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The Value of Natura 2000

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The Value of Natura 2000

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Contents

Introduction

1. What is the value of Natura 2000 for biodiversity protection?
2. What is the value of Natura 2000 in terms of benefits to people?
3. What is the economic value of Natura 2000?

Conclusions

References

- 3
4
7
8
10
11

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Introduction

The Value of Natura 2000

The Natura 2000 network encompasses nearly a fifth of EU territory and provides protection for over two hundred habitat types and more than a thousand rare and threatened species. The benefits to people provided by the network are estimated to be worth €223-314 billion per year. In this Future Brief we explore the 'value' of Natura 2000 from different angles: in terms of biodiversity conservation, the benefits for people, and economic value.



The critically endangered Iberian Lynx (*Lynx pardinus*). Programa de conservacion ex-situ del lince Iberico. <http://www.lynxessitu.es/>

Why protect nature? Many would argue it is because we, as a society, value it. But what form does that value take; do we value ecosystems and biodiversity for their intrinsic worth or for what they can do for us?

Ecosystems provide humanity with a multitude of benefits, from food and clean water to space for recreation and contemplation. The concept of 'ecosystem services' — as these benefits have been dubbed — could prove an important tool in the bid to halt global biodiversity decline (MA, 2005; TEEB,

2010). By making explicit the services that ecosystems provide, to both policymakers and stakeholders alike, the concept provides an additional powerful justification for nature conservation (Harrison *et al.*, 2014). To this end, ecosystem services now form a key part of Target 2 of the EU Biodiversity Strategy, which aims that: *“by 2020, ecosystems and their services [will be] maintained and enhanced”*.

However, there are concerns that the concept is too utilitarian, as it describes only the benefits provided to people, without any

acknowledgement that ecosystems may have intrinsic value (Schröter *et al.*, 2014; Reyers *et al.*, 2012; Fisher & Brown, 2015). Furthermore, a major criticism of the concept is that despite its inclusion in biodiversity policies at national, regional and global levels, protection of ecosystem services may not guarantee protection of biodiversity (Norgaard, 2010; Faith, 2012; Deliège & Neuteleers, 2014).

Although there is good evidence to show that biodiversity has a fundamental role to play in ecosystem functioning — underpinning essential processes such as resource capture, biomass production and nutrient recycling — links between biodiversity and ecosystem services are less clear (Cardinale *et al.*, 2012; Balvanera *et al.*, 2014; Harrison *et al.*, 2014; see also Science for Environment Policy's In-depth report Ecosystem Services and Biodiversity for detailed overview of research on this topic). While there are many ecosystem services, such as water purification and soil formation, in which biodiversity plays a key role, this is not always the case. Intensive farming, for example, maximises the ecosystem service of food production but can have devastating effects on biodiversity. In fact, maximising provisioning services such as crop production is estimated to be the single largest driver of biodiversity loss over the last 50 years (MA, 2005).

Many scholars, therefore, call for recognition that biodiversity should be protected for its own sake (Faith, 2012; Schröter *et al.*, 2014). Indeed, the EU Biodiversity Strategy itself makes the dual importance of ecosystem services and the intrinsic value of biodiversity explicit in its vision for 2050: “By 2050 European Union biodiversity and the ecosystem services it provides – its natural capital – [will be]

protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided.”

The Natura 2000 network of nature protection areas is the EU's flagship initiative to conserve biodiversity across the region. Covering 18% of the land in EU countries as well as approximately 4% of its marine waters, it is the world's largest ecological network under a single regulatory framework (Popescu *et al.*, 2014; Evans, 2012). The network was established under the 1992 Habitats Directive but also incorporates special protection areas designated under the 1979 Birds Directive. The aim of the network is to ensure the long-term survival of Europe's most valuable and threatened species and habitats (European Commission, 2013).

In this report we explore the ‘value’ of the Natura 2000 network from three different angles:

- i. The value of the network to biodiversity protection. How effective is the network in helping to halt the decline of biodiversity?
- ii. The value of the network in terms of benefits to people. Does the network provide a flow of ecosystem services?
- iii. The economic value of the network. Economic valuation can be a useful way of making the benefits of ecosystem services explicit, while taking into account the cost of their management. What do economic valuation studies on Natura 2000 sites show?

