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IMPROVEMENT OF THE SYSTEM OF INSTITUTIONAL SUPPORT OF SUSTAINABLE ENVIRONMENTAL MANAGEMENT OF THE CARPATHIAN REGION AND THE EUROREGION "BUG"

Purpose. *The aim of the study is to improve the organizational structure of institutional support of sustainable environmental management in the Carpathian region and the Euroregion "Bug".*

Methodology / approach. *The general theoretical scientific methods, fundamental principles of environmental economics, cross-border cooperation, which are highlighted in the works of both Ukrainian and foreign scientists on economic problems of ensuring sustainable environmental management, were used as the methodological basis of the study. To perform the tasks, the following research methods were used: monographic (to study the principles of environmental management); system-structural (to study the essence and content of institutional support of sustainable environmental management); institutional (to assess the relationship and research the cross-effect between regional and local authorities); abstract-logical (theoretical and methodical generalizations and formulation of conclusions).*

Results. *The developed theoretical-and-methodological, and applied provisions for improving the system of institutional support of sustainable environmental management were logically brought to the level of specific proposals suitable for implementation into the practice of public administration and local government in the context of cross-border cooperation. It was proposed to develop the Concept of balanced development of cross-border and border regions for 2022–2026, highlighting the state of implementation of current tasks, prospects for projects, cross-border cooperation agreements, integration of border regions to the European information and intellectual domain as well as monitoring the state of their implementation in the future. All of that will provide an opportunity to get sustainable development and improvement of the reputation of the border areas of Ukraine from the ecological, economic, and social points of view.*

Originality / scientific novelty. *It was formed and scientifically substantiated from the standpoint of an integrated approach and synergistic effect, necessary strategic imperatives and preconditions for developing a strategy of cross-border cooperation between Ukraine and neighbouring countries on the terms of joint implementation of Strategies, programs, and agreements that correspond to the strategic directions of ecological, economic, and social development of each country and region, outline the needs and future goals of cross-border cooperation to avoid isolated development of only one of the parties in the context of cross-border and Euroregional cooperation.*

Practical value / implications. *A system model of institutional support for cross-border*

cooperation is developed, which interacts with elements of the internal and external environment in particular based on a single regulatory framework, which will serve as a doctrine of environmentally balanced development and will allow implementation in practice a comprehensive approach of solving environmental, economic and social transboundary problems and ensure environmental protection based on complementary requirements established in border and cross-border regions.

Key words: *cross-border cooperation, environmental protection, environmental management, Euroregion, institutional support, ecological-and-economic mechanism.*

Introduction and review of literature. Contradictions related to the depletion of natural resources and environmental pollution have become apparent in current conditions. Current global environmental problems are associated with the implementation of anthropogenic processes without taking into account the ability of nature to compensate for the negative impact of the process, as well as through the focus on the prevalence of socio-economic priorities of human development [1; 2; 3]. After all, research on sustainable environmental management covers the theory and practice of economic and environmental development of border areas on both sides of the border, taking into account the conditions of rational use of natural resources.

As Z. Gerasymchuk emphasizes, sustainability of environmental management is one of the urgent issues of our time regarding the transformation of the technogenic type of economic development into sustainable development, where it is necessary to form new principles or improve institutional ones [4]. Issues of institutional support are particularly acute due to emergence of new challenges, formal and informal inconsistencies, and creation of a new type of relationship in terms of participation in integration processes at the international, national, and regional levels.

After all, development of institutional support is a necessary prerequisite for sustainable environmental management at different economic and social levels of border areas, where the situation is the same in terms of problems, in particular:

- development of the institutional base for sustainable development of environmental management, as well as transition to sustainable environmental management,
- increasing socio-economic unemployment level, development of transboundary cooperation, the continuation of environmental protection, biological and landscape biodiversity, conservation of biological and landscape biodiversity in the Carpathian region and the Euroregion “Bug”.

Nowadays analysis of institutional support for the sustainability of environmental management is the subject of research for many domestic and foreign leading scientists. Many scholars divide institutional support into institutes and institutions in particular as noted by O. Drebot [5], institutions that can maintain agreements, arrangements in space and time, to ensure their implementation, which is the key to the efficiency of their operation. As noted by L. Granovska [6], one of the important institutions that regulate the activities of enterprises and create an appropriate environment for the innovative development of various enterprises is the institution of power. According to A. Lesnaya [7], institutional support involves a set

and interaction of existing in the country both formal and informal principles, rules, norms and procedures of economic activity, sanctioned by law or custom, as well as organizations and institutions, political and administrative structures that control the compliance of economic entities with legal norms in the interests of the entire social system. Yu. Rosetska [8] defines institutional support as a direction of the development of the economic system, as well as guidelines for the formation and selection of the most effective and social institutions.

Regarding the development and ensuring the balance of environmental management in the context of cross-border cooperation is noted in the works of A. Gadzalo [9], A. Noferen, M. Berz [10], P. Kutsab [11], I. Skorokhod, V. Kukharyk [12]. L. Gizhdivan believes that a transboundary natural resource is a natural resource, the location of which covers the territories with different national or international legal regimes of two or more states as well responsible for their rational use and preservation [13].

Cross-border (transboundary) resources are those bodies and forces of nature, quantitative and qualitative composition of which cannot attribute to the property of only one state, and use of their useful properties by one state can cause damage to another, which has a common border with it [14; 15; 16]. The analysis of the problems of cross-border cooperation through the prism of the modern theory of institutional economics in the domestic scientific literature is quite limited. But despite the significant differences in the historical processes of cross-border cooperation, local policy frameworks (institutes and institutions) are an equally obvious driver of cross-border cooperation on both sides of the border [17; 18].

The existing scientific developments do not cover the whole set of methodological tasks for the institutional support of sustainable environmental management in the context of cross-border cooperation. At present, a holistic model of joint effective ecological and economic development of border regions has not developed. The mechanism of institutional support of cross-border cooperation with EU countries in terms of strengthening the European integration process and the implementation of the Association Agreement between Ukraine and the European Union needs to be clarified and studied more detailed.

The purpose of the article is to improve the organizational structure of institutional support of sustainable environmental management in the Carpathian region and the Euroregion “Bug”.

Results and discussion. Over the past few years, Ukraine has become an active participant in European integration processes, it contributes to the development and improvement of the common borders of neighbouring countries. Under current ecological and economic conditions, the most effective way to solve common problems of development and deepen mutually beneficial contacts is cross-border cooperation. Forming the institutional basis for the implementation of sustainable environmental management through regulatory-and-legal and organizational-and-economic provision for the implementation of measures to achieve sustainable environmental management aimed at restoring and preserving the natural potential of

border regions and paving the way for attracting non-traditional sources of investment income. After all, institutional changes are a sign and at the same time the direction of market transformations, the introduction of reforms in the system of organization and economic relations in the border areas of Ukraine.

We took the Carpathian region as an example, which has become an important tool for the cooperation of local and regional authorities of Ukraine not only with individual states, but also the entire European Union (EU) [19].

The Carpathian region includes four regions – Lviv, Ivano-Frankivsk, Zakarpattya and Chernivtsi. The Carpathian region covers about 56.7 thousand km^2, which is 9.4 % of the territory of Ukraine, the population is almost 6.4 million people, which is 12 % of the population of Ukraine. The main purpose, such as creation of the Carpathian region in 1993, was to establish good neighbourly relations, ensure social stability, promote environmental and economic development in the border areas of member countries, cooperate with national institutions and organizations, etc. [20].

The main types of cooperation in the Carpathian region are tourism and recreation (74.6 %), transport development (60.7 %), cultural cooperation (67.0 %). Note that the location of the population is significantly influenced by environmental and economic factors but the influence of area square is no less important. As a result, the population in the regions of the Carpathians are not the same (Table 1). In most regions, the rural population predominates over the urban one, in particular in Ivano-Frankivsk, Zakarpattya and Chernivtsi. Population density is reaching the European level.

