

OPTIMAL USE OF NATURAL FUNDS

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ABSTRACT: Human society as well as the man, uses natural resources in terms of potential for development. Natural resources are the phenomena, processes or objects that are found in nature and that have constructive or destructive influence on the development of living beings and their activities. Renewable natural reserves, or funds, despite the power of regeneration, can be completely exhausted, or destroyed, and because of that, there are belong to the group of non-renewable, unlike the flow of energy, which is considered as inexhaustible resource. If the natural balance is violates, the damage that nature can inflict is enormous and difficult to repair. The world is rich in renewable resources, which include natural and funds, and if these resources are used optimally, it may be unlimited. Protection of natural values, is achieved by implementation of measures for preservation of their quality, quantity and reserves, as well as natural processes and their interrelationships and the natural balance of all.

Key words: natural resources, naturall funds, optimal use, protection.

ОПТИМАЛНО ИЗПОЛЗВАНЕ НА ЕСТЕСТВЕНИ ФОНДОВЕ

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РЕЗЮМЕ: Човешкото общество, както и човекът използват природните ресурси и средства ресурс от гледна точка на ресурсите са развитие. Природните (естествени) явления, процеси или предмети, които се срещат в природата имат конструктивно или разрушително влияние върху развитието на живите същества и тяхната дейност. Възобновяеми природни ресурси или фондове, въпреки че те имат право на възстановяване, могат да бъдат напълно изчерпани, или унищожени, както и принадлежат към група изчерпване ресурси, за разлика от потоците от енергия, която се счита за неизчерпаем ресурс. Ако наруши естествения баланс на щетите, които могат да нанесат е огромен и труден поправива. Светът е богат на възобновяеми ресурси, които включват естествени и фондове, и ако тези средства се използват оптимално, ресурсите могат на практика да бъдат неограничени. Прилагане на мерки за запазване на тяхното качество и количество на резерви, както и на естествените процеси и тяхната взаимозависимост и на естествения баланс на цялата система, защитата им е постигната.

Ключови думи: природни ресурси, природни средства, оптимално използване, защита.

1. Introduction

Natural resources management aims to clarify as much as possible renewable sources, and, at the same time, to make the difference in way of managing between renewable and non-renewable resources ¹. In accordance with the strategy of sustainable development of the United Nations, initiated in 1992, further economic development worldwide has been based on the renewable natural resources. The aforementioned strategy is designed to preserve primarily healthy environment which is the imperative to the life of mankind in future. If, however, we consider the postulates of current system of trade economics and definitions of competitiveness, and compare them with the principles of sustainable development, we observe that they are contradictory. The former has the basic rule: making as many products and services as possible at competitive prices and quality, regardless the natural resources, since what is important is to keep increasing their number. With the strategy of sustainable development, it is limited the use of the natural sources, it is required the reduction and elimination of waste, as well as it means transition from non-renewable to renewable resources.

Since, in economics, we have to rely on limited resources, the products friendly to the environment and large investments in the environment, it requires redefinition of the economic postulates and competitiveness. According to duration, non-renewable resources are grouped as follows: mineral raw materials and mineral sources, while the renewable ones are classified into: soil and water with the flora and fauna, and renewable energy resources, such as geothermal energy, wind energy, solar energy and energy of tides and waves. Regarding industrial production, the non-renewable resources of metal, non-metals and energy raw materials are of particular interest. However, since they are depleted, their rational exploitation and usage have extraordinary significance for the sustainable development. The use itself of these resources results in degradation of large areas of soil. The natural resources exploitation has, therefore, direct and indirect, partly lasting or temporary threat, even devastation of the environment. Taking into consideration all these reasons, planned and long-term exploitation of mineral resources has, for each country, in every aspect, the highest possible significance ².

¹ Mihajlović D., Simić V., Upravljanje obnovljivim prirodnim rsursima, Knjaževac, 2010. god.

² Magdalinović N., Upravljanje prirodnim re-sursima, Bor, 2007.

