

The mechanism of market prices and the environment protection

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1. Introduction

The renowned, intellectual and prize-awarded Swiss photographer Fred Boissonnas (1858-1946), in an article entitled "The first climbing up Mountain Olympus" translated into Greek in 1936, reports that "No nation has a land which can be compared with the area of Mountain Olympus, so rich in myths, historical memories, beauties of every kind and a potential for exploitation. For this reason, we should be protected against the risks of an irrational and devastating exploitation" (Kyritsis, 2002). In other words, the key points on which the writer focuses are the potential for exploitation of the specific ecosystem, on the one hand, and the need for its protection on the other. And this, because the resource does not serve only productive and economic purposes, but also historical, protective, aesthetic and recreational needs.

Several years later, the World Commission on Environment and Development, known as the Brundtland Commission, in "Our Common Future" called for a sustainable development, setting out all the prerequisites (economic, social, cultural, political, technological) which are necessary for its fulfillment (WCED 1987). Among these prerequisites, the need for maintaining the ecological basis of development was over-emphasized.

However, since ancient times, many areas have been considered as protected and hence, placed under a special management regime. The first area characterized as such was the Yellowstone National Park in the United States in 1872. The International Union for the Conservation of Nature (IUCN, 1994) designated as "protected areas" the ter-

Abstract

The environment economics is rapidly growing worldwide thus becoming a bridge between conventional decision-making techniques and a more environmentally-sensitive approach. Therefore, being in use or in progress, the economic valuation techniques of environmental goods aim at attributing a monetary value to the goods which are valued. The goods could be a natural resource, a natural element of the environment or even only one function of the natural resource. The monetary values designated through the functioning or non-functioning of the market mechanism are an important sine qua non tool in the hands of those who have to take decisions concerning the natural environment.

Résumé

L'économie de l'environnement se développe de plus en plus à l'échelle mondiale et elle représente aujourd'hui un véritable pont entre les techniques conventionnelles pour la prise de décisions et une approche plus sensible à l'égard de l'environnement. Par conséquent, les techniques utilisées ou celles qui sont actuellement mises au point pour l'évaluation financière des biens environnementaux ont pour but d'attribuer une valeur financière aux biens qui sont estimés. Ces biens peuvent être une ressource naturelle, un élément naturel de l'environnement ou tout simplement une fonction d'une ressource naturelle. Les valeurs financières déterminées sur la base du fonctionnement ou du non-fonctionnement du mécanisme du marché constituent un outil important voire indispensable pour les décideurs dans le cadre des politiques environnementales.

restrial or marine areas intended for protection and conservation of the biological diversity and the natural and cultural resources and managed by every legitimate and effective means.

2. Materials and Methods

In this paper the market prices mechanism and the environment protection are analyzed taking into account the relevant literature and the most important scientific conclusions of international conferences, workshops etc. Moreover, emphasis is laid on the methods applied to estimate benefits

and services while considering the degradation of environmental goods and the need for their valuation..

3. Results and Discussion

3.1 The need for an economic analysis to protect the environment

The Gross National Product accounts for the total value of all the goods and services produced by a country in one year (Marmatakis, 1983). As regards the production process, during the last decades, the amount of the economic goods produced has retained great attention. However, gradually, due to various problems affecting the environment and the human health, a new ideological-philosophical approach has started to develop based on the following statement "We are not interested in GNP. For us, GNP is equal to the Gross National Pollution of the Environment".

Accordingly, the deification of the amount of goods produced has increasingly lost ground, while the concern about the conservation of natural resources and the improvement

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of human life quality has gained momentum. In this context, the statistical measure of GNP has been replaced by the measurement of the Pure Economic Welfare (PEW). At the same time, the costs of environment pollution, degradation of water quality and workers' leisure time have been calculated. As a result, the PEW curve has proved to increase at a lower rate than the corresponding GNP curve (Samuelson, 1975).