Table 1

Territory and quantity of the population of the Carpathian region as of 2019

Region	Territory, thousand km^2	Population, thousand people	Including		Population density per 1 km^2, persons
			urban	rural	
Ukraine	603.5	42153.2	29256.7	12896.5	69.8
Carpathian region	*56.4*	*6056.5*	*3001.5*	*3055*	*107.4*
Lviv	21.8	2522.0	1537.7	984.3	115.7
Ivano-Frankivsk	13.9	1373.3	607.0	766.3	98.8
Zakarpattya	12.7	1256.8	466.1	790.7	99.0
Chernivtsi	8.0	904.4	390.5	513.7	113.1
Poland	312.7	38265.0	31965.0	6300	122.4
Podkarpackie Voivodeship	17.8	2128.4	1431	697.4	119.5
Slovakia	49.0	5456	3653	1803	111.3
Kosice region	6.8	801.4	402.7	398.7	118.6
Presov region	8.9	807	415.5	391.5	90.6

Source: formed by the authors according to the statistics of Ukraine, Poland, Slovakia.

The level of socio-economic development of the Carpathian region is defined as the average value of gross regional product per capita (UAH), where Lviv region is the leader, and this indicator is 85198 UAH, and Chernivtsi region has the lowest indicators in Ukraine – 46136 UAH. The highest indicators of the profitability level

(agriculture and forestry) are for Lviv region – 24.6 %, the lowest – Ivano-Frankivsk and Chernivtsi regions – 12.8 %. Zakarpattya region has the highest growth rates of capital investments in the Carpathian region, Chernivtsi region has the lowest ones (Table 2). The trend of investment inflows indicates that in recent years government regulation has paid little attention to attracting investment to the region, has not contributed to the development of scientific and technical potential respectively, consequently, all of that leads to the deterioration of the gross regional product of the Carpathian region.

Table 2

Dynamics of socio-economic indicators of development of the Carpathian region by years

Region	Years					
	2013	2014	2015	2016	2017	2019
Gross regional product per capita, UAH						
Ukraine	33473	36904	46413	55899	58321	94661
Carpathian region	*20289*	*22921*	*28459*	*27651*	*35422*	*60862*
Lviv	24937	28731	37338	45319	48345	85198
Ivano-Frankivsk	24022	27232	33170	37220	39342	63254
Zakarpattya	17044	19170	22989	25727	27654	48861
Chernivtsi	15154	16552	20338	2336	26347	46136
Gross regional product, million UAH						
Ukraine	1522657	1586915	1988544	2385367	2567844	3978400
Carpathian region	*131682*	*149735*	*188002*	*219875*	*246496*	*404151*
Lviv	63329	72923	94690	114842	135321	214453
Ivano-Frankivsk	33196	37643	45854	51404	53541	86702
Zakarpattya	21400	24120	28952	32390	34213	61335
Chernivtsi	13757	15049	18506	21239	23421	41661
Profitability level, % *(agriculture and forestry)*						
Ukraine	30.5	37.2	41.7	32.4	22.4	19.7
Carpathian region	*13.1*	*14.7*	*18.6*	*14.3*	*7.5*	*18.5*
Lviv	11.8	9.6	11.8	20.3	15.7	24.6
Ivano-Frankivsk	9.8	12.9	18.6	8.6	10.8	12.8
Zakarpattya	12.5	15.8	19.5	16.5	19.7	23.8
Chernivtsi	18.3	20.3	24.3	11.6	-16.1	12.8
Capital investments, million UAH						
Ukraine	267728	219420	273116	359216	448462	623979
Carpathian region	*19517*	*20718*	*29563*	*33885*	*42430*	*53795*
Lviv	9817	9555	13387	18605	24106	31062
Ivano-Frankivsk	4797	6837	9609	7948	9708	9306
Zakarpattya	2646	2639	3778	4663	5624	9330
Chernivtsi	2257	1687	2789	2669	2992	4097

Source: formed by the authors according to the State Statistics Service of Ukraine.

The improvement of economic indicators is due to the development of small and medium-sized businesses, inflow of investments, improvement of living conditions, ensuring the welfare of the population. The investments are the main factor that would contribute to the growth of the gross regional product GRP in the Carpathian

region, as shown by the investment dynamics for 2013–2019 (Table 2).

The main development of the Carpathian region should be social orientation with observance of the economic and ecological balance of the environment. There is a high level of unemployment in the Carpathian region, as well as in most regions of Ukraine. This problem is especially relevant for rural areas. Based on the above socio-economic indicators, we can understand what is slowing down the development of the Carpathian region: critical demographic situation, increase of the share of unemployed citizens and unbalanced economic relations.

Concerning to the socio-economic and environmental indicators of Volyn region, which is part of the Euroregion "Bug" (Table 3), here the gross regional

Table 3

Socio-economic and environmental indicators of the Euroregion "Bug"

Indicator	2012	2019	2019 to 2012, +/-
Area, thousand hectares	2014.4	2014.4	-
Gross regional product, million UAH	20005	60448	40443
The share of gross regional product in total, %	1.4	1.7	0.3
Population, thousand people	1041.5	1035.3	-6.2
Salary, million UAH	2339	8663	6324
Capital investments in environmental protection, million UAH, of which	2.9	36.1	33.2
current costs of environmental protection	67.4	286.2	218.8
crop products	105.3	225.9	120.6
Area of agricultural land, thousand ha	1048.7	1253.9	205.2
The sown area of crops, thousand ha	527.6	27841.7	27314.1
Yields of cereals and legumes, c/ha	34.1	42.5	8.4
Livestock products, million UAH	35.0	634.1	599.1
Area of hunting lands, thousand ha	1562.5	1465	-97.5
Marketed commodities (goods, services) of forestry, million UAH	323.2	637.3	314.1
Harvesting of merchantable wood, thousand m^3	1021.8	1421.4	399.6
Reforestation area, ha	4200	7112	2912
Total exports of goods, million USD	628.8	6940.0	6311.2
Total imports of goods, million USD	1089.0	14559.4	13470.4
Pollutant emissions into the atmosphere, thousands t	6.6	5.3	-1.3
Expenditures for measures aimed at reducing air emissions, thousand UAH (actually spent)	74.1	1579.4	1505.3
Reduction of pollutant emissions into the atmosphere after the introduction of air protection measures, t/year	42.6	58.8	16.2
The total amount of waste accumulated during operation in specially designated places or facilities (waste disposal sites), t	17061.5	8466.0	-8595.5
Number of biosphere reserves	3	4	1
Area of national nature parks, ha	91.3	108.2	16.9

Source: formed by the authors according to the State Statistics Service of Ukraine.

product is formed due to the energy production by enterprises, including PJSC "Vladimir-Volyn Poultry Farm" (solids, nitrogen compounds, carbon monoxide,

methane), PJSC "Gnidavsky Sugar Plant" (solids, nitrogen compounds, carbon monoxide, methane), Gubin Poultry Complex LLC (solids, nitrogen compounds, carbon monoxide, methane), as these enterprises are the biggest air contaminators, where improper processing of industrial waste takes place, and the technological renewal level of production is low.

As for agricultural activity, it is related to the life of the basic settlement and decisively influences the development of its social and industrial infrastructure. The production of agricultural goods, in contrast to industrial ones, is a process of direct use of nature.

