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Environmental economics – a modern science with traditions*

Ekonomia środowiskowa – współczesna nauka z tradycjami

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Abstract: The fact that problems of environmental degradation and its protection are gaining importance is caused, among others, by limitations in management efficiency. It forces us to look at economic processes with consideration of output of such disciplines that indicate how one should manage in a situation of reduced availability of natural resources. Such discipline, without any doubts, is environmental protection. This science indicates methods and economic instruments that can be applied in economic practice necessary for environmental protection. It deals also with problems related to economic studies of implications of environmental policies. At the same time environmental economics that results from neoclassical trend of economics looking at the market as unfailing mechanism of economic regulation proves that invisible hand of market fails in case of environmental protection. That is why we should apply different types of instruments especially these related to indirect regulation (including such economic instruments as taxes) that support actions related to limitation of environmental degradation. It is worth also to add that recognition of methodological premises of this science supports not only development of this discipline but first of all it shows that it is applicable. The principles developed by environmental economics should be applied in practice by all participants of economic life from consumers and to producers and governments in order to keep not only current natural resources but most importantly ensure the development opportunities for next generations.

Keywords: environmental economics, environmental crisis, ecology

Streszczenie: Rosnące znaczenie problemów degradacji środowiska i jego ochrony spowodowane jest m.in. ograniczeniami w efektywności gospodarowania. Zmusza nas to do spojrzenia na procesy gospodarcze z uwzględnieniem dorobku dyscyplin, które wskazują, jak należy postępować w sytuacji ograniczonej dostępności surowców. Taką dyscypliną jest bez wątpienia ochrona środowiska. Nauka ta wskazuje metody i instrumenty ekonomiczne, które można zastosować w praktyce gospodarczej niezbędnej do ochrony środowiska. Zajmuje się również problemami związanymi z ekonomicznymi badaniami implikacji polityk środowiskowych. Jednocześnie ekonomia środowiska, która wynika z neoklasycznego trendu ekonomii postrzegania rynku jako niezawodnego mechanizmu regulacji gospodarczej, dowodzi, że niewidzialna ręka rynku zawodzi w ochronie środowiska. Dlatego należy stosować różnego rodzaju instrumenty, zwłaszcza te związane z regulacją pośrednią (w tym takie instrumenty ekonomiczne jak podatki), które wspierają działania związane z ograniczaniem degradacji środowiska. Warto też dodać, że uznanie przesłanek metodologicznych tej nauki sprzyja nie tylko rozwojowi tej dyscypliny, ale przede wszystkim pokazuje, że ma ona zastosowanie. Zasady wypracowane przez ekonomię środowiska powinny być stosowane w praktyce przez wszystkich uczestników życia gospodarczego, od konsumentów po producentów i rządy, aby zachować nie tylko aktualne zasoby naturalne, ale przede wszystkim zapewnić możliwości rozwoju kolejnym pokoleniom.

Słowa kluczowe: ekonomia środowiskowa, kryzys środowiskowy, ekologia

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Introduction

One of the most important issues of our times is the degradation of the natural environment. It concerns all aspects of the environment and has been caused by man as a result of living, industrial, communication, trade and even tourism activities aimed at meeting social needs. This degradation has led to certain limitations that diminish the living space and material basis of human existence. They are linked with the depletion of non-renewable resources and overexploitation of renewable resources, pollution of ecosystems and the degradation of basic components of the environment, i.e. air, water or soil.

The limitations of human living space have led to the reduction of resources at the disposal of future generations as a result of the loss of some natural resources. Hence, there is talk of intergenerational justice, according to which it is important that future generations should have access to natural resources which is equal to that of contemporary generations and an equal opportunity to develop in various spheres of social life.

In order to reduce the negative effects of human activity, new forms of human activity have been sought to counteract the threats resulting from the advancement of civilisation. This has resulted in the development of new disciplines, including environmental economics, which are necessary to indicate actions that would be rational and bring about the intended effect not only in the form of improvement in the condition of the natural environment, but mainly in the improvement of social well-being as a result of the improvement in the condition of the environment. A common understanding of this relationship should result in economic and social growth.

