Marioara RUSU*, Violeta SIMIONESCU**

**Institute of Agricultural Economics, Romanian Academy, Bucharest*
***Faculty of Natural and Agricultural Sciences, University Ovidius Constanţa*
mara.r@xnet.ro

NATURAL RESOURCES AND ENVIRONMENT PROTECTION: A THEORETICAL APPROACH

ABSTRACT

The economic activities have contributed to the gradual diminution of natural resources over time and have had a significant impact upon the environment. The paper attempts to provide the interested persons with a theoretical-methodological framework referring to the economy of natural resources and environment protection, while focusing on the agricultural sector.

Key words: natural resources, environment protection, ecological footprint.

JEL Classification: Q01, Q50.

1. INTRODUCTION

The economic activities have determined the gradual diminution of the natural resources reserves in time and have had a significant impact upon the environment. The diminution of the area covered by forests, the diminution of fish populations, the diminution and even disappearance of certain animal species, the progressive diminution of fossil fuel reserves, water pollution and ozone layer diminution are some of the great problems that humankind is facing. The experts warn on an impending ecological disaster in the conditions in which the consumption of natural resources exceeds the carrying capacity of the Earth by almost one-third (WWF, 2007). Thus, it has been estimated that more than three-quarters of the world population is living in countries with ecological deficit, where consumption exceeds by far the biocapacity. Thus, there are worries about the underestimation of the ecological problems, in favour of those problems of strict economic nature (WWF, 2008). As a consequence, the entire society is threatened by the collapse of the ecological capital, as a result of the neglect of natural values, which in reality represent the core element of life and prosperity.

2. STATE OF KNOWLEDGE

The protection of the natural environment, of the biomes, of biodiversity and of ecosystems from these biomes contributes to economic growth on the long term, by supplying essential ecosystem goods and services, such as natural capital, fertile soils, climate regulation, fresh air and water, renewable energy and genetic diversity (Turner et al, 2003). The adequate management of ecosystems and natural resources under these ecosystems support the agricultural and non-agricultural productivity. Thus, a series of research works suggest that it will be more and more difficult to support economic growth as the population has had a negative impact upon the biomes supplying the natural resources, which have an essential contribution to sustainable development in the future (Rijberman, 2003; Zhang et al, 2007; Ayres, 2008).

3. MATERIAL AND METHOD

The approach to the natural resources issue, according to the tendencies in the latest years has not been considered separately, but in close environmental dependency. The novelty element brought about by the present paper is putting together the core elements specific to the evaluation, exploitation and management of natural resources, while focusing on the agricultural sector. The utility of the paper derives from the fact that it provides the interested people, theoreticians and practitioners in this field with a conceptual and methodological framework on the exploration, sustainable exploitation and utilization of natural potential.

4. RESULTS AND DISCUSSIONS

The specialty literature presents a wide range of approaches to the resource issue. Being at the border between the economic and technical sciences, the resource economics has tried to determine the economic implications of the identification, attraction into the economic circuit, exploitation and use of different types of resources.

4.1. DEFINITION AND CLASSIFICATION OF NATURAL RESOURCES

The resource concept was defined by numerous experts in the field of economics, geography, history and ecology, leading to the differentiation of the basic meaning: “material or abstract element that can be used for meeting certain human needs or necessities” (Erdeli & Ielenicz, 1999, p.274).

The resources are considered highly dependent on the development level of the human society and the existing system of values: the same elements can be

considered resources by a society, or on the contrary, they can be ignored by another society, due to society development level or lack of knowledge.

The most common classification divides the resources into three categories: i) anthropic resources – number and mental possibilities of people; ii) capital resources – elements built by people in order to carry out their social, economic and cultural activities; iii) natural resources – elements of the natural environment that are useful for people.

In order to meet the people's needs, any economic activity presupposes the efficient utilization of certain resources, in a certain quantity and of a certain quality. Thus, the *economic resource* can be defined as the "totality of elements, circumstances and premises that are directly or indirectly used or that can be used in producing and obtaining economic goods" (Chivu et al, 2001, p.382). Seen as a stock, the economic resources form the national wealth; seen in their movement, as a flow, in the process of obtaining the economic goods, these form the production factors.