Table 4

Mathematical model of indices characterizing the ecological, economic and social level of sustainable development of Volyn region

Indicator	Linear equations	Coefficient of determination R^2
The level of social development of the region (S)		
Index demographic status	$X_1 = -0.0047 \cdot S1 - 0.102 \cdot S2 + 0.015 \cdot S3 + 0.101 \cdot S4 + 0.37 \cdot S5 + 6.45$	0.999
Social infrastructure index	$X_2 = 0.00186 \cdot S6 + 0.00112 \cdot S7 + 0.0446 \cdot S8 + 0.0167 \cdot S9 - 0.0112 \cdot S10 + 0.1616$	0.612
Education index	$X_3 = 0.002 \cdot S11 + 0.0005 \cdot S12 - 0.0087 \cdot S13 - 0.0002 \cdot S14 - 0.0109 \cdot S15 + 0.76$	0.997
Health Index	$X_4 = 0.003 \cdot S16 + 0.0075 \cdot S17 - 0.0091 \cdot S18 - 0.0104 \cdot S19 + 0.0067 \cdot S20 - 0.0257 \cdot S21 + 0.3222$	0.926
Social Development Index	$X_1 = 0.0321 \cdot X1 + 0.0871 \cdot X3 + 0.0823 \cdot X4 + 0.0861$	0.973
The level of economic development of the region (E)		
Investment activity index	$X_5 = 0.00026 \cdot E1 - 0.082 \cdot E2 - 0.0062 \cdot E3 + 0.00254 \cdot E4 + 0.0023 \cdot E5 + 0.812$	0.881
Index of economic activity	$X_6 = 0.0008 \cdot E6 - 0.00012 \cdot E7 - 0.0006 \cdot E8 + 0.00052 \cdot E9 + 0.0005 \cdot E10 + 0.112$	0.465
Index of financial providing the region	$X_7 = 0.002 \cdot E11 + 1.43 \cdot E12 - 1.35 \cdot E13 + 1.72$	0.572
Index of foreign economic activity	$X_8 = 0.002 \cdot E14 - 0.0004 \cdot E15 - 0.00007 \cdot E16 + 0.0004 \cdot E17 - 0.0012 \cdot E18 - 0.002 \cdot E19 + 0.1321$	0.992
Index of economic development	$X_2 = 0.2121 \cdot X5 + 0.162 \cdot X6 + 0.154 \cdot X7 + 0.321 \cdot X8 + 0.0003$	*0.978*
The level of ecological development of the region (N)		
Anthropogenic load index	$X_9 = 0.585 \cdot N1 + 0.0053 \cdot N2 - 1.423 \cdot N3 + 0.0005 \cdot N4 + 0.045$	0.922
Load reduction index	$X_{10} = 0.0326 \cdot N5 - 0.5448$	0.741
Index of natural resource potential	$X_{11} = 0.890$	1.000
Environmental Development Index	$X_3 = 0.483 \cdot X9 + 0.39 \cdot X10 + 0.4432$	*0.966*

Source: authors' calculations.

To improve the situation it is necessary to use the natural potential of the region within certain limits. After all, further research should be considered on the rational use of natural resources and environmental protection, which will ensure the growth of the social condition of the population of the Ukrainian border area, as investments will lead to an increase in the attractiveness of the region. A different set of factor values and time intervals was formed to determine the most significant factors influencing the ecological state of the region. We propose to calculate the ecological, economic and social forecast model of the region, which provides the linkage between economic, environmental, and social indices of sustainable environment usage (Table 4).

To verify the reliability of this model it is necessary to follow these steps [21]:

1) check the significance of the correlation coefficient. This parameter is responsible for the adequacy of the model. The test is carried out using the Fisher LSD. Test the hypothesis, whether the option is possible, when $a_1 + \ldots + a_n = 0$;

2) check the essence of the regression coefficients using the Student's t-test. Test the hypothesis, whether the option is possible $a_j = 0$ for each possible j;

3) for this purpose it is necessary to calculate the remains of the model $u_i = y_i - \hat{y}_i$, that is, the difference between the values obtained by the model and the real data, the relative error $\delta_i = 100\ \% \cdot u_i/y_i$, the root mean square error of the perturbation dispersion $\hat{S} = \sqrt{\frac{\sum_{i=1}^{n} u_i^2}{n-m-1}}$, selective coefficient of determination $R^2 = 1 - \left(\sum_{i=1}^{n} u_i^2 / \sum_{i=1}^{n} (y_i - \hat{y}_i)^2\right)$ and correlation coefficient $R = \sqrt{R^2}$. Based on these calculations, we can check the accuracy of the forecast (Table 5).

Table 5

Checking the model adequacy

Criteria	Index			
	economic level	ecological level	social level	sustainable environmental management of the region
Fisher LSD	685.25	6287.71	598.20	8.34
Student's t-test	65.21	163.12	16.44	27.85

Source: authors' calculations.

A linear multifactor model was calculated to construct the forecast using the least-squares method for three components (social, economic and environmental) the subsequent equation has been formed:

$$X_1 = 0.0321 \cdot X1 + 0.0871 \cdot X3 + 0.0823 \cdot X4 + 0.0861;$$

$$X_2 = 0.2121 \cdot X5 + 0.162 \cdot X6 + 0.154 \cdot X7 + 0.321 \cdot X8 + 0.0003;$$

$$X_3 = 0.483 \cdot X9 + 0.39 \cdot X10 + 0.4432;$$

$$Y = 1.0281 \cdot X_1 - 0.2321 \cdot X_2 - 0.1216 \cdot X_3 + 0.1180.$$

The results of mathematical modelling and the result of the forecast for the development of Volyn region until 2025 are shown in Fig. 1.

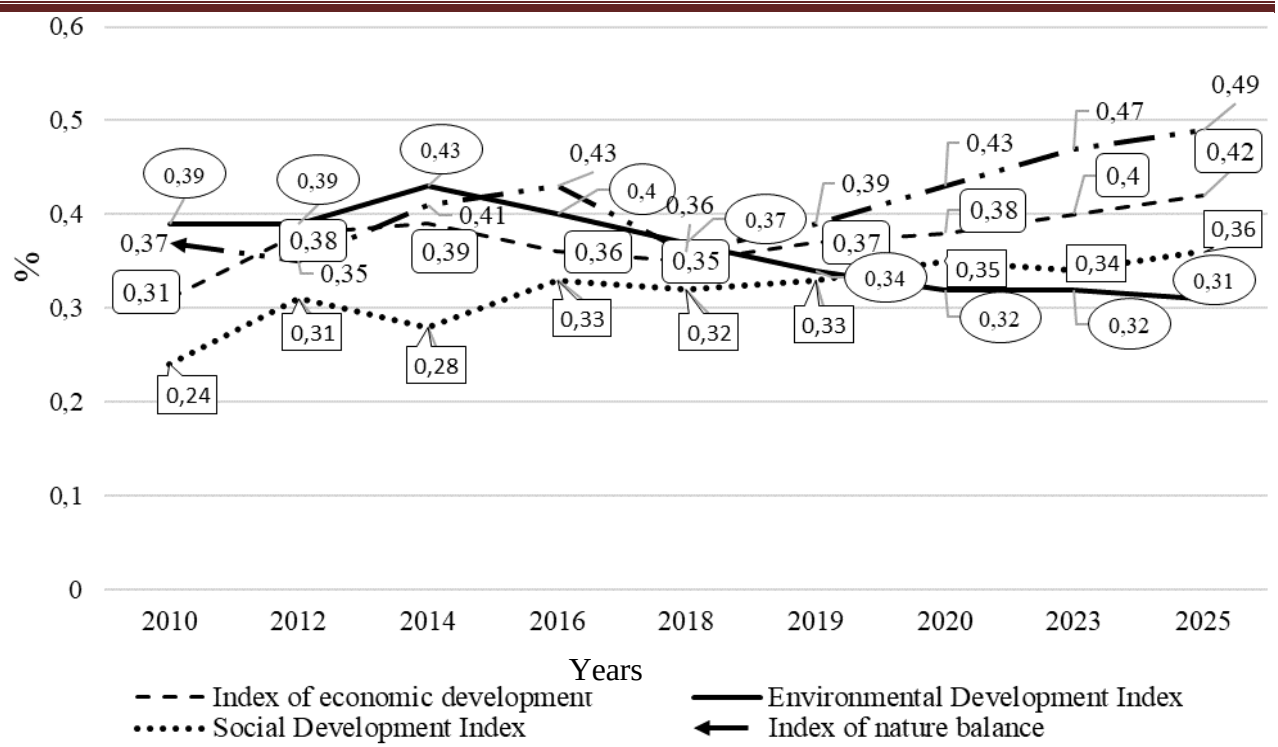

Fig. 1. Dynamics and forecast of the index of sustainable environmental management of Volyn region

Source: calculated by the authors.

