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FINANCIAL PROVISION MANAGEMENT FOR THE ENVIRONMENTAL PROTECTION OF THE TRANSBORDER REGION

ABSTRACT

The aim of the article is to conduct a comparative analysis of the Volyn region (Ukraine) and Lublin Voivodeship (Republic of Poland) environmental protection financing. As well as to determine the level of partnership participation in the financing of the environmental measures within the cross-border region. The system of financial support for environmental protection in the cross-border region is explored in the article. The content of the transboundary natural resource's management mechanism is considered. The main sources of funding for environmental measures in the Volyn region and Lublin Voivodeship are identified. A comparative analysis of the dynamics and structure of current costs spent and capital investments for the environmental protection of the Volyn region and Lublin Voivodeship is carried out. It is determined that the structure of environmental protection expenditures within the cross-border region is dominated by costs spent on the protection of water resources, air, waste management, and biodiversity conservation. Linear trend models were built for the amount of funding in Volyn Oblast and Lublin Voivodeship using the trend forecasting methodology. The forecast of the dynamics of the environmental protection financing within the cross-border region for 2022-2023 is determined by the method of extrapolation.

Determination of the degree of cooperation in the field of transboundary natural resources management and the division of responsibilities between its key players are important aspects of the financial model's effectiveness. The degree of cooperation in the field of transboundary natural resources management, including independent control, dialogue, cooperation, coordination mechanisms and joint management is revealed in the article. It has been proved that the cross-border relations within the Volyn region and the Lublin Voivodeship are at the level of cooperation. But it is noted that efficiency will be achieved only at the level of joint cross-border management in this area. The main tools of integrated management of financial support for environmental protection are identified. The distribution of partnership participation in the financing of environmental measures is proposed depending on their location in the border areas of the Volyn region and Lublin Voivodeship.

Keywords: trans-boundary natural resources, management, financial mechanism, environmental protection, costs and revenues

JEL Classification: F15, Q26, F36

INTRODUCTION

Any economic activity, undertaken within border areas, may cause the evolution and spread of some environmental threats and dangers, and exert downward pressure on the transboundary natural resources and their state. Therefore, when introducing various types of economic activity in border regions, we must follow the international environmental legislation. Today's Ukraine is a potential pollution source for territories of neighboring states due to a number of economical, technical, technological, organizational and other reasons. However, its own territory is constantly meeting with some dangers and threats from the EU countries bordering the western regions too.

Given the above, it is arguable that the study of issues concerning the management of natural resources being located along or crossing the international border has become

more relevant. Not only the stable functioning of the economy, the population's well-being, and the transition to the concept of sustainable development, but also good neighborly relations among neighboring states depend upon the effective management of such resources. The effective management of such resources, being divided by borders, brings to the front some friendly relations, information exchange and joint implementation of measures for their protection, use and reproduction within the context of the cross-border cooperation and its enhancement.

According to the accelerated pace of Ukraine's European integration, as well as due to the special attention paid by European governments and the public both to the environmental characteristics of partner countries and to research concerning the transboundary natural resource management mechanism and its formation within the context of the cross-border cooperation is gaining importance.

Therefore, the study relative to natural resources in the cross-border region and to its financial provision management, improvement and efficiency increase is currently central to establishing the cross-border cooperation or to bringing relations to some new and equal levels.

LITERATURE REVIEW

Basic scientific factors, principles and concepts of environmental management and environmental protection economics, management theory, mathematical modeling and forecasting in economics, the concept of sustainable development became the theoretical background of the present research herein.

Issues of sustainable development goals implementation in Ukraine are relevant [1]. In order to implement sustainable transformations in the economy of Ukraine and identify the main problems of low-carbon strategy establishment in the context of harmonization of international and state legislation, it is necessary to form effective mechanisms for financing sustainable development processes of regions [2]. Article [3] assesses the dynamics of innovation and investment provision of regional environmentally safe development in Ukraine.

The problems of financing environmental protection in Ukraine were considered by N. Kovshun, N. Piatka [4], N. Karpyshyn [5], S. Holubka, I. Shtuler, P. Biloskyrskiy [6], I. Martyniuk [7]. The current state of financial provision of environmental protection in order to identify the most significant problems and propose ways of their solution, taking into account the domestic practice and the experience of European countries was monitored in these works.