The natural environment in which the human activity is carried out represented the first source of resources attracted and utilized in the production processes under the form of natural resources and labour resources (Răducanu, 2000). The resources attracted and used in the economic circuit become production factors. There were numerous debates on this concept in the economic literature. Thus the classical economists considered labour, land and capital as the main production factors. William Petty, the precursor of classical economy, considered that labour is the father and land is the mother of national wealth, and Jean Baptiste Say considered that labour, land and capital are the originary tangible resources (Ilieş & Ilieş, 1998). As far as society developed, other production factors began to be taken into consideration: technologies, technological progress, information, scientific research, managerial capacity, etc. Seen as component part of economic resources, the *natural resources* are a primary production factor: air, water, biomass, the underground mineral resources are included in this category. Another definition considers the natural resources as the totality of those forms and combinations of the matter, existing in nature, which can be useful for the society, in one of its evolution stages (Giraud, 1989).

The utilization of natural resources depends on the natural conditions (weather, relief, hydrography, etc.). In their entirety, the natural resources and the natural conditions represent the natural factor, which, together with the demographic factor and the development level of the working tools, influence the development level of a country. Thus, the quality of resources and their accessibility level directly influence labour productivity in the economic sectors. At the same time, the general economic development level and the scientific and technological progress implicitly influence accessibility. Having in view the evolution and structure of resource utilization, we can consider any element of the environment as a potential resource, which can become a natural resource to the extent to which the economic and technical considerations, which restrict their utilization at present, will be removed by the increasing pressure of demand. At the same time, we must not overlook the

fact that the technical progress can also contribute to the exclusion of certain resources from the category of exploited resources.

The utilization of natural resources raises two important problems: i) the need to identify the most efficient utilization modalities and the substitution possibilities of exhaustible natural resources; ii) diminution of environmental disequilibria determined by the exploitation, conditioning, processing and utilization of resources.

There are numerous criteria for resource classification. Thus, according to the utilization period and character of their utilization, these are classified into: i) natural reproducible or renewable resources (land, forests, hunting resources, water, etc.); ii) natural non-reproducible or non-renewable resources, which are not naturally reproduced and are exhaustible (fossil fuels, ores, etc.). According to their volume in relation to the market demand, they are divided into: i) abundant natural resources; ii) scarce natural resources. According to their recovery and utilization level: i) partially recoverable natural resources; ii) non-recoverable natural resources (Răducanu, 2000; Bran & Ioan, 2009).

As regards the classification of resources according to the knowledge criterion, we can differentiate the following groups of resources: i) identified and exploitable under economic conditions by the current technologies; ii) known resources, yet not economically exploited in the current technological conditions (sub-economic resources); iii) presumably exploitable (unknown).

A frequently used classification in the specialty literature is that proposed by James Sweenezy, which uses two criteria: availability in time (adjustment of utilization processes in time) and the physical properties (Table 1). In this case, depending on their physical properties, the natural resources can be classified into biological, mineral and environmental resources. Depending on their availability in time, they can be classified into exhaustible, renewable and expandable resources.

Table 1

Classification of natural resources according to their availability in time and physical properties

Availability in time	**Physical properties**			
	Biological	**Mineral**	**Energy**	**Environmental**
Expandable	– agricultural products	– salt	– solar radiations – water pollution	– noise pollution – water pollution – air pollution
Renewable	– forestry products – fish – livestock – wild animals – wood – flora – fauna		– firewood – geo-thermal water	– ground water – air – animal populations – forests
Exhaustible	– endangered species	– non-energy minerals – soil types	– crude oil – natural gas – coal	– virgin vegetation – ozone layer

Source: Sweeney, 1993

Regardless of the classification modality, natural resources are considered to be limited and insufficient in relation to necessities. These characteristics impose the need to focus on resource preservation, conservation, rational use and increased efficiency in resource utilization.

4.2. ECONOMIC EVALUATION OF NATURAL RESOURCES

In the present context, in which getting aware of the environmental problems and of resource exhaustion possibility is an important issue in all the fields of activity, the rational use of resources becomes a unanimous desideratum. The sustainable management of natural resources presupposes, among other things, a mostly accurate evaluation, so that well-defined criteria should exist in the hierarchization and setting of costs. Although the natural resources result from a long evolution process of the natural environment, in conformity with nature's development laws, at present, man practically intervened in the utilization of all natural resources (design works, research, melioration, exploitation, information, etc.).

These interventions imply certain expenditures. The value of resources thus depends on the amount of expenditures, the quality of each resource and the demand for resources in a certain development stage of the society. The economic evaluation of resources can be made through the evaluation of the absolute value or of the relative value (Toderoiu, 2002).

