

Foreword: The importance of valuing ecosystem services

Ecosystems provide a range of services that are of fundamental importance to human well-being, health, livelihoods and survival (Costanza et al., 1997; MEA, 2005; TEEB Foundations, 2010; TEEB Synthesis, 2010). Interest in ecosystem services in both the research and policy communities has grown rapidly (Braat and de Groot, 2012). As of this writing, over 9000 journal articles have been published on this topic, according to the ISI web of science, and the number is growing exponentially. The most highly cited of these (with over 4000 citations in the ISI web of science as of this writing) is one that I and 12 coauthors published in *Nature* in 1997 that estimated the value of global ecosystem services to be in excess of US\$33 trillion per year, a figure larger than global gross domestic product (GDP) at the time (Costanza et al., 1997). This admittedly crude underestimate, and a few other early studies, stimulated a huge surge in interest in this topic. In 2005, the concept of ecosystem services gained broader attention when the United Nations published its Millennium Ecosystem Assessment (MEA) (2005). The MEA was a 4-year, 1300-scientist study for policymakers. In 2008, a second international initiative was undertaken by the UN Environment Programme, called The Economics of Ecosystems and Biodiversity (TEEB) (TEEB Foundations 2010). The TEEB report was picked up extensively by the mass media, bringing ecosystem services to a broader audience. Ecosystem services have now even entered the consciousness of mainstream media and business. Hundreds of projects and groups are currently working toward better understanding, modeling, valuation and management of ecosystem services and natural capital. Emerging global, national and regional networks, like the Ecosystem Services Partnership (www.es-partnership.org) are coordinating their efforts. Ecosystem services are now poised to provide real solutions to the problem of how to sustainably manage our critical natural capital assets.

The idea that preserving the environment as an asset, rather than an impediment to economic and social development, is both very old and very new. For most of human history, at least until the start of the Industrial Revolution, the benefits humans derived from nature were well recognized

and embedded in various cultural rules and norms. Parts of forests, lakes or mountains were often deemed sacred and off limits. But it is no coincidence that these sacred natural assets also supplied essential life-support services for the communities involved. This is in stark contrast to the post industrial view in much of the Western world that nature is merely a pretty picture – nice to enjoy if you can afford it but not essential to the more important business of growing the economy. Too often, when the issue of conservation of nature has entered public or political discussions, it has been purported to come at a cost, and the discussion has been framed as ‘the environment versus the economy’.

Probably the most important contribution of the widespread recognition of ecosystem services is that it reframes the relationship between humans and the rest of nature. A better understanding of the role of ecosystem services emphasizes our natural assets as critical ingredients to inclusive wealth, well-being and sustainability. Sustaining and enhancing human well-being requires a balance of all of our assets – individual people, society, the built economy and ecosystems. This reframing of the way we look at ‘nature’ is essential to solving the problem of how to build a sustainable and desirable future for humanity – a goal that we all share. The ecosystem services concept makes it abundantly clear that the choice of ‘the environment versus the economy’ is a false choice. If nature contributes significantly to human well-being, then it is a major contributor to the *real* economy (Costanza et al., 1997), and the choice becomes how to manage all our assets, including natural and human-made capital, more effectively and sustainably (Costanza et al., 2000).

Estimating the relative magnitude of the contributions of ecosystem services has been an important part of changing this framing. Valuation of these services is ultimately about assessing trade-offs toward achieving the goal of sustainable human well-being. All decisions that involve trade-offs involve valuation, either implicitly or explicitly. When assessing trade-offs, one must be clear about the goal. Ecosystem services are defined as the benefits people derive from ecosystems – the support of sustainable human well-being that ecosystems provide. The value of ecosystem services is therefore the *relative* contribution of ecosystems (natural capital) to that goal. There are multiple ways to assess this contribution, some of which are based on individuals’ perceptions of the benefits they derive. But the support of sustainable human well-being is a much larger goal and individuals’ perceptions are limited and often biased (Kahneman, 2011). Therefore, we also need to include methods to assess benefits to individuals that are not well perceived, benefits to whole communities and benefits to sustainability (Costanza, 2000). It is also important to note that ecosystems cannot provide any benefits to people without the presence of people

