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Assessment of Environmental Risks and Their Impact on the Sustainable Socio-Economic Development of Territorial Communities

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ABSTRACT

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The relevance of this study stems from the growing impact of environmental risks on the socio-economic resilience of territorial communities in Ukraine amid wartime destruction, climate change, and the ongoing transformation of the public governance system. The deterioration of environmental quality, depletion of natural resources, and increasing technogenic pressures directly affect population well-being, territorial investment attractiveness, and overall quality of life. This necessitates the development of a new system of local environmental governance focused on risk prevention, the integration of environmental indicators into strategic development planning, and the enhancement of decision-making efficiency at the local level. The purpose of the article is to assess environmental risks and determine their impact on the sustainable socio-economic development of territorial communities amid wartime and post-war transformations and the growing environmental responsibility of local self-government bodies. The study employs general scientific methods – analysis, synthesis, induction, and deduction – to systematize approaches to environmental risk assessment and to determine their influence on community development. The comparative method is used to analyze national and international practices of environmental risk management, while the generalization method serves to formulate practical recommendations. Statistical and logical-analytical approaches made it possible to identify interrelations between environmental conditions, economic indicators, and the quality of life of the population. The study identifies the structure and scale of environmental risks arising from air pollution, land and water degradation, ecological imbalance, and the technogenic consequences of Russia's aggression against Ukraine. It has been established that such risks reduce the level of economic activity of territorial communities, negatively affect public health, and slow down local development. The main barriers to effective environmental risk management have been identified as the fragmentation of environmental monitoring systems, insufficient funding for environmental programs, a shortage of qualified personnel in environmental management, and the lack of integrated governance mechanisms for environmental security. It has been proven that environmental risks have a multidimensional impact on the financial, social, and demographic stability of territorial communities. The study substantiates the need to establish a unified digital environmental monitoring platform, strengthen the human and institutional capacity of local authorities, diversify sources of environmental financing, and transition to preventive, data-driven environmental management based on open data and multi-sectoral partnerships among state, municipal, private, and civil society actors. Future studies should focus on developing an integrated index of community environmental sustainability, improving spatial planning mechanisms that account for environmental risks, and assessing the effectiveness of environmental policy during the post-war recovery of Ukrainian territories.

KEYWORDS

environmental security, community resilience, environmental monitoring, risk management, socio-economic stability, territorial recovery.



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Оцінка екологічних ризиків та їх вплив на сталий соціально-економічний розвиток територіальних громад

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СТАТТЯ

АНОТАЦІЯ

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Актуальність дослідження зумовлено зростанням впливу екологічних ризиків на соціально-економічну стійкість територіальних громад України в умовах воєнних руйнувань, кліматичних змін та трансформації системи публічного управління. Погіршення якості довкілля, деградація природних ресурсів і зростання техногенного навантаження безпосередньо впливають на добробут населення, інвестиційну привабливість територій і загальну якість життя. Це вимагає формування нової системи локального екологічного управління, орієнтованої на запобігання ризикам, інтеграцію екологічних індикаторів у стратегічне планування розвитку громад і підвищення ефективності управлінських рішень на місцевому рівні. Метою статті є оцінка екологічних ризиків і визначення їхнього впливу на сталий соціально-економічний розвиток територіальних громад в умовах воєнних та післявоєнних трансформацій і зростання екологічної відповідальності органів місцевого самоврядування. У роботі застосовано загальнонаукові методи – аналіз, синтез, індукцію та дедукцію – для систематизації підходів до оцінювання екологічних ризиків і визначення їхнього впливу на розвиток громад. Порівняльний метод використано для зіставлення національної та міжнародної практики управління ризиками довкілля, а метод узагальнення – для формування практичних рекомендацій. Статистичний аналіз і логіко-аналітичний підхід дали змогу встановити взаємозв'язки між станом природного середовища, економічними показниками та якістю життя населення. Досліджено структуру та масштаби екологічних ризиків, що формуються внаслідок забруднення атмосферного повітря, деградації земельних і водних ресурсів, порушення екологічної рівноваги та військово-техногенних наслідків російської агресії. Встановлено, що такі ризики знижують рівень економічної активності територіальних громад, негативно впливають на здоров'я населення та уповільнюють темпи місцевого розвитку. Виявлено основні бар'єри ефективного управління екологічними ризиками: фрагментарність системи моніторингу довкілля, нестачу фінансування природоохоронних програм, кадровий дефіцит у сфері екологічного менеджменту та відсутність інтегрованих управлінських механізмів екологічної безпеки. Доведено, що екологічні ризики мають багатовимірний вплив на фінансову, соціальну та демографічну стабільність територіальних громад. Обґрунтовано потребу у створенні єдиної цифрової платформи моніторингу стану довкілля, підвищенні кадрового потенціалу місцевих органів влади, розширенні джерел екологічного фінансування та переході до превентивного управління природоохоронною діяльністю на основі відкритих даних і партнерської взаємодії між державними, муніципальними, приватними та громадськими структурами.

