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METHODS OF ECONOMIC ASSESSMENT OF NATURAL RESOURCES

Abstract
The aim of the scientific work is to research the main concepts of economical evaluation of natural resources. Tasks associated with the aim: To research natural resources as an active factor for sustainable development; To research widely used economical approaches of economic evaluation of natural resources; To research main criteria for making the „right" decisions. Effective use of natural resources ensures growth of a country. Ineffective use of natural resources can potentially cause serious losses to environment and economics; Not always it is possible to substitute natural capital with different forms of capital. Its decrease can affect sustainability and development of economics; If economic growth is faster than use of natural resources, then state policy of resource use is based on sustainability. Prior to economic valuation of natural resources and using them in economics, it is essential to develop a united economic approach. It is necessary because evaluation methods should become a united system. When using natural assets, the aim is to achieve the highest benefit and the least wear and tear. Sustainable development is when there is balance between human social environment and economic environment. Not always nature assets can be substituted by different forms of assets. Decrease in nature assets can affect development and sustainability of economics.

Key Words: Natural capital; Assets of natural resources; Economical approach; Productivity of natural resources.

Introduction

Over the last years use of natural resources in the world has increased. It is due to fast production development, progress of science and technology and increase of population. It puts extra pressure on nature and this in turn creates problems with environmental management.

Creation of environmental economics is connected with economic solution of world problems. It is possible to ensure sustainable development by carrying out economic valuation of natural assets. The basis of evaluation of natural resources is social environment, natural environment and economic environment. Various popular economic approaches should be used.

The aim of the scientific work is to research the main concepts of economical evaluation of natural resources.

Tasks associated with the aim:

- To research natural resources as an active factor for sustainable development;
- To research widely used economical approaches of economic evaluation of natural resources;
- To research main criteria for making the „right" decisions.

EU region statistic data and specialist literature was used to solve the tasks of the research. Following methods were used in the research: abstract logical, monographic, document analysis, mathematical statistics, deduction and synthesis.

Results and discussion

Extracting natural resources and production and processing connected with natural resources, and consumption of natural resources is basis not only to human agricultural activity. It also causes various environmental and health problems, including climate changes, eutrification of water bodies, accumulation of hazardous chemical substances in living organisms, increasing amount of waste, changes in landscapes and biotypes. (Hackett S.C., ...2006)

Economic assessment of natural resources is carried out using 2 groups of assessment methods: Indirect method, employing marked methods (substitution method; method of productivity or income changes; hedonic method; travel costs method); Direct method (constructed (hypothetic) marked method) (Turner R.K. ...., 1999.)

Effective use of natural resources promotes growth of a country, ineffective use of resources decreases potential of sustainability of a country. Ineffective use of natural resources can potentially cause serious losses to environment and economics.

Prior to economical evaluation of natural resources and their use in country's economics, it is important to develop a united economic approach. It is necessary as the methods of economic evaluation of natural resources should not be used only for isolated cases but they should become a united system. The main conceptual principles of economic evaluation methods of natural resources are:

1. Natural resources as asset – in economics environment is considered as a complex asset that provides different services
2. Economic approaches
3. Standard Criteria to decision making (Tietenberg, T. .....2006.)

Natural resources as assets

It is a very special asset that ensures not only our existence but also development of economics. When using any assets, we want to ensure that we achieve the highest level of utility and the least wear and tear. (Harris J. ..... 2006)

Natural resources provide economics with raw materials that are turned into goods via process of production (Figure 1). Environment also provides a direct service to the consumer.