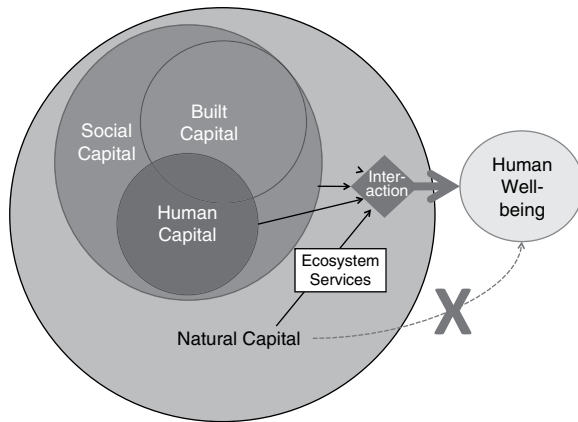


Figure F.1 Interaction between built, social, human and natural capital required to produce human well-being. Built and human capital (the economy) are embedded in society which is embedded in the rest of nature. Ecosystem services are the relative contribution of natural capital to human well-being, they do not flow directly. It is therefore essential to adopt a broad, transdisciplinary perspective in order to address ecosystem services.

(human capital), their communities (social capital) and their built environment (built capital). This interaction is shown in Figure F.1. Ecosystem services do not flow directly from natural capital to human well-being (as is implied in the popular diagram in the MEA). It is only through interaction with the other three forms of capital that natural capital can provide benefits. The challenge in ecosystem services valuation is to assess the relative contribution of the natural capital stock in this interaction and to balance our assets to enhance sustainable human well-being.

It is also important to note that expressing the value of ecosystem services in monetary units is *not* the same as privatizing them or commodifying them for trade in private markets (Costanza, 2006; Costanza et al., 2012; Monbiot, 2012). Most ecosystem services are public goods (non-rival and non-excludable) or common pool resources (rival but non-excludable), which means that privatization and conventional markets work poorly, if at all. In addition, the non-market values estimated for these ecosystem services often relate more to *use* or *non-use* values rather than *exchange* values (Daly, 1998). Nevertheless, knowing the value of ecosystem services is helpful for their effective management, which in some cases can include economic incentives, such as those used in successful systems of payment

Table F.1 Range of uses for ecosystem service valuation

Use of valuation	Appropriate values	Appropriate spatial scales	Precision needed
Raising awareness and interest	Total values, macro aggregates	Regional to global	Low
National income and well-being accounts	Total values by sector and macro aggregates	National	Medium
Specific policy analyses	Changes by policy	Multiple depending on policy	Medium to high
Urban and regional land-use planning	Changes by land-use scenario	Regional	Low to medium
Payment for ecosystem services	Changes by actions due to payment	Multiple depending on system	Medium to high
Full cost accounting	Total values by business, product, or activity and changes by business, product, or activity	Regional to global, given the scale of international corporations	Medium to high
Common asset trusts	Totals to assess capital and changes to assess income and loss	Regional to global	Medium

for these services (Farley and Costanza, 2010). In addition, it is important to note that valuation is unavoidable. We already value ecosystems and their services every time we make a decision involving trade-offs concerning them. The problem is that the valuation is implicit in the decision and hidden from view. Improved transparency about the valuation of ecosystem services (while recognizing the uncertainties and limitations) can only help to make better decisions.

The valuation of ecosystem services can have many potential uses, at multiple time and space scales. Confusion can arise, however, if one is not clear about the distinctions between these uses. Table F.1 lists some of the potential uses of ecosystem services valuation, ranging from simply raising

awareness to detailed analysis of various policy choices and scenarios. For example the 1997 paper in *Nature* (Costanza et al., 1997) was clearly an awareness-raising exercise with no specific policy or decision in mind. As its citation history verifies, it was very successful for this purpose. It also pointed out that ecosystem service values could be useful for several of the other purposes listed in Table F.1, and it stimulated subsequent research and application in these areas. But it would be a mistake to criticize the exercise for not achieving purposes for which it was not intended.

This book is a compendium of some of the latest work on valuing ecosystem services, including a range of case studies. These studies begin to address some of the many limitations and caveats clearly noted in the 1997 *Nature* paper. It will be a valuable resource for anyone interested in this topic and for moving the science and practice of ecosystem services forward. But there is still much to be done. The process of valuing ecosystem services requires a deeper understanding of the interconnections among human psychology and decision processes, ecosystem processes and functions, and economic production and consumption processes at multiple time and space scales. The challenges of ecosystem services science are huge and will require a significantly more transdisciplinary approach than our current academic institutions are comfortable with. But the payoffs are also huge. Our future depends on making rapid progress in this area.

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