Economical and Public Administration Aspects of Biodiversity Maintenance

Аспекти державного управління та економіки збереження біорізноманіття

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Abstracts

The maintenance of biodiversity is pre-condition of the biosphere's sustainable state that forms the necessary terms of human physical existence on the Earth and socio-economic system functioning. Biodiversity maintenance is a public administration action result and economic mechanisms that provide the socio-economic system functioning. A biodiversity determines quantitative and quality composition of ecosystems predetermines pre-conditions of biosphere firmness.

The maintenance of biodiversity in Ukraine has a difficult hierarchical structure of authority, and is characterized by the inconsistency and the unclear functions and duties allocation. The biovariety maintainance function is represented only in 4 % from the general amount of regions of Ukraine in the public administration organizational structure of environment protection. Most part (56 %) belongs to the regions which have the public administration incorporated function in biovariety maintainance industry. All of these require a scientific justification and subsequent improvement of management organizational structure of biovariety maintainance in Ukraine.

The analysis of state and local management systems of the Ukrainian biodiversity has been done. The biodiversity conservation functions analysis and classification have been carried out. The economic effect of biodiversity functioning has been estimated using forests and swamps ekosystems as an example. The necessity of biodiversity in the GDP of the state has been justified.

Збереження біорізноманіття в Україні має складну ієрархічну структуру органів управління, характеризується деякою безсистемністю, нечітким розподілом функцій та повноважень. Лише у 4 % від загальної кількості регіонів України функція збереження біорізноманіття відображена у організаційній структурі держуправлінь з ОНПС. Найбільша частка (56 %) належить регіонам, що мають об'єднану функцію державного управління у га-

лузі збереження біорізноманіття. Все це вимагає наукового обґрунтування та подальшого удосконалення організаційної структури управління збереженням біорізноманіття в Україні.

Розраховано економічний ефект від функціонування біорізноманіття України на прикладі лісових і болотних екосистем. Розроблено методику економічної оцінки функціонування біорізноманіття. Обґрунтовано необхідність урахування біорізноманіття у ВВП держави.

Key words:

ekosystems, public administration, biodiversity, conservation, economic.

екосистеми, державне управління, біорізноманіття, збереження, економіка.

Introduction

Ukraine, covering only 6 % of the total area of Europe, has 35 % of its biodiversity. Biodiversity is one of the key components of sustainable development, environmental policy of EU countries and in the world, so we need a clear effective management system of biological diversity. It is necessary to improve the actual organizational structure and necessity of the national biodiversity conservation led to this research.

The recent studies analysis concerning a given problem

Biodiversity creates a safe and healthy environment, provides the population with food, medicines, raw materials for industry. It also supports the ecosystems functioning, including circulation and purification of natural waters, soil conservation and climate stability. That is why biodiversity is studied in a number of scientific papers, including T. Andrienko, Toddler, AJ Alexandrova, O. Veklych, O. Wroblewska, L. Hryniv, Y. Remarks the PI Amana, LG Miller, I. Sinyakevich, AJ Sohnych et al. However they are mainly conserned with the maintenance of the ecosystems ecological state, but administrative and economic elements remain insufficiently studied.

However, according to the work of foreign experts (Fabijanski P, SN Bobyleva, Motkyna GA, Tulupova AS, James AN, Green MJB, Paine J., Dixon J., Pagiola S., Brink BIE, Butler RW, etc.), the real economic assessment of biodiversity should be obtained and later be reflected in the national accounts of each country for efficient storage and accounting functioning. All theses determine the purpose, the subject and the object of this study.

Objectives

The purpose of this paper is to analyze the biodiversity actual management system, identify gaps in the system and develop the measures to eliminate them.

The presentation of main research material with full scientific results justification

The control system of biodiversity conservation in Ukraine has a complex, extensive and multi-layered structure. The central executive body is the Ministry of Ecology and Natural Resources of Ukraine, which manages the processes of biodiversity preservation and restoration. In recent years there was some instability in the functioning of the ministry, frequent reorganization of departments, their functions, accountability, and duplication of functions. Nowadays, the Department of Natural Resources and Department of Protected Areas play a key role in biodiversity preservation (Fig. 1).

