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Evaluation of the effectiveness of implementing measures to preserve natural resources in the context of sustainable development

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Abstract. Performance evaluation helps to identify the most effective approaches to conserving natural resources, which helps to optimise costs and increase the efficiency of using financial and material resources. The purpose of this study was to assess the effectiveness of implementing

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measures to preserve natural resources in the context of sustainable development. The study employed the evaluation and sustainable development methods for a comprehensive assessment of the effectiveness of measures to preserve natural resources, considering economic, environmental, and social aspects. The research findings show that sustainable development is a critical concept for the modern world, as it ensures a balanced combination of economic growth, social well-being, and environmental sustainability. The performance measurement framework emphasises the significance of integrating different management systems, such as the balanced scorecard, value-based management principles, and integrated risk management (IRM). This integration enables effective risk management at all stages of project implementation, which provides a strategic focus on improving business performance and contributes to a greater probability of achieving sustainable development goals. The results of the study showed that a systematic approach to planning natural resource conservation measures is key to success. It includes eliminating differences in planning systems, detailing results through balanced scorecard projections, continuous monitoring of processes, and active staff involvement, which helps reduce agency conflicts. The results of the study can be used by environmental protection institutions to plan and implement effective measures to preserve natural resources, which will help achieve environmental goals at minimal cost

Keywords: natural resources; project; economic assessment; environmental sustainability; social impact; environmental goals

Introduction

In modern world, the issue of preserving natural resources is becoming increasingly important due to population growth, urbanisation, and industrialisation. The depletion of natural resources, climate change, and ecosystem degradation threaten the economic well-being and quality of life of future generations. In this context, the concept of sustainable development, which envisages a balanced combination of economic growth, social well-being, and environmental protection, is becoming central to the policies of many countries. Effective management and conservation of natural resources are key components of sustainable development. Implementation of measures aimed at the rational use of resources requires a thorough economic analysis to assess their impact and benefits. That is why the investigation of the cost-effectiveness of such measures is relevant. Evaluating the effectiveness of the measures taken to preserve natural resources is a key element in ensuring their long-term impact. However, despite a significant amount of research in this area, there are still gaps in understanding which

approaches and tools are most effective in concrete economic, social, and environmental contexts. At the same time, most studies focus on the development of individual measures without due attention to their comprehensive assessment and integration into overall sustainable development strategies. Further research should focus on developing integrated assessment methods that factor in all these components and on investigating the long-term effects of conservation measures.

Assessment of the effectiveness of measures to preserve natural resources includes an analysis of the costs and benefits associated with the implementation of such measures. Studies conducted by I.A. Vasylenko *et al.* (2019) show that the rational use of resources and the introduction of energy efficient technologies can considerably reduce production and operating costs. S.M. Smyrnova *et al.* (2020) emphasised the significance of considering ecosystem services when assessing economic efficiency.

Significant attention of scientists, politicians, and the public is focused on the development

and implementation of measures to preserve natural resources in the context of sustainable development. According to S.I. Boguslavska (2021), the basis for assessing the effectiveness of such measures is the concept of sustainable development, which combines economic, social, and environmental aspects. According to this concept, measures aimed at preserving natural resources should not only prevent ecosystem degradation, but also contribute to economic growth and social well-being.

According to R. Korchovyi (2023), the introduction of economic instruments such as pollution taxes, payments for ecosystem services, subsidies for environmentally friendly technologies, and the creation of an emissions allowance market play an important role in ensuring the effectiveness of measures to preserve natural resources. The use of these tools helps to increase the motivation of enterprises to operate in an environmentally responsible manner and reduce their environmental impact.

N. Avanesova *et al.* (2021) also considered that the role of evaluating the effectiveness of implemented measures is important. The methodologies developed for this assessment include cost-benefit, product life cycle, and environmental indicators to determine the extent to which environmental and resource-saving goals are being met. Among these methods, the approach based on the Balanced Scorecard (BSC), which allows considering both financial and non-financial factors, stands out.

