



The value of biodiversity and ecosystem services: functions for human wellbeing

The overall objective of EcoStack is to develop and support ecologically, economically and socially sustainable crop production via enhancement of ecosystem services provision and protection of functional biodiversity.



EcoStack & Ecosystem Services

Beyond their intrinsic value, **ecosystems** and the organisms that populate them are valuable since they **provide many and varied benefits to humans**. For example, EcoStack aims to preserve insects that contribute to agricultural production through pollination and antagonizing crop pests. But what are all these services and what is their economic value?

Let's take a look at the main services that the natural environment provides for humans...

What are ecosystem services?

The concept of “ecosystem service” is of paramount importance to understand the multitude of ways humans interact with the natural environment. More specifically, the assumption that **human wellbeing is indissolubly bond with healthy ecosystems** underlies this concept. Ecosystem services can be distinguished into the following categories: supporting services, provisioning services, regulating services and cultural services (Fig. 1).

Four basic categories of ecosystem services exist.

Supporting services are necessary for the production of all other ecosystem services. They provide the “basic services”, such as habitat, soil formation, nutrient cycling, and seed dispersal. **Provisioning services** are probably the ones we are most familiar with, as they are associated with the delivery of tangible products, such as food, freshwater, fiber, biochemical, and genetic resources. **Regulating services** arise from the role nature has in moderating ecosystem processes, such as floods and diseases. This category includes water purification, pollination, carbon storage, erosion prevention and climate regulation. Last but not least, **cultural services** relate to cultural, intellectual, spiritual and social development. We should not forget that we also derive non-material benefits from nature, such as recreation, aesthetics, inspiration, education and cultural heritage.

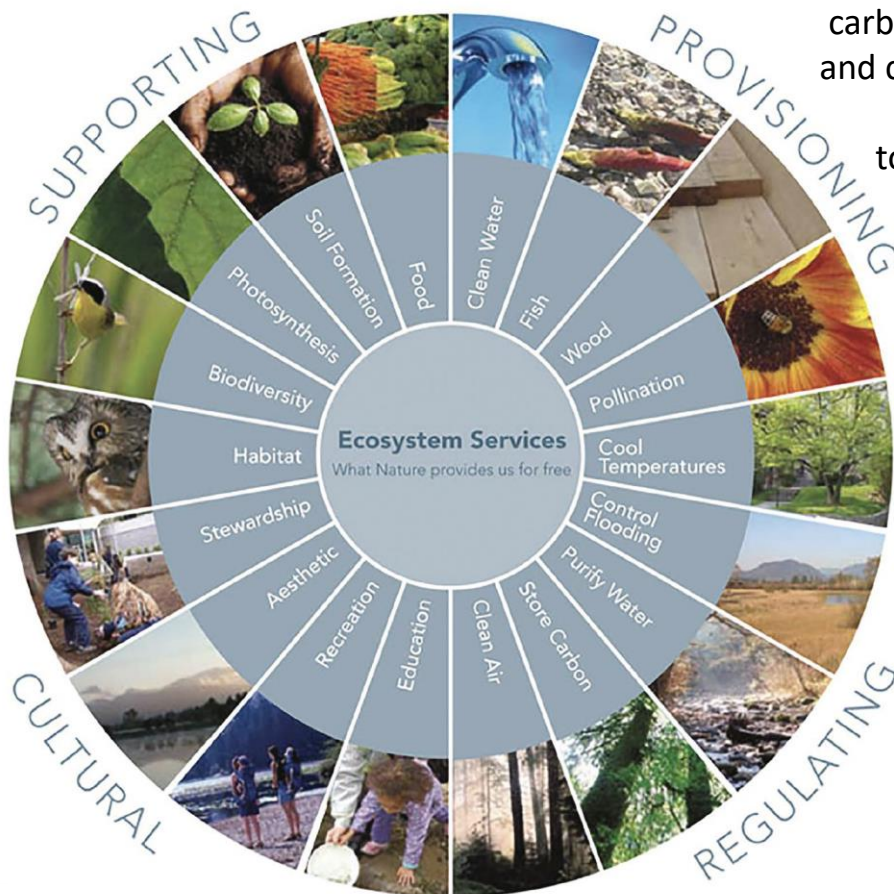


Figure 1. Categories of ecosystem services.

Source: Thorsen, B. J., Mavsar, R., Tyrväinen, L., Prokofieva, I., & Stenger, A. (2014). The Provision of Forest Ecosystem Services. Volume 1: Quantifying and valuing non-marketed ecosystem services. What Science Can Tell Us 5. European Forest Institute.

The economic value of biodiversity

Biodiversity consists of the species that populate ecosystems, thus providing valuable ecosystem services. As all other environmental goods, the value of biodiversity relates not only to the consumptive direct-use value. Instead, its **Total Economic Value** is also made up of the indirect use value and the non-use values (option value, bequest value, existence value, see Fig. 2). For example, among its values, the **functional biodiversity** in agroecosystems supported by the **EcoStack project** has an indirect use value, as it may increase yields and reduce the costs of chemical inputs.

