THE ECONOMIC APPROACH OF ECOSYSTEM SERVICES PROVIDED BY PROTECTED AREAS

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Abstract: *As practice shows us, at the present time ecosystem services are recognized by humanity, but unfortunately are undervalued compared to their full potential. Most of planet's ecosystems are degradated by anthropic activity of humankind. It is almost impossible to say that there are no areas affected by human activity, however, the Protected Areas are a good opportunity, so the assessing of ecosystem services in Protected Areas can be a solution to the problem of economic growth. At present, there are few consistent informations on economic value of ecosystem services in Romania, on the basis of which can be adopted some sustainable financing policies of activities in Protected Areas. The premise from which we start is that a proper management of natural capital will allow biodiversity conservation and human well-being if it find appropriate economic instruments. For this reason, studies of economic research on the contribution of those ecosystem services to the communities welfare may constitute credible means for decision-makers, demonstrating the Protected Areas importance. This paper, based on the study of international and national literature, examines the state of knowledge on the economic and environmental valences of ecosystem services. The growing interest of researchers regarding the economic valuation of ecosystem services related to Protected Areas is visible through the many studies carried out at international level. Although national scientific research relating to ecosystem services is at the beginning, concerns researchers economists and ecologists have been directed toward this recess, of ecosystem services. The reason for we should assign an economic value to ecosystem services is to ensure that their value is included actively in decision-making and is not ignored because "is still available". Briefly, the paper start with an overview of the main definition of ecosystem services. From the point of economic value view, the paper include a theory of value review, and after this was elucidated aspects as Total Economic Value, direct use value, indirect use value, non-use value, bequest and exchange value. The value theory is presented in terms of labor, utility or entropy. In conclusion was carried out a briefly overview of reason to research ecosystem services within Protected Areas.*

Keywords: ecosystem services, Protected Areas, economic value, Total Economic Value

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Introduction

According to the IUCN definition (2008) protected area is “a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.” When you include a protected area in a certain category, first must to correspond to primary objective, i.e. definition, and then to some specific objectives, which for most Protected Areas are different. These specific objectives of management may be:

- Scientific research
- Wilderness protection

- Preservation of species and genetic diversity
- Maintenance of environmental services, such as water supplies
- Protection of specific natural and cultural features
- Tourism and recreation
- Education
- Sustainable use of natural resources
- Maintenance of cultural and traditional sites, including sacred areas

Around the world there are many names of Protected Areas, such as National Parks, Natural Reserves, Forest Parks, Marine Sanctuaries, but these names may have different meanings in certain countries. In order not to be confused, International Union for Conservation of Nature (IUCN) has defined six main categories of protected according to the main objectives of management.

National Parks are included into category II of IUCN protected area, and they have as main management objectives the biodiversity conservation, visitors and public educations and informations, visitors recreation and scientific research. To achieve these objectives management often need more than the funds which is allocated. Therefore, the economic assessment of the benefits of biodiversity conservation and ecosystem services provided by national parks is important to demonstrate the value of these parks to an adequate funding.

At present, there are few consistent informations on economic value of ecosystem services in Romania, on the basis of which can be adopted some sustainable financing policies of activities in Protected Areas. The premise from which we start is that a proper management of natural capital will allow biodiversity conservation and human well-being if it find appropriate economic instruments. For this reason, studies of economic research on the contribution of those ecosystem services to the communities welfare may constitute credible means for decision-makers, demonstrating the Protected Areas importance.

This paper, based on the study of international and national literature, examines the state of knowledge on the economic and environmental valences of ecosystem services. The growing interest of researchers regarding the economic valuation of ecosystem services related to Protected Areas is visible through the many studies carried out at international level. Although national scientific research relating to ecosystem services is at the beginning, concerns researchers economists and ecologists have been directed toward this recess, of ecosystem services.

Although ”ecosystem services" enjoys a rich literature, its meaning is still intensely discussed and put in different interpretations. Thus, in the following we will give a brief overview of the history of the concept and some definitions that have been mentioned so far.

