

PROBLEMS OF ENVIRONMENTAL AND ECONOMIC SECURITY OF FORESTRY ENTERPRISES IN THE POST-WAR PERIOD IN UKRAINE

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Abstract. Climatic problems, the state of the natural environment, military actions are the main problems of today, which directly affect the ecological and economic safety and, as a result, the sustainable development of forestry enterprises. Theoretical, methodical and practical principles of ensuring ecological and economic safety of forest enterprises are the subject of the research. The aggravation of the ecological situation in Ukraine requires the development of modern mechanisms of regulation of ecological and economic safety in accordance with the principles of ecologically safe economic development. *Methodology.* The theoretical and methodological basis of the research are the basic theoretical regulations of domestic and foreign economic science on the issues of economic and ecological safety of forest enterprises, laws of Ukraine, EU directives. The research was conducted on the basis of general scientific methods and techniques: logical and qualitative analysis and synthesis – when substantiating theoretical approaches to ensuring ecological and economic safety; system structural analysis – when analyzing the current state of sustainability of forestry enterprises; comparative analysis – when comparing the state of ecosystems during military operations. When analyzing the sustainability of forest enterprises, the methods of integrating the approaches of the economic and ecological apparatus, the general theory of development, and the methods of economic and ecological analysis were used. In the process of synthesizing the multi-link economic-ecological system, the methods of the theory of multi-link management systems were used. The purpose of the study is to substantiate the peculiarities of the mechanism of ensuring ecological and economic security of the functioning of forestry enterprises in the post-war period in the context of the European policy of the green course on the following thematic platforms – the need to ensure ecological and economic security, economic integration and rapprochement, adaptation to climate change. The realization of the goal determined the solution of the scientific research tasks: to substantiate the need for ecological and economic security, to analyze the trends of the implementation of the new EU forest strategy in the direction of the reform of the country's forest sector, to prove the feasibility of the algorithm of the mechanism for ensuring the ecological and economic security of forestry enterprises. *Results.* According to the results of the research it is proved that today the general model of multipurpose use of forest resources should cover the problem of the ratio of the available and desired state of resources. This ratio should determine the nature and scale of the problem, which is manifested in ensuring ecological and economic security in accordance with ecologically oriented principles. *Conclusions.* Taking into account today's realities, the mechanisms of functioning of ecological and economic security are determined, which are aimed at maintaining the balance between its structural elements and the implementation of both anthropogenic and natural loads on them. In this way it is possible to ensure stable development, achieve the set goals, achieve the desired results without harming the environment, preserve the natural resources and the assimilation potential of the forest ecosystem. Therefore, the focus on the new forest strategy of the EU is a step towards an effective and sustainable economy, intensifying efforts to adapt to climate change and mitigate the consequences of military actions, as well as solving environmental problems in the forest sector.

Key words: ecological and economic security, forestry enterprises, sustainable development, climate change, post-war recovery.

JEL Classification: Q23, Q57, O44, P28

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1. Introduction

The Ukrainian economy is characterized by the complexity of economic conditions caused by many factors in modern times. Military actions led to the deterioration of ecological and economic conditions not only in certain regions or population groups, but in almost all spheres of state development. Businesses and entrepreneurs were the first to suffer. In addition to the existing economic and political crisis, a pandemic, military operations and the lack of government programs to support the business environment were added. Therefore, the concept of environmental and economic security has become particularly relevant. After all, the turbulence of the external and internal environment, existing threats and risks that affect the stability of the company's activity, as well as the creation of new ones, prompt the company to search for more effective tools and mechanisms to increase the level of its own security. (Zaichenko, Dima, 2021) Among the most important is the growing role of environmental factors, which are gaining strategic importance in almost all areas of economic activity, including forestry. Its rational organization presupposes orientation on minimization of environmental risks and losses and maximization of social benefits. It should be recalled that effective use of available forest resources at the level of individual forest enterprises is possible only if they are in accordance with ecological and economic safety. Thus, the implementation of environmental and economic safety measures is necessary to ensure effective forest management based on ensuring sustainable forest management, preservation of biodiversity in forests, forest management adapted to climate changes, popularization of the forestry profession in society, ensuring the financial stability of the forestry industry and creating favorable conditions for activation of the development of wood processing and related branches of the economy. Hence, balanced forestry means finding the most important factors that significantly influence the expected result that the ecosystem achieves in its development, while weak factors are either not taken into account or are considered as random deviations (fluctuations).

Theoretical and methodological aspects of environmental and economic security of

enterprises are reflected in the works of N. Andreeva, I. Balaniuk, I. Boyk, O. Vasiliev, T. Vasylytsiv, V. Geets, O. Hnatkovich, B. Danylyshyn, S. Dovbny, A. Yepifanov, O. Ilyashenko, A. Kozachenko, P. Kravchuk, G. Mishenina, V. Muntiyanyan, I. Nagorno, V. Pripotnia, O. Prokopenko, T. Radevich, N. Reverchuk, S. Smirnoi, V. Stepanov, S. Tkachuk, S. Shkarlet, V. Shpilovoy, V. Yachmenyov and other authors.

Despite the considerable work of scientists, the dynamics of development of ecological and economic systems, which are forestry enterprises, ecological and climate problems of today, there is a need to generalize and deepen the justification of provisions for ensuring their ecological and economic security, which determines the relevance of the topic, goal and task of research.

The purpose of the study is to substantiate the features of the mechanism of ensuring the ecological and economic security of the functioning of forestry enterprises in the post-war period in the context of the European policy of the green course according to the following thematic platforms – the need to ensure ecological and economic security, economic integration and rapprochement, adaptation to climate change. The realization of the goal determined the solution of scientific research tasks: to substantiate the need for ecological and economic safety, to analyze the trends of implementation of the new EU forest strategy in the direction of reform of the country's forest sector, to prove the feasibility of the algorithm of the mechanism for ensuring ecological and economic safety of forest enterprises.

The theoretical and methodological basis of the research are the basic theoretical regulations of domestic and foreign economic science on the issues of economic and ecological safety of forest enterprises, laws of Ukraine, EU directives. The research was conducted on the basis of general scientific methods and techniques: logical and qualitative analysis and synthesis – when substantiating theoretical approaches to ensuring ecological and economic safety; system structural analysis – when analyzing the current state of sustainability of forestry enterprises; comparative analysis – when comparing the state of ecosystems during military operations. When analyzing the sustainability of forest enterprises, the methods of integrating the approaches of the

economic and ecological apparatus, the general theory of development, and the methods of economic and ecological analysis were used. In the process of synthesizing the multi-link economic-ecological system, the methods of the theory of multi-link management systems were used.