The formation of the system fiscally regulating the environmental management should be based on the diversification of the vast majority of instruments regulating taxes, economic incentives, and the compensation for some environmental losses due to the negative anthropogenic impacts [8].

The experience of foreign countries in the formation of systems fiscally regulating the environmental management is based on the diversification of such a vast majority of instruments regulating taxes, economic incentives, and compensation for environmental losses due to the negative technological and anthropogenic impacts [9].

These problems in the theoretical and methodological plane have become catalysts for numerous studies by leading scientists and the publication of their results in authoritative scientific journals. So, L. Hazuda, M. Hazuda, K. Indus studied the management principles in the sphere of the support of rural border areas development [10]; G. Grabowska, who studied the exploitation of natural resources in border regions [11], I. Laskowicz, who examined the development of geo-ecological maps of border areas as one of the forms of activity in the framework of the Polish-Ukrainian cooperation [12], B. Kawałko, who studied the Poland-Belarus-Ukraine Program within the framework of the development policy of border regions [13], I. Dubovich focused on three basic principles of the cross-border cooperation in the environmental management field: the creation of joint bodies (neighboring countries) or corresponding organizational structures of the management and control in the territories adjacent to the border, the setting up a border monitoring system that would meet international requirements for the rational use, reproduction and protection of natural resources, the harmonization of environmental laws of European states aimed at solving interstate problems of the environmental management at various geospatial levels are mentioned herein as the theoretical background too [14].

To organize proper financing of the qualitatively new principles regulating the use, storage, improvement, and protection of natural resources, the introduction of new, non-typical, non-traditional approaches is required. The approximation, attachment of nature needs to a specific territory, the consumer of natural resources, the establishment of priority areas for financing, and the implementation of a number of unpopular measures and their financial mechanism are considered in the work of M. Shchuryk [15].

Core principles of environmentally sound and economically feasible water management are considered in the work of P. Skrypchuk, O. Suduk [16], which proves the feasibility of reorganization of the economic mechanism for the rational water use, and an increase in the level of validity of decisions on the water system management.

Any information concerning the current expenditures, capital investments for the environmental protection of the Volyn region, and ecology payments have been collected from the Main Department of Statistics in the Volyn region. Data on costs and revenues for the environmental protection of Lublin Voivodeship have been collected from the official website of the Voivodeship Fund for Environmental Protection and Water Management in Lublin.

AIMS AND OBJECTIVES

The aim of the article is to conduct a comparative analysis of Volyn Region (Ukraine) and Lublin Voivodeship (Republic of Poland) financial provision management for environmental protection. As well as to determine the level of partnership participation in the financing of the environmental measures within the cross-border region.

METHODS

In the course of organizing and conducting the study, we have applied the general scientific and special methods such as science-based abstraction, synthesis, comparative and statistical analyses structural and logical method. In addition to the mentioned above, methods of mathematical modeling and forecasting in economics have been used when developing a model for transboundary natural resource financial management.

RESULTS

Environmental protection is one of the most significant elements of state economic activities. Accordingly, its financial support is of national, regional, and local importance. Moreover, it is a critical process accumulating funds by business entities and by the state to carry out environmental measures in order to improve the environmental situation in the state, to solve problems related to the state of the environment, the sphere of protection, rational use and reproduction of natural resources.

The transboundary natural resource management mechanism is the process of the integrated system combining a set of management methods and tools of two or more geographically neighboring countries in the field of the protection, rational use, and reproduction of the transboundary natural resources crossing or defining the borders of these states, resulting in the achievement of goals of their managing.

Financing for the environmental protection in the Volyn region is carried out from the state and local budgets, trust funds for the environmental protection, own funds of enterprises, institutions, and organizations, and borrowed funds. The analysis of the statistical material from the Main Department of Statistics in the Volyn region shows that the annual running costs spent on environmental protection have a positive upward trend. So, in 2017 this indicator increased by 33 % compared to the previous year, in 2018 – by 28.4 %, in 2019 – by 16.6 %, and in 2020 – by 3.1 %. Costs of wastewater management prevail in the structure of expenses under directions – 58 % in 2020. There were spent 21 % of costs on the protection of biodiversity and landscapes, 20 % – on waste management, and 0.9 % – on the protection of ambient air and climate (Fig. 1).