There are several approaches in the scientific literature to assessing the cost-effectiveness of natural resource conservation measures. According to V.V. Makedon & O.G. Mykhaylenko (2022), traditional methods include cost-benefit analysis, which allows assessing the economic feasibility of projects. Other approaches considered by O. Khokhulyak (2023) include life cycle assessment, which assesses environmental and economic impacts throughout the life cycle of a product or service. Social aspects of sustainable development include equity, access to basic services, human rights, and social cohesion. A.A. Ivashura (2022) found that environmental aspects focus on conserving biodiversity, maintaining ecosystem services, and reducing pollution. M.A. Khvesyk & V.K. Holyan (2006) showed that measures to preserve natural resources can considerably improve the quality of life of the population and contribute to social stability. The literature review suggests that assessing the economic efficiency of natural resource conservation measures is a complex and multifaceted process that includes economic, social, and environmental aspects.

The purpose of this study was to analyse and identify the most effective approaches to implementing measures that promote the conservation of natural resources, considering the principles of sustainable development.

Objectives of the study:

J to investigate the methodologies for assessing the economic efficiency of measures to preserve natural resources;

J to propose an assessment of the economic efficiency of concrete measures to preserve natural resources;

J to analyse the impact of natural resource conservation measures on sustainable development.

Materials and Methods

The economic valuation method was used to determine the economic efficiency of implementing measures to preserve natural resources. Different scenarios for implementing measures to preserve natural resources were considered to determine the most effective one. Specifically, the economic feasibility of such measures was assessed through the lens of their impact on profitability, payback, and reduction of resource costs. The study considered both direct economic benefits and indirect effects, such as reduced environmental burden, improved quality of life, and enhanced ecosystem services. The method of analytical synthesis helped to systematise and interpret the results of studies conducted in different conditions and using distinct approaches. Data collected from scientific sources of C. Wang & G. Dong (2019), A. Ivashura (2022), R. Korchovyi (2023), D. Bukreeva *et al.* (2023) were systematised to create a holistic picture of the cost-effectiveness of natural resource conservation measures. This is how the methodological issues of implementing green technologies are presented in the study.

The analysis method was employed to assess the effectiveness of measures to preserve natural resources. This method involved a cost-benefit analysis to determine the economic feasibility of the measures implemented, specifically their impact on cost reduction, revenue growth or improvement of the economic performance of enterprises or regions. The analysis also included market research, examination of structural changes in the economy, assessment of the value of ecosystem services and opportunities for their monetisation, which helped to identify the effectiveness of measures in terms of both short-term and long-term economic results. This approach has provided a more accurate and informed understanding of the financial implications of implementing environmentally friendly measures. The analysis also included market research, examination of structural changes in the economy, assessment of the value of ecosystem services and opportunities for their monetisation, which helped to identify the effectiveness of measures in terms of both short-term and long-term economic results.

The method of scientific synthesis was used to systematise and analyse the available data obtained from various studies, expert assessments, and empirical research related to natural resource conservation and sustainable development. This method helped to summarise scientific approaches, experience of implementing measures in different countries and regions, as well as to identify best practices and key success factors. Based on the synthesis, recommendations were developed for the implementation of measures adapted to concrete conditions, factoring in the environmental, social, and economic features.

To assess environmental performance, the study used quantitative indicators of greenhouse

gas emissions reduction, water and air pollution reduction, and biodiversity conservation. The study included collecting data from environmental monitoring systems and analysing the results of the implementation of measures at the enterprises. Specifically, the results of the implementation of drip irrigation systems, renewable energy sources, and waste recycling in various sectors of the economy were investigated.

An essential element of the study was the systematisation of measures to preserve natural resources based on Ukrainian and foreign practices. This included an analysis of existing waste management systems, energy efficiency technologies, renewable energy sources, and agricultural irrigation systems. The study was conducted with due regard to the specifics of each sector of the economy and the possibility of scaling the results to the national level.

The application of these scientific methods in the study helped to comprehensively assess the effectiveness of measures to preserve natural resources, considering all key aspects of sustainable development.