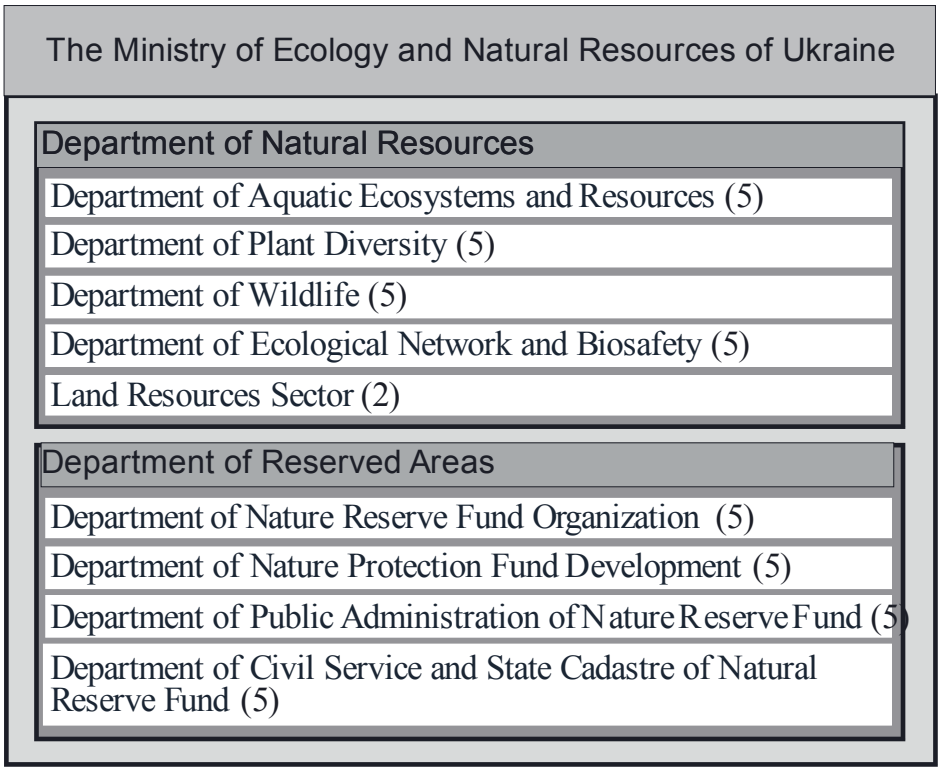

Figure. 1. Organizational biodiversity subdivisions within the Ministry of Ecology and Natural Resources of Ukraine

Territorial units (departments, sectors) of state departments of Ukraine Environmental Protection of regions, the competence of which is the conservation of biodiversity and it is given in Table 1. In this paper, such units are classified into four groups: a separate function of biodiversity preservation (group 1), a combined function of biodiversity preservation (group 2, departments), and the combined function of biodiversity preservation (group 3, office) lack of preservation unit (group 4).

Table 1. Subdivisions of regional departments responsible for biodiversity conservation

Number	The grouping of Ukraine regions	Region	Title of the department that is responsible for the conservation of biodiversity
1	2	3	4
1.	Group 1. Separated function of biodiversity conservation	Volyn	Department Reserves, biodiversity and integrated management
2.		Lugansk	Department of land and mineral resources, flora, fauna, natural protected areas and ecological networks (direction of biodiversity, nature conservation, ecological network)
3.	Group 2. Combined preservation function of biodiversity (Departments)	Vinnytsa	Department of Land, bioresources, nature reserve and Ecological Expertise
4.		Donetsk	Department of protected areas, water and biological resources
5.		Ivano-Fran-kivsk	Department of Environmental Network, nature reserve and Biological Resources
6.		Kyiv	Department of bioresouces, nature reserves, information and communications
7.		Lviv	Department of Monitoring, management of biological resources, and ecological network of nature reserves and public relations
8.		Rivne	Department of State ecological expertise, monitoring, public relations and Reserves
9.		Poltava	Department of bioresources, land issues and the nature reserve fund
10.		Sumy	Department of Nature Protection Fund and Reserves
11.		Kharkiv	Department of monitoring, public relations, environmental economics, coordination of environmental programs, bioresources and nature reserve