2. The need to ensure environmental and economic security

Regular monitoring of the level of economic security, based on regulatory and legal acts that ensure both economic and environmental security, warns of the emergence of threats and identifies problematic aspects, which makes it possible to analyze the efficiency of the enterprise and formulate preventive measures to support stable functioning.

It should be noted that the peculiarity of domestic forest enterprises is that management decisions are made not to prevent threats and risk situations, but after they have occurred, which leads to an increase in the current costs of the enterprise, the use of most of its resources, and a decrease in its sustainability in general. That is why it was necessary to study in more detail the content of ecological and economic security and its role for forestry enterprises in modern realities. (Zaichenko, Dima, 2021) Consequently, it is necessary to emphasize the task of economic and ecological safety of forest enterprises, Table 1.

It should be noted that the Law of Ukraine dated 25.06.1991 № 1264-XII "On the Protection of the Natural Environment" declares that the protection of the natural environment, rational

Table 1

Environmental and economic safety of forestry enterprises: purpose, task

| Goal | Task |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Economic security of the enterprise</i> | |
| Prevent economic imbalances, strengthen its resilience to external and internal challenges and threats, and create conditions to ensure the competitiveness of the Ukrainian economy. | Protection of economic interests from possible threats; Sustainability and stability, realized in the formation of the competitive potential of the enterprise, and on its basis – competitive advantages and competitiveness, the possibility of development; Flexibility of elements of the internal environment, which allows to adapt to external changes, quickly eliminate various threats without negative consequences; Balance, reliability, emergence, which ensures the sustainability of the enterprise as a system in the face of real and potential negative impacts; Access to resources and markets, the level of protection against external and internal risks, the level of economic efficiency of operations, and the company's ability to develop. |
| <i>Environmental safety of the enterprise</i> | |
| Ensure rational use of natural resources; Provide sustainable forest management and enhance the ability of forest ecosystems to adapt to climate change; Preserve biodiversity and ensure the development of the Nature Reserve Fund of Ukraine; Strengthening the adaptive capacity and resilience of social, economic and environmental systems to climate change; Stabilizing the ecological balance in the areas of hostilities after the restoration of Ukraine's territorial integrity within its internationally recognized state borders. | Reform the environmental financing system to encourage pollution reduction; Conduct a national forest inventory; Strengthening the resilience of forest ecosystems to pests and new climatic conditions, implementing fire prevention and rapid response measures; Reducing clear-cutting in the Carpathian region; Introduction of timber sales by auction only; Ensuring the digitalization of administrative services and information on the state of the environment; Simplify the process of demarcating protected areas; Ensure the collection of information on environmental risks and damage in the territories. Develop action plans for climate change adaptation in the areas of biodiversity conservation, forestry, public health, agriculture and soil, transport and infrastructure, and tourism; Conduct a financial assessment of the implementation of climate change adaptation measures. |

Source: prepared by the author using (Strategy of environmental security and adaptation to climate change for the period up to 2030, Cherchyk, 2017)

use of natural resources, ensuring the ecological safety of human life is an integral condition for sustainable economic and social development of Ukraine. Most of the principles of environmental protection are involved in the activities of business entities in one way or another, namely: the priority of environmental safety requirements, the obligation to comply with environmental regulations and limits on the use of natural resources when carrying out economic, managerial and other activities, the provision of an environmentally safe environment for people's life and health, the ecologization of material production based on the complexity of solutions in matters of environmental protection, the use and reproduction of renewable natural resources, the wide implementation of the latest technologies, etc. If considering the analysis of the legislative basis of environmental safety, at the legislative level in Ukraine there is no definition of the concept of "environmental safety of the enterprise", although this issue is the most relevant today, while the legislator in Article 50 of the Law № 1264-XII provided an interpretation: environmental safety is such a state of the natural environment, in which prevention of deterioration of the ecological situation and the occurrence of hazards to human health is ensured. Thus, in carrying out its activities, a business entity must comply with environmental regulations, guarantee the payment of payments and fines for environmental pollution, ensure the environmental friendliness of its products, etc., and thus ensure the environmental safety of production. In case of non-compliance with environmental safety requirements in the course of business activity, the business entity or its officials are subject to disciplinary, administrative, civil and, in some cases, criminal liability. Therefore, the business entity should be interested in the proper organization of the work of environmental service specialists. (Simple issues of complex environmental safety of the enterprise, Cherchyk, 2018)

At the current stage of development of society, the phenomena of environmental crisis have acquired a global character. This has a negative impact on the quality of life of people, the state of the economy, the structure of markets, the operating conditions of enterprises, and leads to the degradation of ecosystems. Such a situation

requires a review of modern management principles, a transition to ecologically sound principles of development. This is especially true for forests, which should be considered as complex, dynamic ecosystems with long-term economic efficiency largely determined by the company's environmental policy and the implementation of the principles of sustainable and regenerative forest management. Consequently, the assessment of environmental and economic safety becomes important, which should take into account, on the one hand, the interests of the development of the enterprise in terms of ensuring its own safety and, on the other hand, the safety of the results of its activities for the environment. The results of the assessment of environmental and economic safety allow to make sound management decisions at the strategic level, to prevent negative situations at the strategic and operational levels of the company's management. (Strategy of environmental security and adaptation to climate change for the period up to 2030, National Security Strategy of Ukraine Human Security – Country Security)

The development of methodological aspects of the study of ecological and economic safety of forest enterprises includes the definition of principles, criteria, approaches and methods that form the framework and ensure the complexity of the study of the safety of the enterprise. Threats to the ecological safety of Ukraine are formed by a significant level of pollution of atmospheric air, water resources, land resources, an imperfect system of state supervision (control) and insufficient effectiveness of environmental monitoring. In addition to the existing problems, the negative impact of climate change and military actions on the territory of the country have been added.

According to the United Nations Development Program's 2019 Human Development Report, insufficient attention to the challenges posed by the impacts of climate change will contribute to social inequality, undermine democracy, cause displacement and instability, and ultimately threaten the prospects for achieving the Sustainable Development Goals. (Strategy of sustainable development of Ukraine until 2030)

The importance of adaptation to climate change in Ukraine is particularly relevant in the context of the Association Agreement between

Ukraine and the European Union, as Article 365 states that cooperation between the Parties shall include the development and implementation of policies to combat climate change. Thus, climate change negatively affects forests, and forests can prevent or slow down the process of climate change. Today, the process of implementing Ukraine's climate change adaptation strategy for the period up to 2030 has begun in the country.