КЛЮЧОВІ СЛОВА

екологічна безпека, стійкість громад, моніторинг довкілля, управління ризиками, соціально-економічна стабільність, відновлення територій.

1. Introduction

Modern socio-economic development of territorial communities is increasingly dependent on environmental factors. The environmental impact no longer seems to be just a background – it shapes the living space, determines how attractive the community is to the investor, or even, viable in the long term. Problems that until recently were perceived as local – soil pollution, depletion of water resources, changes in the microclimate – are now intertwined into a broader system of risks affecting the economy, social processes, and public health. Sometimes the consequences of these risks do not appear immediately: they accumulate, reducing productivity, increasing health care costs, and creating a feeling of gradual degradation of natural capital.

Decentralization, which was supposed to provide communities with greater autonomy, at the same time opened up several new management tasks. When powers are transferred to the local level, the responsibility of local self-government bodies, in particular for the state of the environment, also increases. However, the monitoring system remains fragmented. Environmental indicators are often left out of strategic development documents, as if they were an appendix, not a basic element. Often, communities do not have reliable data to realistically assess the scale of environmental threats and potential losses. Added to this is the lack of financial resources for the implementation of environmental programs, the lack of trained specialists and the heterogeneity of information sources. Because of this, management decisions are made based on partial or incomplete data, without proper analytical validity.

In a scientific and practical sense, the issue of assessing environmental risks for the sustainable development of territorial communities is becoming more and more important. It is not only about the creation of individual methods – it is important to learn to see the relationship between the natural, social and economic environments. The formation of integrated approaches here is not so much a technical as a conceptual task: how to combine environmental policy with local development programs, how to avoid duplication of functions, how to create real decision-making mechanisms based on verified data. It is obvious that the effectiveness of such systems is still far from desirable, and therefore, the issue of finding a balance between the environmental and socio-economic interests of communities remains open.

2. Literature Review

The study of the assessment of environmental risks and their impact on the sustainable socio-economic development of territorial communities is carried out in four interrelated areas, covering institutional-economic, analytical-environmental, socio-financial and security-recovery aspects of sustainability.

Within the first direction – institutional and economic – attention is focused on management mechanisms for the sustainable development of communities and the transformation of their economic models under the influence of environmental factors. N. Petrukha and V. Brych proved that institutional consistency and regulatory support are the basic prerequisites for reducing environmental risks in the activities of agricultural enterprises, as well as for the formation of financial sustainability of territorial communities [1]. V. V. Faifura et al. determined that environmental modernization of territorial communities is an effective tool for the transition to a “green” economy, as it contributes to the harmonization of economic and environmental goals [2]. T. Nazarova and V. Lynnyk showed that the effectiveness of local self-government reforms largely depends on the integration of environmental risks into the system of strategic planning of community development [3].