12.	Group 2. Combined preservation function of biodiversity (Departments)	Khmel-nytsk	Department of integrated management and control of biological resources, Protected Areas and Ecological Network
13.		Cher-kassy	Department of land resources, flora and fauna, nature reserve, Ecological Network and Radiation Safety
14.		Cherniv-tsi	Department of bioresources, nature reserve and network formation
15.		Cherni-hiv	Department Reserves and ecological networks, and public relation
16.		The Crimea	Department of regulation and use of bioresources and reserves
17.	Group 3. Combined preservation function of biodiversity (Offices)	Zhyto-myr	Office of bioresources, nature reserve and econetwork formation
18.		Odessa	Office of bioresources, nature reserve and econetwork formation
19.		Dnipro-petrovsk	Office of bioresources, nature reserve
20.		Zakar-pattya	Office of econetwork formation, nature reserve
21.		Zapori-zhia	Office of environmental management, protection and restoration of biological resources, nature reserve and ecological networks
22.		Kirovog-rad	Office of natural reserves, mineral resources and the ecological network
23.		Ternopil	Office of bioresources, nature reserve and econetwork formation
24.		Kherson	Sector of reserve management and bioresources
25.	Group 4. Lack of preservation of biodiversity unit	Myko-layev	Office of conservation programs and monitoring

According to the table 1, the largest proportion (56 %) belongs to regions with combined functions of state administration in the field of biodiversity (group 2) which are presented in the structure of the executive authorities departments (regional departments of Environmental Protection). In particular, these units due to their duties ensure the conservation of biological and landscape diversity, establish an ecological network, develop of reserve management, protect and use of territories and objects of natural reserve fund, keeping the Red Book of Ukraine

and the Green Book of Ukraine.

Only two regions of Ukraine (8 %), in particular, Donetsk and Luhansk regions have got environmental conservation departments in the state organizational structure. This is very positive to the biodiversity preservation.

The following divisions were established in the fourteen regions of Ukraine, namely in Vinnitsa, Donetsk, Ivano-Frankivsk, Kyiv, Lviv, Rivne, Poltava, Sumy, Kharkiv, Khmelnytsky, Cherkasy, Chernivtsi, Chernihiv oblasts and Crimea. The Second place is occupied by 32% of the regions of Ukraine (Zhytomyr, Odesa, Dnipropetrovsk, Transcarpathian, Zaporozhye, Kirovograd, Ternopil, Kherson region), where the function of biodiversity preservation lies on the offices of the state authorities. (Group 3). It should be noted that the offices are not separate units and they have a narrower range of responsibilities than departments. Therefore, this fact can be considered as a drawback of the existing management. According to the the analysis of this research, just in Mykolyiv region there isn't a special unit that is responsible for the function of biodiversity. Instead, this function is assigned to the department of environmental programs and monitoring. Clearly, this leads to the lack of system management in biodiversity preservation in this region.

Experience of Nature Conservation in Poland: Public Administration

In Poland, for example, forest area of 9 million hectares and forest cover was 28.8% of the total area of the country. For one person has an average of 0.24 ha of forest. State Forestry «Forests Panstvove» includes 428 nadlisnytstv, which are subdivided into 5680 forest. Headed «Forests Panstvove» by general director, which is subject to the general direction of the Bureau State Forest, and 17 regional directorates. The structure of the State Forestry «Forests Panstvove» also includes:

- forest general bank in Kostshytse;
- Cell culture Holuhovi timber;
- Information Centre national forests in Warsaw;
- The center of the development and implementation Bedonyu;
- Cell Technology Yarochini timber;
- Department of Informatics state forests in Lodz;

The basic unit in the management of forests is nadlisnytstva. Integral part of the General Directorate of State Forests are also complex 9 Conservation of Nature and 11 regional inspectorates. In the State Forestry «Forests Panstvove» with more than 26,000 people.