1. What is the value of Natura 2000 for biodiversity protection?

The Natura 2000 network has a central role in EU biodiversity policy; it encompasses more than 200 natural and semi-natural habitat types across the EU, including over a thousand rare and threatened species, along with many others that also benefit from the sites' protection (European Commission, 2009a). Examples of Natura 2000 sites include the Amvrakikos delta in Greece, a vast wetland which provides important habitats for waterbirds, including the rare Dalmatian pelican (*Pelecanus crispus*). In the Azores, Atlantic spotted dolphins (*Stenella frontalis*), long and short-finned pilot whales (*Globicephala melas*, *G. macrorhynchus*) and Risso's dolphins (*Grampus griseus*) are all seen in the marine Natura 2000 sites. Habitat for

the critically endangered Iberian lynx (*Lynx pardinus*) is protected by several Natura 2000 sites in south-western Spain (European Commission, 2009b).

The network therefore already forms the cornerstone of biodiversity protection in the EU by helping maintain and restore important habitats and species. A comprehensive review of research into the network's effectiveness, produced for the European Environment Agency (EEA), highlights examples of where Natura 2000 has had positive effects (McKenna *et al.*, 2014). For example, Lawton *et al.* (2010) state that it provides high levels of protection to components of England's ecological network.



Golden eagle. ©istockphoto.com/Neil_Burton.

However, the review also suggests that the Natura 2000's overall conservation value is not yet clear. It points to cases where the network's potential is not being fully met, or where data on its effectiveness are unavailable. The network is still young, which means that many of its benefits for biodiversity may not be seen for decades to come. Furthermore, good management and careful design of the sites are needed to ensure it can achieve its full potential.

Member State data submitted to the European Commission, as required by the Habitats Directive, suggest that 17% of habitats and species targeted by the Directive had attained favourable conservation status between 2001 and 2006 (European Commission, 2009c). Academic studies can shed more light on certain species and habitats, and provide more recent information. However, McKenna *et al.* (2014) caution that the research base is currently limited and existing results should not be generalised.

Several studies have shown the benefits of Natura 2000 sites to groups of birds. Donald *et al.* (2007) found a correlation between Member States' percentage land cover of Natura Special Protection Areas (SPA) and positive bird population trends for the period 1990–2000. The association was particularly strong for species targeted by the Birds Directive, i.e. those listed under the Birds Directive's Annex I (species considered particularly vulnerable or rare, or which need special conservation measures). Population growth was also greater for these species in Member States than in non-Member States. Natura 2000 areas have also been found to help conserve certain non-Annex I bird species. For example, Pellissier *et al.* (2013) showed that the abundance of 54 of 100 monitored common bird species in France increased with greater Natura 2000 coverage; the vast majority of these species were not listed under Annex I.

Partly as a result of a new focus on habitats rather than individual species, there is now good evidence that Natura 2000 sites may also benefit non-target species. For example, Trochet & Schmeller (2013) identified 11 fish species and three plant species defined as threatened under the IUCN's Red List system, but not listed in the Habitats Directive's annexes, which have over 90% of their distribution covered by Natura 2000.

Some types of species may receive fewer benefits from Natura 2000, which some studies attribute to a general tendency to focus on protecting 'charismatic' species, such as birds, mammals and flowering plants. Rubio-Salcedo *et al.* (2013) suggest that it is for this reason that Natura 2000 sites in Spain do not sufficiently protect lichen species, for example.

Poor management can also undermine the positive impacts of the network. For example, the range of the black grouse (*Tetrao tetrix*) population in the Ore Mountains is almost entirely covered by an SPA. Nevertheless, the population is decreasing due to the unfavourable management by the forestry industry for timber production, such as afforestation of valuable grouse habitats, like heaths and shrubland (Bastian, *et al.*, 2010).

Kati *et al.* (2015) surveyed 242 conservation scientists involved in Natura 2000 and found that although they were moderately satisfied with how the network was being implemented, they felt that key improvements were needed: to increase public awareness and provide environmental education to local communities; to improve the quality of environmental impact assessments, and to establish a specific Natura 2000 fund, which could help deal with issues



Landmannalaugar,
Fjallabak Nature Reserve
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such as understaffing of Natura management authorities. McKenna *et al.*'s EEA review (2014) also suggests better management, stakeholder participation and site selection will increase site effectiveness.