The forecast of the model parameters (Fig. 1) shows that while maintaining the existing trends in 2018, the level of economic and social development of the region will grow steadily and in 2025 will be 0.36 – social, 0.31 – economic level of development, the disappointing environmental component of the region development according to the forecast model in 2025 will be 0.31. Due to the gross regional product, the economic level of development in the Volyn region prevails, the ecological level tends to decrease, as companies that emit harmful substances into the atmosphere and do not carry out proper industrial waste recycling, which will contribute to environmental safety.

From the forecast model, we can conclude that mathematical calculations were performed, where the task was to analyze the assessment and further state of regional development, and correlations were established between the economic, environmental, and social components of the development level. As the analysis shows, the linkage between the components exists, which indicates a positive trend, and it allows to make generalizations for further research using the institutional aspects of the development of sustainable environmental management. In general, environmental management in the Volyn region is not balanced, which indicates the lack of an effective environmental policy in the country.

If we speak about Ukraine, the current of environmental policy in the field of environmental protection specified in the Law Ukraine "On Basic Principles of State Environmental Policy of Ukraine for the period up to 2030" of February 28, 2019, No. 2697-VIII. The purpose of this Law is to implement a national environmental policy, which is to stabilize and improve the environment through an integration

policy to ensure the preservation of the natural environment, as well as the introduction of an ecologically balanced system of environmental management and conservation of natural ecosystems [22]. The world experience of developed countries shows that the integration of environmental policy requires the improvement of the system in the context of institutional and managerial and demonstrates the sustainable development of the state [23; 24].

Ukraine's ratification of the Convention on Long-range Transboundary Air Pollution places additional demands on the state to comply with environmental legislation on air protection, implementation of environmental measures, and monitoring practices by those adopted in the EU. Negative phenomena occur due to a large disproportion in the levels of environmental protection in the Ukrainian, Belarusian and Polish parts of cross-border associations: as a result, there is a transboundary transfer of air pollution to the border areas of Belarus and Poland; surface water pollution throughout the border, twice the emission of air pollution in the border regions of Ukraine. There is a big difference in the environmental protection costs between the border voivodeships of Poland and the regions of Ukraine, and it requires scientific research in the context of cross-border regions.

To comply with the requirements of the Convention on Long-range Transboundary Air Pollution, additional requirements are set for the monitoring and forecasting system of environmental pollution for Ukraine, without which they are unable to implement them in the Convention. The use of measures to reduce emissions into the environment is to some extent complicated by the tough economic situation. Fulfilment of the requirements of the Convention on Transboundary Movements of Pollutants requires conducting systematic research of objective prerequisites for effective air quality management at the interstate level, in particular:

- monitoring of data on the joint program of observations and analysis of the spread of pollutants over long distances;
- the state of the environment or its objects (soil, water, subsoil, atmospheric air) and the levels of their pollution;
- environmental forecasts, programs, and projects, measures of state environmental policy, regulations on environmental protection of neighbouring states;
- costs associated with the implementation of environmental measures at the expense of environmental funds.

Solving the above tasks becomes possible through the implementation of joint environmental projects and programs, attracting financial resources from both countries and European entities [25]. Development of Ukraine-Poland-Belarus cross-border cooperation in the environmental field requires revitalization. It is necessary to study comprehensively the issues related to the organization and coordination on both sides of the border of cooperation in the field of ecology.

Let's take the Polish experience of rationalization of environmental management as an example, which can be very valuable for Ukraine, in particular for the Carpathian region, where today we have to determine the real directions of its

withdrawal from the ecological and economic impasse. It is precisely valuable because Ukraine has neither enough time to search for effective regulators of sustainable environmental management (the ecological situation is too critical), nor resources to ensure a program to combat environmental pollution, as well as in agriculture. It also does not have strong legislative and executive authorities capable of developing and uncompromisingly implementing national ecological and economic policies.

Solving the tasks of counteracting modern challenges of cross-border economic and environmental threats to the national security of Ukraine, among other things, it is necessary to intensify cooperation. It is expedient, despite the existing interstate problems of geopolitical, legal, or other nature, to implement cross-border environmental and economic cooperation actively, which will solve problems or reduce tensions in relations between neighbouring states. And it is in these areas: solving problems of environmental pollution; waste disposal and creation of a network of waste disposal companies; improving the quality of drinking water and water quality in rivers and lakes; optimal use of land resources; prevention and overcoming the negative consequences of natural and man-made disasters. It is already possible today to organize effective cross-border cooperation with the mandatory use of environmental economics methodologies. The implementation of joint initiatives on issues identified may lead to further intensification of other areas of cross-border cooperation, promote friendly and mutually beneficial partnerships between neighbouring countries, ensure transparency of state borders, involvement in international cooperation at various levels to address existing ecological, economic, and other international issues.

Bilateral agreements provide for the following main areas of cooperation in the ecological sphere [26]:

- taking concerted action to reduce the negative impact of global climate change on the economy and society;
- mutual operative informing about the threat of significant transboundary pollution of the territory of one of the parties and forecasts of its spread;
- organization of environmental education and upbringing of the population;
- information exchange in the field of environmental protection;
- harmonization of environmental legislation, regulatory and legal regulation of environmental protection and environmental management;
- improvement of the ecological-and-economic mechanism of environmental quality management and environmental management.

The ecological feature of sustainable environmental management provides a complex of adaptive processes, allows to maintain the natural state of ecosystems.

This requires the development of a cross-border strategy that ensures the fulfilment of the following conditions:

- the scale of consumption of natural resource potential should not exceed the natural conditions of ecosystem regeneration;
- amounts of industrial and household waste, which does not exceed the

assimilation capacity of the biosphere;

- selection of the optimization strategy, which should take into account the interests of both current and future generations.

Economic feature of cross-border cooperation of sustainable environmental management must provide:

- rational and efficient use of natural resources;
- formation of a truthful and flexible fiscal system;
- formation and use of tools mechanism for balancing the interests among the subjects of production and economic activity;
- introduction of the necessary investment support in mountainous regions;
- financing of measures for the social and economic development of the Carpathian region.

The economic feature should contribute: the reduction of budget expenditures for infrastructure development; raising funds for environmental protection. All items will provide an opportunity to predict in the future: the activity of local authorities in attracting the most self-dependent resources, and facilitate the monitoring of prices for natural environment services in the border areas of the Carpathian region; to assess the use of natural resources to ensure a stable socio-economic status.

To achieve parity of economic and environmental characteristics, the restructuring of production can only serve as a foundation for the implementation of ecologically sustainable environmental management. Priority features for the implementation of holistic environmental management are associated with the creation of a holistic economic mechanism and adequate institutional support. It is worth noting another aspect of rational use of economic features in border regions, where the linkage with the information strategy of ecological and economic development of the Carpathian region is required, namely obtaining information on planned tasks of ecological and economic development, namely information and statistical data; informing on the definition of deviations from the planned performance indicators; activity of implementation of functions of authorities concerning the ecological and economic development of the Carpathian region. Informativeness should provide: analysis of the ecological condition, level of economic and social development, demographic situation, as well as ecological education of the population; identification of aspects that are an obstacle to the implementation of regulations, agreements and strategies of ecological and economic development of the Carpathian region. And in the future, it provides an opportunity for introduction of a mechanism for monitoring the state of the environment and rational use of natural resources under established norms and rules; the introduction and improvement of the system of public sources of information (web pages of public authorities). For each of the proposed features, in the future, they will contribute to the improvement of the environmental and economic development of the Carpathian region and thus the quality of the social population.