3. Sustainable development of forest enterprises is the basis for environmental and economic security

The forest cover of Ukraine is 15.9%. Despite the small forest area, Ukraine ranks 9th in Europe in terms of forest area and 6th in terms of timber reserves. The conditions of forest vegetation in Ukraine are heterogeneous, so forests are unevenly distributed throughout the country. Forest cover varies from 3.7% in Zaporizhzhia Oblast to 51.4% in Zakarpattia Oblast. Half of Ukraine's forests are artificially created and require increased care. About 0.8 million hectares of forests belonging to the former collective farms are located on reserve lands and are in an unsatisfactory condition (they are arbitrarily cut down, die from fires, diseases, pests, etc.).

The total area of forest plots belonging to the Forest Fund of Ukraine is 10.4 million hectares, of which 9.6 million hectares are covered with forest vegetation.

Therefore, forestry is one of the most important segments of the Ukrainian economy (Table 2). Sustainable development of forestry is based on a harmonious combination of ecological, economic and social functions of forests. Ukraine has joined international agreements to support the sustainable development of forestry. Currently, the national forest policy of Ukraine must be implemented on the basis of sustainable development.

An important feature of the development of forestry is the ownership of forests and land by the Forest Fund. According to the author, the state ownership is the most effective for the sustainable development of forestry. Therefore, it is necessary to create a state specialized economic enterprise "Forests of Ukraine" by merging state specialized forestry enterprises belonging to the sphere of management of

the State Agency of Forest Resources, with subsequent transformation of the state specialized economic enterprise "Forests of Ukraine" into a joint-stock company, 100% of the shares of which belong to the state, taking into account the peculiarities, the regularity caused by modern realities (Some issues of forest management reform).

It should be noted that the Resolution of the Cabinet of Ministers of Ukraine of September 7, 2022¹ 1003 "Some issues of reform of management of the forest sector" provides for implementation of a comprehensive reform through reorganization of state unitary commercial enterprises under the management of the State Forestry Service of Ukraine and formation of state unitary commercial enterprise "Forests of Ukraine", which is a part of the management of the State Forestry Service of Ukraine.

The main advantage of a single state enterprise is the possibility of attracting really large financing: grants, EU funds for the implementation of innovative investment projects, the purchase of forestry, logging and timber processing complexes, fire-fighting equipment. After all, the cost of restoring forestry activities in the territories where hostilities took place and significant damage was caused to the forest fund and forest infrastructure is estimated at more than 15 billion UAH (The reform of the forest sector is necessary to meet the needs of the army – an expert).

Undoubtedly, the studies on the strengthening of the influence of military actions on the economic dynamics of forestry development were intensified, which drew attention to the need to change the management methodology, in addition to the emphasis on taking into account the damage caused to the environment.

This logically raises the first question about effective ways to deal with the economic aspect of the forest industry in wartime conditions. It should be noted that in June 2022 the Regulation of the European Parliament and the Council №2022/870 on temporary measures to liberalize trade came into force. This decision complements the opportunities available to Ukrainian exporters under the Association Agreement between Ukraine and the EU.

Now the tariffs prescribed by the agreement are temporarily suspended, but the principles

Table 2

Main indicators of the forestry management

| Name | Year | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|-------------------|----------------------|----------------------|
| | 2010 | 2015 | 2019 | 2020 | 2021 |
| Cost of sold forest products, million UAH | 3530,2 | 10176,9 | 12846,8 | 12366,7 ² | 20476 ² |
| Total deforested area, thousand hectares | 402,2 | 399,3 | 436,8 | 382,0 ² | ... |
| from felling of the main use | 29,1 | 34,6 | 29,6 | 30,1 ² | ... |
| <i>from felling of formation and improvement of forests and other fellings</i> | 373,1 | 364,7 | 407,2 | 351,9 ² | ... |
| Timber harvest, total, thsd. m ³ | 18064,6 | 21924,2 | 20869,6 | 17826,2 ² | 17649,4 ² |
| from felling of the main use | 7767,5 | 9097,7 | 7914,6 | 7124,6 ² | 7114,0 ² |
| <i>from felling of formation and improvement of forests and other fellings</i> | 10297,1 | 12826,5 | 12955,0 | 10701,6 ² | 10535,4 ² |
| Harvesting of round wood, total, thsd. m ³ | 16145,6 | 19267,7 | 17886,6 | 16773,0 ² | 16666,9 ² |
| Forest reproduction area, thousand hectares | 70,1 | 60,4 | 48,8 | 44,8 | ... |
| <i>planting and sowing forests</i> | 56,1 | 40,4 | 32,1 | 30,2 | ... |
| <i>natural regeneration of the forest</i> | 14,0 | 20,0 | 16,7 | 14,6 | ... |
| <i>Of the total area of forest reproduction, thousand hectares</i> | | | | | ... |
| <i>afforestation area</i> | 27,8 | 2,5 | 2,2 | 2,3 | ... |
| <i>reforestation area</i> | 42,3 | 57,9 | 46,6 | 42,5 | ... |
| <i>Area of transfer of forest crops and forest areas of natural regeneration to areas covered with forest vegetation, thousand hectares</i> | 54,8 | 60,8 | 58,8 | 57,9 | ... |
| <i>including forest crops</i> | 40,0 | 45,5 | 41,5 | 40,0 | ... |
| Number of forest fires | 3240 | 3813 | 1263 ¹ | 2608 ¹ | 660 ¹ |
| Area of forest lands covered by fires, thousand hectares | 3,7 | 14,7 | 1,1 ¹ | 75,0 ¹ | 0,3 ¹ |
| Forest fire damage, million UAH | 26,7 | 20,2 | 6,8 ¹ | 19,1 ¹ | 2,1 ¹ |
| Area of forest protection against pests and diseases, thousand hectares | 81,9 | 46,0 | 96,6 | 94,7 | ... |
| <i>biological method</i> | 68,4 | 31,6 | 94,4 | 85,6 | ... |
| <i>chemical method</i> | 13,5 | 14,4 | 2,2 | 9,1 | ... |

¹ Data from State Emergency Service of Ukraine.