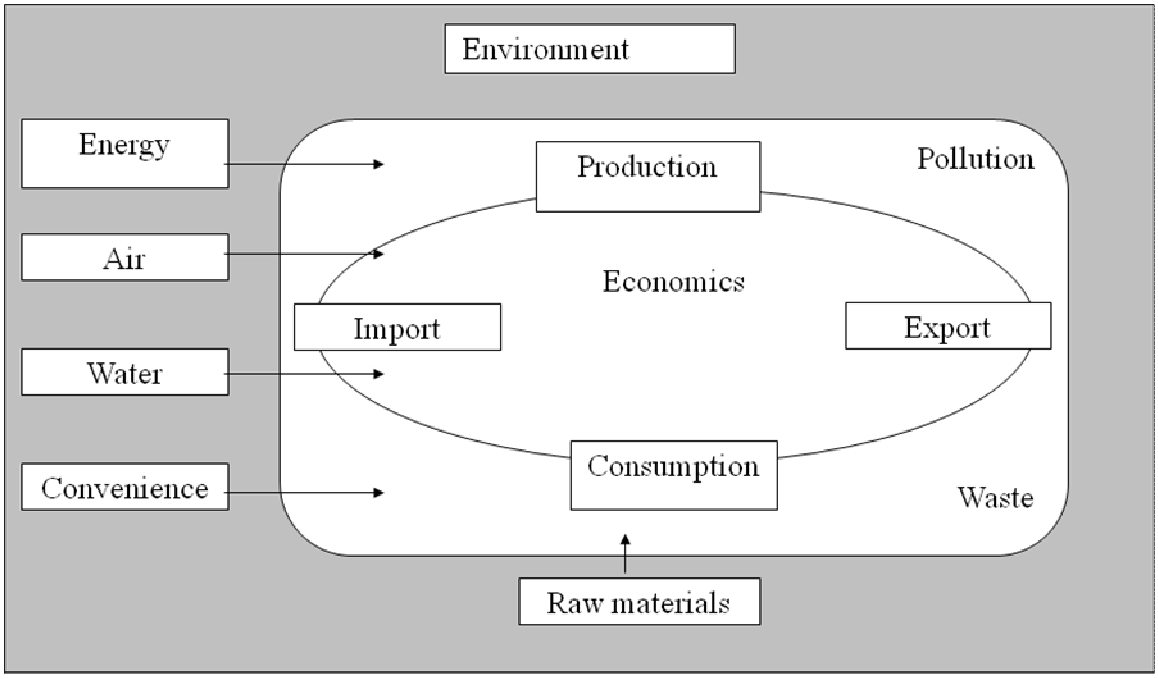

Figure 1 Economical System and Natural Resources. (Tietenberg, T. .....2006.)

When referring to natural resources as an asset, it is clear that the resources are limited but our wishes are unlimited. Therefore there is a tendency that the speed of extraction and use of natural resources is growing to the maximum but the resources are limited. Growing population and growing standards of life mean that demands and expectations are growing but increasing attention is paid to environment and its protection. Complexity of environmental economics is determined by meeting these contradictive conditions and restrictions. Not only it is essential to compare all costs and outcome but also evaluate efficiency of use of natural resources.

Central problem that is being solved by environmental economics is shortcomings. The market shortcomings mean that the market is wasting resources. The market shortcomings are visible when the market does not use resources to create the best possible social welfare and at the same time ensure the resources are used effectively and the environment is protected. (Hanley, N., Shogren, J., White, B.,....2007)

Environmental economic issues are characterised by following aspects:

1. Environmental aspect – determines interdependence of production, power industry, transport and environment.
2. Exploitation aspect – coordinates capacity of production, power industry, transport and warehouses and shipping capacity;
3. Technology aspect – is used in production, power industry, logistics, technology processes in accordance with optimal masurements determined by the progress of science and technology;

4. Energy aspect – is economy of energy in various aspects of environment determined by definition of energy and the price increase;

5. Commercial aspect – describes economic efficiency. It consists of planning, management and legal documentation;

6. Economic aspect – determines all costs connected to several elements of environmental economic in order to form advantages of efficiency of the system. (Turner R.K. ....., 1999.)

The same problems affect all components of environmental economics. They are connected with creating costs and evaluation of efficiency of investment.

Three pillars of sustainable development are shown in Figure 2.