The concept of "service ecosistemic" has its origin in the late 1970, when he was identified as "public services of global eco" (Ehrlich et al., 1977), as well as "services of nature" ((Westman, 1977), and as "services ecosistemice" (Ehrlich and Ehrlich, 1981), and more recently as "eco-services" (Bulte et al., 2005). Then the concept continues to be thorough in 1970s and 1980s, highlighting the social and economic dependence of natural assets. Natural assets or natural capital are represented by natural and environmental resources with non-renewable (mineral deposits) or renewable (forests, schools of fish) character (Zaman and Gherasim, 2010). Natural capital is defined by International Institute for Sustainable Development (IISD) - with a large degree generallity - as representing the earth, the air, the water, the living organisms and all biosphere formations which provides us, imperatively, goods and services of ecosystems for survival and prosperity. Westman (1977) and de Groot (1987) have shown in their papers the benefits of ecosystem functions, in order to increase public interest in terms of biodiversity conservation.

In the 1990s start to be introduced more and more ecosystem service concept in the literature. Costanza and Daily (1992) define natural capital and state that ecosystem is a renewable natural capital. During this time the term has had a remarkable rise, on the one

hand through Daily's book, Nature's services: societal dependence on natural ecosystems (Daily, 1997b), but also through the works of other authors (Costanza et al., 1998). Since 2001 until 2005 Millennium Assessment (MA) had over 1360 experts who were involved in the development of reports regarding natural capital/ecosystems and human well-being (MEA, 2005). After re-launching MA (Millennium Assessment), the number of scientific papers has grown exponentially, most of the authors trying to define, to classify, to quantify, to evaluate and to establish payment schemes for ecosystem services (Fisher et al., 2009; MEA, 2003; MEA, 2005; Fisher et al., 2008; de Groot et al., 2002; Faber et al., 2002; Wallace, 2007; de Groot et al. 2010). A more systematic and detailed approach of ecosystem services concept history is carried out by Gómez-Baggethun et al. (2010) and Fisher et al (2009).

Whereas the definition enjoys a variety of approaches, it will give a brief overview of the most intensively used definitions of ecosystem services. With a widespread use in the literature is MEA definition, by which ecosystem services are seen as benefits that people obtain from ecosystems (MEA, 2003). These include supply services, regulation services, cultural services and support services (MEA, 2005; Daily, 1997).

Costanza et al. (1998) defines ecosystem services as the benefits that people obtain, directly or indirectly, from ecosystem functions.

Based on the definition of MEA, TEEB project defines ecosystem services as a direct or indirect contributions of ecosystems to human well-being (TEEB, 2010).

Definitions of ecosystem services vary from author to author, so Boyd and Banzhaf (2007) distinguish between ecosystem functions (biological, chemical and physical conditions of ecosystems) and ecosystem services (components of ecosystems that are valued by people and used passively or actively to produce human well-being). Also the same authors argue that ecosystem services are only the ,,final product" of benefit for human well-being (eg. surface water).

Ecosystem services include the organization of ecosystems (structure), the operation (process) and the outputs, if they are consumed by the population directly or indirectly. At the same time, the distinction between direct and indirect consumption of ecosystem services will be useful for natural capital systems accounting (Boyd, 2007) or for economic evaluation. Thus it can be said that it represent the conditions and processes through which natural ecosystems, and the species that are part of them, support and fulfill human life.

For example, if the provision with food is a final service, and the pollination is intermediate, then the benefit is food for consumption. Summary, ecosystem services are ecological phenomena and the benefit is that thing which has a direct impact on human well-being (Fisher et al., 2008).

Into another approach ecosystem services are flows of materials, energy and information from natural capital that ,,in combination with" forms of human capital and manufactured produce human well-being (hydropower use water regulation services, but also needs and civil engineers and raw materials, such as cement; recreational service is conditional on the existence of transport infrastructure and accommodation) (Fisher et al., 2008).