The aim of this article is to present a relatively new scientific discipline, i.e. environmental economics, and to draw attention to its links with other disciplines, including ecology and economics. Another aim of this article is also to indicate the necessity of undertaking studies and work on the development of disciplines, which

are aimed at seeking rationality in the economic decisions of producers, decisions on the consumption of individual resources or decisions of political public nature made by governments in relation to the natural environment and its quality.

1. Traditions of environmental economics

The foundations for environmental economics has been laid by ecology. It is a natural science that investigates the relationship between organisms or groups of living organisms and their environment. It also examines the interrelationships between living organisms¹.

The relationships between the organisms themselves and the environment and living organisms, as well as the negative effects of human activities, have been perceived since ancient times. There were studied by the most eminent thinkers of different cultures and epochs. These included Plato, who wrote in *The Banquet* "and then broad-bosomed Earth, the everlasting seat of all that is" (Platon 1988, 61). The Greeks had a positive attitude towards nature. This was probably related to their beliefs and religion, in which the living things had a patron in the form of goddess Artemis (Hargrove 1988, 16-18). It is also easy to find a positive attitude towards nature in the views expressed by St Francis of Assisi. "This saint preached not only to people but also to animals and plants. He also highlighted his fraternal attitude towards all living beings (Korporowicz 2000, 9).

Ernst Haeckel is considered to be the founder of ecology, and the person who coined this term (Spooner 1984, V). This was in 1869. This is because he started to study the relationships between organisms and the outside world around them. E. Haeckel himself studied marine animals.

¹ The term "ecology" is taken from the Greek word "oikos", which means "home, habitation, place of residence, environment". However, an Ancient Greek dictionary is the only one to provide a different explanation for the word "oikos", i.e. community. The Greeks, therefore, included in this notion not only the physical dimension of the environment, but also the social dimension, without which man cannot live and develop.

In his work, he expanded Darwin's theory on the influence of species on each other in the struggle for existence. However, due to the fact that in the second half of the 19th century scholars were not yet able to formulate synthetic hypotheses on the mutual relationships between species and the interaction of plants and animals, two, on the most part, distinct disciplines were founded: plant ecology and animal ecology. It was only the advancement of knowledge in the first half of the 20th century that brought the two disciplines closer to each other which led to the emergence of general ecology (Korporowicz 2000, 10). This discipline deals not only with the relationships between living organisms and the environment or the limits of population endurance to various biotic and abiotic factors but also with social living conditions².

² There are many misconceptions concerning the term "ecology", which is commonly confused with nature conservation. There seems to be a twofold misconception. First of all, the part of ecology that is the basis of the science of nature conservation is called *sozology*. *Sozology* - from *sodro* - means to protect in Ancient Greek, and in Modern Greek to save, rescue, or deliver. This term was introduced by Polish scholar Walery Goetel. *Sozology* is a science that seeks to recognise the sustainability of natural resources and addresses the immediate effects and consequences of changes in ecosystems. Secondly, nature conservation is not a science but a system of action. This term is therefore used to describe activities that aim to preserve the natural conditions of individual areas or single sites. If we would like to talk about nature conservation as a science, we should use either the term *sozology* or "science of nature conservation". It should be added, however, that the term *sozology* has not been accepted by the scientific community and is not used universally, which results in the interchangeable, often completely incorrect use of the terms "ecology" and "nature conservation". Another misconception is the use of the term nature conservation in conjunction with the term environmental protection. These terms are considered to be synonymous, although it is worth remembering that environmental protection covers not only the natural environment but also the social and psychological environment. Therefore, nature protection is an activity or system of action for the rational management of natural resources, including the formation of new ecosystems or the reclamation of a degraded natural environment.

The development of ecology has been greatly influenced by a group of scientists from the Department of Sociology and Anthropology at the University of Chicago, studying urbanisation and urban way of life. This is where the new branch of ecology, called human ecology, was founded. This department was not a scientific school itself, because it brought together scholars representing different fields who were able to work together in a concerted manner in the university and other institutions [...] but they did not hold similar views on other matters in general" (Szacki 1981, 645). They went down in the history of social thought under the name of the Chicago School. They worked from 1915 to 1930. They were interested in observing human behaviour in a particular place and environment, namely in the urban environment (Turner and Turner 1993, 44-46).