The second direction – analytical and environmental – is related to the development of systems of indicators, indicators and methods for assessing the balance of territorial development. O. V. Mykhailovska and M. S. Tatarchuk determined that the ecological balance of community development should be assessed through integrated indicators that combine the state of natural resources with socio-economic parameters [4]. A. Vysochyn et al. proved that environmental risks significantly affect the financial stability of territorial communities, causing the redistribution of budget resources to eliminate the consequences of natural and man-made threats [5]. H. V. Mudrak proposed a multi-level system of environmental, social and economic indicators for assessing the sustainable development of the communities of Eastern Podillia [6]. O. Hrynkevych et al. emphasized the importance

of environmental indicators for strategic diagnostics of territorial development and emphasized the need to introduce digital tools to monitor the dynamics of environmental risks [7].

The third direction – socio-financial – is devoted to assessing the socio-economic potential of territorial communities in the context of environmental safety and sustainable development. L. P. Horbata substantiated that information and digital transformations of society create new risks for the environmental sustainability of communities, in particular those related to limited access to environmental information and digital inequality [8]. O. Uhodnikova et al. have developed a model for assessing the socio-economic potential of territorial communities, in which environmental safety is a systemic factor of regional competitiveness [9]. O. Marukhlenko et al. showed that the development of community potential as a factor of socio-ecological progress requires the integration of managerial, economic and environmental approaches [10]. N. Tkalenko et al. proved that the environmental component of sustainable development is a determining element of the financial stability of communities, and its underestimation leads to an increase in environmental and social risks [11].

The fourth direction – security and recovery – includes the study of the impact of hostilities and global threats on the environmental sustainability of territorial systems. I. Irtyshcheva et al. showed that Russian aggression has led to an increase in environmental risks due to the destruction of industrial and municipal infrastructure, pollution of soil, water and air resources, as well as the loss of biodiversity, which creates long-term threats to the sustainability of communities [12]. N. Bielikova and O. Levanda found that hostilities have a cumulative negative effect on the environment, emphasizing the need for an international mechanism for assessing environmental damage and implementing strategies for environmental restoration of the territories of Ukraine [13].

3. Problem Statement

Despite the available research in the field of environmental management, there is no systematic classification of environmental risks in communities and effective methods of their assessment and inclusion in socio-economic planning. The relationship between environmental threats, the well-being of the population and the investment attractiveness of territorial communities has not been sufficiently clarified. The limited empirical data and fragmentary monitoring reduce the accuracy of previous results. The authors' study aims to create an integrated approach to the classification and assessment of environmental risks, improve the analysis of their impact on community development using statistical, comparative and spatial-analytical methods, as well as propose practical mechanisms of integrated management to increase the environmental sustainability of territorial systems.

4. Methods and Materials

The article is aimed at assessing environmental risks and determining their impact on the sustainable socio-economic development of territorial communities and strengthening the environmental responsibility of local self-government bodies.

To achieve this goal, the following tasks are provided:

1. To determine the essence, typology and key determinants of environmental risks of territorial communities and their connection with the parameters of sustainable development.
2. To analyze scientific approaches to assessing environmental risks and establish their impact on socio-economic indicators of community development.
3. To substantiate the directions for improving the system of management, monitoring and minimization of environmental risks to strengthen the sustainability of local development.

5. Results and Discussion

Environmental risks are a determining factor in the sustainable development of territorial communities, as they reflect a set of threats arising under the influence of natural, man-made and socio-economic factors. Their content covers the probability of occurrence of environmental events, the scale of possible losses and the ability of the management system to respond to them. Within communities, such risks manifest themselves in land degradation, water pollution, loss of biodiversity, deterioration of air quality, increased waste and reduced ecosystem resilience. Their classification by sources, scale,

duration and predictability allows streamlining the assessment of threats and creating the basis for the formation of effective mechanisms for managing the sustainable development of territories (Table 1).