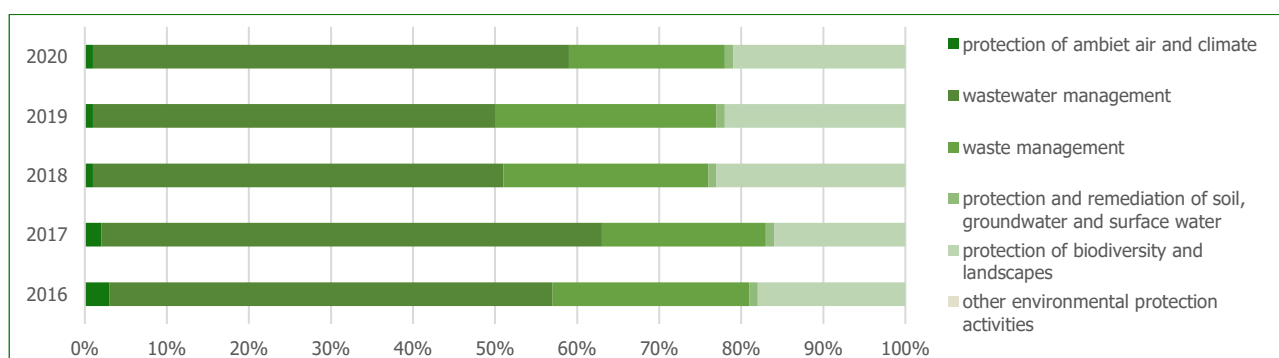


Figure 1. The structure of current costs for environmental protection in the Volyn region for the period 2016-2020. (Source. [17])

The capital investments for environmental protection in the Volyn region in 2017 increased by 44.8 %, compared to the previous year in 2016 – by 44.7 %, and in 2019 – by 3.4 %. There is a decrease in the annual dynamics of capital investments for environmental protection in the Volyn region by 9.5 % only in 2020, due to the COVID-19 pandemic which changed the trend of economic development in most countries, including Ukraine [17].

In 2020, the structure of capital investments for environmental protection in the Volyn Region is dominated by investments in wastewater management – 80 %. There were spent 14 % of investments on waste management. In addition to the mentioned above, 5 % were spent on the protection of ambient air and climate, and 1 % – on the protection of biodiversity and landscapes (Fig. 2).

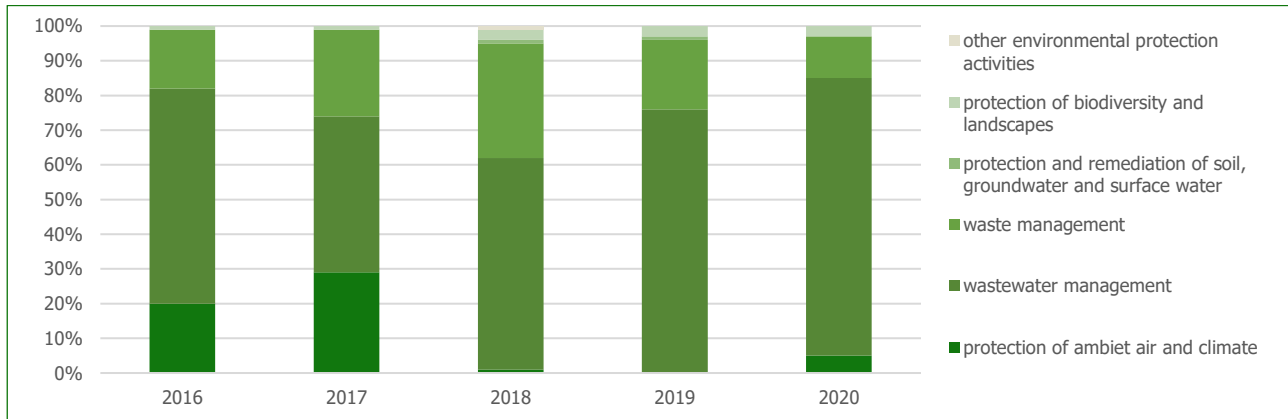


Figure 2. The structure of capital investments spent on environmental protection in the Volyn region for the period 2016-2020. (Source: [17])