2. Importance of natural conditions and resources for development

The nature itself is a variety of natural complexes which, on some parts of the outside soil area, show different characteristics, being, however, at the same time, functional since it offers various possibilities for transformation of materials and energy. In a word, all those possibilities are called „Natural potential“. People and society determine which natural conditions they are going to include into their economic activity, and which of them they are going to exploit less. Natural conditions involving solar energy, internal heat of the Earth, the geographic position, the relief, climate, precipitations or natural funds, in one moment of human activities, at a certain level of economic development, become natural resources, that is, people start using them as energy sources. The natural sources include the elements and natural forces of the lithosphere, hydrosphere and atmosphere, involving mineral resources, soils, lakes, groundwaters, seas and oceans, as well as flora and fauna. The natural conditions are characterized by richness of natural resources, their availability and quality.

The natural production resources, thus, are no longer a part of the nature and they become a subject of work even before they become a subject of the production process. If we consider the inseparability of the natural productive power and the environment, we should take into consideration two principles:

- 1) Definition of the environment as a pre-condition of the existence of humans, where the natural conditions represent those elements of nature with which the man is directly associated by basic needs of his biologic being.
- 2) Definition of the environment as a necessary supposition for realizing the process of production that can be characterized as the nature having the function of an object and a tool in human's activity, that is, like all its elements being used in production or as an object of processing.

3. Quantifying natural resources and supplies

Since it is hard to measure and foresee the direction to which the natural resources are to go in future, it is, from the point of view of economics aspect, significant and comprehensive to quantify them. Only if we know the real measures or quantities of a certain natural resource, that is, its natural fund, it is possible to undertake adequate measures for their rational use, regeneration, preservation and reproduction. The supplies of natural resources involve only a part, appropriate for exploitation in already existing technological and economic circumstances.

Unlike supplies, the resources represent the wholesome amount of a certain natural element of a definite quality. The quality of the mineral raw material bed may be on the higher level in relation to its average spread in the Earth's crust, but also lower in relation to the level of possibilities for exploitation. The size of the natural resources supplies belongs to the relative size of order of magnitude because the supplies are

changed both under the influence of technological progress and the price movement of the natural raw materials and final products on the trade market in the country and abroad. Total natural sources supplies are estimated and expressed through three segments, as follows:

- 1) Produced quantity
- 2) Remaining usable quantity
- 3) Quantity that remains

Geologically, the resources are classified into:

- 1) discovered and
- 2) undiscovered.

- Discovered resources are those whose quantity and quality arrangement, based on geologic research, is known.

- Undiscovered resources are supposed resources whose existence is based on geologic knowledge, that can be:

- a) hypothetical – it is supposed that they exist on the basis of geologic knowledge with known characteristics;
- b) theoretical – their existence can be determined on the basis of well-known types of geologic layers, or on the basis of certain characteristics³.

Natural funds belong to discovered resources; since there is a danger that they can be drained, it is necessary to determine the optimum use of these renewable sources.

4. Analysis of the optimum use of natural funds uses

In modern literature on economics, most widespread and generally accepted classification of resources is: human, physical and natural resources. This classification is in many aspects similar to the classical division of production factors, where the capital can be grouped as human, physical and natural. The group of renewable natural resources involve the following:

- a) natural, biologic funds (for example, fish or forests)
- b) energy streams (for example, solar energy, energy of wind, tides, etc.).

However, the attribute „renewable“ should be taken conditionally. The renewable natural supplies or funds, although having greater power of regeneration, can be completely exploited or destroyed, so that they belong to the group of draining resources, unlike the sources of energy which are considered non-draining resources.