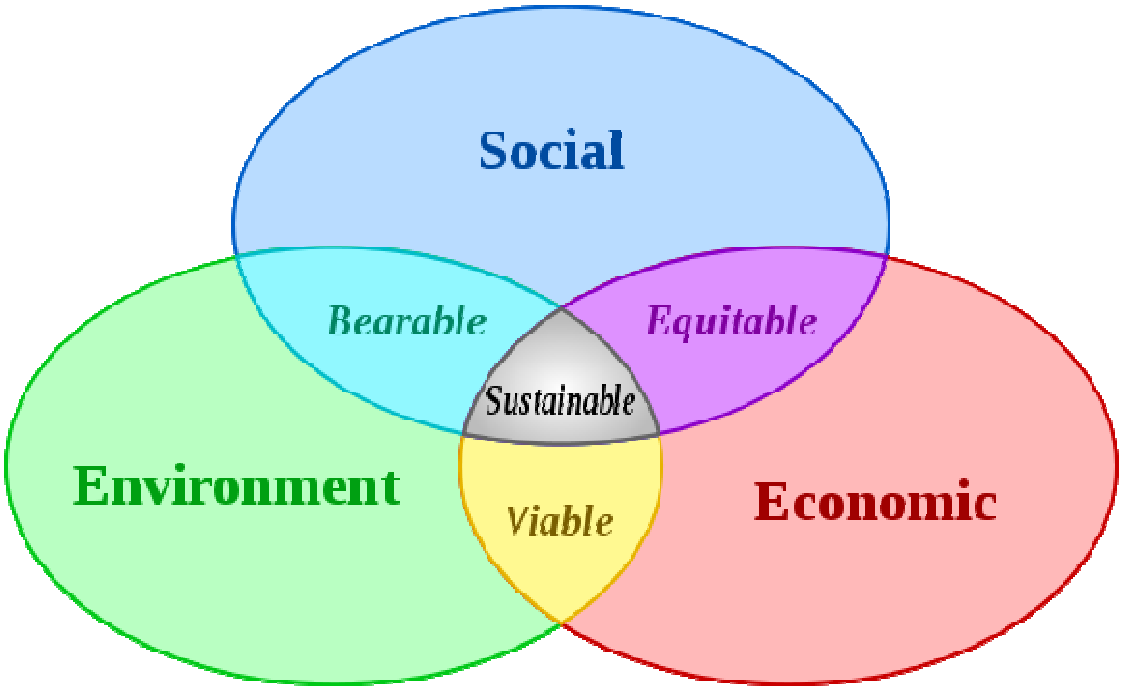

Figure 2 Three Pillars of Sustainable Development

Source: Johann Dréo , Sustainable development

It is shown in Figure 2 that sustainable development is only when there is a balance between social environment, environment and economic environment. Currently Latvia is trying to find balance between natural environment and social environment and between social environment and economic environment. There are some efforts put in to find balance between natural environment and economic environment but this is only initial stages and will need more development. Currently there is no balance in Latvia that would ensure sustainable development.

Environmental economics include Economy of utilisation of natural resources and environmental or natural assets. Utilisation of natural resources focuses on research of

relationship of environment and social production. Its task is to research rules that are created by society using natural resources to provide for their needs

One of the most important indicators about natural resources and their economic valuation is natural assets.

Natural assets are formed by ecosystems (sea, forest, agricultural land etc) that create and support ecosystem services and natural resources necessary for existence of human race. Ecosystem services include supply of food, regulation of water, air and climate, preservation of soil fertility, circulation of nutrients, aesthetic and cultural values of nature etc. (Millennium Ecosystem Assessment...., 2005)

There are 3 types of natural assets: critical, constant and tradeable natural assets. When the natural assets decrease, access to resources and services that are important to human survival and quality of life also decreases. (Millennium Ecosystem Assessment...., 2005)

Natural assets not always are replaceable with different forms of assets. Its decrease can significantly affect sustainability and development of agriculture. Currently in the world stores of natural assets are decreasing. Therefore economic evaluation of natural resources and their effective use has become more important. Environmental and natural axioms have to be combined in order to make progressive economic decisions about management of natural assets.

Economic approach

Different economic approaches can be used when evaluating resources economically. It provides better understanding about connection between economic system and natural assets.

Positive economics shows what is, what was and what will be. Normative economics answers the question what should be. Argument between these economics ensures continuous development and both approaches are important. (Tietenberg, T. .....2006.)

For example, in order to evaluate dynamics of use of natural resources, positive economic approach is used. It helps determine whether use of resources has increased, decreased or has stayed on previous level. (Table 1) To determine whether the speed of utilisation of natural resources is acceptable or not and also to analyse possible ways of using natural resources, normative economic approach is used.