An important step for environmental security between the cross-border regions of Ukraine is the organizational side and attracting significant environmental

investment. The most important obstacles to the development of cross-border cooperation (CBC) are inconsistencies in legislation and frequent changes in the leadership of local authorities in cross-border regions with the participation of border areas of EU member states. Establishing an effective system of information support for all actors and participants in cross-border cooperation will help eliminate existing barriers and open new opportunities for cooperation within cross-border regions (including by monitoring the situation in cross-border markets, preventing threats to the economic security of the border region, etc.). In Ukraine, the system of information exchange between Ukrainian and foreign partners is poorly established, which hinders their effective interaction.

The Cabinet of Ministers of Ukraine by its order of December 27, 2002, No. 744-r approved the Action Plan for the Implementation Priority Provisions and Principles of the "Program of Integration of Ukraine into the European Union". The Framework Convention on the Protection and Sustainable Development of the Carpathians was ratified by the Law of Ukraine of April 7, 2004, No. 1672 to improve the quality of life, strengthen local communities, and preserve natural values. The implementation of the principles set out in the Carpathian Convention will contribute to the harmonious combination of human interests and environmental protection, as well as the development of sustainable management approaches and statutory regulation, outlining the important role in involving local and regional authorities. According to the Law of Ukraine dated 06.10.1998 No. 163-XIV "On local self-government in Ukraine" [27], the responsibilities of the executive bodies of village and city councils include: ensuring balanced economic, environmental, and social development of border areas, effective use of natural, financial and investment resources. These powers should contribute to the improvement of the field of environmental protection, restoration of protected areas, as well as defending the interests of the mountain community. After all, on the territory of the border region, economic and environmental processes are regulated by central and local executive bodies, as well as local governments with the help (institutional, organizational, environmental, economic, information infrastructure) of financial provision for sustainable environmental management.

Institutional support at the regional level includes:

- creation of a supervisory group for the implementation of legislative and normative acts of local executive bodies and local self-government;
- taking measures to improve governance structures at local and regional levels;
- development of limits on the use of natural resources and discharges of pollutants into the environment in border areas;
- joint conclusion of environmental agreements and cross-border cooperation projects.

Organizational support:

- maintaining existing and creating new jobs in the Carpathian region and the Euroregion "Bug";
- increasing the investment attractiveness of border regions;

- targeted use of natural resources in the border areas of the Carpathian region and the Euroregion "Bug".

Ecological-and-economic support:

- rational use of natural resources of local significance;
- introduction of the ecological-and-economic mechanism of environmental management;
- development of programs, agreements on cross-border cooperation, implementation of environmental measures;
- investment ecological and economic attractiveness of border regions.

Information support:

- information support for subjects and participants of cross-border cooperation;
- information on the status and prospects of cross-border projects, effective management decisions;
- awareness of the advantages and disadvantages of participation in various cross-border projects, providing feedback.

Several directions limit the full use of cross-border cooperation to address problematic issues of border regions of Ukraine. Among them are the following: the lack of a Concept of balanced development of cross-border and border regions of Ukraine; underestimation at the regional level by local executive bodies of the country of cross-border cooperation. As Ukraine has limited access to EU programs and initiatives compared to other countries of Eastern and Central Europe, this is one of the problematic issues that need to be jointly addressed at the level of the Government of Ukraine and European institutions. The development of cross-border cooperation is currently a dynamic process that should be one of the priorities of the current state of international relations. In our opinion, the proposed directions for the institutional support of sustainable environmental management of cross-border and transboundary cooperation, based on the experience of collaboration across local and regional authorities, are subject to the creation of favourable organizational, economic, and social conditions for sustainable environmental management. It is worth noting that solving the problems of ensuring balanced use of nature is impossible due to the involvement of only one group of functions of institutions, and a comprehensive approach needed for a successful solution. Among the main functions of international ecological institutions are:

- conditions for simplification of international contracts and agreements;
- development of new principles, norms and laws;
- receiving reports on the implementation of contracts by states;
- coordination of ecological monitoring (including information and data collection);
- intensification and introduction of controlling authorities;
- promoting research;
- technical and financial support;
- enhancing the participation of civil society.

These functions indicate high responsibility, including financial (fines, penalties,

quotas), consolidation of the role authority of states (because non-compliance with set requirements, agreements leads not only to image losses but also negatively affects cooperation with other participating countries). Hence the task facing international institutionalization are global:

- cross-border cooperation in solving common ecological problems;
- joint development of laws and norms (institutional structuring);
- regulation, coordination, and control over the implementation of agreements by the organizations;
- regularly provided reliable reporting information.

The essence of the functioning of the institutional support in the direction of environmental management is to develop laws, norms, and rules in the formation of a paradigm of sustainable environmental management. First of all, an inventory of current legislation is needed, which would ensure: identification of legal norms that are subject to repeal or revision; elimination of discrepancies and contradictions between separate normative legal acts. It is worth mentioning that none of these regulations clearly explains and describes the mechanism for cross-border cooperation and assessment of its environmental and economic efficiency, which is significant in the implementation of the form of foreign economic cooperation. The agreements and drafts should clearly define the following provisions: name, essence, and purpose of an ascertainable form of cross-border cooperation, term of its implementation, compliance with priority areas of cross-border development of participating regions, and regulations adopted by governments and local governments of the parties, participants (their number and territorial affiliation), justification of the need to implement the form of cross-border cooperation, its financial support, organizational structure, management, its powers, and responsibilities, resolution of controversial issues, project implementation plan, legal support, expected effect (social, economic, environmental, humanitarian, etc.) and socio-ecological-economic performance indicators (which can be used to conclude the degree of achievement of the expected balanced result). Fig. 2 shows the conceptual ideas for the institutional support of sustainable environmental management, elements, and directions of their interaction.

But if we consider in detail each component of the structure of this mechanism, it should start with the information component.

The information component includes information on monitoring the environment on both sides of the border, assess the feasibility of investment activities, information on the state of use of natural resources, information on the implementation of tasks, principles set out in the program agreements of cross-border and transboundary cooperation, etc.

Information changes the nature and condition of the region, which is submitted from different areas of activity, where you can diagnose the economic, environmental, and social condition of the region. There is a certain peculiarity in the improvement of regulatory and legal providing. In this case, regulations play an important role, where it controls the operation of economic instruments and levers.