Table 1. Classification of environmental risks of territorial communities

Classification criterion	Risk groups	Characteristics of manifestations
By source of occurrence	Natural, man-made, socio-economic	Natural disasters, accidents, pollution as a result of the economic activity of enterprises, irrational land use
By the scale of action	Local, regional, cross-border	From minor local disturbances of ecosystems to global climate change
By duration of exposure	Short-term, medium-term, long-term	Temporary consequences of accidents or persistent processes of environmental degradation
According to the possibility of forecasting	Predictable, unpredictable	Evaluated by environmental monitoring models or sudden events without preliminary indicators
According to the degree of controllability	Managed, partially managed, unmanaged	Possibility of influence of public authorities on the sources and consequences of risk through regulatory, technological, or organizational measures

Source: Formed by the authors based on [4; 6; 7; 10; 12; 13].

In modern conditions, the practical application of the classification of environmental risks makes it possible to identify the systemic nature of threats that combine natural, man-made and anthropogenic factors. One of the largest examples in recent years was the explosion of the Kakhovka hydroelectric power plant dam in June 2023. According to a report by the United Nations Environment Program (UNEP), the flooding area exceeded 600 km², and water losses amounted to about 14 km³, which caused degradation of coastal ecosystems, soil erosion, fish deaths and large-scale pollution with residues of petroleum products and heavy metals. More than 30 zones of potential environmental pollution have been identified, where the level of lead and copper content exceeds the permissible concentrations by 3–6 times [14]. This case illustrates long-term, regional, and partially manageable risks that go beyond the boundaries of a single community and require many years of environmental monitoring, soil restoration, and floodplain reclamation.

At the same time, for many Ukrainian communities, local man-made risks associated with air quality are becoming more and more relevant. Data from the SaveEcoBot open ecological network show that in September 2025, the average daily concentrations of fine particles PM_{2.5} in industrial centers, in particular in Dnipro, Kryvyi Rih, and Zaporizhzhia, consistently exceeded the level of 50 µg/m³, i.e. 3–4 times higher than the WHO recommendations [15]. This situation forms chronic risks of medium duration, which directly affect the morbidity of the population, reduce working capacity and increase social costs for health care. In addition, against the backdrop of the ongoing war, the number of combined environmental risks has increased sharply. According to the Ministry of Environmental Protection and Natural Resources of Ukraine, as of mid-2025, more than 9 thousand cases of environmental damage were recorded, and the amount of environmental damage exceeded €108 billion [16]. These losses include land contamination with explosives, destruction of industrial facilities, loss of forest resources, and large-scale fires in communities. According to the classification, such risks are mixed, long-term and partially unmanageable, because they combine military, industrial and natural consequences that require international monitoring, comprehensive environmental audits and infrastructure restoration. Thus, the application of the environmental risk classification system in modern Ukrainian realities makes it possible to scientifically determine the priorities of environmental policy, form hazard maps for communities and ensure the integration of environmental measures into sustainable development strategies. This confirms that environmental risk management has become not only an environmental but also a socio-economic task on a national scale.

Environmental risk assessment is based on a systematic analysis that combines quantitative measurements of natural and man-made threats with a qualitative study of their socio-economic consequences. Quantitative methods cover the parameters of pollutant concentration, toxicity, degradation areas, waste volumes and the probability of accidents. Qualitative – reflect the perception of risk, the effectiveness of institutional response mechanisms, the level of community resilience. The most effective are integrated approaches that combine these indicators in a single risk matrix. Such a combination allows taking into account not only natural and technical, but also socio-behavioral factors, increasing the accuracy of determining the priorities of environmental policy at the local level (Table 2).