Fisher et al. (2009) proposed another definition by which,, ecosystem services are aspects of ecosystems used (passively or actively) to produce human well-being. It also states that these ecosystem services including organization or structure, and processes and/or functions are services only when there is someone to take advantage of him, and that without a human beneficiary, they may not be called services.

If we are referring to the classification of these services, the most important is the Millennium Ecosystem Assessment classification (2005), which includes four categories of services: provision, regulating, cultural and supporting. Whereas are widely used in international research literature and also in this paper will make use of this classification system.

The economic value of ecosystem services

Economics has enjoyed a number of theories on value, which have elucidated value concept in terms of labor, utility or entropy. Labor-based value theory had as advocates on Adam Smith, David Ricardo and Karl Marx and according to this theory a single production factor, namely labor, creates the economic value in certain areas of activity, the source of national wealth. Utility-based value theory had it as parent on Greek philosopher Xenofon, and then has been developed by economistsn as William Stanley Jevons, Menger, Leon Walras, John Maynard Keynes. This underlines the role a good utility in determining its value. The general model of entropy-based value theory developed by Paul Bran takes into account the formation of physical, social and financial forms of value, as well as the contribution of the four general factors involved in the mechanism for obtaining the value, Natural Environment, Society and enterprise system in the state of production (The Manufacturer) and in the state of consumption (The Consumer) (Bran and Costica, 2003).

Labor value theory of Marx has two functions: to explain the equilibrium price (or exchange value) of goods, around which the actual price fluctuates all the time, and to provide aggregators or aggregate structure in terms of which a large number of industries (or sectors primitive) are aggregated within a smaller "departments". Most followers and antagonists of Marx aimed the first part of the labor theory of value. Marx used the the value as aggregator because he believes that it is more essential that the price and the amount can be determined only by technologies and therefore is not affected by market price and wage changes. This is valid only if chosen production methods are not changed. Marx defined the value as the total amount of labor performed (in hours) to produce a unit of good (or materialized in a unit of good) (Morishima, 1973).

As tell Smith, the labor is the actual measure of value, in a monetary economy money itself is the common way to represent value, although nominal prices themselves are adjusted on basis of labor weight both for the production of money and the other goods. He argues that labor is the only accurate measure of value, or the only standard by which we can compare the value of different commodities, in any place and at any time (Henry, 2000).

When discussing about value it is necessary to remind the water-diamonds paradox which explains the difference between use value and exchange value. Water has infinite value and unlimited, being essential for life, but its exchange value is low, while diamonds that are not essential, have high exchange value. In according to Adam Smith there are two forms of value: use value, expressed using the utility and exchange value, determined by the purchasing power of other goods (Levy, 1982).

According to utility-based value theory, the exchange value was based on both utility and scarcity. Menger proposed there were different categories of wants or desires, for examples food, shelter, and clothing, that could be ordered in terms of their subjective importance. His principle is that to one additional units the intensity of desire decrease with successive units of the good. If we replace the term ‘‘desire for one additional unit’’ with the term ‘‘marginal utility,’’ we thus have the economic principle of diminishing marginal utility (Constanza, 2004)

To be able to assess ecosystem services in a relevant manner as possible and to see the connection between them and human well-being, it is important to elucidate the significance of ecosystem services value that can be viewed from three perspectives: ecological, economic and social. The ,,value” term has different meanings within the three disciplines (natural sciences, economics, socio-cultural sciences). Thus, in the following it is presented the concept of ecosystem services value, addressing the "value" according to the three disciplines.

