
Multiple frameworks

Mapping and assessment of ecosystems and their services (MAES) is only one among several frameworks aimed at increasing the knowledge base about ecosystems and their services. Among other initiatives are the National Ecosystem Assessment (NEA), a UK-devised process involving government, academic, NGO and private-sector institutions; the Common International Classification of Ecosystem Services (CICES), a global initiative developed from the work on environmental accounting undertaken by the European Environment Agency; and the experimental ecosystems accounts by the System of Environmental-Economic Accounting (SEEA)[5], a joint initiative of the UN, the Commission, FAO, OECD and the World Bank. A report produced for the Commission highlights the need to further integrate and implement existing frameworks at EU level in order to harmonise efforts.

Economic valuation of ecosystem services

The total economic value of an ecosystem is defined by the benefits flowing from a variety of services. Some benefits provide market goods or services (which can be used directly or indirectly), while others provide non-market goods and services (which have value for future generations or are of purely existential value).

Figure 3 – Ecosystem services according to their valuation type



Source: adapted from Biodiversity in environmental assessment / Slootweg et al., 2010.

A variety of economic valuation methods are used to estimate the benefits provided by ecosystems. Some of them are robust and straightforward to apply, such as the market price method used for calculating the value of 'direct use' goods like timber. Others, such as the 'replacement cost' method, estimate hypothetical costs (e.g. the cost of a waste-water treatment plant in the absence of a given ecosystem), or, as in the case of the 'damage cost avoided' method, the value of a service is calculated on the basis of the cost of damages (say, from flooding) which would occur in the absence of an ecosystem (such as a floodplain). Some methods rely on subjective judgement, such as the hedonic pricing method, used for estimating the beauty of a landscape.

Over the past 25 years, progress has been made in economic valuation of ecosystem services. Both the ecological understanding of these services and monetary valuation methods have been improved, especially for regulating and cultural services, which are harder to measure than provisioning services. Economic valuation can provide useful estimates regarding the impact of specific changes on a given ecosystem. It can contribute to estimating the value of natural capital, so that it can be reflected in policy decisions, indicators and accounting systems; ultimately, it can help protect biodiversity and ecosystems.

Although ecosystem services are not yet incorporated into decision-making through incentives and price signals, there are instances of market-based mechanisms encouraging the conservation of natural resources, such as payment for ecosystem services (PES) schemes which have emerged in recent decades, mainly in developing countries. Most of the time, the buyer of services (e.g. water users or a hydropower company) pays the provider (e.g. farmers or landowners) for maintaining ecosystem services, with the state often acting as an intermediary between the two parties or

paying on behalf of its citizens, who are the indirect beneficiaries.[6] Payment for ecosystem services schemes also serves as a social and political instrument in support of the rural poor, sometimes at the expense of the efficiency of the schemes. Research suggests that payment for ecosystem services schemes work best when providers' property rights are clearly defined, transaction costs are low, schemes are genuinely used for preserving ecosystem services, and actions are targeted at areas most at risk.

Value of the Natura 2000 network

A European Commission report published in 2013 attempts to estimate the value of benefits from the Natura 2000 network of protected sites in the EU covering over 1 000 000 km^2 or over 18% of EU land area, as well as 2 960 marine sites, covering over 250 000 km^2.

The report employs two different methods to estimate the total economic value of Natura 2000. The first uses available estimates of the value of the benefits delivered by a number of Natura sites and scales them up to estimate the benefits at network level ('site-based estimates'), placing the overall benefits of Natura 2000 at €223–314 billion annually. The second uses the available estimates of the value of the benefits delivered by habitat type, and extrapolates them to network level ('habitat-based estimates'), placing the overall benefits of Natura 2000 at €189–308 billion annually. These figures are the best currently available indicative values, yet they should be used with care, as they rely heavily on the 'benefits transfer' approach.

The total carbon stock stored by Natura 2000 sites is estimated at almost 10 billion tonnes. The stock is valued at between €607 and €1 130 billion depending on the choice of carbon price. Partial value estimates for specific services of the Natura 2000 network, such as mitigating the impacts of natural disasters, water provision and purification, pollination, marine environment, tourism and recreation, are currently merely illustrative or experimental.[7]

However, the economic valuation of ecosystem services has weaknesses. Estimated values remain approximations based on varying methods and assumptions. Moreover, ecosystem services values are context-specific, as the importance of an ecosystem (say, a coastal buffer zone) varies according to local conditions. Yet, because studies have only been carried out for a few localities, estimates are often calculated through the 'benefit transfer' (also called 'value transfer') approach, i.e. by analogy from a thoroughly studied ecosystem elsewhere. The economic valuation of ecosystem services does not necessarily give a full picture, as analyses often concentrate on a few high-profile services (such as carbon capture and storage) and rarely assess the value of wider economic services. Moreover, there is not necessarily an immediate link between biodiversity loss or ecosystem degradation and the actual impact on ecosystem services: ecosystems can be resilient up to a point, and then start a rapid decline.

Some scientists criticise the concept of ecosystem services valuation for its lack of methodological solidity, as calculations can be based on a variety of methods, and warn economic valuation may become an end in itself, gaining primacy over the initial purpose of protecting biodiversity. In this context, some see non-monetary valuation, a technique used long before economic valuation (for instance to define protected areas), as an alternative to a perceived monetisation of biodiversity.

European Parliament

Parliament has consistently called for ecosystem services to be an essential element of biodiversity protection. In its resolution of 21 September 2010 on the implementation of the EU's biodiversity legislation, Parliament urged the Commission to focus more on ecosystem services. In its resolution of 20 April 2012 on the EU's biodiversity strategy,

Parliament underlined that payment for ecosystem services is a promising tool for biodiversity conservation, and recognised that biodiversity and ecosystem services provide significant non-monetised benefits to industry and other economic actors. In its resolution of 12 December 2013 on green infrastructure, Parliament underlined the need to strengthen capacity and knowledge in relation to the mapping and assessment of ecosystems, and called for EU financial instruments to be fully used to promote green infrastructure.

Main references

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What has nature ever done for us? How money really does grow on trees / Juniper, Profile Books, 2013.

Endnotes

1 Mixed status means ecosystem services are degraded in some European regions and enhanced in others.

2 TEEB is hosted by the United Nations Environment Programme with financial support from the European Commission, Germany, the Netherlands, Norway, Sweden and the United Kingdom.

3 Brazil, China, India, Mexico and South Africa.

4 In Switzerland, the Federal Institute of Technology (ETH Zürich) created an online tool for visualising ecosystem services. The tool provides help to decision-makers when planning new developments. See their presentation for more details.

5 The System of Environmental-Economic Accounting is a UN-level framework which helps to produce statistics on environment-related indicators that are not shown separately in national accounts. European environmental economic accounts are governed by Regulation 691/2011.

6 Examples range from a water company in France paying dairy farmers for land management compatible with the production of spring water, to land managers in Costa Rica receiving payment for services sourced from forests and financed through fuel and water taxes.

7 For an overview of partial estimates, see The economic benefits of the Natura 2000 network, pp. 53-55. For examples of specific ecosystem services in Natura 2000 sites, see pp. 67-70.

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