Thus, the *absolute value* is determined in conformity with the amount of the expenditures for the research, utilization and exploitation of natural resources taken into consideration. At the same time, one must have in view the necessary expenditures for the rehabilitation of lost qualities as a result of human action (for instance soil erosion, intensive logging, etc.). This category also includes the evaluation method through compensatory expenditures, i.e. those expenditures that society will have to bear if it lacks certain resources. The method can be applied both for a short period of time, expressing the yearly efficiency of resource reproduction, and for a longer period of time. The *relative value* is determined by the calculation of additional production efficiency that is obtained by using more valuable resources compared to the less valuable resources. Such an evaluation has a geographical character, as it is based on the influence of natural factors and serves to the identification of the optimum resource utilization variant, which ensures a larger profit with minimum expenditures.

A system of economic indicators is used for the characterization of the rational use, reproduction and protection of natural resources. These serve to the scientific substantiation of the rational location of the economic objectives in dependence with the natural resources they use; to the determination of the most advantageous resource extraction and processing technology; to the identification of the set of measures necessary for environment protection. These indicators can be grouped as follows: i) economic indicators, which characterize the condition of each natural

resource; ii) indicators characterizing the neutralization of man's negative actions on the environment; iii) indicators reflecting the expenditures related to the environmental rehabilitation measures; iv) indicators on the economic efficiency of the environment degradation prevention measures (Bran et al, 2006).

Besides these general indicators, there are also indicators that characterize each resource separately. Among these indicators, we shall mention the indicators characterizing the land and forestry resources. Thus, the following economic indicators are used for the land resources: i) agricultural land area, which includes the arable areas, areas under multiannual crops (vineyards, orchards), pastures, hayfields, etc.; ii) non-agricultural land area – land under buildings, ore extraction quarries, land under terrestrial transport line, natural reserves, etc.; iii) land improvement measures, such as irrigations, soil erosion control; iv) consumption, as assessed by: agricultural land utilization, as one of the indicators referring to the attraction of land areas into the economic circuit (total agricultural area/total area); arable area/total area; forested areas, pastures, hayfields/total area). The forestry resources are evaluated through indicators referring to the total forestry area, including the area covered by forests; reforested areas in one year; planting shelter belts; quantity of cut wood; losses of forestry areas following fires or floods; necessary investments for applying the forest protection measures, etc.

The rational use of natural resources is the main modality to efficiently increase production, which can be obtained by economizing the production factors in the process of their extraction and processing. In this respect, the technical-scientific progress becomes the main instrument to solve up the contradictions between the increase of social needs for resources and the limited possibilities of the environment.

The current technologies do not make it possible to fully utilize numerous resources. In conclusion, the improvement of technologies must lead to the removal of losses, on one hand; on the other hand, it must lead to profitability in the exploitation of certain potential resources. At the same time, any technological innovation should be evaluated according to its ecological dimension, the analysis starting from the consumption of energy, continuing with the utilization efficiency of raw materials and ending up with the evaluation of the utilization impact of the finished product, as well as after it has been taken out of use.

4.3. NATURAL RESOURCES, ENVIRONMENT AND ECONOMIC GROWTH

The ecological crisis that humankind has to face at present, aggravated by the energy and raw materials crisis and by the food crisis, has determined the increase of awareness of the danger involved by the non-rational exploitation of natural resources.

Throughout the years, starting from the premise that the economic development takes place within ecological systems, the *eco-development* concept gained ground and has been at the core of many debates. This concept is defined as a complex relationship between the economic development and the natural environment. Eco-development refers to the development at regional and local level, focusing on the adequate and rational use of national resources, of technology and management style, which should respect the natural and local ecosystems and the social and cultural patterns. The concept is also used to describe an integrated approach to environmental development (OECD, 1997).

The scientific and technological progress has experienced such performances, so that in order to reach the proposed objectives, man is capable to significantly transform the natural environment. The society began to be aware that the non-rational, uncontrolled exploitation of the natural environment may have, besides beneficial effects on welfare, negative consequences upon the ecological equilibrium. In the last decades, the introduction and dissemination of different entropic processes led to a real environmental crisis expressed by the antagonism between society and environment, seen as two systems, with their own development laws.