The next steps in the development of ecology were to build a concept of the ecosystem whose properties result from its biotic and abiotic relationships. The interdependencies of the components form and integrate the overall natural system, which consists of physical, chemical and biological elements (More, Magaldi, and Gray 1987, 662). The complete natural system is made up of all the populations living in a particular environment, which are connected to each other through processes of metabolism and energy exchange (Odum 1983, 3). An example of a complete natural system is a specific forest, pond, meadow or fragments thereof (Semkow 1980, 46). However, with the advancement of civilisation, ecosystems lose the features of natural systems and become human-modified ecosystems. New ecosystems are being created, such as urban or agricultural ecosystems. However, if the transformations go too far, the ecological functions are disrupted, which may result in irreversible changes over time, e.g. loss of the most valuable nutrients in the soil or desertification of agricultural areas (Woś 1993, 23).

The next element in developing ecology and knowledge of the impact of human activities on nature was the report of U Thant,

Only One Earth and reports for the Club of Rome which contributed to the development of ecology and the general perception of the relationship between human economic activity and the degradation of nature. The first of the reports, *The Limits to Growth*, despite the broadly criticised methodological errors, shook the intellectual world. As a result, new research directions were created, e.g. ecological philosophy, cultural ecology or ecological ethics³.

The consequence of the development of knowledge about the relationship between human and the environment was the formation of a new branch of ecology called "deep ecology". It means a way of thinking about the world, nature and human which assumes their fundamental unity (Naess 1989, 18-19). An important feature of deep ecology is the recognition of all life forms as equally important. At the same time, any dominance of human over nature is denied. All nature, everything that lives has an equal right to exist. Human, therefore, is just one of many elements of biosphere (Melosik 1995, 100-101). Deep ecologists see the world holistically, i.e. as a whole, and give all the components of nature the same weight. Therefore, human is not given a special, privileged role or place among other beings. On the contrary, it is stressed that human cannot exist without the surrounding world of plants and animals (Smolicz 1990, 275-280). They postulate a specific biocoenotic ethics, which entails negation of the anthropocentric ethics that dominates Western culture. This means that every form of life has a right to existence and development that may conflict with the immediate interests of human. The industrial civilisation as the so-called old paradigm gives human special rights, even dictating that nature be subordinated to human and transformed in a way convenient for human. A specific ecolog-

ical philosophy moves from a quantitative towards a qualitative understanding of economic growth but mainly towards the category of quality of life. The fundamental issue here is coexistence, which does not affect the ecological balance (Capra 1987, 363-418). And human is only one of the elements of the natural world and therefore must respect the laws of nature.

The ideas of the deep ecologists are considered too dogmatic. The adoption of the principles of this philosophy imposes on one the view that human needs and goals should not take precedence in any way over the needs of other living beings (Melosik 1995, 107-110).

They are also criticised for their lack of references to reality and their inconsistent attitude to their own ideas. Representatives of biocentrism, for example, criticise the hitherto prevailing understanding of environmental issues. They have not developed any solutions to that themselves. Their work does not tend to go beyond the existing parameters. They therefore continue to propose partial measures, i.e. protection of the air, resources, water, and endangered species. Thus, they do not bring about any change in their philosophy of conduct in relation to the traditional approach. Another reason for criticism of the assumptions of deep ecology is its inconsistent attitude towards human. The foundation of this philosophy is the equal treatment of all living beings. This means that human as a living being should be perceived the same way as any other being. Meanwhile, biocentrists exclude humans from nature, treating them differently from other beings as the most harmful and dangerous species. Since human is a part of nature, human behaviour should be treated as natural and not excluded from it, as deep environmentalists advocate (Melosik 1995, 111).

Deep ecology, despite numerous flaws and contradictions, has offered a new perspective on the role and attitude of human towards nature. However, for representatives of deep ecology breaking away from anthropomorphism does not mean a depreciation of human being; on the contrary,

³ Ecological ethics is an important strand of humanistic thought, because it recognises not only what is beneficial to all living beings. A rational code of moral conduct cannot only take into account interpersonal relationships, but also the relationship between human and nature.

they believe that they strive to create conditions for comprehensive human development in social life. In line with this philosophy, development is possible when “every person, whose values are important to him or her are not threatened, spontaneously strives to expand own knowledge, deepen own understanding of the world and fulfil own potential” (Stemplewska-Zakowicz 1989, 5). Deep ecologists also believe that if they cannot change the predatory attitude of human towards nature, they will at least draw attention to the fact it is overly and quite often needlessly degraded.