In order to solve the environmental problems of Lublin Voivodeship, it is required to formulate an environmental policy relative to the protection of the natural heritage, the rational use of natural resources, the conservation of ecosystems, and the environmental safety of the surrounding territory. This is being implemented with the help of relevant programs, in particular: the environmental protection program of Lublin Voivodeship, a waste management plan, a water management program, the creation of certain water reserves, and an air protection program in urban conglomerates.

The analysis of current costs for the protection of the natural environment of Lublin Voivodeship shows that the costs for the environmental protection in the Lublin Voivodeship have both increased and decreased over the past five years. So, in 2017 this indicator decreased by 37.8 % compared to the previous year, and in 2018 – by 31.5 %. Next 2019 and 2020 are characterized by some increase in the costs spent on environmental protection by 5.1 % and 45.6 %, respectively (Fig. 3).

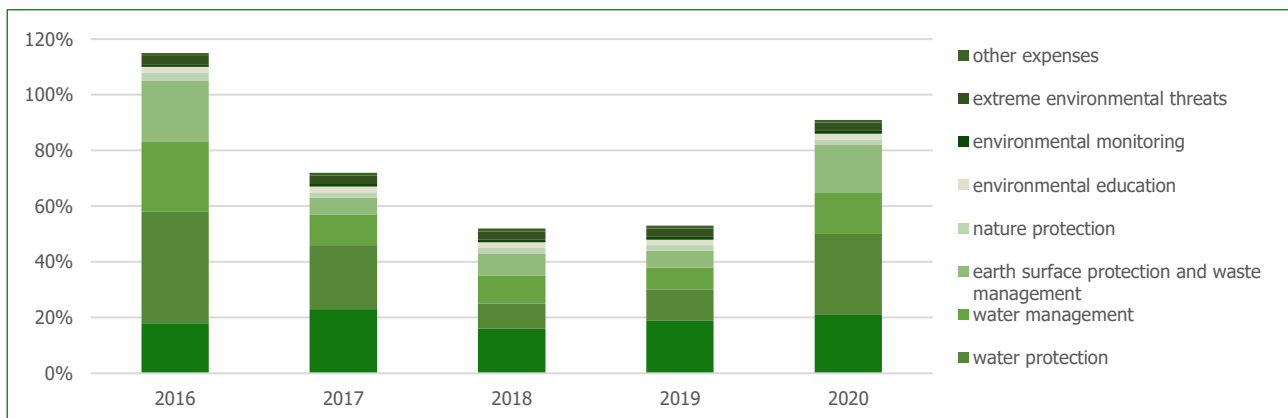


Figure 3. Dynamics of environmental costs spent in Lublin Voivodeship for the period 2016-2020. (Source: [18])

Costs for the protection of water resources prevail in the structure of environmental protection costs in Lublin Voivodeship spent in 2020. They have amounted to 34.1 % of the total cost, 24.1 % of the expenses given for the air protection, 17.3 % – for water management resources, 14.9 % – for the earth’s surface protection and waste management, 5.5 % – for

emergency environmental threats, 1.7 % – for the nature conservation, 1.4 % – for the environmental education, 0.7 % – for the monitoring of the environmental conditions and 0.3 % –for other expenses.

To align the indicators of environmental protection expenditures, we have reduced all the data with indicators in millions of dollars in accordance with the national currencies of the countries in the relevant years (Fig. 4). The figure shows that the Republic of Poland makes the largest environmental protection expenditures within the border areas of Ukraine and the Republic of Poland in 2020; it accounted for 70 %, while in Ukraine it accounted for 30 %.