The terms „renewable“ and „non-draining“ are not synonyms because there is a rather wide group of renewable sources that can be exploited. This group involve agricultural soil, water and air. Regardless the fact that mentioned resources have the characteristics of renewable resources, it does not mean they are non-draining. Their quantities are limited, which

³ <http://www.scribd.com/doc/26847026/Skripta-Ekonomija-Prirodnih-Resursa>

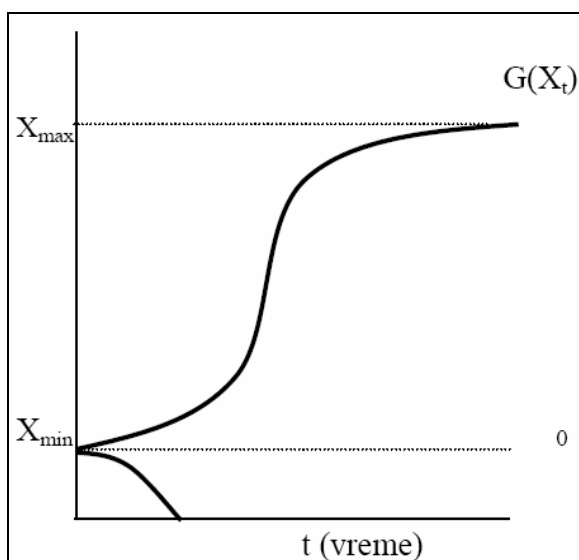
furthermore means they are not renewed in a biological way. Stated characteristics are certainly closer to the supplies of mineral wealth, therefore, they are naturally classified into the group of non-renewable ones.

When talking about typical renewable resources, the greatest attention of economists is drawn by renewable supplies or funds of biologic resources (for example forest or fish poipulations). ⁴

One of significant characteristics od these resources is their property of natural growth or quantative regeneration. That is why they have special importance for human use.

Their use can be timely unlimited if the intensity of their use does not exceed the rhythm of their regeneration. Moreover, the growth of biologic population is not unlimited.

The bearing capacity of the environment or the eco-system, represents the limiting level of supplies of a definite type. The growth of a certain biologic resource can be shown on the picture 1.



Picture 1. Growth function of biologic population

The picture shows that the growth of biologic population beyond a certain level, X_{min} , has ascending trend up to maximum saturation of the eco system in which it exists, that is , up to the level X_{max} . At the ecosystem satiety, the whole bearing capacity of the environment has been used up. [5].

This increase of population is characterized in the conditions where there is no rivalry with other species, that is predators, to which belong human beings, as well. When the number of population has a decreasing trend and it falls down below the minimum, it can be concluded that it has not been regenerated any more, but it falls, while the resource itself ceases to be regenerated.

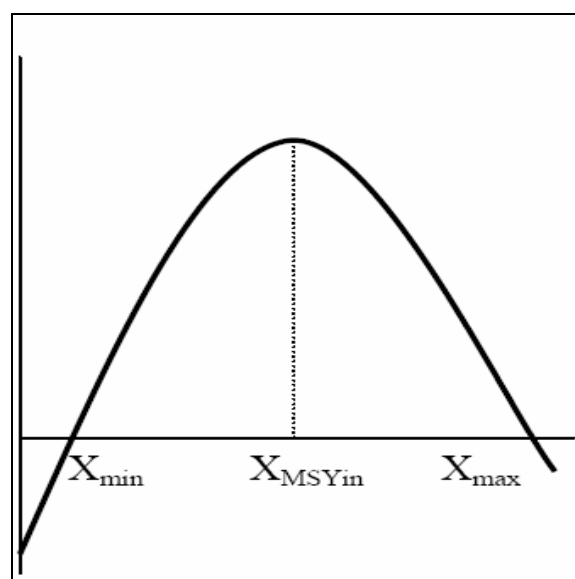
At some biologic species (renewable resources) the minimum level of population (X_{min}) does not exist, that is, it

amounts zero. It is similar to the growth rate. In a general example, the growth rate could be shown as a curve, as in Picture 2, in the interval between X_{min} and X_{max} as a parabola.

The maximum value of this parabole is equal to the highest sustainable yield, that is, the population level (X_{MSY}). In that case, the regeneration rate is highest. It can be deduced that, if the population is kept on that level, using up of these resources can be for a maximum long period of time.