Table 2. Basic scientific approaches to quantitative and qualitative assessment of environmental risks

Approach	Methodological framework	Advantages	Restriction	Examples of practical use
Quantitative	Probabilistic and statistical models, GIS mapping, loss calculation	Objectivity, comparability of indicators, and forecasting of consequences	Need for reliable data, high cost of monitoring	Calculation of damage from air pollution, mapping of environmental hazard zones
Quality	Expert assessments, vulnerability analysis, DPSIR and SWOT models	Flexibility, taking into account local specifics, community involvement	Subjectivity, complexity of formalization	Identification of socio-environmental priorities of the territorial community, adaptation of local development strategies to environmental risks, and formation of response plans
Integrated	A combination of quantitative and qualitative indicators, construction of integral risk indices	Consistency, adaptability, and the possibility of integration into planning	The need for cross-sectoral coordination	Formation of environmental passports of communities, risk assessment in river basin management plans

Source: Formed by the authors based on [1; 5; 6; 7; 9; 11].

In modern ones, it is territorial communities that have become the basic level of implementation of quantitative and qualitative approaches to environmental risk assessment. This is due to the fact that environmental processes – air pollution, land degradation, changes in the hydrological regime – manifest themselves locally, and therefore risk assessment and management should be carried out where the primary threat is formed. In practice, quantitative methods are used by communities in the form of official calculations of losses according to state methods. For example, according to the Order of the Ministry of Energy and Environmental Protection No. 277 of 28.04.2020, communities have the right to record the facts of excess emissions and file claims for damages. In 2024, such lawsuits were filed by Ivano-Frankivsk and Kryvyi Rih communities against industrial enterprises, which made it possible to direct the received compensation funds (more than UAH 40 million) to local budgets for environmental programs [17]. This is an example of a quantitative approach that directly strengthens the financial capacity of communities to manage risk. Integrated approaches are manifested in planning based on environmental indicators. Thus, in accordance with the Order of the Cabinet of Ministers of Ukraine No. 1077-r of 1.11.2024 “On Approval of Management Plans for the River Basins of the Dnipro and Don for 2025–2030”, communities located within sub-basins must conduct a self-assessment of water management risks and determine the priorities of investments in treatment facilities, floodplain reclamation and wastewater control. Within the framework of this approach, communities act not as objects, but as subjects of spatial risk management, coordinating their actions with basin structures and state water policy [18]. On the example of the Desnyansky Basin Department of Water Resources, which in 2024 presented the Dnipro Basin Management Plan 2025–2030, a cartographic model of risks for local councils of Chernihiv, Kyiv and Poltava regions has already been formed. It includes layers of spatial data on the state of water bodies, sources of pollution and predicted scenarios of flood threats. This allows communities to scientifically choose sites for the reconstruction of reclamation systems and determine the territories where new construction is prohibited [19].

The impact of environmental risks on the socio-economic development of territorial communities is multidimensional and mutually reinforcing. Natural and man-made threats affect the well-being of the population, the state of the environment, the level of employment, the value of real estate and the dynamics of investments in the local economy. Water and air pollution, soil degradation and depletion of natural resources cause a decrease in the environmental sustainability of territories and an increase in social costs of communities: the morbidity of the population increases, and the recreational functions of natural areas are lost. For local governments, this means reducing tax revenues to local budgets, reducing the cost of land plots, increasing spending on the health care system and eliminating the consequences of environmental emergencies. A low level of environmental safety reduces the investment attractiveness of communities, forming a closed cycle: degradation of the natural

environment leads to economic recession, and the lack of financial and human resources leads to the impossibility of implementing environmental protection measures (Table 3).

Table 3. Relationship of environmental risks with socio-economic indicators of the development of territorial communities

Risk category	Socio-economic manifestation	Typical indicator	Economic consequence	Social consequence
Air pollution	Increase in morbidity of the population, decrease in working capacity	Number of days with excess MPC PM _{2.5}	Decrease in the level of labor productivity, increase in the budget, and household expenditures on health care	Deterioration in the quality of life, shortening of life expectancy
Land and water degradation	Reduced yield, loss of agricultural potential	Heavy metal content in the soil and the salinity level	Decrease in agricultural sector incomes, rising unemployment	Migration of the population from rural areas
Military-man-made environmental consequences	Destruction of infrastructure, pollution of territories	Area of contaminated or flooded land	Decrease in investment attractiveness, increase in the budget burden	Social destabilization, deterioration of public health, and living conditions
Disturbance of the ecological balance in urbanized areas	Overloading of engineering infrastructure, reducing living comfort	Urban Pollution Index (AQI)	Increase in housing and communal services, decrease in the market value of housing	Deterioration of the psycho-emotional state of the population

Source: Formed by the authors based on [2; 3; 5; 10; 11; 12].