The term "value" is used to explain the contribution of an action or object to the fulfillment of a goal, objective or condition specified by the user (Costanza, 2000). In our context, the value of an action or object is measured by its contribution to maintaining the health and

integrity of an ecosystem or species, as such, regardless of human satisfaction (Faber et al., 2002).
The reason for we should assign an economic value to ecosystem services is to ensure that their value is included actively in decision-making and is not ignored because "is still available".
Seeing cumulative benefits provided by ecosystems are assigned values, was introduced the concept of Total Economic Value, which estimates the direct use value both the non-use value. Hein et al. (2006) provides a framework scheme in which makes a correlation between the components of total economic value and the main groups of ecosystem services (Figure 3).
The general unit of measure used by economists to express the benefits of ecosystem services is represented by money (Hermann, 2011). Ecosystem services are valued according to the association or not with a market price. Tradable services can easily be evaluated based on the market price, but non-tradable services are most often assessed using compensation techniques "willingness to pay" or "willingness to accept" (de Groot et al., 2002).

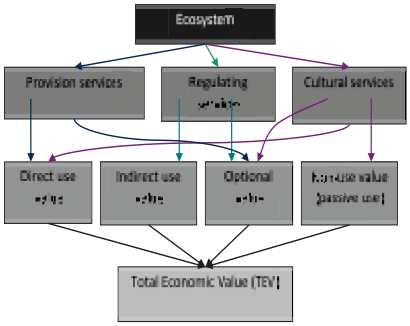

Figure 1: Total Economic Value of Eosystem Services
Source: adapted from MEA, 2005 and by Hein et al., 2006

*Direct use value***,** in the present case of a protected area, is the value derived from direct use of protected area activities such as tourism, recreation, harvesting natural resources, access to genetic resources, hunting, education and research. These values can be commercial, equal to the price when it is not distorted by market(harvesting resources, tourism and research) or non-commercial, which means that there is no formal or permanent market where they are traded (collecting firewood or abusive grazing). The process of obtaining a market price value corresponding to the commercial use value will generally be a simple process. However, even if the prices are set administratively, they do not always reflect the true value of the product. Instead, the assessment of non-commercial activities is more complex and heavy, and involves a whole range of techniques for fixing the prices. Goods or services with direct use value are used without being consumed,, "itself".
The indirect use value of Protected Areas is the value derived from indirect use of the protected area. The indirect use is most often consists of ecological functions of protected area, such as watershed protection, providing breeding habitat for migratory species, climate stabilization and carbon sequestration or providing habitat for insects that pollinate crops or raptor species, which regulate the natural populations of rodents. In most cases these functions are dispersed so that the value of indirect use will most often not evaluated.
Optional value of an Protected Areas is given by the alternative of using the protected area sometime in the future, referring to the utility that can have a good in the future. For example, knowledge of information about vegetable biodiversity concerning some

unknown genes plants in our day, may be particularly important in the future because they can provide inputs for pharmaceuticals or cosmetics.

Non-use values are values that humans are maintaining for a protected area and which have no relation to the actual use of the protected area. Two common examples of non-use value is the bequest value and existence value. Bequest value is representing by the benefit/satisfaction of knowing that someone else benefit or will benefit from the protected area. Existence value reflects the benefit of knowing that the protected area exists, even if it is not accessed or used in a certain way. These values are very difficult to measure in general. Natural monuments, rare geological formations, threatened or endangered rare species have low utility value, but a large value of existence. The value of existence is the only component of VET that is not based on the interests of society - non-anthropogenic.

Total Economic Value (TEV) of an protected area consists of use and non-use values. Use value components are direct value, indirect and option value, and for non-use value we have bequest value and existence value. In determining the economic value of a good or service ecosystem we must to distinguish between economic assessment and financial analysis. Economic evaluation based on economic value, measures the market values and non-market that humans consider a protected area. Financial analysis is only a subset of economic evaluation and measures only cash flow of a protected area. Although financial analysis is a very useful tool, it may not be suitable to any situation (Phillips, 1998). The value related to a good or service is not equal to the price, these being two different concepts. Prices are only events which appears when we have free trade market, therefore are objective. In contrast, the value is subjective, is closely related to human perception. (Drăgoi, 2008).

TEV is measured by the preferences of individuals. For example when goods and services are provided in actual markets, then individuals show their preferences through their purchasing behaviour. Thus, the price that they are paying in the market is at least a lower-bound indicator of how much they are willing to pay for the benefits they received from consuming that good or service. But for ecosystem services which are not traded in actual markets, market price data are missing. In such cases, we must to apply the methods of economic valuation that will estimate these 'non-market' or 'external' benefits. These techniques express economic value in units of money.