Results and Discussion

Sustainable development is a concept that emerged as a response to the global environmental and socio-economic challenges facing humanity in the second half of the 20th century. Comparing the findings with the studies of other researchers helps to identify general trends and specific approaches to assessing the effectiveness of measures to preserve natural resources in the context of sustainable development. Raising environmental awareness among the population and encouraging environmentally responsible behaviour. Sustainable development and economic efficiency are interrelated concepts that reinforce each other. Implementation of the principles of sustainable development can contribute to economic efficiency through the following mechanisms (Andryeyeva et al., 2019):

1) rational use of resources and implementation of energy-efficient and energy-saving technologies can significantly reduce production and operation costs;

 sustainable development stimulates the development of innovative technologies that can increase the productivity and competitiveness of the economy;

 ensuring social justice and improving the quality of life contribute to social stability, which is an important factor for economic growth;

4) support of ecosystems and preservation of natural resources ensures long-term sustainability of economic development, preventing resource depletion and adverse environmental impacts.

The interconnection between these concepts helps to create the conditions for a balanced and harmonious development that meets the needs of present and future generations. In the context of modern environmental challenges, the conservation of natural resources is becoming an integral part of sustainable development strategies, and it is the economic benefits of implementing measures to conserve natural resources that can be assessed by a series of defining criteria, namely: the introduction of energy efficient technologies and renewable energy sources can reduce energy and fuel costs, e.g., the use of solar panels can substantially reduce electricity costs for businesses and households; optimisation of waste management and recycling reduces disposal costs and helps to create new sources of income from the sale of secondary materials; water conservation measures, such as drip irrigation systems, can increase agricultural productivity and

reduce water supply costs (Zhylins'ka, 2017). Enterprises that implement conservation measures can avoid fines for environmental violations and reduce the cost of compensation measures, and such an assessment of the costs of implementing conservation measures is a critical aspect of determining their cost-effectiveness. Such costs may include initial investments in equipment procurement and installation, development of innovative technologies, and staff training. For example, the installation of solar panels requires a significant initial investment, but these costs can be offset by electricity savings in the long run (Makedon & Makovets'ka, 2023). Operational costs include the cost of maintaining and operating new systems and technologies, such as drip irrigation systems, which may require additional costs but will ensure more efficient use of water. Administrative costs for project management, monitoring, and reporting, which may include the costs of developing natural resource management strategies and policies. Some measures may require government support or funding from international organisations, which should also be considered in the overall cost estimate.

The performance assessment framework developed based on the analysis of experience in implementing measures to preserve natural resources in the context of sustainable development and involving the use of a management system focused on economic performance criteria and taking into account the balanced scorecard tools is presented in Figure 1.



Figure 1. The structure of the process of assessing the economic efficiency of natural resource conservation measures

Source: developed by the authors of this study

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A key element in planning measures for the conservation of natural resources is a system for evaluating options and substantiating intermediate results. The specific features of planning measures to preserve natural resources of enterprises are as follows:

J eliminating differences in planning systems and organising the implementation of plans;

J the need to highlight the results of the initiated measures in the context of the projections of the balanced scorecard;

J in monitoring the process of measures to preserve the natural resources of the divisions by a set of indicators;

J in carrying out a set of activities to involve staff in the natural resource conservation and reduction of agency conflicts.

It is necessary to discuss the need for measures to preserve the natural resources of the risk management system in a balanced scorecard. However, to manage the processes of natural resource conservation, we propose an integrated system that combines the conceptual foundations of three currently progressive systems. Therewith, in terms of the principles of risk management, they focus on the integrated risk management system (IRM), which is still in its infancy but is already effectively used by a series of Ukrainian and foreign industrial enterprises. The conservation of natural resources is based on the Balanced Scorecard (BSC), Value Based Management (VBM), and the concept of an integrated risk management system (IRM). The analysis shows a series of common aspects for all three management systems: strategic orientation of all integrated systems, their focus on increasing business efficiency; the concept of risk management should be considered as a way to manage risks that act as value management factors.