² Data from State Forest Resources Agency.

of phytosanitary and legality are not abolished. In the EU, a single directive is strictly followed – illegal timber cannot enter the European market. Taking this into account, and taking into account the fulfillment of the requirements of the EU legislation, illegally harvested wood will not be able to enter the EU market. In Ukraine these requirements are not fully met, which leads to various situations that are harmful from an ecological and economic point of view. With the support of NATO, the EU is ready to accept timber from Ukraine, but with the condition of cooperation with the EU and inspection of the timber supplied by Ukraine. It is very important that in the regions where there are no active hostilities, the norms of the law are strictly observed: there should be no

violations and there should be no increase in deforestation, which is harmful both ecologically and economically (Forest industry in war conditions. What to expect and what to fear?).

It should be emphasized that Ukrainian forests have been significantly affected by military operations, many areas with plantations are still mined. Therefore, all initiatives and European integration programs related to forest policy must be adapted to military realities.

Currently, Ukraine is losing Ukrainian forests and other valuable territories due to military actions Table 3. This table visualizes the consequences of the hostilities and the damage caused to the environment, especially to Ukraine's forests, as a result of the Russian invasion. It will take decades to repair it. Since February 24,

Table 3

War damage to the environment of Ukraine (as of November 2022)

| Damage to the environment | Total amount |
|----------------------------------------------------------------------------------------------------------------|------------------------------|
| The amount of environmental damage | >1.35 trillion UAH |
| The soil is littered with dangerous things | >183 thousand m ³ |
| Emissions that entered the air from the burning of Russian equipment and generated >325 thousand tons of waste | >38 thousand tons |
| Discharge into atmospheric air | > 67 million tons |
| The land is littered | >2.3 million m ² |
| Forests were burned, some of them were lost forever | ~23.3 thousand ha |
| Conservation areas that suffer from war | 20 % |
| Occupied by: | |
| Reserves | 8 |
| National Parks | 10 |
| War-affected forests | >3 million ha |
| Ramsar sites are threatened with destruction (~600,000 hectares) | 16 |
| Territory that needs demining | >2 thousand km ² |
| An emerald network that is at risk | ~ 2.9 million ha |

Source: prepared by the author based on the data of the Ministry of Environment, State Environmental Inspection of Ukraine

nearly 3 million hectares of forest in Ukraine have been destroyed by the war. Currently, more than 500,000 hectares of forest are under occupation and hostilities, that could be lost. Self-seeding forests and restoration of arable land will help us restore forests and increase their area.

At present the question of Ukraine's post-war reconstruction is being discussed, which should be based on the principles of the European Green Course and the use of advanced environmental tools. Therefore, the main task is to implement several vectors simultaneously: restoration of the environment, implementation of European integration reforms and implementation of climate change policy.

Therefore, the question of effective ways to restore the environment logically arises. And the most important thing is to implement priority initiatives already during the war. The Ukraine Recovery Conference, held in Lugano, Switzerland in July 2022, was an important contribution to the future recovery of the environment.

One of the programs of the conference to be implemented in the future is "Reconstruction of a clean and protected environment". It is planned to implement 76 nature protection projects in the amount of 25.5 billion euros. The practical results of the implementation of the program should be: construction of more than 100 modern waste management facilities, 10 national parks organized according to EU standards, 9 forest seed centers for growing tree

seedlings, and so on (The reform of the forest sector is necessary to meet the needs of the army – an expert).

It is known that the reconstruction of Ukraine will require intensive use of various spheres: mining, industry, transportation and others, which will be accompanied by an increase in carbon emissions into the atmosphere. Switzerland's experience and support are valuable for Ukraine to implement "green" principles and rebuild the country without harming the world's ecology. (Kovalchuk, Kravchuk, 2019; Honcharuk, Kovalchuk, 2020)

It should be emphasized that the European Community is making great efforts to combat climate change. Ukraine is already an official part of the European Union. Therefore, the need for reforms is inevitable in order to reduce emissions and renew tasks to fulfill obligations under the Paris Climate Agreement. In the future, the creation and implementation of the interdepartmental program "Environmental education and information for sustainable development of Ukraine for 2022–2032" is planned for each region of Ukraine.

In Europe, forests occupy 35% of the total area of the continent and are represented by various local species of trees. Among European countries, Ukraine ranks ninth in the area of forests. However, within half a year of the full-scale Russian invasion, 30% of Ukrainian forests were damaged by hostilities. Currently, about 600,000 hectares of Ukrainian forests are occupied.

Attract funds and international experts for mine clearance, rational use of forest resources, and increasing Ukraine's forest cover. This will be facilitated by: planting forests, implementing new logging regulations, developing recreational forest resources, and legalizing independent or "wild forests" (Environmental reforms of Ukraine on the way to the EU).

4. Effectiveness of the European experience in the field of environmental and economic security

A study of the European experience in ensuring ecological and economic security shows that forests play the most important role for ecology and human health, absorbing carbon dioxide and providing us with oxygen, preserving streams and rivers, protecting adjacent agricultural lands from erosion and drought, and also mitigating the effects of global warming.

It should be noted that on July 16, 2021, the European Commission adopted a new forest

strategy, which proposes measures to protect the forests of the European Union, providing for an increase in area, biodiversity and improvement of the ecological situation. Due to significant changes in ecological indicators as a result of human activities, which are taken into account in the Climate Change Study 2021, the total area of European forests may decrease significantly. At present 43,5% of the territory of the European Union is covered with forests. In order not only to maintain this indicator, but also to increase it, the New Forest Strategy of the EU until 2030 was developed (State strategy of forest management of Ukraine until 2035). The main tasks of the New Forest Strategy of the EU are presented in Table 4.

All measures for the preservation and protection of forests must be implemented by the Member States of the European Union, as well as by private companies and civilians on a voluntary basis, stimulated by financial support.

Table 4

The main tasks envisaged by the EU's New Forest Strategy

| Direction | Content of the task |
|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Planting new trees | Planting of new trees, at least 3 billion trees, on the territory of the European Union by 2030. |
| Protection and recovery | Restoring the natural balance of forests helps preserve endangered species of animals, birds, insects and plants. |
| Reduction of greenhouse gas emissions by at least 55% by 2030 | States should prioritize reducing emissions and increasing the uptake of greenhouse gases by natural sinks, such as forests. Large and biodiverse forests reduce the impact of air pollution on human health. |
| Protection and restoration of biological diversity of forests | Restoring the natural balance of forests helps preserve endangered species of animals, birds, insects and plants. |
| Rational use of forest resources | Execution of reforestation works, control over the amount of felled forest, which should not exceed the number of seedlings planted, complex measures for processing raw materials. |
| Development of a closed cycle economy | Recycling, multiple use and efficient application are the main principles of the circular economy. This will help extend the life of wood products, which in turn will improve the climate, reduce the use of forest resources, create new jobs and increase business profits. |
| Protection of untouched forests | In the EU, there are only about 3% of unused and old forests that need to be protected by the states. |
| Spread of ecotourism | This is a form of tourism characterized by visits to natural areas untouched by man. To this end, the EU Commission will encourage cooperation between the tourism and forestry sectors and nature conservation. |
| Financing of private entrepreneurs and owners of forest enterprises | The strategy is aimed at the economic development of private individuals to provide services that lead to the restoration and conservation of forests. |
| Research and creation of innovative technologies for the protection of the forest sector | Research in this area will contribute to the optimal and rational use of resources, combat the effects of climate change, effectively increase forest diversity and improve ecology. |
| LIGNO adheres to the principles of sustainable development | The LIGNO online wood products platform supports the European Commission's desire to protect forests and increase their area. |

