

ECONOMIC RELEVANCE OF BIODIVERSITY

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Summary

An economic assessment of biodiversity can be applied to all human activities which cause a change of biodiversity and which have significance for the human world. The economic value of biodiversity is not the value of biodiversity as such but of how use, conservation or changes are perceived by those who are affected. Factors are, for example, the use of therapeutic or nutritive substances of species occurring in a certain area, the definition of new protected areas, the progress of the destruction of the tropical rainforest, the consequences of oil pollution etc. The economic valuation depends very much on more general considerations concerning human values and the assessment of other valuable competing resources. The different types of economic valuations can be seen as methods to determine the relative importance of the consequences for nature and biodiversity caused by economic decisions and acts. The results may help in the decision-making process of policy makers in the environmental and economical sector. However, the conservation of biodiversity based on pure economic reasons is not sufficient and at the same time not very well accepted among conservationists and representatives of ethics of nature.

1. Introduction

Within political discussions concerning the protection and conservation of biological diversity the argument is quite common that biodiversity ought to be regarded as an economic good. It differs from the economic value of natural resources in general because the profitable commercial use may destroy biodiversity. For instance, forestry projects which replace genetically and biologically diverse agro-forestry species and

crops with monocultures for the paper or pulp industry do not value biodiversity as a result of a long term evolutionary process.

However, there are several reasons for the vagueness of economic approaches concerning biodiversity: *Property rights* are not well defined, therefore it is a problem to establish a market; biodiversity can be characterized as a *common* and *public good* which necessarily needs collective measures for protection, but they are very often difficult to realize; the origin of the current shape of biodiversity is the result of billions of years of *evolution*, but economic considerations can be characterized as short term considerations; the loss of a species is *irreversible* and economically not calculable; artificial goods cannot *substitute* natural goods in the same way which defines biodiversity as a scarce good; the *lack of knowledge* concerning the interdependencies between species and components of ecosystems impedes the application of calculable economic measures. However, there are important economic considerations which support the protection of biodiversity.

An economic assessment of biodiversity can be applied to all human activities which cause a change of biodiversity and which have significance for the human world. The economic value of biodiversity is not the value of biodiversity as such but of how use, conservation or changes are perceived by those who are affected. Factors are, for example, the use of therapeutic or nutritive substances of species occurring in a certain area, the definition of new protected areas, the progress of the destruction of the tropical rainforest, the consequences of oil pollution etc. “As the value that different individuals and different societies place on resources is measured by their willingness to forgo the benefits of alternative uses for the same resources, this requires the valuation of biological resources in alternative uses. Values vary with the preferences, culture, ethical values and world views of the people concerned, as well as the technology available to them. They also vary with the distribution of income and assets” [Perrings 1995, 827]. Therefore the economic valuation depends very much on more general considerations concerning human values and the assessment of other valuable competing resources [Klauer 2001, Shiva 1991, Perrings 1995]. The different types economic valuations can be seen as methods to determine the relative importance of the consequences for nature and biodiversity caused by economic decisions and acts. The results may help in the decision-making process of policy makers in the environmental and economical sector.

2. Biodiversity as an economic good

The value of biological resources currently exploited may be a direct one when they are used as consumption good or production: timber, oil, fat, pigments, fragrance, etc. These natural resources are endangered by reducing the biological diversity and the growing habitats. The direct value of the genetic diversity of wild species for science as well as for the food and health sector is hardly calculable. Many domesticated biological resources are traded on markets, and their direct use values (such as crops, livestock and timber) are reflected in their market prices. Others derive value from their role in supporting marketed resources. The biodiversity of landscapes, forests, marine ecosystems, etc. is seen as an important value to satisfy cultural, social and aesthetic

needs. People can value systems and species they have never seen and they will never see.

The value of biodiversity can also be an indirect one by supporting resources which have a direct value. Ecosystems and their biological diversity are the basis of life on earth. They have a vitally necessary function for the regulation of the climate, the production of oxygen, the provision of drinking water etc. The rapid extinction of species—at least on a large scale—endangers the stability of those ecosystems. Biological resources also have non-use or passive values stemming from the fact that we may care about others (or other species) [cf. Klauer 2001, Perrings 1995]. “The use value of biodiversity is generally an indirect use value, derives from the role of the mix of species in supporting either individual organisms (the value of habitat) or ecological services (the value of ecosystem functions)” [Perrings 1995, 827]. There are several methods by which it can be shown that there is a clear and substantial economic value of biodiversity. But pure economic considerations cannot be the only contribution to protect biodiversity.