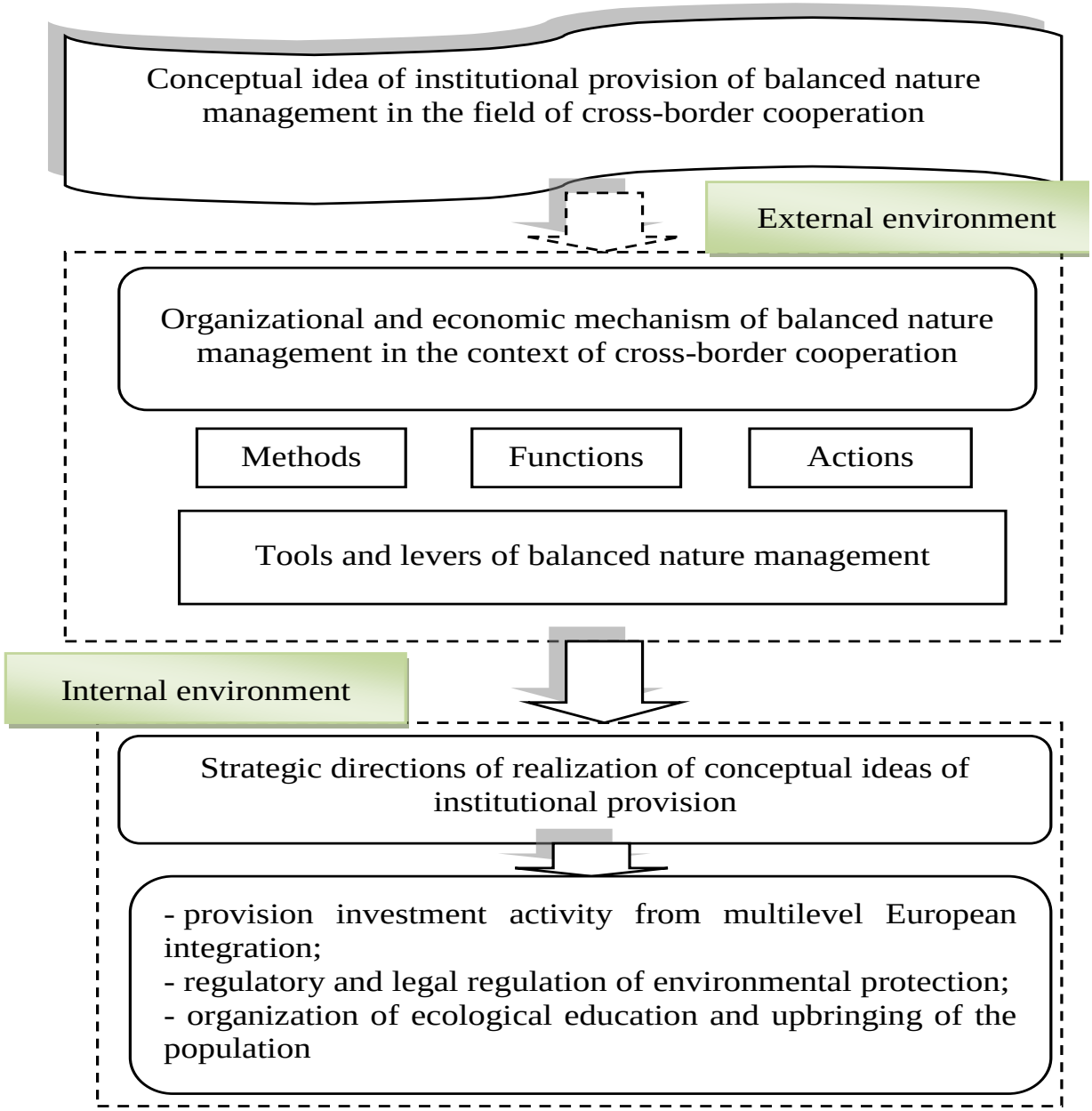

Fig. 2. Conceptual scheme of institutional support of sustainable environmental management in the context of cross-border cooperation

Source: developed by the authors.

Institutional support of sustainable environmental management is a component of the ecological-and-economic mechanism, regardless of the organizational and legal forms of economic entities in the border and cross-border regions.

To date, a good reason is that informal institutional norms and rules for the balance of environmental management in the region are not used in border regions.

The normative-legal regulation of the natural environment includes the use of economic methods and levers, as economic levers provide: attracting investment in border regions of Ukraine, financial support for cross-border cooperation programs, environmental tax, special tax regime. Through the use of levers, sustainable environmental management is provided, as well as the use of strategic directions for

the implementation of institutional support, as these areas are now gaining relevance in the region:

- forming of a developed market of ecological services;
- legislative and regulatory incentives to solve environmental problems;
- expanding cooperation with international environmental organizations, European countries;
- development of work on the creation of an environmental monitoring system;
- development of cross-border environmental programs in which the parties have a common interest;
- creation of joint nature-protected areas.

In Ukraine, among the main factors hindering the development of cross-border cooperation are the following:

- underestimation by the central government of cross-border cooperation as a tool for territorial/regional development and improving the quality of life of people living in the border regions of Ukraine;
- meagre level of financial support for joint cross-border projects on environmental protection from both the government and local authorities (except for border infrastructure);
- weakness of the institutional base of regional development, which in the border regions should play the role of one of the drivers of cross-border cooperation in the field of environmental management;
- local authorities do not realize that the tasks of developing cross-border cooperation require to perform coordination functions, rather than strict administration.
- lack of a single information network on the use, assessment, implementation of natural resource potential in the context of cross-border cooperation. As a result, too few entrepreneurs and non-governmental organizations are involved in the implementation of cross-border cooperation projects [28; 29; 30; 31].

The process of forming an effective institutional mechanism should take into account the important components of ensuring the development of the territory, which are determined by economic, social, environmental, and other elements. It is important to consider this when evaluating the institutional mechanism. According to some scientists [32], any proposed or improved institution can ensure the growth of indicators (economic, social and environmental) within its activities.

But at the same time it is difficult to achieve a coherent, effective and at the same time operational and administrative management, which can be implemented by different organizational systems within a single integrated natural complex. To do this, firstly, at the highest management level one must be aware of the need for balanced development in the border area; secondly, the definition of balanced development is one of the main state priorities. And then the necessary resources will be allocated for institutional changes.

When it comes to the decisive role of the state in creating political and economic conditions and institutions that will not lead to environmental destruction, it should

be remembered that the institutional phase of reforms associated with the creation of new institutions lasts, according to experts, 5–6 years. The other phase (cultural and mental) can last for a lifetime of several generations [32].

To realize sustainable environmental management in the context of cross-border cooperation, a Department with European integration powers should be set up. Integration activities should include the development of the relevant action plan of the State Program for cross-border cooperation, monitoring on Ukraine's implementation of international obligations on sustainable development (Fig. 3).