The value of ecosystem services goes beyond the extractive and consumptive use value.

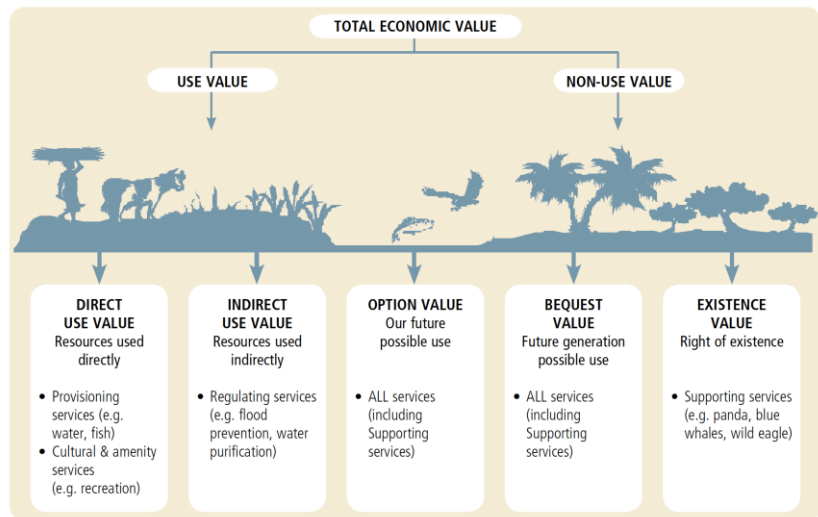
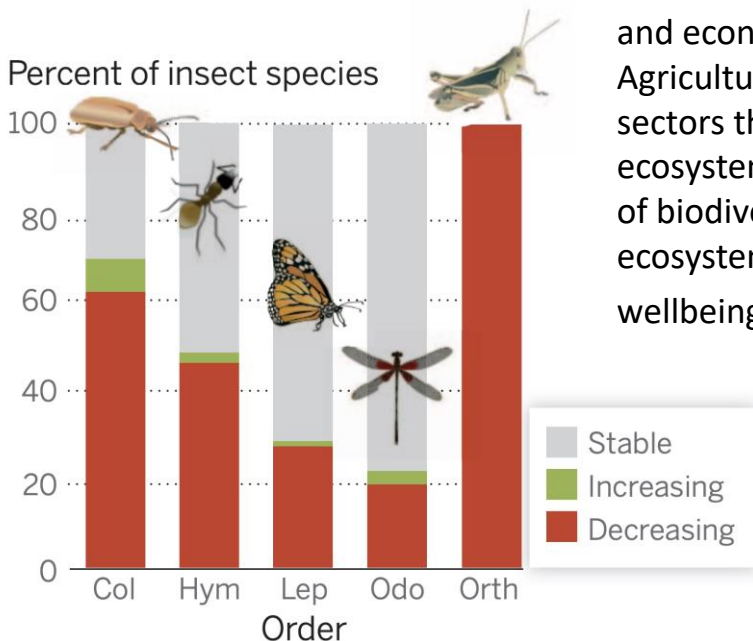


Figure 2. The total economic value of ecosystems. Source: Smith, M., de Groot, D., Perrot-Maître, D. and Bergkamp, G. (2006). Pay – Establishing payments for watershed services. Gland, Switzerland: IUCN. Reprint, Gland, Switzerland: IUCN, 2008.

Depletion of ecosystem services and biodiversity

Biodiversity and its associated ecosystem services are under severe threat worldwide. According to recent estimates, **about one million species are at risk of extinction**, many within decades (see an example for insects in Fig. 3). This mass extinction, as well as the resulting impacts on ecosystem health, may have severe consequences for human societies and economies in the near future. Agriculture and food production are important sectors that both provide and benefit from ecosystem services. Given the enormous value of biodiversity, protecting and supporting ecosystem services actually improves human wellbeing.

Figure 3. Loss of insects species. Source: Dirzo, R., Young, H. S., Galetti, M., Ceballos, G., Isaac, N. J., & Collen, B. (2014). Defaunation in the Anthropocene. *Science*, 345(6195), 401-406. Note: Col: coleoptera; Hym: hymenoptera; Lep: lepidoptera; Odo: odonata; Orth: orthoptera.

Concluding highlights

- Ecosystems and biodiversity provide many and varied benefits to humans
- Ecosystem services consist of supporting, provisioning, regulating and cultural services
- Ecosystems and biodiversity have an use value (direct and indirect) and a non-use value (option, bequest, existence)
- Actions must be taken to protect and support ecosystem services and biodiversity to revert the current losses of species diversity
- EcoStack aims to improve biodiversity and ecosystem services in crop production systems

Acknowledgements: Image at the top of the first page (adapted) is courtesy of f/orme Pet Photography (<https://cutt.ly/9vOAOIR>).



Any questions? Please contact us at : info@ecostack-h2020.eu

Visit our Website to be informed and get involved through our Stakeholder Learning Platform: www.ecostack-h2020.eu



24 PARTNERS FROM 13 COUNTRIES



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