Summarising this part of the article, it should be stated that the problems of environmental degradation are not the result of imperfections in technology but of the consumer value system of mass societies. Also, erroneous decisions taken in the name of misconstrued economic growth resulted in individual resources being treated as free goods which led to their prolonged overexploitation. This attitude to the natural environment has led to its unjustifiable degradation (Korporowicz 1998, 178).

2. Environmental economics as a science

The sciences that deal with the problems of the relationship between the environment and human outside the natural sciences also include those in the field of social sciences and especially economics, which research human behaviour as a relation between given objectives and limited measures with alternative applications, including, among others, rational human activities in the environment (Blaug 1994, 30). At the crossroads of these sciences, environmental economics was created, an interdisciplinary science that stems from ecology and economics. This is a relatively new discipline, since it is about fifty years old. The need to combine the principles developed on the basis of ecology and economics and to apply the laws described by both disciplines stems from the fact that responsibility for pollution caused by the transfer of negative effects of economic activities to other members of society has been defined. This fact impairs the sustainability of natural

resources, which in turn limits economic and social development. This forces the application of measures which would induce market participants to make a joint effort to protect the natural environment.

Environmental economics makes use of the paradigm of neoclassical economics, where the basic methodological premise is the model of a rational and, at the same time, selfish human, which is based on the Cartesian conviction that science and scientific method are infallible and that human acts rationally on the basis of scientific methods. In other words, *homo economicus*, i.e. an individual who makes rational decisions in order to maximise individual and social satisfaction (Woś 1993, 63).

Another assumption of neoclassical economics is the conviction that the market is the most effective and efficient instrument for regulating the demand and supply of individual goods, which should result in the correct allocation of resources. The market and the market economy are in this respect in line with the socially expected effects. It is the “invisible hand” of the market, which regulates all development processes in the free market economy.

Both of these axioms of neoclassical economics are used and then criticised by environmental economics to find the relationship between environmental quality and the functioning of the economic system. It is about the existence of externalities and the limitation of natural resources, which are considered from the perspective of market reliability and rational decisions from the point of view of human economic activities.

In a market economy, there is a belief that the market is the most effective tool for achieving what is socially desirable. However, this type of economy may force the misallocation of resources due to externalities, which are responsible for the accumulation of environmental problems. An externality occurs when producers pass on to third parties who are neither consumers nor producers of the effects “of their production in the form of pollution. In this case, it is the markets that are

failing because the environmental quality is not subject to market exchange. And the market alone cannot achieve an efficient allocation of natural resources. Efficiency can be achieved through certain forms of state intervention in the form of applicable regulations, and especially economic instruments.

Also, the activities of homo economicus in the market economy system are not rational from the point of view of the environment, because the "economic man" acting economically to stay on the market reduces the production costs. This refers to pollution that is neither reduced nor disposed of, but is emitted directly to the environment, polluting it. Thus, cares about increasing own benefits at the expense of the degradation of nature and other people who do not have to participate in the exchange.

Environmental economics tackles many issues on the borderline of economics and ecology. The most important problems include the use of natural resources for economic purposes. In this junction, attention is focused on explaining what economic reasons lie behind the issues of protection of the environment and its resources and what are the economic consequences of nature degradation (Folmer, Landis, and Opschoor 1996, 13). These elements are related to the analysis of the functioning of markets in the context of environmental protection and considerations on how to correct negative market actions, which economists call marketing defects. Particular emphasis is placed here on the misallocation of resources, which is caused by externalities understood as the unwanted environmental effects of human economic activity. This economy branch is sometimes referred to as the economy of externalities.