If, however, the population drops below X_{min} , the growth rate becomes negative. At the population whose minimum is zero, it is said there is no negative growth rate.

Then, the parabole marks its beginning in the coordinate beginning, that is, $X_{min}=0$.



Slika 2. Growth rate of biologic population

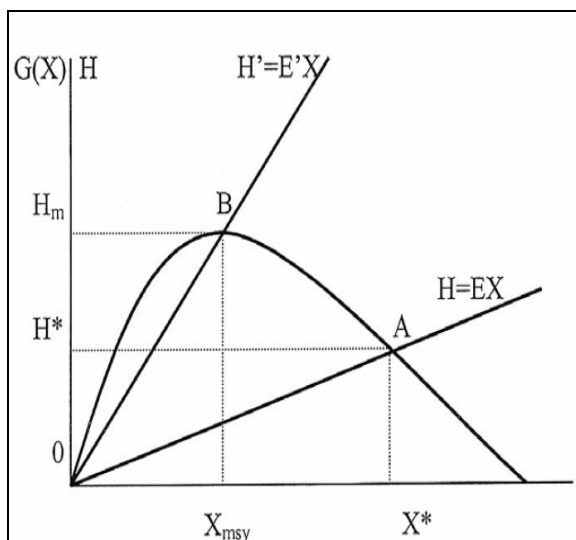
The use of renewable resources by people means usage of their properties of regeneration. The income and benefits from use of natural sources (renewable funds) can be conditionally called „yield“ or „harvest“. Total yield (H) depends on the size of supplies (X) and on the effort or endeavour (E) that is invested, so that those resources can be used up.

Besides the work effort, the term „endeavour“ refers to the quantity of engaged physical capital and equipment. As far as natural funds are concerned, the greatest significance, having in mind the exploitation of them, is the imperative to exercise exploitation up the level which does not endanger the population regeneration.

We can deduce that the sustainable yield rate plays a singificant role in exploitation of these resources. The use of the resources beyond their rate of renewability or regeneration results in their devastation, while each insufficient exploitation results in growth of resources supplies. ⁵

⁵ Pešić R., Ekonomija prirodnih resursa i životne sredine, Beograd, 2002.

⁴ http://www.policy.hu/pesic/GLAVA_2.pdf



Slika 3. Balance level of resources consumption

On Figure 3, it is shown the level of resources utilization. The intersection of the yield lines, H , and the curve of population growth, is the point A which stands for sustainable level of resource consumption H^* .

However, A is not the maximum level of sustainable resources utilization. Higher yield can be achieved, and this depends on the quantity of effort or tried endeavour into exploitation. For example, in the balance point B, since $E' > E$, it follows $H' > H$. If we considered the time dimension, the analysis of natural resources exploitation would have the characteristics of dynamic analysis.

If we suppose that the consumer's intention is to maximize profit for a long time, in economic analysis, the time dimension could be manifested as presenting money flows to their current value, that is, through introducing discount interest rate. Discount rate is an important factor at determining the cost of the resource exploitation. If the growth rate of the resource value (the sum of their biologic growth and the rate of their growth of price) is higher than the discount rate, such resource should not be used; it is because if we do not exploit it, it turns into investment. For example, if the value growth of wood in a forest or fish in water is higher than the discount rate, then it is worthwhile to postpone the utilization of the resource and wait for the profit.

If the discount rate were zero, then it is quite reasonable that the yield value rate would be higher than the discount rate; therefore, utilization of that resource would not be worthwhile. On that level, the population starts regenerating per its natural rate. If the discount rate has been on a high level for a long time, it can, under all other unchanged conditions, bring to elimination of some biologic species and to devastation of the natural funds resources. Thus, as natural funds can be used during unlimited period of time, it is necessary to manage them properly.