The Comparison of Forests in Poland and Ukraine

In Ukraine, as forest conservation care of the State Agency of Forest Resources. Forest management at the local level state enterprise that are managed by the State Agency of Forest Resources of Ukraine and coordinated by its appropriate regional authority (Reskomlis Crimea, 24 regional departments of forestry and hunting). The economic evaluation of Ukraine forest and wetland ecosystems effectiveness was carried out in this research due to the fact that forested and open wetlands cover about 20 % of Ukraine (Table 2).

Table 2. The Comparison of Forest in Poland and Ukraine

Country	Area of forests, thousand ha	Share of forest, %	Area of Nature Protection Fund (NPF), thousand ha	Share of NPF from the total territory, %	Specific indexes			
					Forest on a one ha territory	Area of NPF on a one ha territory	Forest per one person, ha/person	NRF, per one person, ha/ person
1	2	3		4	6	7	8	9
Poland	8890	28,5	7130,4	22,8	0,284	0,228	0,233	0,187
Ukraine	10400	15,9	3670,5	5,4	0,173	0,06	0,23	0,07

Although Ukraine has a larger area of the territory which is occupied by forests than Poland, but the proportion of the total territory is of nearly half.

The research showed that in the modern practice of biodiversity cost-effectiveness evaluation, there are not any elaborated methodological approaches, due to the following reasons:

Table 3.The structure of Ukraine land fund

№	Indicator	Area, thousand ha	Share of total area, %
1.	Total land	60354,8	100,0
2.	Forests and wooded area	10556,3	17,5
3.	Open wetlands	975,8	1,6

1. There is not any real market value of natural and social resources, and as a result, the use of subjective assessments designed on economically unsound manner;
2. The lack of legal framework in evaluation of this kind in general and biodi-

versity in particular;

3. The Departmental approach to the assessment, development methodology was done by organizations subordinate departments, engaged in the use and reproduction of this type of resource.

Economic Efficiency of Functioning of Natural Ecosystems of Ukraine

Today, Ukraine cannot stay away from the prevailing world market ecosystem services due to the threat of global ecological crisis. The national economy formation delay leads to the annual loses of foreign investment in the environmental performance development. The following areas of the market ecosystem services (Economics and Organization of the nature reserve fund of Ukraine, 2007):

1. Genetic resources market of country-members of the Convention «On Biological Diversity» (Article 15). Access to genetic resources and equitable sharing of benefits from their use (strains of microorganisms, including industrial, pharmaceutical raw materials of plant and animal breeding resources, materials cryobanks);
2. Quotas market for carbon emissions and carbon sequestration by promoting forest regeneration (Kyoto, 1997). According to this Ukraine can receive $7.5 billion. every year;
3. «Debt for nature» market. (Poland, Bolivia, Costa Rica, Madagascar) The restructuring of external debt ($ 104 billion or 88,9 % of GDP). The ecotourism development investment, restructuring of enterprises which damage the unique natural objects (World Bank, World Resources Institute, the United Nations);
4. Ecosystem services market associated with the contribution of natural ecosystems to the global stability of the biosphere. The idea of international mutual payments for maintaining of global stability was signed by developed countries in Rio de Janeiro and leads to the payments of 0,7 % of GDP. In Ukraine such compensation may be between 2-6 % of GDP.