2.1. Cost-benefit analysis

A general method of economic assessment is usually based on a cost-benefit-analysis. But within the framework of economics, nature, species and biodiversity are not just seen as commodities which should be used as profitably as possible [cf. Power/Rauber 1995]. There is a difference between the economic value and the commercial value [Marggraf 2001, 364-370]. Nevertheless there is a link between the instrumental value of biodiversity and the value of biodiversity as such.

A cost-benefit-analysis assesses how citizens value measures concerning the protection of biodiversity and nature. But their assessment of a measure very often depends on the circumstances of the people involved. The setting up of a protected area may be of different value to those who like to use this area for recreation and holidays than to those who speculate in property or who have an interest in farming. The increasing number of tourists may have both positive and negative implications (greater demand for hotels, better traffic infrastructure, rising prices, etc.). In order to include various interests the cost-benefit analysis uses the method of potential PARETO-improvement. A protection measure can be defined as a potential PARETO-improvement, if after the action involved in the protection measure has been completed, those who benefited from it provide monetary compensation to those who may have lost out in the process. This compensation should not, however, be in excess of the gain: the maximum willingness to pay (e.g. economic benefit of a national park) must be compared with the claim for compensation of residents or farmers (e.g. costs of a national park). The aim is to relate the economic value of biodiversity to other economic values (salaries, prices, etc.). This method is based on the interests of the human individuals involved [cf. Marggraf 2001, 363-364].

Biodiversity is of great importance for human needs and benefits for example in the areas of food, health, chemical substances, technical and scientific development, aesthetic uses, etc. The basic economic categories are the production value and the consumption value. Components of biodiversity are integrated in the process of the

production of goods. Changes in this process influence the costs of production, prices, salaries etc. Concerning these indirect issues biodiversity has a production value. The destruction of the tropical rainforest is for example one of the causes of the greenhouse effect and has a lasting effect on agriculture. More common, however, are the direct economic influences of biodiversity changes. Components of biodiversity affect human beneficence. The economic value of this can be described as consumption value. This value may be the recreation effects of hiking in a national park or scuba-diving etc. There is, however, a value beyond the direct uses of biodiversity. Many people support the protection of an endangered species without ever having a real chance to see a specimen in nature (e.g. a blue whale). Their aim is the protection of the mere existence of this species for future generations [cf. Marggraf 365-366].

But there are still other economic values concerning the consumption value of the use of biological diversity. Protected areas for example serve as resources for various types of tourism (recreation, wildlife observation etc.). For some countries tourism has become one of the main pillars of their economy. There is, however, also an economic relevance of the consumption value which does not depend on this kind of direct use. There are empirical studies concerning the readiness to pay. Per person per annum, the people involved in the surveys were ready to pay an average of \$US 7.6 for the protection of for example the Pacific salmon, \$US 8.1 for the sea otter, \$US 11.4 for the protection of wild turkeys, \$US 21.0 for the northern spotted owl, and \$US 50.0 for the Humpback whale. The figures show that there is an economically calculable interest in and benefit from species protection without the aspect of direct consumption [Marggraf 2001, 396]. Therefore there is a gap between the economic and the commercial value of biodiversity [Brown 1997]. (Excellent tables which give an overview of the economic value of the tropical rainforests, wetlands, rangelands and marine systems based on very different studies can be found in Perace, Moran 1994, 86-93.)

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Biographical Sketch

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Professional Stages and Positions

- Since 1998 Head of Research and Managing Director (since 2002) of the 'German Reference Centre for Ethics in the Life Sciences' (DRZE), Bonn
- 1994-1998 Researcher at the Institute of Science and Ethics, Bonn
- 1994-1998 Assistant of the subgroup „biotechnology“ of the board of editors of the German „Lexikon der Bioethik“ (ed. by Görres-Gesellschaft, Munich)
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Education

- 1985-1993 Study of Biology, Philosophy, and Education at the University of Bonn (Germany)

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