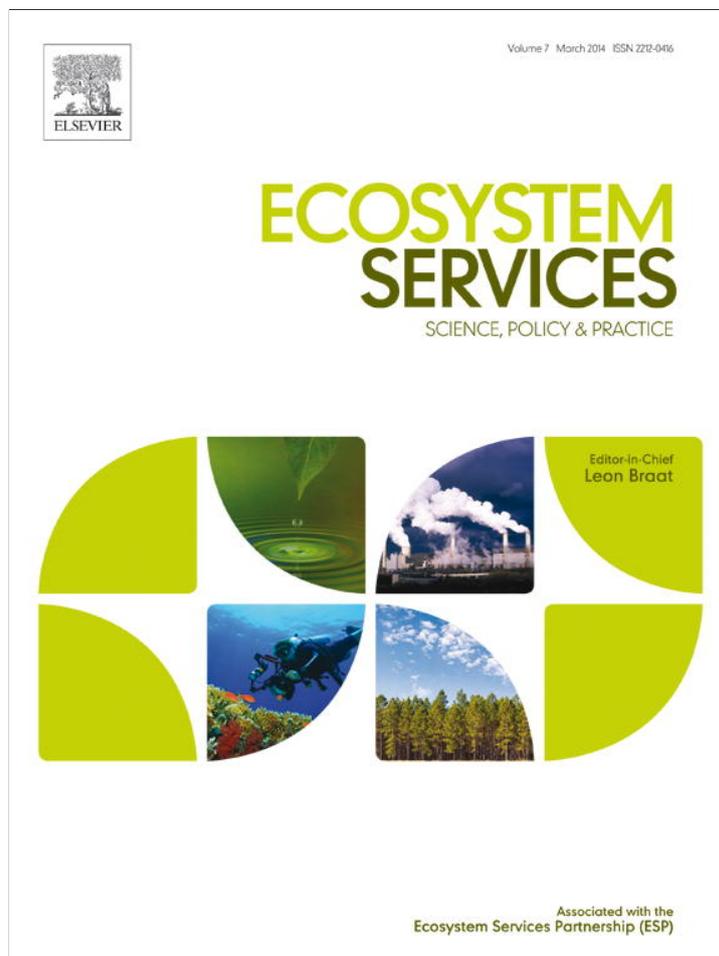


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## Ecosystem Services

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## Accurate accounting: How to balance ecosystem services and disservices



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The ecosystem services concept is becoming increasingly integrated into the way societies view and appreciate nature and the environment. Ecosystem services are derived from so-called “natural capital” – the goods and services that ecosystems provide for humans and societies and this has an economic value that is largely unaccounted for (TEEB, 2010). The concept now provides the basis for much of the emerging regional and global environmental policy and conservation programs (Daily and Matson, 2008; Fisher et al., 2009; Perrings et al., 2011), such as the EU Biodiversity Strategy 2020 (European Commission, 2013), or the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) (UNEP, 2013). The idea has also gained traction in the scientific community, demonstrated by the exponential increase in the scientific literature using the term (Fig. 1).

Despite the growing importance of ecosystem services in environmental decision- and policy-making, ecosystems are not benign entities that exist for human benefit; there are many ecosystem functions which do not provide benefits to humans. Some authors (Dunn, 2010; Lyttimäki and Sipilä, 2009) critique the “ecosystem services” discourse for focusing only on the positive aspects of nature and the environment, while ignoring some of the negative or dangerous aspects, so-called “ecosystem disservices.” However, we argue that many ecosystem disservices have always been acknowledged and accounted for, though perhaps not explicitly and without calling them “ecosystem disservices.” Our aim is to highlight the long-standing existence of this imbalance, which has only recently

started to equilibrate with the emerging acceptance and valuing of ecosystem services.