In assessing the value of Natura 2000 for biodiversity protection, many studies have mapped species' key habitats against Natura 2000 site locations. These 'gap analyses' help indicate whether a species, or a group of species, is adequately covered by the network and therefore to what extent the network helps to promote a species' long-term conservation.

For instance, a recent pan-EU study concluded that the Natura 2000 network may be better at promoting long-term persistence of amphibians and reptiles than non-Natura 2000 protected sites (Abellán & Sánchez-Fernández, 2015). The researchers found that species are more likely to occur in multiple sites, as opposed to a single site, in the Natura 2000 network compared with the non-Natura 2000 network. For example, 29% of all European terrestrial reptile species were represented at least 20 times in the Natura 2000 network, compared with 19% in nationally protected areas. This is a greater number than expected by chance for Natura 2000, given the area it covers.

However, gap analyses have also revealed that many species remain poorly covered, or not covered at all. These include both target and non-target species. For instance, Trochet & Schmeller (2013) identified 14 threatened non-annexed species that are highly protected by Natura 2000 (discussed earlier). However, they also identified 15 threatened species which are listed in Annexes II, IV or V of the Habitats Directive and had less than 10% of their distribution covered by Natura 2000. These included nine Annex II species, which require SAC (special area of conservation) designation, such as the Monte Albo cave salamander (*Speleomantes flavus*) and Olimpia's ground beetle (*Carabus olympiae*).

Abellán & Sánchez-Fernández (2015) conclude that amphibian and reptile species with narrow ranges are more likely to be insufficiently covered. These include threatened species such as the Montseny brook newt *Calotriton arnoldi* (non-annexed) and the Sardinian mountain newt (*Euproctus platycephalus*) (listed under Annex IV of the Habitats Directive, thus requiring strict species protection, but not necessarily SAC designation).

There are also concerns about how well Natura 2000 can protect species under climate change; sites are fixed in location, but many species are expected to shift their range in future. In their study of owls in the Italian Alps, Brambilla *et al.* (2015) suggest that projections of ranges under climate change could be used to identify suitable new sites for Natura 2000.

However, research has also suggested that Natura 2000 could help species survive under climate change. Thomas *et al.* (2012) found that 40% of new colonisations by seven butterfly and bird species in the UK since the 1970s have been in nationally protected areas ('Sites of Special Scientific Interest' — 80% of which, by area, are also Natura 2000 protected). Ninety-eight per cent of 256 invertebrate species were also found to have disproportionately colonised these protected areas in new parts of their ranges. The findings indicate that protected areas help species expand their range in response to climate change, and other drivers of distribution change, as they often provide the specific conditions needed for colonisation.

In summary, the network has the potential to have immense benefits for biodiversity, but the evidence suggests that in order to achieve these benefits better management, assessment, planning and stakeholder engagement is needed (McKenna *et al.*, 2014; Kati *et al.*, 2015; Opermanis *et al.*, 2013). It is currently difficult to judge progress on many fronts because of a shortage of information for certain habitat types, such as marine ecosystems, or certain areas, and these knowledge gaps must be addressed.

2. What is the value of Natura 2000 in terms of benefits to people?

Natura 2000's primary aim is to protect biodiversity. However, the network does not exclude human activities: it is designed to ensure that people co-exist sustainably with the natural world (European Commission, 2013). Indeed, in addition to the satisfaction of knowing that biodiversity is protected, an ecosystem service in itself, evidence shows that Natura 2000 sites provide numerous other benefits to people (Kettunen *et al.*, 2009).

Bastian (2013) examined the ecosystem services provided by Natura 2000 sites in the Ore Mountains in Germany. The diverse habitats provide a wealth of services, the author found. Semi-natural grasslands in the area, for example, provide an attractive environment for recreation, habitat for pollinators and water purification. Wild berries can also be harvested there. The sites also contain wetlands, which provide water purification and flood protection as well as climate regulation in the form of carbon storage. Forests in the region also store carbon, purify water and regulate floods as well as improving the aesthetic value of the landscape and stimulating recreation and tourism in the local area. Alongside these benefits for people, the Ore Mountains' Natura 2000 sites also protect biodiversity for its own sake, providing habitat for a host of species, some of which are rare and threatened, from orchids to European vipers and black grouse (see Figure 1).



Common European adder (*Vipera berus*). CC BY 3.0 Benny Trapp.