The generalization of domestic and international experience, presented in experts work (Economy Saving Biodiversity, 2002) allowed to differentiate six approaches to economic evaluation of biodiversity functioning (economic assessment based on the final national economy results, socio-economic assessment, experts review, costly techniques, rental approach and the total economic value concept). The most promising is the total economic value concept, as it provides a comprehensive approach to assessing biodiversity (Theory and practice of biodiversity (the methodology of wildlife in Russia)).

The calculation of economic efficiency of Ukraine forest and wetland ecosys-

tems was carried out on the basis of the developed methods, which are based on the concept of total economic value. The results are shown in Table 4.

So, as calculations show, an annual economic impact of Ukraine wetlands wastewater treatment is about $86 million. The total mass oxygen deposition from forests and swamps is about 60 million tons, which allows ensuring the livelihoods of 147 million people, which is three times more than the population of Ukraine. The economic impact of clean air (absorption of carbon dioxide) is about 1795 million. The total economic impact of forest and wetland ecosystems functioning was estimated at 1880 million. Annual economic impact of forest ecosystems is $150, and weatlands is 316 as per 1 ha.

Table 4. Economic efficiency calculation of biodiversity in Ukraine

№	Indicator	Calculation results		Total
		Forest Ecosystems	Wetland ecosystems	
1	2	4	5	6
1.	The economic effect of savings on the purchase of industrial wastewater treatment plants due to natural water purification, million dollars	-	85,8	85,8
2.	The oxygen production million tons	52,78	7,05	59,83
3.	The number of people whose livelihoods ensured by oxygen, million persons	130	17	147
4.	The economic impact of clean air, million dollars	1583,4	211,5	1794,9
5.	The total economic impact on the natural functioning of ecosystems million dollars	-	-	1880,7
6.	The economic operation effect per 1 ha, dollars	150	316,3	466,3
7.	The share of natural capital in comparison with the state budget (2013),%	4,4	0,6	3,01

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Comparison of the Biodiversity Functioning Effects to Budgetary Financing

The share of natural capital in the structure of Ukraine state budget was calculated to about 5 % that's 2 % – in the structure of GDP. The annual economic performance of the Ukraine forest and wetland ecosystems equals to 12 budgets of Rivne region. This indicator must be significant for preservation investment.

Table 5. Comparison of the biodiversity functioning effects to budgetary financing

№	Funded measure from Ukraine State Budget in 2009	Sum-total million	Excess effect of the Ukraine biodiversity functioning compared to budget investments
1.	The costs of the Ministry of Environmental Protection of Ukraine	1608,35	9,4
2.	Applied scientific and technical developments, state target programs and public order in the area of environmental protection, research personnel financial support	2,7	5572,4
3.	Measures for the establishment and preservation of natural areas, conducting of endangered flora and fauna inventories	66,48	226,3
4.	Formation of National Ecological Network	15,0	1003,0

Estimation of biodiversity components economic efficiency is the basic tool to prove the necessary of annual fund increasing.

One of the innovative tools to attract foreign investment in Ukraine is the implementation of the Kyoto Protocol. Economic grounding allows coming to the conclusion that Ukraine forest ecosystems efficiency occupies the second place after Russia. Ukraine forest ecosystems are able to provide livelihoods to population up to 63 million people and be the second after Poland. As carbon recipient countries, Moldova and Belarus should compensate Ukraine for these effects on forest preservation. This would allow Ukraine to restructure its external

debt (Table 6).

This comparison showed that the forest and wetland ecosystems efficiency in more than 9 times higher (research – in 5572 times, nature reserves – in 226 times, in more than 1000 time in national ecological networks) than the total budgetary investment in environmental protection in 2009. This is a definite argument for fund increasing.