Table 1

Peat Extraction in Latvia

Rādītājs		**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Peat extraction (thousands of tonnes)		824,6	399,1	467,5	846,6	585,2	595,1	791	1000	541,2	865,5	855,5
Decrease/ increase			- 51,6%	17,1%	81,1%	- 30,9%	1,7%	32,9%	26,4%	- 45,9%	59,9%	- 1,2%
Absolute increase	C		-425,5	68,4	379,1	-261,4	9,9	195,9	209,0	-458,8	324,3	-10,0
	B		-425,5	-357,1	22	-239,4	- 229,5	-33,6	175,4	-283,4	40,9	30,94
Speed of growth	C		0,48	1,17	1,81	0,69	1,02	1,33	1,26	0,54	1,60	0,99
	B		0,48	0,57	1,03	0,71	0,72	0,96	1,21	0,66	1,05	1,04
Speed of increase	C		-0,52	0,17	0,81	-0,31	0,02	0,33	0,26	-0,46	0,60	-0,01
	B		-0,52	-0,43	0,03	-0,29	-0,28	-0,04	0,21	-0,34	0,05	0,04

C – Chain

B – Basis

Source: Authors' calculations from the Central Statistical Bureau

Normative economic approach can be used in different contexts: for example, to design desirable situations or to evaluate efficiency of the current situation.

Normative criteria for decision making

If it is essential to find out whether the proposed actions are desirable, the first step should be determination of benefits and losses. If benefits are higher than losses then action is desirable. This simple system is economic basis in decision making.

It can be formulated as follows: if B is benefit from use of natural resources and C is costs then:

- B>C action desirable;
- B< C action to be rejected
- B = C point of no losses

Also, if B/C >1 action is desirable.

All benefits and costs are evaluated taking into consideration their effect on development of humankind.

Benefits can be found on demand curve of goods or services. Demand curve shows the price people are ready to pay for quality goods. Analysis of benefits and costs is carried out.

For example:

- In 2009 peat extraction was carried out by 42 companies. 16 of them were members of Peat production association..
- Extraction volume (16 companies) 640,68 thousand tonnes
- Turnover (16 companies) was over 51 million lats

This example shows the economic benefit is 51 million lats. Overall it is difficult to use the method as crucial data is missing. Data that is missing is: economic profit or loss – this indicator can be found in company's yearly calculations of profit and loss; benefits or losses to social environment. This indicator can be found by carrying out sociologic questionnaire; environmental benefits and losses – this indicator can be obtained by an expert method.

Basic rules of microeconomics are used to carry out more precise analysis (Figure 3)

If marked has complete competition mechanism:

- Prices of resources are determined by marked forces – balance of demand and supply.

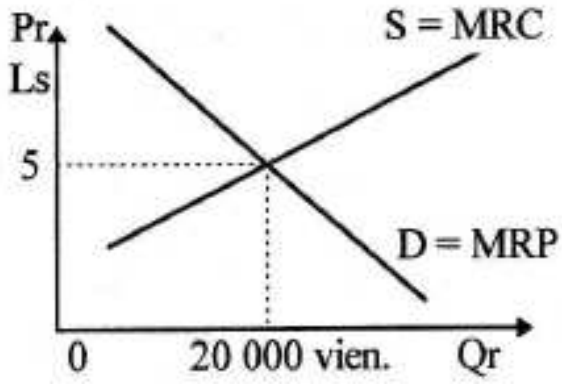

Figure 3 Basic rules of microeconomics

Source: Mankiw, N.,G.,2009

MRC – Border costs of resources

MRP benefit from selling the product or monetary value of border product.

Demand for resources is determined by monetary value of border product. (MRP)

MRP= MR * MP (specification of incomplete market)

(MR – border profit; MP – border product)

In circumstances of perfect market competition MR = P

MRP = P * MP

<u>Rules of balance in the market:</u>

MRC = MRP balance

MRP > MRC it is possible to increase overall benefit if amount of resources is increased

MRP < MRC if extraction of resources is increased, losses will be suffered.

By reaching higher productivity of resources (for example greater added value from using one tonne of resources) higher level of dematerialisation is reached.

Productivity of natural resources in EU27 is shown in Figure 4.