Source: generated by the author using the EU Forest Strategy until 2030

It is now important to ensure the sustainable management of forests in order to preserve and enhance their biodiversity, as well as to maintain a balance with other forest ecosystem services. The process of European support against the background of huge losses caused to Ukraine as a result of Russian aggression was initiated by Germany.

In view of the full-scale Russian military invasion of Ukraine, the European forest ministers and observers of the FOREST EUROPE process, on the initiative of Germany, supported Ukraine in its post-war recovery and implementation of necessary reforms and signed a joint decision "Supporting the Recovery and Sustainable Management of Ukrainian Forests and the Forest Sector".

It is noted that Russia's actions contradict international law and leave only traces of destruction, and Europe stands in unconditional solidarity with Ukraine. The project of a strategic document to support the restoration and sustainable management of Ukrainian forests and forest sector is being developed by the Secretariat of the "Forests of Europe" process in Bonn. The document also envisages financial support for the post-war restoration of Ukraine's forests and the involvement of international organizations such as UNECE, FAO or UNEP in this initiative.

In August 2022, during the meeting of the Expert Group of the European Forest Process, a "road map" of further steps was supported. In the next six months, recommendations for forest restoration will be developed and assistance will be provided for the implementation of priority tasks identified by the Ukrainian side (European partners expressed their readiness to assist Ukraine in post-war forest restoration).

5. Post-war forest restoration

It is worth mentioning that the Law No. 5650 "On Amendments to Certain Legislative Acts of Ukraine on Forest Protection", adopted by the Verkhovna Rada of Ukraine, will help to increase the area and preserve the forests of Ukraine. It also provides a legal basis for the preservation of biodiversity and non-forest natural ecosystems created as a result of set-aside and reservation of arable land.

In view of the above guidelines, the implementation of the draft law will allow to

legalize self-seeding forests on agricultural lands. This will allow to increase the forest cover of Ukraine by 500,000 hectares and at the same time save hundreds of millions of hryvnias of public funds, since the creation and maintenance of one hectare of forest costs several tens of thousands of hryvnias.

It should be emphasized that the current system of forest management in Ukraine is radically different from the one that has been operating in European countries for a long time. The draft law will help to realize all the ambitious plans for the implementation of the "Green Country" program of the President of Ukraine and the planting of 1 billion trees by 2025. The document will allow to preserve steppes and meadows, pastures and hayfields. It is important that about 300,000 hectares of degraded, unproductive lands without steppe, meadow and forest vegetation will be restored.

It's worth mentioning the forestry reform, which is outlined in the decision of the Cabinet of Ministers, which provides for the merger of 158 state forestry enterprises into a single state specialized enterprise "Forests of Ukraine". And instead of 24 interregional departments of forestry and hunting, 9 regional departments of forestry and hunting will be created.

Guided by the officially accepted international initial methodological positions on the management of ecological and economic security of forestry enterprises, their synthesis and systematization to enable implementation in hromadas. It should be noted that Ukraine, as a candidate for EU membership, must follow the European path of development. Forestry management according to EU standards and practices will not only increase the profitability of the industry, financially strengthen the state, but also protect valuable forest areas.

Summarizing the single basic methodological and methodical positions regarding the transformation of the industry, the reform will make it possible to introduce effective changes and solve the following problems:

- financial imbalance of the industry;
- lack of reliable information about the state of the country's forest fund;
- low level of forest cover, which persists for decades;
- low labor productivity;
- low level of mechanization of forestry work, etc.

The reform resolves the conflict of interests in the forest sector – the State Forestry Agency will have control functions and the newly created company will have management functions.

Scientists emphasize that the transformation of the industry does not mean a reduction in the number of employees. One of the tasks of the reform is to keep professionals in the forest and pay them a decent salary. And this, in turn, will help reduce the level of corruption. The document provides for the payment of taxes that will remain in local budgets (The government launched the reform of the forest industry, State strategy of forest management of Ukraine until 2035).

For example, Lithuania managed to balance all financial issues after the creation of a single enterprise. And today the salary of a Lithuanian forester does not depend on the geographical location of the forest enterprise. At present, the Lithuanian Unified State Forestry Company has its own unified budget and is a profitable company.

The legislator clearly emphasizes that it is forbidden to privatize state forests, and the state enterprise "Forests of Ukraine" is a 100% state owned enterprise. Another important advantage of these reforms is the possibility of attracting European investments for the development of the industry and the purchase of new equipment.

On the basis of relevant regulations concerning the indicators of the pre-war period, it should be emphasized that the level of investment and financing of forest restoration in the EU countries is significantly higher than this indicator in Ukraine, in particular, in the EU it is 24 dollars per 1 ha, and in Ukraine – 0.3 dollars per 1 ha.

In addition, the creation of a single company allows to develop and make profits not only from the harvesting and processing of wood, but also from the development of recreational facilities, the production of own eco-products, and so forth (The government launched the reform of the forest industry).

The conducted analytical review allowed to identify the key structural components that need to be resolved in relation to forestry enterprises. For example, under the conditions of climate change, outdated approaches to forest management, which do not ensure adequate resilience of forests to changes, need to be revised. Another important aspect is the

protection of forest biodiversity: centralized systems for monitoring forest biodiversity have not been developed and implemented, so there is no reliable data on the state and dynamics of forest biodiversity. Measures necessary to prevent the degradation of forest biodiversity and forests in general are not being implemented. There is an urgent need to improve the information support system for forest management, based on the establishment of a national forest inventory and the improvement of forest monitoring. The forest management system also needs significant reform. The main factors leading to illegal logging are the following: difficult social and economic situation of citizens; forest areas on the reserve lands of village councils are not properly protected and controlled; unclear legal status of field protection forest strips owned by collective agricultural enterprises; lack of opportunity to earn a decent legal income, presence of a large number of private woodworking centers that buy illegally harvested timber and avoid punishment; impossibility to fully perform the function of state forest protection in the southern and eastern regions of Ukraine due to lack of adequate funding (The government launched the reform of the forest industry).