Therewith, value management factors become risk factors at the same time, and the system makes provision for risk analysis of initiatives to use the factors, namely:

J use of indicators (early indicators) that characterise the goals and results of individual projections of the balanced scorecard, identify risks in the risk management system and can be intermediate indicators in the management system for the cost of implementing measures to preserve natural resources;

J an integrated approach where the entire value chain is analysed with a focus on the relationship between business processes and results, and risks are considered not only as hazards but also as hidden opportunities to improve efficiency.

Therefore, the integrated management system for natural resources conservation efficiency is represented by the diagram presented in Figure 2.



Figure 2. Integrated system for managing the economic efficiency of natural resource conservation projects

Source: developed by the authors of this study

In this system, performance management of natural resource conservation projects is, firstly, an element of all BSC projects, and secondly, an independent element of managing the cost of such projects. The identification and structuring of risks in natural resource conservation projects using an integrated management system should follow the logic of the balanced scorecard and the sequence of the integrated measure itself (Villanueva & Blanco, 2019). The economic efficiency of implementing natural resource conservation projects considered as investment projects is proposed to be defined as a ratio:

$$\xi = NAV / [P_B + PV(E)], \qquad (1)$$

where PV(E) is the capitalisation of business integration costs. This approach is substantiated by the fact that the denominator (1) includes all capitalised costs of natural resource conservation projects. The economic implementation of such projects is more efficient if $\xi > WACC$ of the project being implemented.

To formalise the problem of managing the efficiency and effectiveness of natural resource conservation projects, let us introduce the concepts of ideal (index 0), estimated (index 1) and actual values of enterprises at time t (index 2). The ideal value of the cost of the project for the conservation of natural resources A in year t(B- $PV_{A0}(t)$ is determined by two conditions: compliance with the real market situation (the real state of the environment) and the ideal (best within the available possibilities) reaction of the economic environment. $BPV_{A}(t)$ is the factual value of the cost of natural resource conservation projects "A" in year t, which corresponds to the real market situation and the factual level of management decisions of the customers of such projects. Other elements of the incremental value of natural resource conservation projects have an analogous interpretation (Avanesova et al., 2021).

The difference $NAV_1 - NAV_2 = \Delta NAV_{1/2}$ is an error in the efficiency assessment associated with miscalculations in the assessment of the current

value of natural resource conservation projects and deviations of the forecast (estimated) values of cash flows and risks from the factual ones $(\Delta NAV_{1/2} <> 0)$. The difference $NAV_0 - NAV_2 = \Delta NAV_{0/2}$ is the loss of effect caused by the imperfection of the investment project management process $(\Delta NAV_{0/2} <= 0)$. $NAV_0 - NAV_1 = \Delta NAV_{0/1} -$ deviation of the estimated value of the effect of the association's natural resources conservation projects from the ideal value due to errors in cash flow estimates and risks caused by uncertainty in the market situation and the quality of calculations:

$$\Delta NAV_{0/1} = \Delta NAV_{1/2} + \Delta NAV_{0/2}.$$
 (2)

The ideal estimate of the economic effect of implementing measures to preserve natural resources under this approach would be equal to:

$$NAV_0 = NAV_1 + \Delta NAV_{1/2} + \Delta NAV_{0/2}.$$
 (3)

Since $\Delta NAV_{0/T} <> 0$, (1) can be considered as a transition from a point estimate of the effect to an estimate with confidence intervals. Therefore, the analysis of the economic efficiency of concrete measures to preserve natural resources requires careful consideration of both the economic benefits and costs of their implementation. Implementation of such measures can lead to significant economic benefits, cost savings, and improved environmental sustainability, but requires detailed planning and evaluation to maximise results.

Implementation of measures to preserve natural resources has a comprehensive impact on sustainable development, covering economic, environmental, and social aspects. Measures aimed at preserving natural resources can have a considerable economic impact. Renewable energy sources, such as solar panels and wind turbines, reduce dependence on fossil fuels and create new jobs in the green energy sector. This leads to economic growth and the development of new sectors of the economy (Bhunia *et al.*, 2021).