The Brundtland Commission (WCED 1987) defines "sustainable development" as the development aiming at the fulfillment of present needs without jeopardizing the potential ability of future generations to satisfy their own needs. However, in view of such a development, two basic conditions could be pre-selected: 1. the need for inter-scientific cooperation and 2. the change of human behavior standards (Dimitriou, 2003). The second condition may become possible only through a change of our consciousness as reported by Daniel Bell (according to Small, 1983).

Therefore, in order to implement sustainable development, with its economic-environmental-social-political-cultural implications, the market prices mechanism may and must act as a driving force in the change of attitude and behavior of every kind of entrepreneurs and individuals as consumer units. This becomes particularly significant considering that environment damages are irreversible. Consequently, it is necessary to put a limit to the friendly consumption attitude of individuals but also to ignorance, unaccountability and profit deification by entrepreneurs.

According to economic theories, consumers can express their preference for the goods which have already achieved the market mechanism through the prices set on the market for these goods.

The various natural areas are mainly characterized by two parameters. 1. their multi-complexity and 2. the dynamics of their constituents. On the other hand, they provide goods and services whose economic valuation, until very recently, did not seem to be feasible. Obviously, this was due to the fact that there was no price for these goods and services.

In order to assess the value of an environmental commodity, several scientists have worked and are still working to develop and apply in practice various methods. Besides, the Nobel-price Lord Kelvin reports that: "if you can count what you study and express it in numbers, then you know something about it. However, when you cannot count it and put it in numbers, then the knowledge you have about it is very weak and more or less non-satisfactory. Maybe it is the beginning of knowledge but substantially your thoughts have not yet reached the stage of science". The goal of every democratic and fair society is the "rising of the prosperity of citizens" but also "its fair distribution". As regards natural resources, to assess their value and to set a price, environmental, aesthetic, historic values should be taken into account for each resource separately (Workman, 1982). Efforts should be made to quantify these effects and express them in monetary units, and if this is not possible, to ex-

press them in numerical indices or if no scientific basis exists, at least, they should be mentioned (Christodoulou, 1989). In this way, researchers try to estimate the value of environmental goods to subsequently submit their conclusions to decision-makers. As a matter of fact, with this economic data available, decision-makers might easily and effectively support and promote actions concerning areas to be protected, resources to be mobilized and the best alternative practices (Dimitriou, 2003).

Finally, the value of the economic analysis in the field of protection, management and improvement of natural resources is obvious and represents an important sine qua non tool for decision-makers.

3.2 The market prices mechanism

Before the 19th century there was an "overabundance of natural environment" because the number of people who could use it for recreation was very limited and the economies of the various countries were not so developed to cause massive destructions of the environment. However, little by little, particularly in the big cities, people "have become conscious of some values and needs to which they could not or they did not give proper attention in previous times" (Kasioumis and Papageorgiou, 1999). Over the last decades, the human needs to provide services from natural resources have increased to a dangerous extent. Indeed, the world population has rapidly increased and the standards of living have significantly improved. Notwithstanding, due to this kind of improvement, people feel more and more intensely the need to access to the natural ecosystems and to enjoy the landscape. Nevertheless, the human presence in the ecosystems, with any kind of activities, and the harmful effects of production processes (industries and so on) on the environment inevitably create big problems. Yet, the consequences of these problems for the ecosystems are severe and often non-reversible.

However, should the damage caused by a specific economic action be limited only to the individual polluter, then no pollution problem would exist because the polluter would co-estimate the benefits and damages and would act consequently. In practice, the private benefit tends to be higher than the private damage and as a result, this encourages the polluting behavior. However, the "benefits from environment pollution" might be spread to the wider public. For example, the outputs of a production process which does not include any action or cost to prevent environment pollution are placed on the market at lower prices and consequently, the benefit (lower prices) is transferred to the buyers of these products.

The most characteristic feature concerning the damages caused by the environment pollution and the benefit deriving from its prevention is that generally, they are not subjected to pricing and cannot be expressed in monetary units through the market mechanism. Therefore, the environment pollution is referred to be a major economic problem and as

such, it is faced at international level by a number of specialists. On these grounds, Benjamin Franklin's statement following which "a grammar of prevention is worthy as a kilogram of therapy" should be fully endorsed and applied in daily life. However, in the USA, for instance, 99% of the environmental expenditure is devoted to pollution control and only 1% to prevention (Miller, 1999).