In order to fulfill the decrees of the President of Ukraine and the tasks of the Government of Ukraine, two resolutions of the Cabinet of Ministers of Ukraine have been adopted, which will contribute to overcoming the shadow systems in the forestry of Ukraine, in particular, regarding the introduction of electronic accounting of timber and the sale of timber in electronic form. At the same time, they do not completely solve the problem of illegal logging, as there is a demand for illegally harvested timber in Ukraine and the sale of raw timber is not regulated by law.

Work is underway to ensure public access to information on the use of forest resources. On the official website of the administrator of the unified state electronic timber accounting system of the SE "Forestry Innovation and Analytical Center" the possibility of checking the legality of timber harvesting has already been implemented. At the same time, the access of interested parties to basic information about the forests of Ukraine is difficult. There are no adequate mechanisms that would allow

interested parties (especially local communities) to ensure that their own interests are taken into account in forest management. However, in Ukraine the state management system dominates in the field of forestry. In EU countries it is carried out by local authorities. However, the management from the side of central authorities is the prevention of pollution of the ecosystem, harmonization of interaction between society and nature, reproduction of ecological balance in forest ecosystems. That is, it is not the forest protection, but the preventive function of forest reproduction that is activated.

In addition, it should be noted that the financial system of forestry in modern conditions is imperfect. Budget financing of forestry activities is insufficient, its share in total costs during the decade was about 30%, but in recent years no funds have been provided. At the same time, the forests of Ukraine mainly perform protective, recreational and nature protection functions; a significant part of the forests of the south and east of Ukraine is not classified as exploitable, which requires significant budgetary support to ensure proper management of forestry in extreme natural conditions (State Strategy of Forest Management of Ukraine until 2035, From now on self-seeded forests and meadows are protected from destruction: the Parliament adopted the draft law № 5650 in the second reading).

A significant burden on enterprises is the payment of land tax from the Forest Fund, which state enterprises must pay annually to the local budget in the amount of 135 million UAH. At the same time, the same state-owned enterprises have to pay an annual rent of UAH 1 billion for the use of forest resources, which results in double taxation of the Forest Fund with different tax bases. Scientific research in forestry and education are lagging behind the world level, mainly due to the inconsistency of their material base to the specified level.

Forestry is conducted according to outdated standards that do not take into account the modern realities of climate change and are not based on the results of modern scientific research. This, in turn, leads to a significant decrease in the level of practical training of students of forestry faculties at the places of production practice in enterprises, which does

not correspond to the level of their theoretical training. It is necessary to improve the hunting management system in order to significantly increase its economic efficiency (State strategy of forest management of Ukraine until 2035, Some issues of forest management reform).

Ukraine continues to implement European environmental legislation and fulfills its obligations to introduce environmental requirements similar to those in force in EU countries. With this in mind and taking into account the above examples, the State Forest Management Strategy of Ukraine until 2035 has revised outdated approaches to forest management. Therefore, it's necessary to outline the problems that require urgent changes in the conditions of climate change and military operations, which are presented in Table 5.

It should be noted that in the conditions of climate change, forests play an extremely important role in ensuring ecological and economic security. The implementation of the Strategy measures will contribute to ensuring the environmental protection and economic potential of forests, reducing their degradation by increasing their area and productivity, which will ultimately improve the state of the environment and the quality of life of citizens (State strategy of forest management of Ukraine until 2035). Adaptation of forests to climate changes and transition to near-natural forestry methods with the formation of forests of natural composition and structure. It is planned to develop measures for adaptation of forests to climate change and increase resistance of forests to climate change according to the following vectors, their visualization in the Table 6.

It is also necessary to emphasize the competitiveness of forest production, which is based on the ability of forest enterprises to produce competitive products. The directions for ensuring the competitiveness of forest enterprises are presented in Table 7.

Forest certification is a marketing tool to increase the competitiveness of forest products. At the state level, the national forest certification system according to the PEFC scheme and the certification system according to the international FSC scheme should be fully supported as a basis for healthy competition while achieving common goals. The organization and implementation of forest certification shall be

Table 5

Imperatives of environmental and economic security of forestry enterprises

| Problems | Goal | Result |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> – The extremely important role of forests for the ecological, economic and social stability of the state, especially in the conditions of climate change; – The need for systematic improvement of forest management to ensure the long-term interests of the state, based on the combination of the principles of state regulation with the mechanisms of market relations, taking into account the goals of decentralization of power, increasing the number of jobs, employment of the rural population, minimizing the risks of corruption and crime; – Adopt open, transparent mechanisms for management and personnel decisions with a gender-sensitive approach, and prioritize the supply of raw materials to domestic producers through the creation of a transparent timber market. | <ul style="list-style-type: none"> – Effective forest management; – Conservation of biodiversity; forestry adapted to climate change; popularization of the forester profession; – Ensuring the financial stability of the forest industry; – Formation of favorable conditions for the activation of the development of woodworking and related branches of the economy of Ukraine. | <ul style="list-style-type: none"> – The country's forest cover is up to 18%; – The total stock of forests in Ukraine is up to 2.5 billion m³; – Increasing the level of absorption of carbon dioxide by the forests of Ukraine; – Increasing productivity and sustainability of forests; – Reduction of the area of forest fires; – 100% detection of forest fires at an early stage; – Updated Park of fire-fighting equipment and restoration of air patrolling of forests; – High-quality forest roads; quality training of personnel for the forest industry; – Popularization of the use of forests for tourism and recreation; – Creation of conditions for attracting business funds for the development of tourism infrastructure in the forestry sector. |

Source: generated by the author using (State strategy of forest management of Ukraine until 2035; From now on, self-seeded forests and meadows are protected from destruction: the Parliament adopted draft law № 5650 in the second reading)