The environmental benefits of natural resource conservation include reduced environmental

pollution, biodiversity conservation, and improved ecosystems. The social benefits of natural resource conservation include improved quality of life, new jobs, and increased social cohesion. The long-term effects of conservation measures can be significant and multifaceted, and include sustained economic growth, environmental sustainability, and social progress (Hurochkina & Sokur, 2021). Implementing sustainable practices in production and consumption can ensure longterm economic stability. Investments in renewable energy, energy-efficient technologies, and waste recycling contribute to the development of new sectors of the economy and reduce the risks

associated with the depletion of conventional resources, enabling the economy to adapt to changes and ensure sustainable growth.

Long-term environmental sustainability is ensured by preserving natural resources and maintaining ecosystem services. Measures aimed at reducing pollution, conserving biodiversity, and using resources rationally help maintain the natural balance and ensure a healthy environment for future generations, which reduces the risks of environmental disasters and ensures ecosystem resilience (Hablovskyi et al., 2023). Based on the substantiations provided, a summary Table 1 is presented.

Table 1. Integrated impact of natural resource conservation measures				
on sustainable development				
Category	Examples of measures	Effects	Advantages	Long-term effects
Economic results	Energy efficient technologies, renewable energy sources	Reduced energy costs, economic growth	Increased competitiveness, new jobs	Stable economic growth
Environmental results	Transition to renewable energy sources, waste management	Reducing pollution, preserving biodiversity	Reducing environmental risks, improving ecosystems	Ecosystem resilience
Social results	Improvement of the energy efficiency of residential buildings, creation of jobs	Improvement of the quality of life, creation of jobs	Reduction of energy costs for households, social cohesion	Social progress
Long-term economic effects	Investments in renewable energy and waste recycling	Economic stability, development of new economic sectors	Reduction of the risks of resource depletion, sustainable growth	Stable economic growth
Long-term environmental effects	Conservation of natural resources, support for ecosystem services	Environmental sustainability, support of the natural balance	Reduction of the risk of environmental disasters, healthy environment	Ecosystem resilience
Long-term social impacts	Investments in the green econ omy, educational programmes on environmental responsibility	Improvement of the quality of life, development of human capital	New employment opportunities, reduction of social inequality	Social progress

Source: developed by the authors of this study based on B. Hablovskyi et al. (2023)

Considering this, the following measures can be taken to preserve natural resources:

1. The use of resource-saving technologies in manufacturing, agriculture, and construction can

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considerably reduce the consumption of water, energy, and raw materials. These aspects include the use of recycling methods, recycling of materials, use of energy-efficient equipment, and optimisation of production processes to reduce resource waste.

2. Implementation of sustainable consumption and production policies. Encouraging more responsible consumption through educational programmes, information campaigns, and eco-labelling initiatives. Encouraging manufacturers to reduce their negative impact on the environment by introducing environmentally friendly technologies and production processes.

3. Promotion of the use of renewable energy sources. Development and support of solar, wind, geothermal, and biomass projects that will help reduce the consumption of non-renewable natural resources such as coal, oil, and gas, as well as greenhouse gas emissions.

4. Creation of economic incentives for resource conservation. Introduction of a system of financial and tax incentives that encourage businesses and citizens to use natural resources rationally. This could include subsidies for the introduction of environmentally friendly technologies, tax breaks for businesses that reduce their environmental impact, and fines for violations of environmental regulations.

5. Development of science-based strategies for the conservation of natural resources. Investigation of local ecosystems, monitoring of the state of natural resources and developing adapted strategies that consider local characteristics, environmental risks, and socio-economic conditions, including the implementation of programmes to preserve water resources, protect forests, and other natural ecosystems.

Therefore, the conducted study is intended to provide a comprehensive analysis of the effectiveness of natural resource conservation measures, which will facilitate the adoption of informed decisions in the field of sustainable development, which will not only reduce the negative impact on the environment, but also provide economic benefits, promote social well-being, and long-term sustainability of the economy. The impact of natural resource conservation measures on sustainable development is multifaceted and complex.

The findings of the present study confirm the significance of preserving natural resources as a key aspect of sustainable development that meets modern global environmental and socioeconomic challenges. The principles of natural resource conservation, such as rational use, support for ecosystem resilience, pollution prevention, and biodiversity protection, are key components of sustainable development strategies. At the same time, the results of the present study confirm that these measures not only ensure environmental sustainability, but also have a significant economic impact.