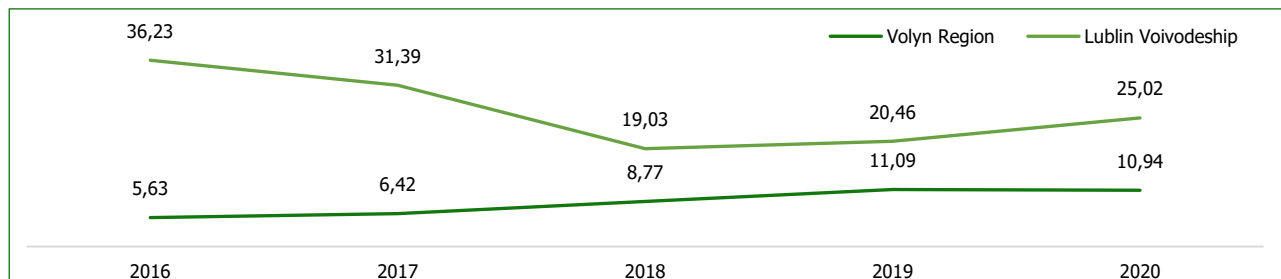


Figure 4. Dynamics of costs spent for the environmental protection of border territories of Ukraine and the Republic of Poland for the period 2016-2020, mln. USD. (Source: own study based on [17; 18])

Therefore, in Ukraine, there is a positive dynamic of expenditures for the environmental protection, namely, some increase in financing, whilst the environmental protection financing in the Republic of Poland has undergone significant changes in recent years.

We offer, according to the available statistical data for 2016-2020, to build a linear trend model for the volume of financing in the Volyn region using the methodology of trend forecasting. The trend model has the form:

$$y = 1.529x + 3.983 \quad (1)$$

where the abovementioned equation – the amount of Volyn Region environmental protection financing (million USA dollars); and x – years.

The determination coefficient of the model $R^2 = 0.52$ confirms its adequacy. Thus, the model can be used to predict the amount of financing.

Similarly, we have built a trending model for the environmental protection financing in Lublin Voivodeship. The trend model has the form (Fig. 5):

$$y = -3.335x + 36.431 \quad (2)$$

where the abovementioned equation – the amount of the Lublin Voivodeship environmental protection financing (million USA dollars); and x – years.

The determination coefficient of the model $R^2 = 0.52$ confirms its adequacy.

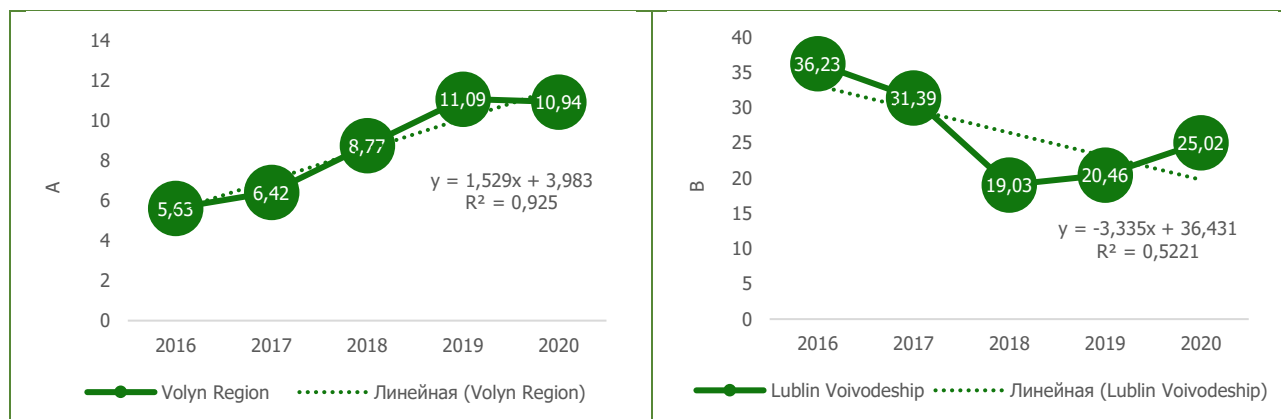


Figure 5. Dynamics of Volyn Region (a) and Lublin Voivodeship (b) environmental protection financing for the period 2016-2020.

Using the trend models (1) and (2), we determine the forecast values of the indicators for 2021 – 2023 by the extrapolation method (Fig. 6).