Under perfect market competition, the prices of goods and inputs reflect their contribution to social welfare. The market mechanism is expected to allocate the inputs in a desirable manner for the partial economic units as well as for the society as a whole. Nonetheless, in practice, the market mechanism acts less satisfactorily due to imperfect competition. In other words, the market is characterized by some particularities which generate functioning problems, commonly known as market "imperfections". Governments take actions to face market imperfections which may be related to: 1. the economic circles, 2. the public goods, 3. the external economies, 4. the information-related problems, 5. the monopoly and its prevalence in the market and 6. the re-allocation of income and the necessary goods (Begg et al., 1998). In particular, the most environmental goods belong to the category of public goods. Public goods are goods which exhibit two properties: 1) they are non-competitive in consumption, in the sense that their consumption by an individual does not exclude their consumption by other individuals and 2) it is not possible to exclude those who deny paying a price for their enjoyment (Georgakopoulos, 1997). The public goods are not included in the free-market mechanism and they are or should be provided by the State itself. Moreover, their consumption is not differentiated according to the individual income but to the benefit which each individual draws. Such a benefit depends on how each individual evaluates the public goods, based on his/her personal characteristics and preference (Georgakopoulos and Patsouratis, 1995).

Finally, market imperfections have created severe problems on the economies relying upon the market mechanism thus preventing the social welfare maximization.

However, pollution problems and environmental damages may also be induced by 1. the type of ownership of natural resources and 2. the existence of external economies.

3.3 Types of Ownership of Natural Resources

The right of ownership of an object consists in the right of using this object and of transferring all the ensuing rights (selling) or some of these rights (renting). The extent to which a commodity or a natural resource may be an object of individual or common ownership or may not belong to anybody depends on the divisibility of the commodity or the resource, the easiness of using it as a private or public commodity and the State potential or willingness to protect it (Kottis, 1994).

However, natural resources should not be a subject of

dealing. The right of ownership should be held by the public sector. In other words, their ownership as well as their use should be collective. On the other hand, the owner of a commodity or a resource can usually request the payment for the use of this property whose value should not be significantly lower than the value of its contribution to the production procedure or the provision of services.

As a result, the resources of common property or common use "are utilized without restriction", while items of individual property are used more carefully and rationally (e.g. domestic animals against wild games). The purchase transactions for water, air, open space etc., usually involve low or zero prices which encourages their irrational use and hence, their waste. For this reason, if we start or continue to price the services provided by these resources, we could impose a careful re-examination of the real cost and the benefits of these services. In other words, it is a sacred duty of all those who are involved in natural resources management to work consciously and effectively so that the true value but also the real cost arising from the services of these resources become evident. Many people who are particularly concerned about the environment feel that the values of natural resources are not considered as they should be or that they have received attention only recently and are little by little affecting the individual behavior and the decision-makers' actions. As a result, economic valuation techniques might be applied to environmental goods (see next chapter) in an attempt to attribute a monetary value to this kind of commodity which could be a natural resource, a natural element of the environment or even only one function of the natural resource (Stamou, 2002).

3.4 External economies

Generally speaking, the Science of Economics recognizes that the activities of economic units may have an effect upon other economic units. These indirect effects (external economies) are distinguished into three big categories (Christodoulou, 1995):

1. Effects that are ascribable to the function of the "multiplier principle" (*multiplier effects*).
2. *Linkage effects* referring to the increase or decrease in incomes created by the changes of the enterprises activities supplying the necessary inputs or working out the outputs of the former enterprises (*backward and forward linkage effects*).
3. *Hidden inputs and outputs* which also include the various environmental effects and the consumer surplus.

The meaning of external economies has not attracted the necessary attention until it was developed and elaborated by Pigou (1960) who presented it as the major cause for the disagreement between "private net product" and "social net product". Consequently, it has been stated that the economic progress is a "statistical miscarriage" when the cost of the progress (destruction of the environment, traffic jam etc.) is not taken into consideration in the national accounts (Kottis, 1994).