Table 6. The economic reasoning of carbon dioxide absorption of neighboring countries forest ecosystems and population livelihood

№	Country	Economic efficiency million, USD		Population, thousand		
		Total	1 ha	Total	including	
					population whose livelihoods provided by oxygen due to forest	% total population
1.	Belarus	10,2	0,5	10367	629,3	6,1
2.	Moldova	3,7	1,1	4358	225,4	5,2
3.	Poland	1740	55,7	38418	107142,9	278,9
4.	Russia	177300	79,1	7911000	10917487,7	138,0
5.	Romania	1340	56,2	22820	82512,3	361,6
6.	Slovakia and the Czech Republic	920	71,9	15645	56650,2	362,1
7.	Hungary	320	34,4	10335	19704,4	190,7
8.	Ukraine	1880	31,1	48457	115766,0	238,9

Conclusions

In the process of research author has come to such conclusions and suggests such recommendations:

1. Biodiversity should receive adequate economic assessment to reflect the GDP as national wealth. According to calculations economic evaluation of Ukraine forests and wetlands functioning is more than 1.88 billion. United States (2 % of GDP and 5 % of the State Budget of Ukraine 2009 level; 3 % of the State Budget of Ukraine 2013 level). The economic account of these functions of biodiversity in GDP will allow to form in Ukraine the market of ecosystem services and to attract foreign investments for nature protection activity realization.
2. Display of biodiversity cost-effectiveness in the state national accounts and

ecosystem services will allow restructuring Ukraine's foreign debt (104 billion dollars.) over 15-20 years.

3. It is necessary to support functioning of forest and swamp arrays of Ukraine in the natural state. Occupying only 19,1 % territories of the state one hectare of swamps brings profit for society in a size over 316 dollars, forest – 150 dollars (does not take into account collection of by-products and medical plants).
4. Analysis of the actual annual funding revealed the discrepancy between the real ecosystems value (value or productivity) and public investment for their maintenance. The economic impact of ecosystems at least 9.4 times greater than the total annual state budget investment in nature conservation. The costs of biodiversity should be allocated by a separate line in the state budget.
5. The total economic value concept in terms of the direct and indirect functions of the biodiversity components is the most appropriate for the economic evaluation. Methods of economic evaluation of biodiversity by law developed by this research should be introduced. This will take account of biodiversity functions such as: wetlands water purification functions, forests and swamps oxygen production, health effects of recreational activities. The economic record of biodiversity functions in GDP will generate ecosystem services market in Ukraine and attract foreign investment into the environmental activities implementation.
6. Implementation of the Kyoto Protocol is a real opportunity for Ukraine to receive funding of $ 7.5 billion for internal environmental policy and the health of the population. Moldova and Belarus, as recipient countries emissions under the Kyoto Protocol should compensate Ukraine the forest ecosystems maintenance and invest into their development.
7. It is necessary to maintain swamps ecosystems in their natural state. It is an important function of wetland ecosystem to be a natural water filter. As society even doesn't assume that due to swamps it annually saves $ 85 million on water treatment plants installation. Moreover, it is impossible to consider all environmental economic and social functions of forest and wetland ecosystems, especially in fish recreation, sport hunting, leisure, recreation, gathering medicinal plants and by-products, etc. This is a powerful argument in the reflection environmental and socio-economic value of forest and wetland ecosystems functioning in the national state accounts confirmed by the developed countries experience.
8. Operation of forest and wetland ecosystems annually provides livelihoods of such number of people that were three times greater than its own population of Ukraine (147 million people). It has great social value that cannot be

expressed by any valuation and calculations.

9. Economic efficiency calculation of the biodiversity components is the basic tool of evidence necessary to increase in annual funding.
10. Biodiversity preservation in Ukraine has a complex hierarchical structure of government and is characterized by some non-systematic, unclear division of roles and responsibilities. Only 4% of the total number of regions of Ukraine the function of biodiversity preservation is reflected in the organizational structure of state environment authority. The largest share (56%) belongs to regions with combined functions of state administration in the field of biodiversity conservation. All this requires further scientific study and improvement of organizational management structure preserving biodiversity in Ukraine.
11. In order to improve management of biodiversity preservation we will use Poland experience, concerning the taxation of land preservation, involvement of local authorities (communes) to address issues of biodiversity preservation management at the community and state authorized territory.

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