BOX 1.

Categorising ecosystem services

The landmark Millennium Ecosystem Assessment (MA, 2005) divided ecosystem services into four categories:

- i. Supporting services. These are services, such as nutrient cycling and soil formation, which are needed for the production of all other services.
- ii. Provisioning services. Products obtained from ecosystems, such as food or timber.
- iii. Regulating services. The benefits obtained from the regulation of ecosystems, including services such as purification of water, flood control, or regulation of the climate via carbon sequestration.
- iv. Cultural services. The benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences.

The EU now uses the Common International Classification of Ecosystem Services, with three categories, provisioning, cultural and regulating and maintenance services. Under this method supporting services are included as part of regulating and maintenance services.

Castro *et al.* (2015) also demonstrated the benefits that Natura 2000 sites can bring, in addition to biodiversity protection. In the semi-arid province of Almeria, Spain, the researchers found that Natura 2000 sites were particularly important for carbon storage and groundwater recharge, known as regulating services (see Box 1 for definitions of ecosystem service categories). In fact, Natura 2000 sites covered only 21% of the land surface in the area, but provided 36% of the regulating services.

Furthermore, the benefits of Natura 2000 sites may extend beyond the boundaries of the network. Schirpke *et al.* (2014) mapped the beneficiaries of 16 ecosystem services generated in the SPA of Alto Garda Bresciano, Italy. The site, which has 14 807 inhabitants, generated a wide variety of services, including crop production, water purification, soil erosion prevention, flood control, pollination, recreational value and inspiration for arts and culture, to name but a few. For many of these, especially provisioning services such as food production and cultural services such as recreation, the majority of beneficiaries were resident outside the Natura 2000 site. This illustrates that the value of the network is not restricted to the sites themselves.

One group of services, which has been neglected by decision makers, are the cultural services such as ‘existence values’ — the enjoyment provided by wild species;

‘bequest values’ — the desire to preserve biodiversity for future generations; and spiritual or symbolic values (Chan *et al.*, 2012). The difficulty in assessing and evaluating these services means that they may be neglected from the decision-making process in a way that provisioning services, such as timber or crops, are not (Chan, Satterfield & Goldstein, 2012; Parks & Gowdy, 2013; Chan *et al.*, 2012).

In conclusion, incorporating people into the design and management of the Natura 2000 network is vital. We live in a social-economic-ecological system and we cannot achieve true sustainability without acknowledging this. Recognition of this will not only help people: it has been shown that better engagement with stakeholders may improve biodiversity protection as well (Young *et al.*, 2013).

3. What is the economic value of Natura 2000?

The idea of putting a price on nature is controversial. Some scholars argue that economic valuation can lead to commodification — setting a price at which to trade nature — with damaging social and environmental consequences (Gomez-Baggethun & Ruiz-Perez, 2011). However, others point out that nature and the services it provides are often regarded as free and unlimited and that this has led to consistent degradation of ecosystems worldwide. Economic valuation makes the value of nature explicit, using units that can be readily understood by all stakeholders and decision makers (Laurans *et al.*, 2013).

The entire Natura 2000 network is estimated to be worth €223-314 billion per year (or 2-3 % of EU GDP) (European Commission, 2013). This figure, calculated by a comprehensive study produced for the European Commission, contains various uncertainties and is likely to increase as data for more ecosystem services is collected, but already shows that the network brings substantial economic benefits. These can also be

further enhanced by improving the ecological status of the network.

This is a gross, rather than net figure, because it does not account for the costs of managing the network, monitoring and infrastructure. However, Gantioler *et al.* (2010) investigated this, estimating that these costs amount to €5.8 billion per year for the EU-27. This means that the network’s benefits far outweigh management costs. For example, the Natura 2000 network in the Netherlands alone has been estimated to be worth €4.5 billion a year (Kuik, Brander & Schaafsma, 2006).

Economic valuation can also demonstrate the relative importance of the Natura 2000 network for different services. Box 2 explores a breakdown of benefits arising from a single Portuguese Natura 2000 site, while a report for the European Commission, *The Economic benefits of the Natura 2000 Network*, is summarised in Box 3 and gives an overview of the valuations for different services (European Commission, 2013).

BOX 2.