According to Pigou, the cost of a production activity for the society is equal to the private cost augmented by the external cost resulting by the specific activity. For that reason, he suggests a tax levy to all polluters. The charge of the levy should normally be equal to the external cost.

Therefore, scientists and a number of economists, who are constantly increasing, believe that the GNP indices should be replaced or supplemented by environmental indices which involve the measurement of life quality and the harmful impact of man on the ecosphere (Miller, 1999). However, this replacement of GNP by other environmental indices also presupposes, as mentioned in the previous chapter, the respective monetary values of the environmental goods assessed.

3.5 Total value of a natural resources

The total economic value (TEV) of a natural resource may be defined as follows (Munasinghe, 1992, according to Blioumis, 1995):

TEV = Direct use value + Indirect use value + Option value + Bequest value + Existence value.

The "direct use value" encompasses the values resulting from the resource use and has a consumptive feature (technical wood, fuel wood, Christmas trees, cork, forage, fruits, recreation etc.).

The "indirect use value" comprises the ecological functions of the natural resource (suitable, quantitatively and qualitatively, water production, flood protection of the areas downstream the resource etc.).

The "option value" refers to the potential which has an individual to benefit, directly or indirectly, in the future, from the natural resource.

The "bequest value" and the "existence value" belong to the so-called "non-use value". The "bequest value" involves the value resulting from the potential of utilizing the resource, directly or indirectly, by the future generations, something which is also included in the definition of sustainable development given by the Brundtland Commission. The "existence value" involves an intense ethical dimension since it reflects the interest someone has in the natural environment in general.

However, the precise determination of the TEV is not simple and it raises several problems. The "use value" may be easily and simply determined by using the respective market prices for the outputs produced (Turner and Jones, 1991). The major problems arise during the determination of the "non-use value" since we have to calculate the value that individuals attribute to the existence of the whole ecosystem or to some of flora or fauna species (Faucheux et al., 1998).

Therefore, the foundations have been laid to carry out the first assessment of environmental goods whereas, at the same time, efforts are made for a more integrated and objective assessment of the TEV.

3.6 Methods used for the determination of the TEV

Up until now, a plethora of scientific methods has been developed allowing to determine the TEV or part of it, of a natural resource. All these methods, depending on the case they apply to, exhibit advantages and disadvantages. Indeed, when solving a specific problem, it is necessary to select the most appropriate method and more often, the research has to be repeated by applying the same method or by the concurrent use of other methods to evaluate the reliability and the validity of the basic method.

The most important methods which could be mentioned for the assessment of the value of protected natural areas are the following (Karameris, 1988; Blioumis, 1995; Dimitriou, 2003; Kotta, 2004):

- The method of change in productivity
- The method of travel cost
- The method of hedonic pricing
- The method of contingent valuation
- The method of replacement cost
- The method of opportunity cost

Since for each decision-making and subsequent implementation process, time and money play an important role, the newly applied research technique based on the Internet is currently gaining ground. Of course, this does not mean that the use of scientific methods, via the Internet, to record individual viewpoints and attitudes does not pose any problem or limitation. However, the advantages far outweigh the disadvantages (Gatzoyannis, 2003).

4. Conclusions

The valuation in monetary terms of the benefits arising from environmental goods and services but also of damages due to human interference, by specific methods and through the market mechanism, as long as the evaluation is done from a private-economic point of view, or by the support of shadow prices (willingness to pay) when it is done from a socioeconomic point of view, despite the difficulties encountered and the intense criticism, is still considered necessary for the rational and effective management of natural resources. This valuation essentially incorporates the social needs and desires but it also includes arguments that decision-makers put forward and the relative interference on the environment.

These methods for evaluating the TEV of a natural resource are of great importance because they duly consider the meaning of the "measure" and the suitable way of living to reach a balance between nature and human beings, as indicated by the ancient Greek philosophy. Moreover this procedure appears to be a useful tool to achieve the goal illustrated by Norman Cousin in his comment "the primary target of education should not be how to prepare young people for their career but to give the potential to develop respect for the life".

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