5. Indicators of the natural funds ecologic state

Talking about valuing nature and its resources, which include the natural funds, it is to admit that none of currently

known methods satisfy even the needs for approximate estimation. If there is no trade valuing, each attempt to make the state realistic can lead to serious mistakes. Whether we accept the „hedonistic“ way of determining prices, hedonic pricing, or the method of willingness to pay for a certain natural wealth, the possibility of arbitrage is great. Although the latter is widely applied nowadays in ecologic-economic analyses, even in the countries of Central and Eastern Europe, within consideration of ecologic aspects of economic transition (Kaderjak and Powel, 1997), the essential problem is still not solved.

The question how to value a natural good or fund on the basis of the statement of its potential consumer, while the mentioned statement is not obligatory for anyone, even for the person who has given it, neither makes any real effects nor makes any attempt to apply this method objectively. That is why the practice of forming ecologic account and separate ecological indicators display some advantages relating to attempts to integrate economic and ecologic accounts. This is proved by the experiences of Canada, Great Britain, the USA, the Netherlands, Norway and France (Theys 1989).

However, this approach has its disadvantages as well. The values given in physical units are possible neither to aggregate nor to perceive through them complex effects of the natural changes. Because of the lack of adequate ponderers, the values of certain indicators become immeasurable and matchless.

A frequent problem is observing natural resources, especially natural funds, whose levels of supplies are not possible to determine with certainty, so that, instead of the level of supplies at the beginning and at the end of analysing period, the data on streams (emissions of poisonous matters, dangerous gases, level of noise, energy consumption, etc) are used. In order to overcome somehow the mentioned disadvantages, it was made (Jackson and Marx 1994) the index of sustainable economic welfare (ISEW). It is based on adapting conventional makro-economic aggregates (GNP and GDP) by involving the costs of personal consumption connected with ecologic circumstances.

However, neither ISEW nor other composite indices reflect completely the reality of changes. It is so because of the following reasons:

- A) they integrate the indices that can move among each other in a completely different direction, and
- B) involve only those ecologic changes that can be monetary expressed; that is why the question of valuing becomes current again.

On the basis of the above, it can be concluded that the systems of observing indicators offered up to now, have had numerous theoretical and practical problems. Apparently, overcoming disadvantages of conventional way of accounting, by redefining existing makro-economic aggregates, can be somewhat more effective solution.

Therefore, the overall conclusion may be that the problem of valuing non-market natural resources still remains one of the most delicate, open issues in economics of the environment

and natural resources. Future efforts to involve the influence of the capital of the nature, through „makro-economic accounts“, and by this, the natural funds, as well, will depend on further progress on this field.

6. Strategy of the development of the natural funds protection

Excessive exploitation of some animal and plant species (collecting, hunting, fishing), as well as illegal trade, and occurrence of invasive types of water, air and soil pollution, can be grouped among factors that significantly endanger the environment.⁶

Reducing pollution and draining natural funds is achieved by economic and other subjects, in such a way to provide availability for future generations. For this purpose, it is necessary to set effective strategies to protect these values.

Economic subjects, that is, enterprises, as well as the management on the level of the whole society and widely, should rely on the following postulates:

- 1) establishing the system of protection and sustainable consumption of natural wealths, that is, resources, (air, water, soil, mineral raw materials, forests, etc.);
- 2) strengthening interaction and achieving significant effects between the environment and developing politics of other sectors;
- 3) investing into reduction of the environment pollution, as well as development of clean technologies;
- 4) reducing high-energetic intensity of the Republic of Serbia economy with more effective consumption of fossil fuels ; (effort to save them as much as possible);
- 5) encouraging use of renewable sources of energy;
- 6) planning sustainable production and consumption, and reducing waste per unit of a product;
- 7) protection and preservation of bio-diversity.

Establishing the system of managing the environment protection in enterprises, its maintenance and continual improvement, with promotion of the quality of services, should be a preferred task of the society itself for harmonizing long-term business politics, on one side, with requirements of ecology, on the other side.

7. Measures to preserve and protect the natural funds

Gradual extinction of some and appearance of other species is the process of evolution. However, a man, through his numerous activities, accelerates this process. In conditions of

private property, despite the right of an individual to limit access to his property for other people, high prices of resources, as well as low costs of exploitation, can lead to drastic consumption, per rate greater than the possibility of resource regeneration, which is, definitely the end of a biologic population.