In the anthropocentric conception the nature, the ecosystems have "value" and are necessary to human, being assessed only for the purposes of human interests. Appreciation of nature and contact with nature just for utilitarian reasons, may, however, be recognized by the aesthetic and contemplative values of these, without leaving anthropocentric side (passive use nature, enjoying it without using it in technological sense).

Socio-cultural values are represented by the benefits which the natural landscapes provides us (historical, ethical, religious, spiritual, etc.). Cultural services play an important role in improving human well-being (Hermann et al., 2011).

Natural ecosystems provide opportunities almost unlimited for spiritual enrichment and leisure. Also, they are a vital source of inspiration for science, art and culture and provides opportunities for education and research. Information functions of ecosystems include: aesthetics, recreation, cultural and artistic information, spiritual and historical, educational and scientifical information (de Groot et al., 2002).

Aesthetic information can have a significant economic contribution, for example it influence on house prices: the houses near national parks or with a view to the ocean are usually more expensive than similar houses located in less-favored areas (Costanza et al, 1998).

Natural ecosystems represents a place to rest and recreate that offers possibilities for different activities such as walk, hiking, fishing, swimming or study in kind. As regards cultural and artistic inspiration, nature is important for folklore and culture, being a reason and a source of inspiration for books, films, paintings, sculptures, music and dance, fashion, advertising, etc. Ecosystems are considered as "field laboratories" for scientific

research, and can be reference zone for monitoring environmental changes (Groot et al., 2002).

In conclusion - The need for ecosystem services research

As practice shows us, at the present time ecosystem services are recognized by humanity, but unfortunately are undervalued compared to their full potential. Most of planet's ecosystems are degradated by anthropic activity of humankind. The increase of population and of living standard sometimes do impossible autoregulation of these ecosystems, and this incapacity to recovery on short and medium time has consequences on the production of natural resources and on regulation of processes in atmosphere, the hydrosphere and the biosphere. So, the assessment of potential for one area from the point of view of ensuring a maximum flow of ecosystem services, is possible only by analyzing the areas which are not affected by human activity. Since it is almost impossible to say that there are no areas affected by human activity, however, the Protected Areas are a good opportunity, the assessing of ecosystem services in Protected Areas can be a solution to the problem of economic growth.

Protected Areas provide numerous and valuable benefits among which the most important are: protect biological diversity and maintain ecosystem services, represent means to prevent and reduce poverty through providing food and drinking water to residents of less-favored areas, provide medicinal plants to pharmaceutical sector, ensure clean drinking water both rural and urban areas, maintain air quality by reducing carbon dioxide, thus contributing to resilience to climate change, mitigate the effects of natural disasters, acting as a barrier to storms, floods and drought prevention, generates significant economic benefits to the tourism sector, offering spaces of leisure to people, as well as physical and spiritual relaxation. To maintain and increase these benefits, the managing of Protected Areas should be included in economic strategies of sustainable development, and more, to be recognized for their value.

Most of Protected Areas contain values which, if are properly managed, can realize directly or indirectly benefits of which would enjoy local communities, but also humanity in general. Maintaining Protected Areas in a suitable state, but also an appropriate use can generate income or most of the times are obtained very large advantages, that could be seriously diminished if we neglect the protected area through negative actions. Economic benefits could be generated both from capitalizing intrinsic values and those extrinsic. In the case of natural resources the economic value can be easily determined (for example the value of a cubic meter of wood, in the case where the objectives of management of area allow), but when it comes to environmental services (water treatment, air quality regulation, ensuring community health, recreational and spiritual value) economic evaluation is more difficult and requires thorough assessment studies. In the case of Protected Areas is important to assess the goods and services in order to ensure a benefits for local community, but also to substantiate sustainable financing schemes of Protected Areas.

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