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Innovative mechanisms of biodiversity’s maintainance

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Abstract. The basic approaches to evaluating the effectiveness of conservation based on best international experience. The economic evaluation of biodiversity resources of Ukraine has been done and the necessity of increasing the annual state budgetary financing biodiversity conservation has been improved. The methodic of evaluating the effectiveness of conservation on three levels: national, regional and local has been ordered, to better analyze the actual state of natural ecosystems, to investigate the dynamics of the cost of maintaining biodiversity by various sources (state budget of Ukraine, the cost of regional state administrations and local self-government). The experience of international financing of biodiversity conservation through environmental funds has been studied, funds of NGOs and grant projects. Scientific and practical interest in the work is the proposed funding mechanism for biodiversity conservation in the current economic climate of Ukraine. Investigated the organizational structure of government biodiversity conservation of Ukraine. The effectiveness of government biodiversity conservation has been investigated. The functions of the Ministry of Ecology and Natural Resources of Ukraine as a central body of executive power in the field of biodiversity conservation have been studied and analyzed. The staffing Ministry of Ecology and Natural Resources of Ukraine has been investigated, the system of placement and examined staffing departments of the Ministry, responsible for biodiversity Ukraine, has been analyzed. The best foreign practices of biodiversity public administration and recommendations for its implementation in Ukraine have been ordered.

Keywords: sustainable development, public administration ecology politics, biodiversity, state.

The maintenance of biodiversity is pre-condition of the biosphere’s sustainable state that forms the necessary terms of human physical existence on Earth and socio-economic system’s functioning. Maintenance of biodiversity is a result from the action of economic mechanism that provides functioning of the socio-economic system. A biodiversity determines quantitative and quality composition of ecosystems, predetermines pre-conditions of biosphere’s firmness. For example, a bogs clear water, the forests product oxygen for maintenance of vital human functions, plants used as medications.

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

nadlisnystv, 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. 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 1).

Table 1

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 2.

The structure of Ukraine 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 biodiversity 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.

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 [8]:

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 seques-

tration 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 be-

tween 2-6 % of GDP.

The generalization of domestic and international experience, presented in experts works [1-9] 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 [8, 9].

The calculation of economic efficiency of Ukraine forest and wetland ecosystems 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 3.

Table 3.

Economic efficiency calculation of biodiversity in Ukraine

№	Indicator	Calculation results		Total
		Forestecosystems	Wetland ecosystems	
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

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 im-

part 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 wetlands is 316 as per 1 ha.

Table 4.

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

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

Table 5.

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

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. 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.

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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Якимчук А. Инновационные механизмы сохранения биоразнообразия

Аннотация. Рассмотрены основные подходы к оценке эффективности сохранения биоразнообразия на основе лучшего зарубежного опыта. Осуществлена экономическая оценка ресурсов биоразнообразия Украины и доказана необходимость увеличения объемов ежегодного государственного финансирования сохранения биоразнообразия. Предложена методика оценки эффективности сохранения биоразнообразия на следующих трех уровнях: общегосударственном, региональном и местном , что позволяет лучше анализировать как фактическое состояние природных экосистем, исследовать динамику расходов на содержание биоразнообразия по источникам (средствами государственного бюджета Украины, расходами областных государственных администраций и органов местного самоуправления). Изучен опыт международного финансирования сохранения биоразнообразия за счет экологических фондов, средств общественных организаций и грантовых проектов. Научный и практический интерес в работе составляет предложенный механизм финансирования сохранения биоразнообразия в современных экономических условиях развития Украины. Исследована организационная структура государственного управления сохранением биоразнообразия Украины. Проанализирована эффективность государственного управления сохранением биоразнообразия. Изучены и проанализированы функции Министерства экологии и природных ресурсов Украины (Минприроды Украины) как центральный орган исполнительной власти в области сохранения биоразнообразия. Исследованы штатное расписание Минприроды Украины, проанализирована система расстановки кадров и исследованы штатное расписание структурных подразделений министерства, что ответственные за сохранение биоразнообразия Украины. Рассмотрен лучший международный опыт государственного управления сохранением биоразнообразия и разработаны рекомендации по его имплементации в Украине.

Ключевые слова: устойчивое развитие, государственное управление экологии политика, биоразнообразия, государственные