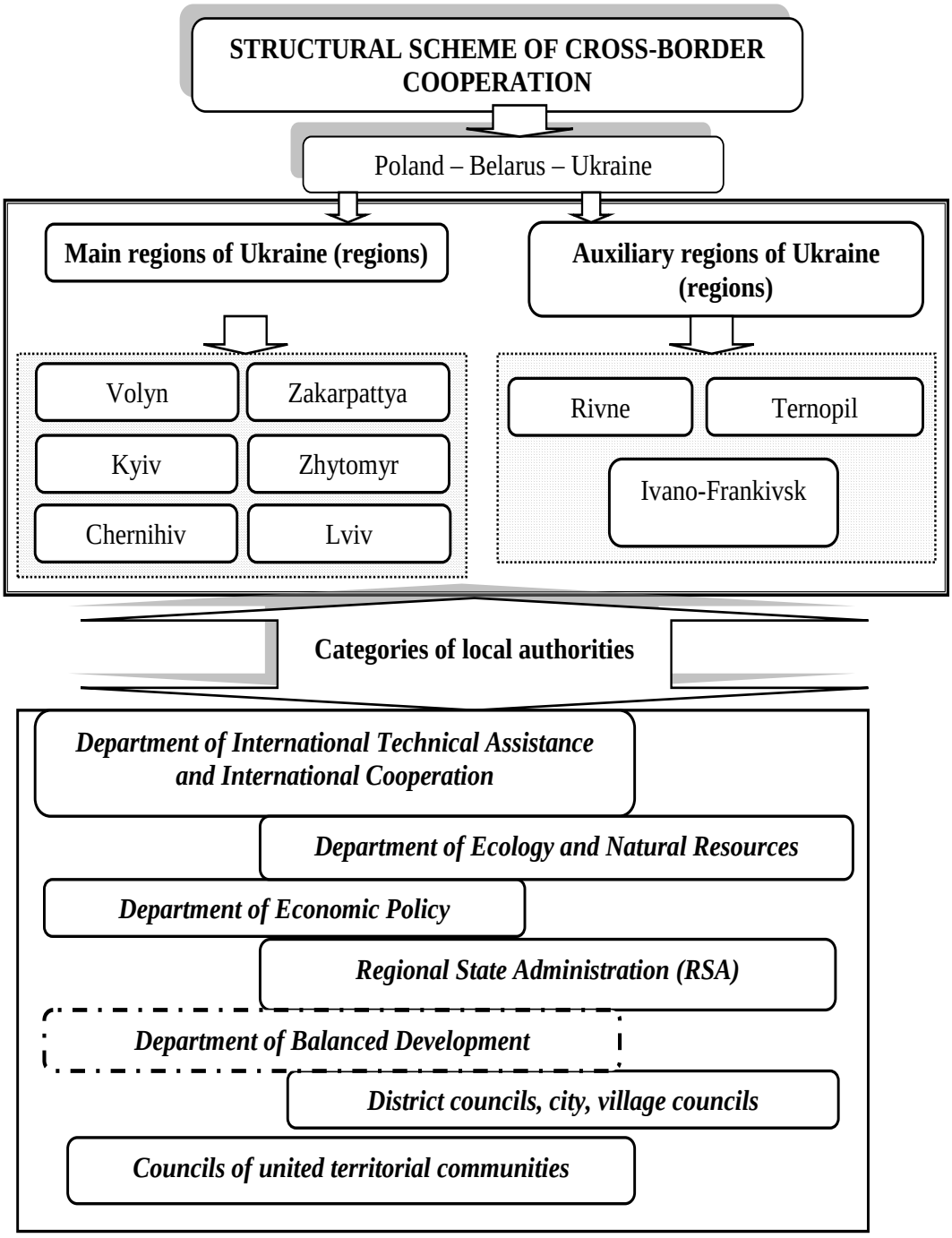

Fig. 3. Institutional and structural scheme of cross-border cooperation

Source: developed by the authors.

Fig. 3 shows the structure of cross-border cooperation, the main and auxiliary areas adjacent to the border regions, as well as local authorities with which the border regions of Ukraine cooperate. We propose to involve representatives of public organizations and authorities in local authorities. The presence of these representatives will promote the thorough consideration of various projects that satisfy as many common interests. Thus, the proposed institutional structure will contribute to the creation and establishment of an interdependent mechanism between them for the balanced development of the regions. An important point of intensification of ecological and economic cross-border cooperation is the unification of research, ecological-economic and administrative structures of adjacent border areas and other regions to use the existing potential. Therefore, the greening of cross-border cooperation will have greater potential in terms of mutual awareness, appropriate equipment with new knowledge, modern environmental and economic thinking. To effectively analyze the institutional support of sustainable environmental management, it is necessary to develop and implement a system of indicators of balanced development according to key economic, environmental, and social indicators. After all, based on data, it is expedient to develop a stable "National Report on Balanced Development of Cross-Border Cooperation" separately from the "National Report on Balanced Development". For further research, it is necessary to develop a mechanism for optimizing the system of public administration of balanced development based on the solution of existing institutional problems. And for improving the institutional framework to implement balanced development to carry out institutional modernization of the system at the regional level in the field of sustainable environmental management, to develop a system of indicators of balanced development, to introduce a system of monitoring the implementation of balanced development in the context of cross-border cooperation.

The most important obstacles to the development of CBC are the issues of the inconsistency of legislation and the permanent rotation of local government leadership in cross-border and border regions. Establishing an effective system of information support for all actors and participants in cross-border cooperation will help to eliminate existing barriers and open new opportunities for cooperation within cross-border regions (in particular by monitoring the situation in cross-border markets, preventing threats to environmental security of the border region, etc.), transfer of cross-border cooperation management from manual to automatic regulation. It should be noted that to further raise public awareness of cross-border cooperation in Ukraine to create a stable pro-European majority in Ukrainian society, The Resolution of the Cabinet of Ministers of Ukraine of July 2, 2008, No. 594 approved the "State Target Program for Informing the Public on the Issues of European Integration of Ukraine for 2008–2011", but to date, unfortunately, any such information program hasn't been developed, as in Ukraine the system of information exchange between Ukrainian and foreign partners is poorly established, which hinders their effective interaction. After all, this problem can be traced in all cross-border and border regions. All this will allow getting a sustainable development and

improvement of the image of the border areas of Ukraine. Improving and developing joint mechanisms and tools for cross-border cooperation based on the strategy of balanced development will help to establish effective cooperation between cross-border and near-border cooperation. The purpose of the Concept of balanced development of cross-border and border regions will be to ensure environmental and economic efficiency and the functioning of cross-border cooperation in the border regions of Ukraine. The implementation of this Concept will make it possible to introduce European standards, improve cross-border and border cooperation, as well as direct the efforts of executive authorities and local governments to implement these plans. The task of the Concept will contribute to the creation of appropriate conditions for organizational, financial, environmental, and economic opportunities of entities and participants in cross-border cooperation; increasing the efficiency of using external and internal factors of development of cross-border and border regions; conducting constant monitoring of ecological and economic activities of border regions to ensure balance (Fig. 4).

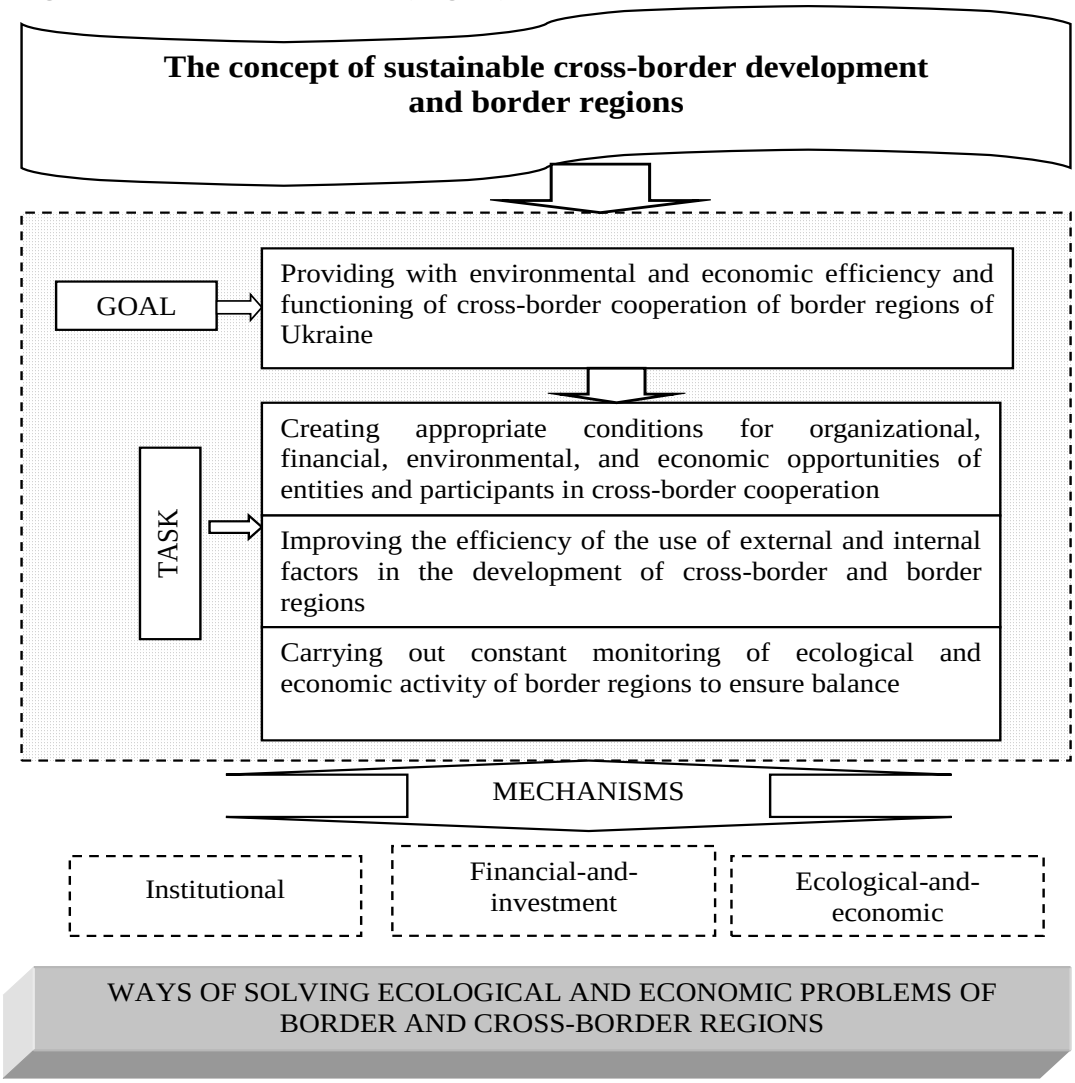

Fig. 4. Model of Concept of the sustainable development of cross-border and border regions

Source: developed by the authors.