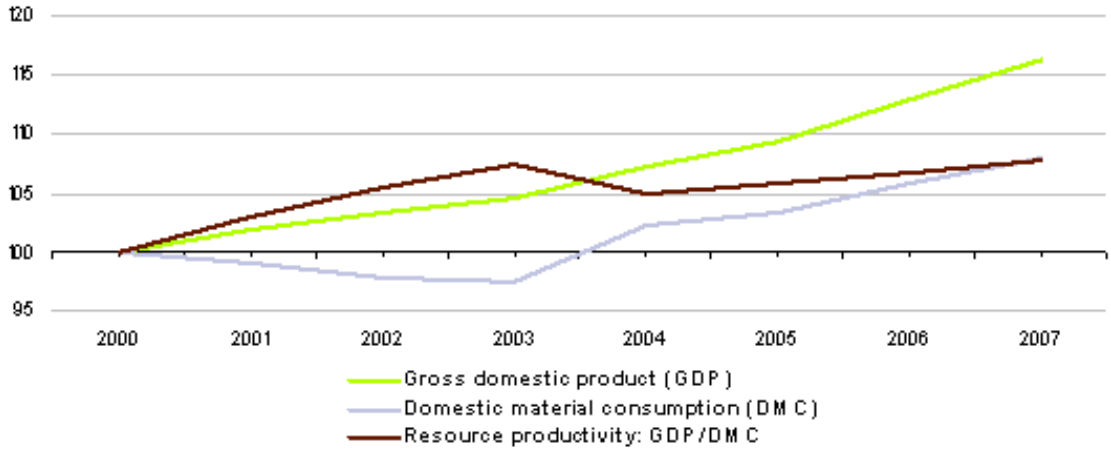

Figure 4 Productivity of natural resources

Source: Eurostat

Overall positive trend is shown. Increase in GDP means increase in productivity if natural resources. It is necessary to increase the productivity to ensure more effective use of natural resources in order to achieve sustainable development.

Table 2 shows productivity of natural assets in EU27 and in Baltic countries.

Table 2

Productivity of natural assets

Territory	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
EU27	1,21 (-i)	1,24 (-i)	1,27 (-i)	1,3 (-i)	1,27 (-i)	1,28 (-i)	1,29 (-i)	1,3 (-i)
Estonia	*0.32*	*0.34*	*0.32*	*0.25*	*0.28*	*0.31*	*0.31*	*0.27*
Latvia	*0.24*	*0.27*	*0.27*	*0.29*	*0.29*	*0.29*	*0.31*	*0.31*
Lithuania	*0.44*	*0.53*	*0.47*	*0.38*	*0.42*	*0.43*	*0.46*	*0.43*

Source Authors' calculations from Eurostat

It is shown in Table 2 that productivity of resources is increasing but in Latvia it has remained on the same level over last few years and it can not be considered as a positive trend.

Conclusions

- Effective use of natural resources promotes development of a country. Ineffective use of natural resources decreases potential of sustainable development of a country. Ineffective use of resources can also cause considerable losses to environment and economics.

- Prior to economic valuation of natural resources and using them in economics, it is essential to develop a united economic approach. It is necessary because evaluation methods should become a united system.
- When using natural assets, the aim is to achieve the highest benefit and the least wear and tear.
- Sustainable development is when there is balance between human social environment and economic environment.
- Not always nature assets can be substituted by different forms of assets. Decrease in nature assets can affect development and sustainability of economics.

Suggestions

- To develop united system prior to approving economic evaluation and management plans of natural assets.
- To use not only positive economic approach but also normative economic approach when evaluating natural assets.
- To create future situations of use of natural resources and analyse them by using economic principles.
- When carrying out economic analysis of natural resources, take into consideration not only speed of development but also productivity.

Bibliography

1. Dréo Johann, Sustainable development .http://www.h-gac.com/community/sustainability/documents/peer-ws_03-28-2011_city_of_galveston.pdf [10.04.2011.]
2. Hacket , S., C., Environmentas and Natural Resources Economics. London: Armonk, New York., 2006.
3. Hanley, N., Shogren, J., White, B., Environmental Economics in Theory and Practice, Palgrave, London, 2007.
4. Harris J. Environmental and Natural Resource Economics: A Contemporary Approach., Houghton Mifflin Company, 2006
5. Mankiw, N.,G., Principles of Microeconomics, South- Western Cengage Learning, 2009
6. Millennium Ecosystem Assessment (2005). Ecosystems and human well-being biodiversity synthesis, 2005.100 lpp
7. Tietenberg, T., Environmental and natural resource economics Boston Pearson/Addison Wesley, 2006.
8. Turner, K., R., Pearce, D., Baterman, I., Environmental economics, Baltimore: The Johns Hopkins University Press, 1999.
9. Eurostat Home. http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/ [10.04.2011.]
10. Central Statistical Bureau of Latvia. http://www.csb.gov.lv [10.04.2011.]