Azores Natura Special Protection Area (SPA) provides valuable ecosystem services

The Pico da Vara/Ribeira do Guilherme SPA on Portugal's Azores Islands provides valuable protection for the priolo, or Azores bullfinch (*Pyrrhula murina*). However, research has found that this Natura 2000 site also delivers a range of valuable ecosystem services for the local community and beyond (Cruz, Benedicto & Gil, 2011). For example:

- **Hazard mitigation.** Water cycle regulation services on the site reduce the number of local floods and landslides. To illustrate the potential impact of these hazards, which occur regularly in this area: a nearby village suffered 29 deaths and around €20 million in damages as a result of such events in 1997.
- **Water supply and purification.** The site supplies almost all water used by local communities (excluding water used by agriculture), worth over €600 000 a year. Its impacts on water quality are valued at over €110 000.
- **Tourism.** Its value for ecotourism is estimated to be over €60 000.
- **Job creation.** Site management directly supports 21.6 full time equivalent jobs.
- **Carbon storage.** Around 465 000 tons of carbon are stored by the site.
- **Education and research.** It hosts around 10 school groups and 10 academic researchers a year.



Azores bullfinch *Pyrrhula murina* Pico da Vara Sao Miguel. CC BY-SA 2.0 putneymark.

BOX 3.

Economic valuation of different ecosystem services, from *The Economic benefits of the Natura 2000 Network* (European Commission, 2013)

Carbon storage

Together, Natura 2000 sites store around 9.6 billion tons of carbon. The study estimates these are worth between €600–1130 billion (based on 2010 stock value).

Natural hazard mitigation

Natura 2000's green infrastructure and natural barriers can help mitigate, and therefore reduce costs of, floods, avalanches and landslides. Although it is not yet possible to value these benefits, due to lack of data, the importance of this issue is illustrated by the fact that economic losses from natural disasters in the EU between 1990 and 2010 amounted to around €16 billion a year.

Tourism and recreation

Visitors to Natura 2000 sites spent an estimated €50–85 billion in 2006. Most visitors are attracted to the sites for their visual and landscape appeal, rather than their specific Natura 2000 designation. However, the visitors who do have affinity for the designation are estimated to contribute €9–20 billion per year.

Water purification and supply

Natura 2000 sites can help purify and supply water cost effectively. Using information from Berlin, Vienna, Oslo and Munich the report estimated that the economic benefits of water purification are between €7 and €16 million per city and of water provision between €12 and €91 million per city.

Food supply

The network is important for food provision: agro-ecosystems make up 38% of the surface of Natura 2000 sites; however, the report did not include an economic estimate for this service. Pollination is another vital service: 75% of the world's major crops are dependent on, or benefit from pollination (Carvalho et al., 2012). It is currently not possible to reliably calculate the value of pollination services provided by Natura 2000 sites; however, they are likely very valuable, given that pollination services across Europe generally are estimated to be worth €14 billion per year.

Conclusions

The value of the Natura 2000 network comes in a variety of forms. First, encompassing a wide variety of habitats and covering vast tracts of land and sea, it already provides essential refuges for some threatened wildlife and has the potential to provide even greater protection for biodiversity, especially in the face of global pressures (European Commission, 2009b). However, the current evidence for the effectiveness of the network is mixed. Although there are heartening trends for some species, especially birds, others continue to decline, or remain unprotected by the network (McKenna *et al.*, 2014).

Improved monitoring and better evaluation of management activities may all help in achieving the full potential of the network. Some scholars have also argued that new sites should be considered, especially in light of the challenges of climate change (Brambilla *et al.*, 2015). The network is still young, and therefore the real gains may not yet be evident, but there is also a paucity of data and

research. Filling this gap is vital to assess whether the current lack of progress is the result of a time delay or lack of effective management.

In addition to biodiversity protection, the Natura 2000 network offers value in terms of benefits to people. Numerous studies have highlighted the importance of protected areas in providing ecosystem services such as water and air purification, space for recreation and carbon storage (Bastian, 2013; Castro *et al.*, 2015; Kettunen *et al.*, 2009). Economic valuations of these services show that, although they go unrecorded in national accounts, they provide real wealth for society. Ensuring that people benefit from the Natura 2000 network is important, but a balance must be struck to ensure that the demand for these benefits — especially when this comes in the form of prioritising provisioning services — does not mean that biodiversity is lost, irreversibly impoverishing our planet.

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