The implementation phase of the Concept provides for the definition of institutional support and implementation of tasks, as the list of tasks that are logically related will contribute to the development of cross-border cooperation. In particular, stage 1 – institutional and regulatory environment provides for the implementation of the Association Agreements between Ukraine and the EU, programs, and agreements cross-border cooperation, implementation, and development of programs at the local and regional level; stage 2 – improvement of legislation – bringing current legislation in line with European standards; stage 3 – promoting the development of environmental monitoring – constant monitoring of the state of the environment, the establishment of joint groups on cross-border and border cooperation; stage 4 – financing – improvement of the legal framework on the audit of the use of funds for environmental projects, as well as the implementation of cross-border cooperation programs; stage 5 – further development of programs and their implementation – attracting foreign direct investment in environmental protection, further development of good neighborly relations, as well as training and education of specialists in environmental and economic security (Fig. 5).

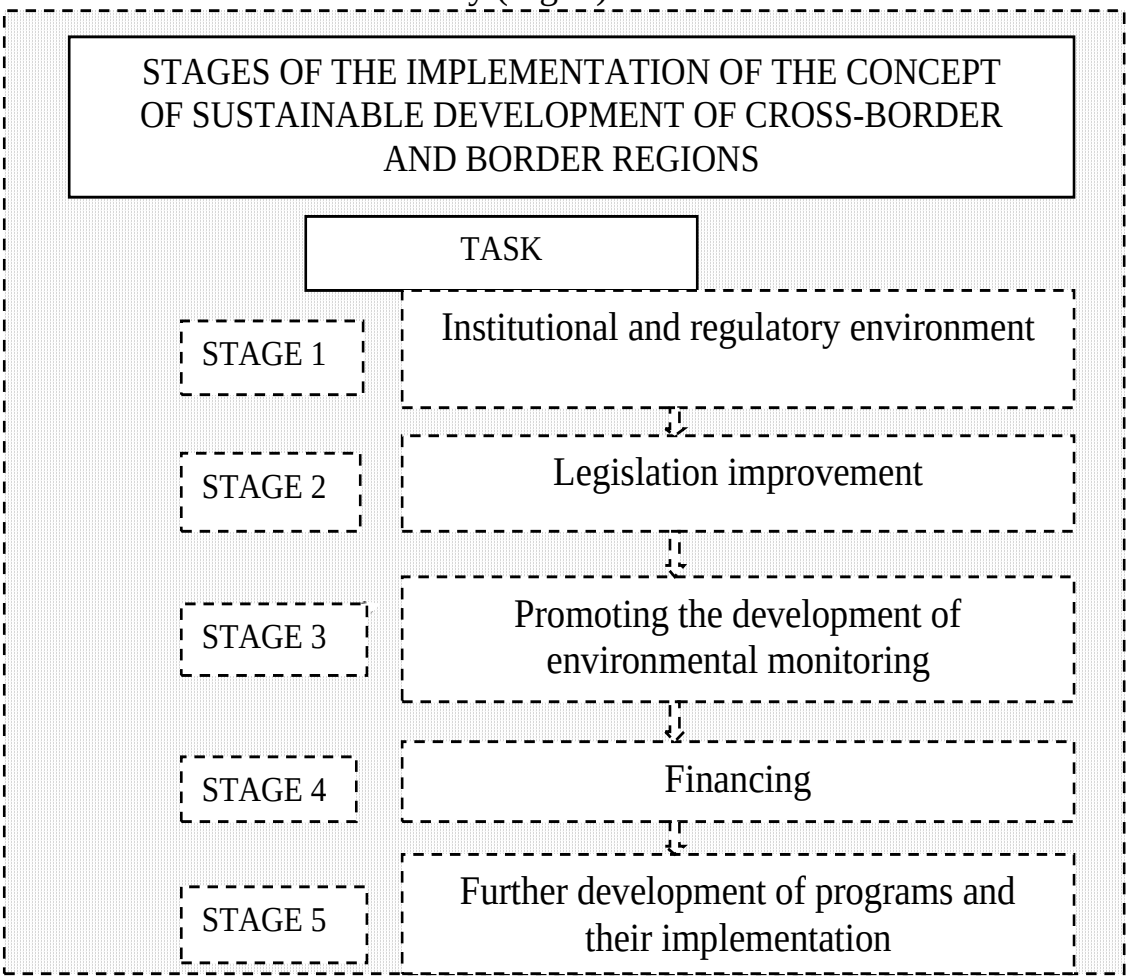

Fig. 5. Stages of implementation of the Concept of the sustainable development of cross-border and border regions

Source: developed by the authors.

The optimal stages of implementation of this Concept, given the current

situation in Ukraine, are setting long-term goals and priorities for certain purposes, involving local and regional authorities in the development of the draft Concept, carrying out constant monitoring and analysis of the current legal norms in which the subjects of cross-border cooperation work, as well as the available foreign experience in the institutional support of sustainable environmental management.

This can be achieved through the improvement of environmental and economic mechanisms with local and regional authorities, as well as the rational use of natural resources in border areas. The concept defines the basic requirements for institutional, financial-investment and ecological-economic mechanisms of cross-border and border regions.

Conclusions. From the above, it can be concluded that the linkage of environmental problems of cross-border cooperation with economic and social indicators reveals the need for equal consideration of each factor in the development of cross-border cooperation programs. European vector of Ukraine's foreign policy, in particular cooperation and accession to the EU, is considered to be a priority, today in Ukraine it is necessary to develop a theoretical and methodological framework and appropriate practical measures to ensure positive changes in the European integration vector in Ukraine. That is why especially important and relevant aspects in this direction are the relevant theoretical and methodological development and proper practical implementation of cross-border ecologically-economic cooperation in the Carpathian region, which would meet EU requirements. The study of environmental and economic factors in the border regions of Ukraine and neighbouring EU countries is of particular importance, as the European vector of Ukraine's foreign policy, in particular cooperation and accession to the EU, is a priority.

It is established that the implementation of the balance of nature management in the context of transboundary cooperation should create a state institution that would have the authority to implement the goals of European integration, including three components: environmental, economic and social. It is also focused on the development of the Concept of Balanced Development in the Border Territories and the relevant action plan of the State Program of cross-border cooperation and control over the implementation of Ukraine's international obligations.

Perspective directions for the implementation of this Concept of balanced development of cross-border and border regions will contribute to their integrated impact on management decisions: first, the creation of effective institutions for the regulation of cross-border cooperation based on local authorities to address issues in the field of environmental management; secondly, improvement of the regulatory framework for cross-border cooperation in the field of the environment; thirdly, the intensification of the European Neighborhood Policy, which will make it possible to form relations with other European countries. Thus, the implementation of the Concept is aimed at overcoming environmental and economic problems.

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