The difference between the price of a resource unit and costs of its exploitation is called rent or net resource price. Thus, high rents and high discount rates lead to devastation of a resource. To prevent this, public subjects, that is, states, conduct a number of technical, legal and economic measures. The spectrum of measures and instruments, intended to preserve natural resources, overcomes the measures of economic policy in its narrow sense, so that, it moves into the domain of ecological politics⁷.

All measures intended to preserve renewable resources can be grouped into the following way:

- 1) Legal measures
- 2) Quantitative limitations, and
- 3) Economic measures

As far as the legal measures are concerned, we, most often, have in mind establishing the right to property over resources. Whether it is about the right to property, that is, private property, or the right to use through concession, the aim is the same:

- to prevent free approach and uncontrolled consumption of resources. It is similar to the way we behave with the public law, when a state, for example, extends its jurisdiction over the area of 200 nautical miles from the coast for the sake of preserving fish and other salt-water species.

However, these measures themselves do not guarantee preservation of biological populations. This is the reason why they are combined with the measures of quantitative limitations. The quantitative limitations can refer to:

- a) limitation of efforts, and
- b) limitation of quantity of exploited „harvested“ resource.⁸

If we, however, take into consideration different scientific disciplines, the measures undertaken to protect the natural funds, can be divided into the following three wholes:⁹

- 1) Scientific basis for protection of endangered species based on the Red Lists and the Red Books which contain basic data on endangered species, as well as the level of their vulnerability on a certain territory. (In 1999 it is published the „Red Book on the Flora in Serbia“).
- 2) Legal protection of the endangered species refers to the legal acts (laws, directives, declarations, codes, and alike) on the international or national level, on the basis of which , to the endangered species, depending on the level of vulnerability, it is awarded the level of legal protection.
- 3) Practical measures for protection of endangered species involve:

⁶ <http://www.ssslink.com/mre/>

⁷ http://www.eko.vojvodina.gov.rs/ocuvanje_biodiversiteta

⁸ <http://www.eko.vojvodina.gov.rs/>

⁹ <http://docs.google.com/viewer>

- „In-situ“ protection – preserving populations in their natural habitats (reserves, parks);
- „Ex-citu“ protection – cultivation of certain populations outside their natural habitats (botanic garden);
- Reintroduction – putting back the endangered species to their natural habitats;
- Introduction – the attempt to settle artificially the species on the space which is not their natural habitat;
- Education and presentation of up-to-now results and knowledges.

8. Conclusion

Since people have been mistaken for a very long time that the nature, in immeasurable amounts, has gifted its wealths, they, by fast growth and development of economy, have used and exploited the raw materials in great quantities. The understanding on self-sufficiency and abundance have been replaced by fear and uncertainty for further survival and economic progress of mankind. These were also the main reasons for introducing a new concept titled “Managing natural resources”. In the base of this concept, further growth and development are based on rational consumption of primary resources, as well as on replacement of non-renewable by renewable natural resources. This approach, at the same time, provides sustainable development of economy. Conciliation of aims of all three dimensions of sustainable development (of the society, economy and environment) is a complex problem which requires multidisciplinary and interdisciplinary approach in research, and cannot be in the focus of just one science.

People have to understand once forever that the laws of money cannot be beyond the laws of nature, so that the latter have to be respected in order to achieve success and prosperity of the humal community, and thus preserve the natural resources for future generations. There are no clear conceptual bases and agreed methodologic attitudes on how to follow, on the level of individual productivity-business systems, ecological changes caused by economic activity. Therefore, it is still far away, even in the most developed countries, the possibility to proscribe the obligation for enterperises to keep and publish data relating to eco-accountancy. For that reason, future development of society should be based on harmonized, not on conflict, relations between economy and ecology – since both have the same aim – that is „Making profit with maximum preservation of the environment“.

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