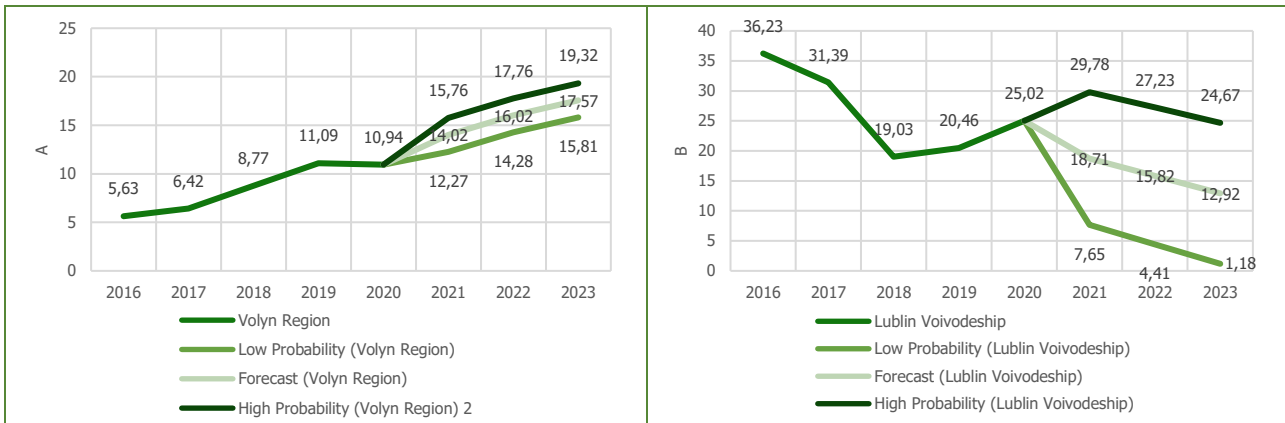


Figure 6. Forecast of the Dynamics of Volyn Region (a) and Lublin Voivodeship (b) environmental protection financing.

According to the forecast, some increase in the environmental protection financing is expected in Volyn Region in the next three years, whilst some decrease will be in Lublin Voivodeship.

The transboundary natural resource management is a tool helping to expand the cooperation across international borders, having a number of specific goals, including resource management, biodiversity conservation, regional economic development assistance, regional and cross-border cooperation, friendly relations strengthening, and developing among the states. Cross-border relations may include the cooperation degrees varying in the transboundary natural resource management field (Fig. 7).

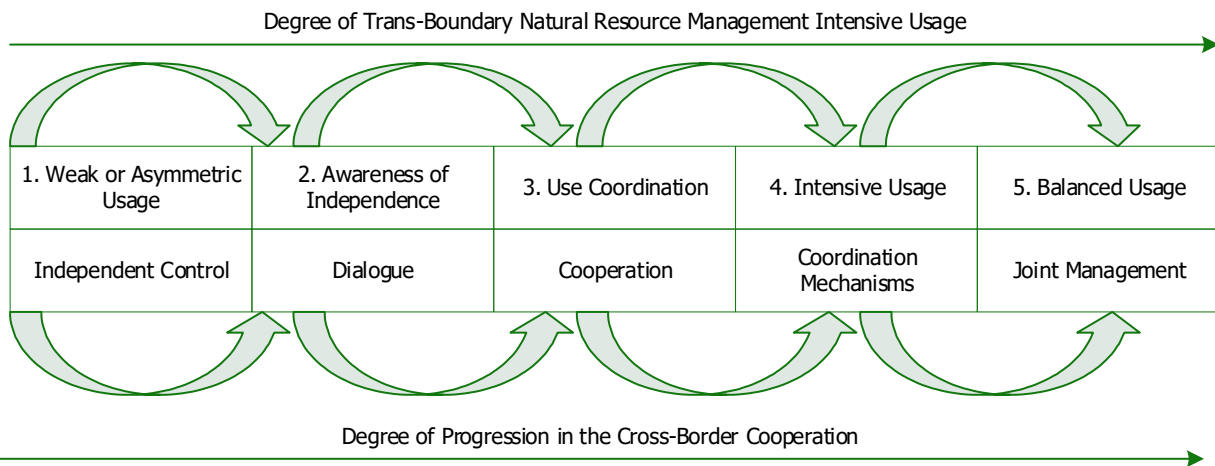


Figure 7. Cooperation degrees in the trans-boundary natural resource management.

