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Economics Briefing 3

Valuing the environment in economic terms

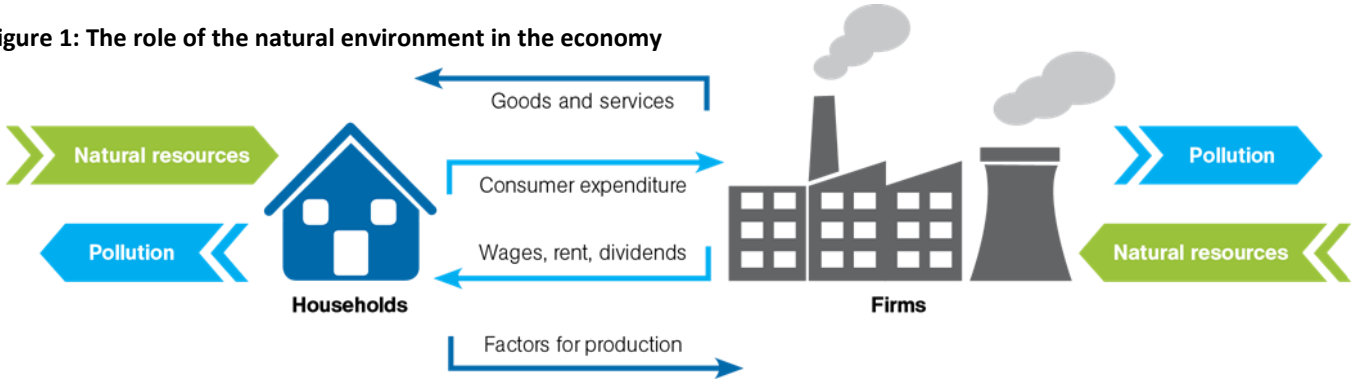
Unlike mainstream economics (which often disregards the environment's central role in our economy), both environmental and ecological economics argue that economic processes cannot be detached from the natural environment in which they operate. This briefing discusses approaches to valuing nature, the Total Economic Value (TEV) framework and alternatives to it.

As shown in the diagram below: the economy cannot operate without a constant flow of matter and energy coming from the natural environment.

For this reason, environmental degradation has a huge economic impact on human societies and productive activities. If, for example, energy flows from the environment were to suddenly stop, then most human economic activity would be impossible. Similarly, if critical natural resources like metals, fossil fuels or water were to vanish, so too would the human economic activities that rely on them.

The central role of the natural environment in economic processes means that nature has an economic value. But unlike other commodities, the value of nature is not reflected, represented or quantified through the price system. For instance, we do not 'pay' for the air we breathe and there is no 'market price' for consuming clean air.

Figure 1: The role of the natural environment in the economy



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Some say this lack of pricing for the natural environment is one of the main causes of environmental degradation. That is, because humans judge natural resources to be free, they have an incentive to over-exploit them.
In the words of the United Nations Environment Program (UNEP):

> *"[…] nature is the source of much value to us every day, and yet it mostly by-passes markets, escapes pricing and defies valuation. This lack of valuation is, we are discovering, an underlying cause for the observed degradation of ecosystems and the loss of biodiversity"*

We can take three points from this: (a) that market prices do not properly reflect the value of nature, thus skewing our consumption and production choices towards an over-exploitation of resources which we do not pay a price for; (b) that market prices only reflect *part* of the value of the goods we consume and produce, and finally (c) that we need an economy that operates within ecological boundaries without this needing to be linked to the market.

Why value nature in project appraisal and evaluation?

Traditional cost–benefit analysis (CBA) focuses mainly on strict economic returns: if the financial benefits of an action outweigh its costs, then CBA considers it 'efficient', no matter what its knock-on environmental impacts or 'externalities' are. An infrastructure project that is damaging a nearby river ecosystem, for instance, may still be classed highly efficient – purely because environmental effects like this do not factor in the standard CBA equation. Put simply, the implicit value put on nature is zero.

In contrast, environmental valuation gives environmental impacts a monetary value so that they can be compared like-for-like with financial returns. A project is only judged efficient if the sum of its financial, economic and environmental benefits outweighs its costs in these areas. If its net environmental costs surpass its economic benefits, it does not pass the test.

Two important prerequisites are needed when including environmental impacts in cost-benefit analysis:

1. a precise definition of the value of the natural environment; and,
2. tools and methods to monetise environmental "assets", "goods" and "services".

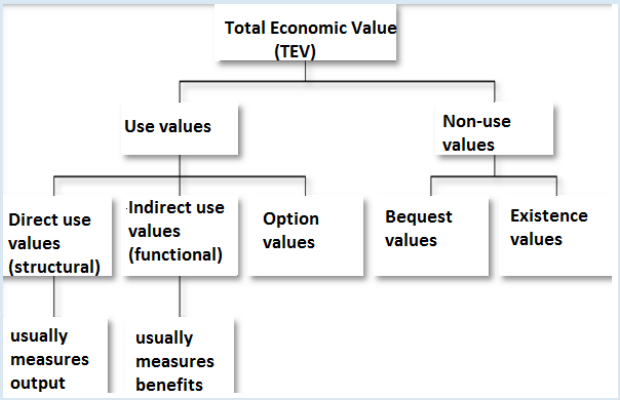
What is the economic value of nature?

As shown, nature is of critical importance (and interest) to the economic system.