The ecological dimension of the economic growth process began to be investigated later on, out of the following reasons: i) existence, for a long period of time, of a false, mechanicist opinion, attributing an exclusive and determining role in national wealth evolution to certain factors with immediate quantitative action (financial resources), neglecting or minimizing the qualitative, long-lasting influence of environmental conditions; ii) the less determinable character of the ecological disequilibria and environment degradation, compared to other problems, that faster drew the attention of the world public opinion; iii) emergence of a contradiction between the economic development concept and environmental development concept, under certain economic theories that had been vehiculated a few years ago (Toderoiu, 2002). In time, the experts' position with regard to this issue evolved, and it has been considered that although the two concepts are antinomic, they can coexist, enabling mutual support and development within an indivisible entirety.

Out of the various concepts on environment protection, which have been treated in the literature in recent years, the following stand out (Bran et al, 2006):

The ecocentric conception is based on the idea that environment protection represents a purpose per se: our planet must be defended without reserve, condemning any harmful intervention of man on the natural resources and promoting a permanent conservation spirit. Under this conception, little attention is paid to people, while the focus is almost exclusively laid on environment protection.

The biocentric conception puts the other forms of life and species existing on the Earth at the core of its concerns, as these cannot defend themselves as

the human species does. This conception considers that man should not intervene on the species' life, but only to protect them. This conception does not have in view the fact that biosphere defense, in the context in which the human beings can sustain their existence and development only by using natural resources, cannot represent an opposable argument in the face of undernourishment or poverty.

The antropocentric conception sustains the idea that everything depends on the human beings' needs, under continuous growth and increasingly different. Yet to see people as living beings that have the right to do anything and to violate nature's laws, for the purpose of their own current interests, proves to be a mistaken conception. The past experiences showed that the irrational exploitation of natural resources, without respecting the limits imposed by nature's laws, can lead to the situation when even the natural bases of human existence can be destroyed.

Man, regarded as a biological and social complex with bio-physiological, psychological and socio-historical determinations, has many needs, and meeting these needs is constrained by many environmental obstacles. In this context, the environment concept has a wide meaning, covering both the natural environment and the artificial (economic, social, cultural and aesthetic) environment. Man defined in his multi-dimensionality, together with his needs, is considered a cybernetic system. For the conservation and development of this system, man performs his activities on the basis of information received and of responses to the variations and uncertainties coming from the natural environment.

Through the received information on the environment situation, behaviour and evolution, man is seeking to provide answers to a series of problems with regard to the selection and ordering of his needs, the organization of his whole individual and group activities, according to certain priorities, in which he takes into consideration the available means, as well as the possibility to create those material, professional, organizational, political and ideological means for meeting his needs. These means, as well as the possibilities to create them, are even more efficient and diversified as man, through his economic and social development, is freed from the direct domination of nature. Both at individual level and at the level of social groups and classes from different countries, there are great variations of types and structures of needs, as well as significant differences as regards the level of their satisfaction.

The economic development level decisively influences the level and structure of desires and necessities, which are practically revealed by the effective demand. The needs, as well as the desire to meet these needs, represent the driving engine that initiates the economic development. Thus, in a society less developed from the economic point of view, the needs are less diversified, less fluctuant, and the bio-physiological survival needs take the largest share.

However, as far as the economic development level is higher, and the volume and diversity of products and services increase, the human needs are no longer strictly linked to the bio-physiological life, and they gradually become necessities of social, scientific, cultural, aesthetic interest, etc.

Besides the economic development level, another factor that influences the volume, structure and evolution of needs is the nature of labour and social relations, the class structure, the cultural level, as well as people's representations and conceptions in relation to their own needs, also reflected by the individual and collective aspirations.

5. CONCLUSIONS

The economic activities have detemined the gradual diminution of natural resource reserves in time, and have had a tremendous environmental impact. There are several approaches to resources in the literature. Lying at the frontier between the economic and technical sciences, the economy of resources is trying to determine the economic implications of the identification, attraction into the economic circuit, exploitation and utilization of different types of resources. Having in view the evolution and structure of resource utilization, we can consider any environmental element as a potential resource, which can become a natural resource as far as the economic and technical considerations that restrict their utilization at present are removed by the demand pressure that is permanently increasing. At the same time, it should not be overlook that the technological progress can also contribute to the exclusion of certain resources from the category of exploited resources.

The main elements of the above-mentioned conceptions lead to an overall approach targeting the reconciliation of man with nature and with himself. The study of natural resources – essential component of environment – is suitable for an ample analysis, made from multiple perspectives: economic growth requirements; potential provided by the environmental factors on long term; scientific and technological progress and demographic evolution, which influence the demand and extraction rate, on one hand, and the substitution and specific consumption decrease rates, on the other hand.

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