We consider that cross-border relations are at the third level within Volyn Region and Lublin Voivodeship as these regions carry out coordinated cooperation; however, the regions independently manage the transboundary natural resources. It is impractical since efficiency will be achieved only with joint cross-border management in his area (fifth level). It should be some conscious interdependence of countries, as the achievement of environmental integrity, protection and rational use trans-boundary natural resources on a sustainable basis, as well as the prevention or mitigation of environmental threats cannot be achieved by one country. This requires interregional and cross-border cooperation. Therefore, it is necessary to apply integrated management to such types of resources, which take into account the interests of neighboring countries.

We consider that the effective financial provision management for the environmental protection of the transborder region needs to use a number of tools in accordance with the basic concepts of the sustainable development and integrated management, including:

- scientific, technical and technological means to improve the transboundary natural resources system understanding;

- organizational and institutional tools for the implementation of such management;
- legal and administrative tools to ensure that the working conditions and regulatory functions that are necessary for the transboundary natural resources are in the harmony through political borders;
- economic, financial and fiscal instruments to mobilize the necessary capital investments and ensure the achievement of common goals;
- training and advanced training of political decision-makers, technical and administrative personnel;
- participation and cooperation tools to ensure a completely transparent exchange of information and the development of long-term cooperation.

However, none of these categories of tools can exist on their own, only by combining them can we achieve progress and sustainable results. These tools should be used in the parallel measurement at the local, national, cross-border and international levels.

Therefore, the environmental protection on each border territory of the Volyn Region and Lublin Voivodeship takes place separately. Given that the territory of this region covers the natural resources polluting both countries, it would be worth exercising joint management in this area. Any pollution of water resources and air spreads on the territory of two areas – Volyn Region and Lublin Voivodeship, but solid wastes are localized. Thus, the purification of the Western Bug River in the Volyn region is beneficial for all the participants, and only our country finances this event. As the Western Bug is a cross-border river, investments should be evenly distributed between countries. Another example is that treatment filters for emissions into the atmosphere are installed in Lublin Voivodeship, this improves air quality not only in this region but also in Volyn Region since the wind direction is mainly western. Obviously, when developing a financial strategy for the environmental protection of border areas, it is necessary to provide various options for the localization of three types of wastes (air emissions, discharges to water sources, solid wastes) in two regions (Volyn Region and Lublin Voivodeship), and provide a financial strategy environmental protection measures for each combination of options. We offer the option of partner participation in the financing of environmental protection measures of the border territories of the Volyn Region and Lublin Voivodeship (Tabl. 1).

Table 1. Partnership in financing of the environmental protection measures depending on their location in the border areas of Volyn Region and Lublin Voivodeship (in %).

Measures	Volyn Region	Lublin Voivodeship
Solid Waste Disposal	Each country finances solid waste on its own	
Disposal Neutralization in Water Resources located in Volyn Region	75	25
Disposal Neutralization in Water Resources located in Lublin Voivodeship	0	100
Decontamination of Air Emissions in Volyn Region	100	0
Decontamination of Air Emissions in Lublin Voivodeship	25.0	75

Since solid waste is not spread geographically, therefore, each border territory independently pays for its neutralization. In the case of water treatment, it should be borne in mind that the Western Bug flows through the territory of Ukraine and the Republic of Poland, so if water treatment is carried out on the territory of Ukraine, these measures should be partially financed by the Republic of Poland. This country should independently finance the purification of water on its territory. Despite the fact that the wind direction is predominantly western in the region and air emissions are cleaned on the territory of the Republic of Poland, Ukraine should co-finance these activities too. Thus, if wastewater treatment plants are being built on the territory of one of the countries of the border territory, then other countries should simultaneously contribute their share in this event financing. All the countries involved will derive benefits.

CONCLUSIONS

Thus, in accordance with the study goal, the nature and characteristic features of the financial provision management for the environmental protection of the transborder region in the Volyn region and Lublin Voivodeship are characterized and proposals for improving the financial provision management of the transboundary natural resources are developed. The appropriate funding should support programs and activities in the field of environmental protection and rational use of natural resources, the sources of which are local budgets, bank loans, foreign investment, fees for the use of natural resources, fines for pollution and the like.