Contrary to the perceived imbalance of the ecosystem services concept focusing only on the positive, beneficial effects of nature, the reality is that the disparity has been there for millennia, but skewed toward an emphasis on the dangers and damage caused by the living environment. Since the dawn of civilization, humans have recognized that nature may in fact kill or harm us – for example through plagues, disease, crop pests, or floods. Societies have simply paid and accounted for the cost of these disservices, either through prevention (building levees or developing vaccines) or remedial measures, such as rebuilding after natural disasters, treating disease, or applying herbicides. In 2007 alone, worldwide expenditure on pesticides reached nearly 40 billion USD (EPA, 2013). Thus, the recent emergence of the ecosystem service concept does not mean that we are neglecting environmental disservices; it simply counterbalances the age-old practice that nature is accounted only for costs, by forcing society to acknowledge the beneficial ecosystem functions that often go unaccounted for (TEEB, 2010). It should also be noted that many disservices are caused, or at least aggravated, by anthropogenic disturbances to natural systems (e.g. insect and pathogen outbreak results from introduction of alien species (Dale et al., 2001)) and therefore can be avoided by more sustainable human activities and lifestyles.

However, there is no truly objective definition of ecosystem services or disservices (e.g. Zhang et al., 2007); these designations are simply a utilitarian means of categorizing ecosystem functions according to their benefit or harm to humans. The ecosystem service concept best functions not as an absolute definition of nature’s value, but rather as an efficient tool for informing environmental policies and making decisions (Costanza et al., 1997; Dunn, 2010; Spangenberg and Settele, 2010). As Costanza et al. (1997) point out, even without

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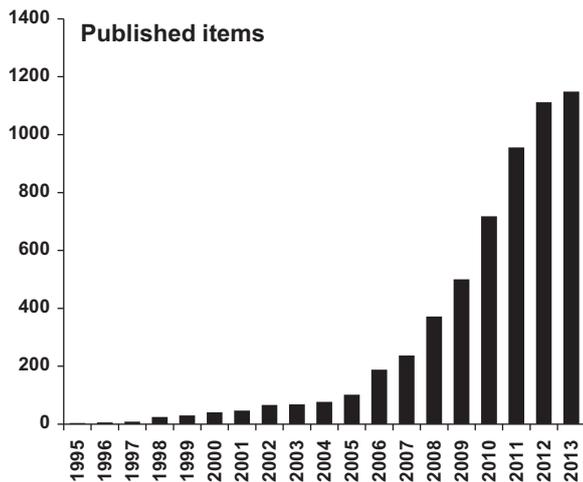


Fig. 1. Published items in each year from a search on Web of Science for term “ecosystem service\*” (Accessed 18 November 2013).

assigning the environment a specific monetary value, our environmental decisions carry an implicit valuation.

When considering the disservices that nature causes, it is important to take into account that the complex nature of ecosystem functioning may result in services and disservices from the same “provider.” In such cases, societies often quantify the damage due to a disservice more quickly than the value of a service. For example fruit bats pollinate many canopy plants (Cox and Elmquist, 2000; Muscarella and Fleming, 2007), including trees that provide fruits which are important for human consumption, timber, and many mangrove species (Fujita and Tuttle, 1991). Insectivorous bat species control insect populations (Kunz et al., 2011), roughly calculated to save farmers millions of dollars, if not more, from reduced pesticide applications and avoided yield loss (Boyles et al., 2011).

Yet, the same taxon has also transmitted devastatingly fatal zoonotic diseases to domesticated animals and humans, such as Ebola (Leroy et al., 2005), Nipah virus (Yob Johara et al., 2001) and SARS (Li et al., 2005). An outbreak of the Nipah virus is estimated to have cost 350 million USD in direct damage to the pork industry in Malaysia alone (Halpin et al., 2007), while SARS, which originates in insectivorous bats of the genus *Rhinolophus* (Li et al., 2005), incurred a 30 billion USD loss worldwide (Halpin et al., 2007). Yet, despite the many valuable, essential services bats provide, these have yet to be accurately quantified, while the price of the disservice was nearly immediately calculated. As the above example demonstrates there is imbalance between accounting for benefits and damages that nature causes to societies. If the various costs of the damage nature causes are regularly accounted for, then surely it is time to also regularly measure the economic and other benefits of the services it provides. Our aim is to highlight this imbalance and support the wide use of ecosystem service concept in policies (IPBES, 2013). This may give a chance to maintain and restore the functioning of ecosystems and to effectively save biological diversity worldwide.

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