Table 6

Climate change adaptation of forest enterprises

| MEASURES FOR THE ADAPTATION OF FORESTS TO CLIMATE CHANGE | |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Improvement of the regulatory and legal framework for felling, formation and rehabilitation of forests, as well as rules for felling of the main use in Ukraine's forests, taking into account the need to adapt forests to climate change; |
| 2 | Transition to the cultivation and formation of forests close to nature, diverse and of different ages, using local tree species resistant to climatic changes, in favorable soil and climatic conditions; |
| 3 | Use of natural regeneration for reforestation; |
| 4 | Implement measures to conserve and reproduce the genetic diversity of forests; |
| 5 | Measures to prevent and control the spread of invasive tree and plant species; |
| 6 | The use of conservation logging techniques, especially in mountainous areas; |
| 7 | The adoption of measures to prevent erosion on forest cuttings, especially in the mountains; |
| 8 | Introduction of modern (innovative) technologies in afforestation, forest maintenance, protection and conservation of forests. |

Table 7

Vectors of competitiveness of forest enterprises

| № | COMPETITIVENESS OF FORESTRY PRODUCTION |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Renewal of the means of production; |
| 2 | Application of advanced technologies in reforestation, logging and other production processes; |
| 3 | Ensure the construction of departmental (technological) roads in forests; |
| 4 | Optimize production costs and reduce cost of goods sold; |
| 5 | Confirmation of the origin of timber, technical, medicinal and other forest products from forests managed in accordance with the principles of sustainable development. |

carried out in accordance with the procedure established by the Ministry of Environment.

Certified forests will ensure economically, ecologically and socially balanced forest management. Forest products will come from forest areas where management is based on the principles of uninterrupted, sustainable and continuous forest use, taking into account the protection of the environment, the preservation of biodiversity, the interests of forest workers and the local population. FSC forest management certification allows:

- increase the confidence of investors, external stakeholders and customers that one's forests are managed in accordance with the FSC forest management standard;
- to ensure a stable system of forest use;
- to meet the growing demand for certified products all over the world.

Improvement of the organization of forest production, taking into account the postulates of the idea of continuity of forest use in the direction of its optimization, covers the main directions of economic activity (main use, restoration, maintenance), the goal of which is to achieve the stability of forest ecosystems in the conditions of a developed forest (FSC supply chain certification).

Such opinions are expressed in studies by scientists from many countries of the world, but leading scientists have come to the conclusion that only with a common focus on sustainable management and its development, that is, with

the support of the governments of all countries, the preservation and inexhaustibility of resources is possible.

Currently, the problem of forest contamination by mines and explosive devices in active and former combat zones is large and widespread. Landmines are one of the main obstacles to post-war reconstruction and development. Contamination with explosive objects and mines blocks access to the use of forest resources of the territory. Adhering to the principle of comparing the trends of economic development and environmental management, it is expedient to implement the vectors of post-war forestry recovery, which are shown in Table 8.

Currently, Ukrainian legislation lacks an up-to-date and systematic document that would define the main principles and priorities for the development of the forestry sector. The State Strategy of Forestry of Ukraine until 2035 and the draft Law No. 5650 "On Amendments to Certain Legislative Acts of Ukraine on Forest Protection" do not cover all issues. In addition, they objectively do not take into account many modern factors of forestry development, as well as the requirements of the EU and international organizations, in particular, FAO and WTO. The generalization of the theoretical provisions allowed to highlight the following measures for the restoration of forestry in the post-war period, which are presented in Figure 1.

The conducted analytical researches allow to determine the algorithm and the main

Table 8

Vectors of the post-war restoration of forestry in Ukraine

| Vectors of the post-war restoration of forestry in Ukraine | |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Organization of the process of exchange of available information, problems and ways of solving them between forest users, departments, authorities, population, representatives, science. Civil Protection Service of the Regional State Administration / VCA. |
| 2 | Development of a system for remote monitoring of the condition of forests with explosive objects and in combat zones, which will allow obtaining up-to-date information on their sanitary condition, fires, arbitrary felling in them, their growth and productivity in the absence of access to these territories. |
| 3 | Implementation of management measures aimed at restoring lost ecological conditions and temporarily damaged ecosystems to near-natural conditions. |
| 4 | Inclusion in the nature reserve fund of areas on which it is impossible to carry out forestry (for example, mined areas). At the same time, it is possible to restore the hydrological regime, in particular to irrigate previously drained areas. |
| 5 | In forestry, it is necessary to take into account and monitor the observance of the Rules for marking hazards associated with mines and explosive objects – the consequences of war, the purpose of which is to protect the civilian population living in areas contaminated with explosive objects, by ensuring a unified approach to the prevention of hazards associated with mines and other explosive objects – the consequences of war. |

Source: generated by the author using (Vasylyuk O, (2022) From now on, self-seeded forests and meadows are protected from destruction: the Parliament adopted draft law № 5650 in the second reading)

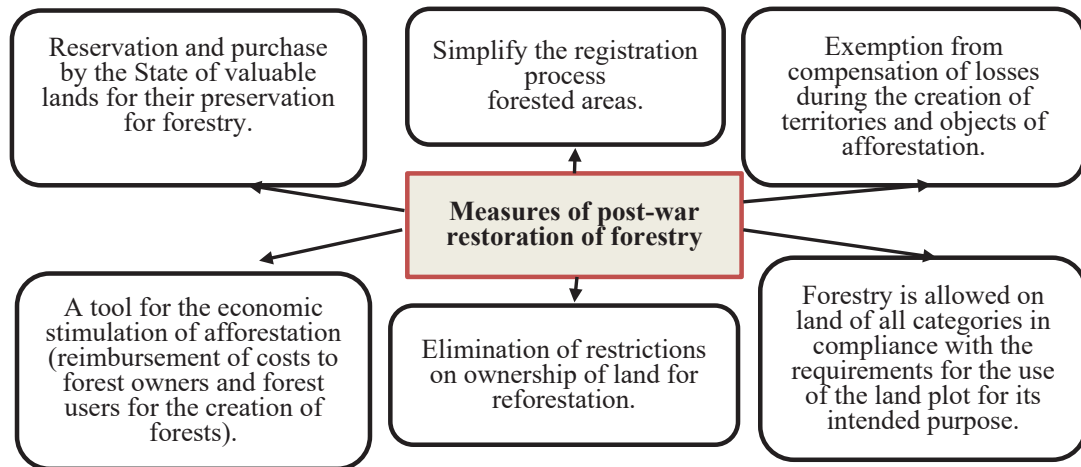


Figure 1. Measures of post-war restoration of forestry

structural components of the mechanism of ensuring ecological and economic safety of forest enterprises and their measurement parameters (Figure 2).