N.Yu. Lazorenko-Hevel' (2014) emphasised the importance of rational use of natural resources, including efficient and careful use of resources, minimisation of waste, and introduction of technologies that reduce adverse environmental impact. These principles are in line with the findings of the present study, which also emphasises the significance of cost-effectiveness of such approaches. There is a similar focus on rational use and waste minimisation. The difference is that the cited study focuses more on technological aspects, while the present study covers a wider range of economic instruments and strategies. N. Andryeyeva et al. (2019) focused on the relationship between sustainable development and economic efficiency, emphasising the importance of energy efficiency, innovation, and social stability. The present study confirms these findings and extends them by adding the need to integrate management systems (BSC, VBM, IRM) to increase the effectiveness of natural resource conservation measures. There is a common recognition of the role of economic instruments in ensuring sustainable development, while the difference is the broader scope of management approaches in the present study.

Researchers L.P. Ishchuk *et al.* (2018) identified the environmental benefits of implementing measures such as the use of renewable energy

sources and optimisation of waste management systems. This approach is consistent with the presented findings on the economic benefits of energy efficiency technologies. O. Zhylins'ka (2017) focused more on specific waste management measures, while the present study covers more comprehensive approaches, including the integration of different management systems. B. Scholtens (2017) considered economic instruments, such as pollution taxes and emission allowance markets, as key to effective natural resource conservation policies. The present study also emphasised the significance of economic instruments, but additionally considered their integration with management systems (IRM, VBM, BSC), which makes our approach more comprehensive. There is a common understanding of the need for economic stimulus, but the present study suggests a more integrated approach to its application. V.V. Makedon & O.G. Mykhaylenko (2022) addressed the importance of using a balanced scorecard (BSC) to assess the effectiveness of environmental measures. The present study supports this idea and extends it by integrating the principles of value-based management (VBM) and integrated risk management (IRM). The common thread is the recognition of the importance of BSC, while the present study adds more tools for integrated management.

Authors C. Wang & G. Dong (2019) focused on climate change adaptation as a key element of sustainable development, which requires effective management of natural resources. The current study highlighted the significance of these measures to ensure long-term economic sustainability, but also added economic aspects such as cost optimisation and productivity gains. The common thread is the recognition of the importance of resource management, while the present study focuses more on cost-effectiveness. B. Hablovskyi et al. (2023) pointed out the need for an integrated approach to the conservation of natural resources, including social, environmental, and economic aspects. The present study also emphasised the importance of this approach but

added concrete recommendations on the use of different management systems and economic instruments. There is a common recognition of the significance of a comprehensive approach, while the present study proposes more concrete methods for its implementation.

In particular, it was found that the rational use of resources and the introduction of energy-efficient technologies can significantly reduce production costs and increase economic efficiency, and such findings are consistent with previous studies that highlight the economic benefits of introducing green technologies, such as the use of renewable energy sources and optimised waste management systems. This approach not only reduces energy costs but also creates new sources of income, which confirms the relationship between sustainable development and economic efficiency. The effectiveness of implementing natural resource conservation measures largely depends on the ability to integrate various management systems, such as the Balanced Scorecard (BSC), Value Based Management (VBM), and Integrated Risk Management (IRM). The study showed that these systems have common features, including a strategic focus on increasing business efficiency and managing risks that affect the cost of resource-saving projects.

At the same time, it is important to consider that the implementation of measures to preserve natural resources may face a series of challenges, including the need for sizeable initial investment and operating costs for innovative technologies and equipment. In this context, it is important to assess not only the economic benefits, but also the potential costs, including administrative and operational costs, to ensure maximum efficiency and long-term sustainability of measures.