This part of the discipline addresses the issue of correcting negative externalities by internalising costs to be borne by polluters. The instrument for correcting these negative effects is a tax which, in order to bring about the desired effect, should be equal to the value of the marginal exter-

nal effect. This type of tax is referred to as the Pigouvian tax. Its name is derived from the surname of Arthur Pigou, who was the first to propose the use of this type of instrument as part of the implemented state policy to correct socially undesirable effects caused by negative externalities (Löfgren 1996, 33). The optimal amount of Pigouvian tax is determined for emissions per each production unit at the level of the marginal value of the clean-up cost. It is the point of social optimum. This means that each plant will reduce its emissions as long as the tax exceeds the marginal clean-up costs. Until the clean-up costs exceed the amount of the tax, it is worth paying it. Otherwise, if the cost of clean-up is lower than the tax, the plant will be interested in clean-up more than paying the tax (Löfgren 1996, 34). However, using a tax as an economic instrument of environmental protection at too high a level may lead to a reduction in the production capacity of the plant and thus to its elimination from the market. From the point of view of economic policy, bankruptcy of a plant is rarely a beneficial solution.

Another area of interest of the environmental economics is focused on the use and protection of natural resources, which we divide into non-renewable and renewable ones. The former includes various types of minerals, i.e. coal, sulphur, ores, crude oil, gas, salt. A characteristic feature of these resources is that they are extracted from the Earth's interior and the deposit used is not restored. An exhausted deposit loses its value irretrievably. Renewable resources, on the other hand, can be a continuous source of their acquisition provided that they are used rationally. All natural resources except minerals are renewable. This is related to the process of their renewal and to the existence of the laws of nature. Examples of renewable resources include flowing waters, forests, animals and plants, solar energy, wind (Woś 1993, 8-9). In the case of resources, the interest in environmental economics concerns the environment as a supplier of raw materials necessary for the functioning of

the economy, with the assumptions of this discipline that the economy has a superior function in relation to the environment (Jeżowski 2000, 11).

In the case of particularly non-renewable resources, environmental economists assume that they will be replaced by the introduction of substitutable raw materials, especially if the existing technical advancement is taken into account. Substitution can also mean replacing and introducing new technologies that will reduce the consumption of raw materials. The technological advancement may also result in new products that will eliminate the need to use resources that are limited in nature.

Therefore, environmental economics deals with the issues concerning the causes underlying the protection of the natural environment and its resources and the economic consequences of environmental degradation. Another issue that this discipline examines are the methods of environmental quality valuation. These valuations are needed in the application of economic calculations which are necessary for analysing the costs and benefits of intentions that have an impact on the state of the environment or for assessing losses in resources. These assessments are essential when estimating the effectiveness of economic activity.

The valuation of the environment as non-market goods is carried out by direct and indirect methods. The former group includes methods in which hypothetical data obtained in the interviews with individual consumers are used. Prospective consumers talk about the prices they would be willing to pay for each component of the environment. In indirect methods, the value of the environment is assessed on the basis of the prices of market goods and services, e.g. the price of land or housing, which may have a different price and depend on the state of the environment in which they are located. The more favourable condition of the environment, the higher the price level of these goods may be.

When valuing the environment, one should always take into account the fact that these valuations are made using various methods. They have many disadvantages and limitations. However, they provide estimates of both the value of the environment and the costs borne by society due to the degradation of the environment.

Conclusion

The constantly increasing importance of the problems of degradation of the natural environment and its protection is caused, among other things, by the reduction of management efficiency. This reinforces the need to look at economic processes taking into account the achievements of such disciplines, which tell how to manage in conditions of reduced availability of natural resources. Environmental economics undoubtedly belongs to these disciplines.

This science indicates the economic methods and instruments that can be used in economic practice that are necessary for environmental protection. It also addresses the problems of how to examine the economic implications of environmental policies. Thus, environmental economics that stems from the neoclassical trend of economics, which accepts the market as an unfailing mechanism of economic regulation, proves that the invisible hand of the market for environmental protection is unreliable. This is why various types of instruments, particularly indirect regulation (including economic instruments such as taxes), should be used to support measures to reduce environmental degradation.

It is also worth mentioning that the recognition of methodological assumptions of this science is conducive to the development not only of the discipline as such, but above all it is an indication of its applicability. The principles developed by environmental economics should be applied in practice by all participants of economic life from consumers and to producers and governments in order to keep not only current natural resources but most importantly ensure the development opportunities for next generations.

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