The expected results of the application of the algorithm for the functioning of the mechanism for ensuring ecological and economic safety of forest enterprises should be 1) the state of protection against the negative influence of predicted environmental factors; 2) the internal capabilities and the ability to counteract destructive influences, which is determined by the ability to react and adapt to changes quickly; 3) the speed of collecting the necessary information for making management decisions; 4) the speed of receiving positive changes; 5) the cost-effectiveness of obtaining a positive effect; 6) the sufficiency of changes to restore the parameters of the enterprise's viability, ensuring its further stability and sustainability of forest ecosystems.

Thus, the given algorithm of functioning of the mechanism of ensuring ecological and economic security of forestry enterprises provides guidelines for understanding the relationship and sequence of application of the specified approaches to further ensure the sustainable development of the country's forestry.

6. Conclusions

Taking into account the problems of the forestry sector in the balanced management of forests in order to use the numerical functions of forests, the need to ensure ecological and economic security has been proven and its

functioning mechanisms have been determined, which are aimed at maintaining the balance between its structural elements and the implementation of both anthropogenic and natural loads on them.

In order to implement the principles of sustainable development, it is argued that it is necessary to reform the forest industry with the implementation of ecological and economic tools. Therefore, ecological and economic safety becomes one of the basic criteria for assessing the effectiveness of forestry enterprises. taking into account the current crisis situation.

Ecological and economic security become particularly relevant with the aggravation of the issue of adaptation to climate change in the restoration of forestry and the impact of military operations on the economic dynamics of forestry development. Forestry, as one of Ukraine's many natural resource industries, is of great interest to the state and society under wartime conditions.

It is proved that ecological and economic security of a forest enterprise is a state of protection from negative environmental impacts, as it is achieved with sufficient potential for its stability, self-identity, integrity, flexibility and adaptability. This makes it possible to ensure stable development, realization of set goals, achievement of desired results without harming the environment, preservation of natural resources and assimilation potential of the forest ecosystem.

The algorithm of functioning of the mechanism of ensuring ecological and economic security of forestry enterprises is proposed, which provides guidelines for understanding the relationship and sequence of application of the specified

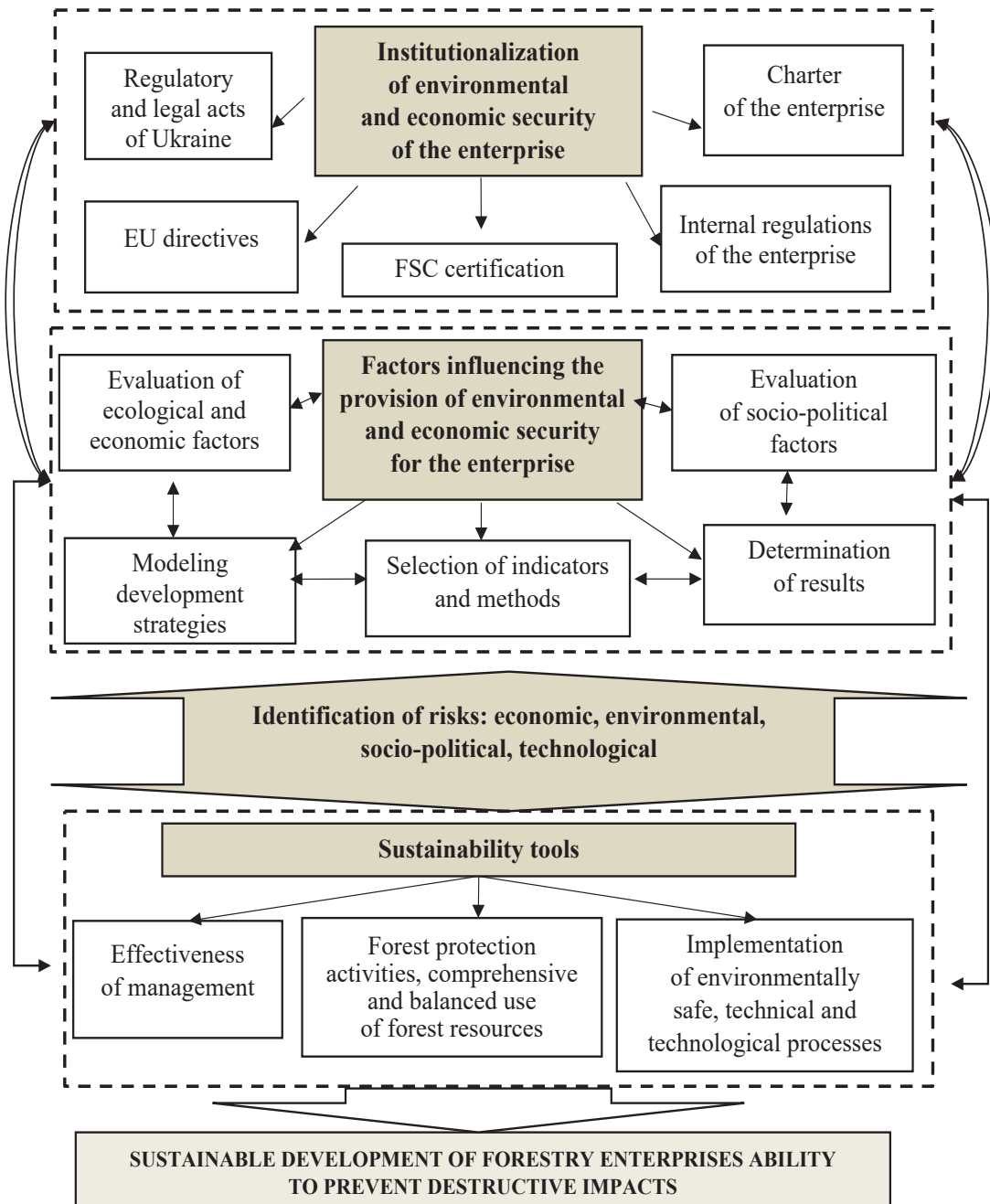


Figure 2. Algorithm of the mechanism for ensuring ecological and economic security of forestry enterprises

Source: developed by the author

methods for further ensuring sustainable development of the country's forestry. It is emphasized that the implementation of the Association Agreement between Ukraine and the European Union requires the orientation of the activities of Ukraine to the provisions of the new forestry strategy of the European Union. In particular, forests must meet the growing demand for wood for existing and new products,

as well as become a politically important source of renewable energy. Further research will reveal different trajectories of the same process, different consequences of the influence of this or that factor on the forest ecosystem. Therefore, the issue of developing a methodology for assessing the impact of military actions on forest ecosystems remains unresolved, which is a direction for further research.

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Received on: 5th of February, 2023

Accepted on: 17th of March, 2023

Published on: 31th of March, 2023