The budget legislation of Ukraine determines the funds for environmental protection among the sources financing the environmental protection measures. They are formed by paying the environmental tax and the monetary damages, caused by a violation of legislation on the environmental protection as a result of economic and other activities. The capital investments for environmental protection in Volyn region in 2017 increased by 44.8 %, compared to the previous year in 2018 – by 44.7 %, in 2019 – by 3.4 %. There is a decrease in the annual dynamics of capital investments for the environmental protection in the Volyn region by 9.5 % only in 2020, due to the COVID-19 pandemic which changed the trend of economic development in most countries, including Ukraine. The costs for environmental protection in the Lublin Voivodeship have both increased and decreased over the past five years. So, in 2017 this indicator decreased by 37.8 % compared to the previous year, in 2018 – by 31.5 %. Next 2019 and 2020 are characterized by some increase in the costs spent on environmental protection by 5.1 % and 45.6 %, respectively.

Determination of the degree of cooperation in the field of transboundary natural resources management and the division of responsibilities between its key players are important aspects of the financial provision management model effectiveness. The degree of cooperation in the field of transboundary natural resources management, including independent control, dialogue, cooperation, coordination mechanisms and joint management is revealed. Ukraine and the Republic of Poland finance the environmental protection in the border areas independently, in their own territories. We consider it is necessary to implement the joint financial provision management, as the positive results will be observed only with the use of the integrated transboundary natural resource management based on the close cross-border cooperation between regions. It will allow rationally, and effectively using, protecting and managing environment.

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УПРАВЛІННЯ В СФЕРІ ФІНАНСОВОГО ЗАБЕЗПЕЧЕННЯ ОХОРОНИ НАВКОЛИШНЬОГО СЕРЕДОВИЩА ТРАНСКОРДОННОГО РЕГІОНУ

Метою статті є здійснення порівняльного аналізу фінансового забезпечення охорони навколишнього середовища на територіях Волинської області (Україна) та Люблінського воєводства (Республіка Польща) і визначення рівня партнерської участі у фінансуванні природоохоронних заходів у транскордонному регіоні. У статті приділено увагу системі фінансового забезпечення охорони навколишнього середовища транскордонного регіону. Розглянуто зміст механізму управління транскордонними природними ресурсами. Визначено основні джерела фінансування природоохоронних заходів на територіях Волинської області та Люблінського воєводства. Здійснено порівняльний аналіз динаміки та структури поточних витрат на охорону навколишнього природного середовища Волинської області й Люблінського воєводства та капітальних інвестицій у неї. Визначено, що в структурі витрат на охорону навколишнього середовища в транскордонному регіоні протягом останніх років переважають витрати на охорону водних ресурсів, атмосферного повітря, управління відходами та збереження біорізноманіття. Використовуючи методику трендового прогнозування, побудовано лінійні трендові моделі для обсягу фінансування у Волинській області та Люблінському воєводстві. Методом екстраполяції визначено прогнозні значення показників фінансування охорони навколишнього природного середовища в транскордонному регіоні на 2022-2023 рр.

Важливими аспектами ефективності фінансової моделі є визначення ступеня співробітництва в сфері управління транскордонними природними ресурсами та розподіл відповідальності між її ключовими учасниками. У статті розкрито ступені співробітництва в сфері управління транскордонними природними ресурсами, серед яких виділено автономне управління, діалог, співпрацю, механізми координації та спільне управління. Доведено, що в межах Волинської області та Люблінського воєводства транскордонні відносини перебувають на рівні співпраці, проте зазначено, що ефективність буде досягати лише при спільному транскордонному управлінні в цій сфері. Визначено

основні інструменти інтегрованого управління фінансовим забезпеченням охорони навколишнього середовища. Запропоновано розподіл партнерської участі у фінансуванні природоохоронних заходів залежно від їх локалізації на прикордонних територіях Волинської області та Люблінського воєводства.

Ключові слова: транскордонні природні ресурси, управління, фінансовий механізм, захист навколишнього середовища, витрати та доходи

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