Conclusions

The study investigated the basic principles of sustainable development, which focus on the conservation of natural resources, specifically their rational use, maintaining the ability of ecosystems to recover, preventing environmental pollution, and protecting biodiversity. It was found that the implementation of these principles is key to achieving sustainable development and economic efficiency. Approaches to assessing the economic efficiency of measures to preserve natural resources were developed. The study suggested using the balanced scorecard (BSC), value-based management (VBM) principles, and the concept of an integrated risk management system (IRM) to improve the efficiency of natural resource management and achieve the goals of sustainable development.

The economic benefits of implementing measures to conserve natural resources, such as energy-efficient technologies, optimised waste management and water conservation, were assessed. It was found that these measures help to reduce production costs, increase productivity, ensure social stability, and long-term sustainability of economic development. An integrated system for managing the cost-effectiveness of natural resource conservation projects was developed, which considers the relationship between business processes, results, and risks. The study presented a system that combines elements of BSC, VBM, and IRM and allows achieving sustainable goals more efficiently through optimised use of investments and risk management.

The study substantiated the need for an integrated approach to the implementation of measures to preserve natural resources, including the use of scientifically sound strategies, integration of local communities into the decision-making process, development of the "green" economy, and strengthening of the regulatory framework. This approach ensures a balanced development of economic, social, and environmental components of sustainable development. It was proved that long-term environmental sustainability directly depends on the implementation of measures to preserve natural resources and maintain ecosystem services. The measures considered, aimed at reducing pollution, preserving biodiversity, and rational use of resources, play a key role in maintaining the natural balance and ensuring a healthy environment for future generations. It was found that the introduction of resource-saving technologies in various sectors of the economy can considerably reduce the consumption of water, energy, and raw materials, which is critical for reducing environmental risks and increasing the resilience of ecosystems. Furthermore, implementing sustainable consumption and production policies, encouraging responsible consumption, and incentivising producers to adopt environmentally friendly technologies are crucial steps towards achieving social progress and economic stability. Thus, an integrated approach to the conservation of natural resources helps to ensure long-term sustainability of ecosystems, economic development, and improvement of the quality of life, which will help to prevent environmental disasters and ensure sustainable development at all levels.

Further research could be aimed at developing integrated natural resource management systems that combine the concepts of risk management, value-based management, and a balanced scorecard, which would allow for more effective risk control and achievement of strategic goals of sustainable development.

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Conflict of Interest

None.

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Оцінка ефективності впровадження заходів зі збереження природних ресурсів у контексті сталого розвитку

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Анотація. Оцінка ефективності допомагає визначити найбільш результативні підходи до збереження природних ресурсів, що дозволяє оптимізувати витрати та підвищити ефективність використання фінансових і матеріальних ресурсів. Мета статті оцінка ефективності впровадження заходів зі збереження природних ресурсів у контексті сталого розвитку. В статті застосовано методи оцінки та сталого розвитку для комплексної оцінки ефективності заходів зі збереження природних ресурсів з урахуванням економічних, екологічних та соціальних аспектів. Результати дослідження показують, що сталий розвиток є критично важливою концепцією для сучасного світу, оскільки забезпечує збалансоване поєднання економічного зростання, соціального благополуччя та екологічної стійкості. Була структура оцінки ефективності підкреслює значення інтеграції різних систем управління, таких як збалансована система показників, принципи управління за вартістю та комплексна система управління ризиками (ERM). Завдяки цій інтеграції стає можливим ефективне управління ризиками на всіх етапах реалізації проєктів, що забезпечує стратегічний фокус на підвищення ефективності бізнесу та сприяє більшій вірогідності досягнення цілей сталого розвитку. Результати дослідження показали, що системний підхід до планування заходів зі збереження природних ресурсів є ключовим для успіху. Він включає ліквідацію відмінностей у системах планування, деталізацію результатів через проекції збалансованої системи показників, постійний моніторинг процесів та активне залучення персоналу, що сприяє зниженню агентських конфліктів. Результати дослідження можуть бути використані установами, що займаються охороною навколишнього середовища, для планування та впровадження ефективних заходів зі збереження природних ресурсів, що сприятиме досягненню екологічних цілей при мінімальних витратах

Ключові слова: природні ресурси; проєкт; економічна оцінка; екологічна стійкість; соціальний ефект; екологічні цілі

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