Some aspects of nature are directly useful for human production and consumption, and have what is known as "use value". Clean water and productive soils for agriculture, for instance, are both environmental services with a physical 'use value'.

But there are also aspects of nature that have much less tangible attributes, for example, a "beautiful" landscape could be thought to have intrinsic aesthetic value. Though this value might not necessarily link to economic production or consumption, it could certainly influence human well-being. Abstract attributes like these are often termed "non-use values".

The sum of "use values" and "non-use values" makes up the total economic value ('TEV') of an ecosystem, species or resource. The figure on the following page illustrates the different components of use and non-use values.



Use values:

Direct use values: material benefits provided by an ecosystem that are directly linked to the economic system and for which market values may exist – e.g. recreational sites, timber extraction, landscape amenity, fishing extraction off a coral reef.

Indirect use values: material benefits which are indirectly linked to the economic system and for which market values are more difficult (yet possible) to derive – e.g. ecosystem services such as air purification, carbon sequestration, and waste dispersal.

Option value: the value placed on preserving a resource for future direct or indirect use (e.g. the value of maintaining a river catchment for future irrigation needs or of safeguarding a fish stock)

Non-use values:

Existence or intrinsic values: value from knowing an environmental good exists and is preserved, despite the fact that it may never be used or seen. One example is that of westerners paying to save giant pandas from extinction even without having seen them or deriving any direct benefit from their species' survival.

Bequest value: value derived from knowing that a resource is maintained for future generations

How can we measure the economic value of nature?

Environmental economists have developed various ways of putting a price on environmental services. Their methods fall into two broad categories: (1) *revealed preference methods* and (2) *stated preference methods*.

Revealed preference (RP) methods are useful for capturing the *use value* of nature.
They rely on actual market data to reveal peoples' environmental preferences, and what they will pay to achieve these preferences. RP methods measure market prices (such as the cost of visiting a national park); averting behaviour (taking into account the actions or expenditures that individuals undertake to avoid something); hedonic pricing (i.e. measuring the impact of green spaces on real estate price variations); and travel cost method (looking at actual human behavior to gauge the value people place on something, for example the distance they travel to a beach).

Stated preference (SP) methods entail using structured questionnaires to ask people about their environmental preferences.
In principle, SP methods can be applied to a wide range of contexts and are the only way of estimating non-use values (which can be a significant component of overall TEV for some natural resources).

Included in this approach are Willingness To Pay (WTP) and Willingness To Accept (WTA) methods. These are surveys that ask people how much they would be willing to pay, sacrifice or exchange in order to receive a certain good or to avoid something undesired, such as pollution.

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In practice, however, most CBA that takes the environment into account uses 'benefit transfer'. This simply involves taking the results of other valuation studies (e.g. the value of a mangrove ecosystem in India) and transferring them to the appraisal in question (e.g. for evaluating the value of a mangrove ecosystem in Tanzania). This approach can be problematic if the values are not transposed in a robust manner – usually using *econometric* techniques (which use maths and statistics to provide empirical evidence).

Is environmental valuation an acceptable methodology?

The practice of putting a price tag on environmental natural resources is not without its limitations.

The first of these relates to accuracy: considering the complex, non-linear nature of ecosystems, valuing the worth of their non-marketed goods can be an imprecise exercise. This uncertainty needs to be acknowledged in the analysis.

Critics also question the very notion of monetising natural assets, arguing that changes to nature should not be judged on the same scale as the consumption and production of goods. Can we really weigh up the extinction of species (expressed in dollar values) with consumption gains?

A third criticism of incorporating environmental valuation into CBA warns that doing so may encourage the adoption of a "weak sustainability" approach (which assumes manufactured capital can replace natural capital) rather than a "strong sustainability" approach (which views natural capital as irreplaceable). After all, the method does make it possible for market benefits to override environmental losses. This is because it is only the *aggregate* costs and benefits (be they financial, economic or environmental) of a project that matter. For instance, a project which decreased environmental capital by £50 but raised economic capital by £70 might still go forward in spite of it resulting in an irreversible environmental loss.

Alternatives to environmental valuation

Critics of valuation have proposed some alternatives which include:

1. Using multi-criteria analysis (MCA) techniques (which assess a mixture of monetary and non-monetary benefits) rather than CBA when an intervention has considerable environmental impacts and/or implications. MCA does not require the monetisation of environmental gains or losses. *This technique is described in detail in briefing 6.*

2. Using a "strong sustainability" criterion when carrying out cost-benefit analysis. By this measure, projects which generate greater overall benefits than costs are only considered 'efficient' if they do not reduce levels of natural capital at all. This follows a precautionary principle approach (a concept which aims to enhance environmental protection by taking preventative decisions, i.e. erring on the side of caution when not all facts are known).

Further reading and useful resources

- UK National Ecosystem Assessment (NEA): http://uknea.unep-wcmc.org/

- The Economics of Ecosystems and Biodiversity (TEEB): http://www.teebweb.org/ecological-and-economic-foundations-report/

- Environmental Valuation Reference Inventory (EVRI): http://www.environment.nsw.gov.au/publications/evri.htm

The **Marine Socio–Economics Project** (MSEP) is a project funded by The Tubney Charitable Trust and coordinated by **nef** in partnership with the WWF, MCS, RSPB and The Wildlife Trusts.

The project aims to build socio-economic capacity and cooperation between NGOs and aid their engagement with all sectors using the marine environment.

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