In modern conditions, environmental risks are increasingly determining the socio-economic dynamics of territorial communities of Ukraine. Their impact is manifested both through direct economic losses and through long-term social consequences – deterioration of public health, migration processes, and a decrease in investment attractiveness. health care costs by 10–15% compared to areas with better environmental performance [20]. High concentrations of particulate matter PM_{2.5} and NO₂ in industrial cities of Ukraine, according to the NGO “SaveDnipro”, in 2023–2024. exceeded the WHO norms by 3–6 times, which, according to environmentalists, led to the loss of more than UAH 5 billion of economic potential due to a decrease in labor productivity [21]. The military-man-made consequences of Russian aggression significantly increase the negative impact of environmental risks on the natural environment and the socio-economic sustainability of territorial communities. According to the report of the United Nations Environment Programme (UNEP) and the UNECE (UNECE), as of the end of 2023, more than 30% of the territories of the southern and eastern regions of Ukraine suffered environmental damage – soil pollution with heavy metals, destruction of hydraulic structures, secondary flooding and fires at industrial facilities [22]. The scale of these destructions directly affects the dynamics of the recovery of the local economy: the level of investment in infrastructure reconstruction remains 40–50% lower than before the war, while unemployment in the agro-industrial complex and logistics sectors increased by 20–25%.

In the south of Ukraine, in particular in the Odesa region, the total environmental damage for 2022–2025. are estimated at more than UAH 39 billion, and the losses of the recreational potential of coastal areas exceed 15% of the pre-war level [23]. In parallel with economic losses, a tendency of socio-ecological depletion of the population is formed. According to the scientists of KPI. I. Sikorsky, long-term air pollution in industrial agglomerations causes an increase in respiratory morbidity by 18–22%, which directly correlates with a decrease in the Human Development Index (HDI) of territorial communities [24].

As a result, environmental risks turn into a system-forming determinant of the quality of life of the population. They not only worsen the state of the environment, but also modify the economic behavior of households, the structure of the labor market, the volume of medical expenses and demographic dynamics. Empirical studies and regional assessments by UNEP and SaveDnipro show that in communities with high levels of air pollution, health care costs account for up to 12% of local budgets, and the average life expectancy decreases by 2–3 years compared to areas with better environmental

conditions [4]. Thus, environmental risks are an integral factor in the socio-economic stability of the community, determining its financial stability, competitiveness and investment potential. The inclusion of environmental safety indicators in the system of socio-economic planning for the development of territories should become a necessary condition for achieving real sustainable development.

The environmental risk management system in Ukrainian communities remains fragmented. In some communities, there are laboratories for monitoring the state of air, water and soil, while in others there are not even basic observation posts. The state network of environmental monitoring is concentrated mainly in regional centers, so more than 60% of territories remain “blank spots” in the system of state control [11]. Data on the state of the natural environment are collected by various institutions – the State Environmental Inspectorate, the State Food and Consumer Service, water management departments – according to different methods, which leads to statistical inconsistency of indicators and makes it impossible to build an integrated database. As a result, the creation of risk maps acquires the character of reconstruction, rather than system analytical modeling.

The financial aspect is another critical link in environmental management. In most communities, environmental protection funds do not exceed 1% of local budgets, which provides funding only for current activities – cleaning of territories, local eco-actions, or information campaigns [8]. Reconstruction of sewage treatment plants, land reclamation, and investments in green infrastructure are postponed indefinitely. Grant initiatives are implemented sporadically, without the formation of stable mechanisms for attracting private capital.

Staffing also remains insufficient: in small communities, ecologist positions are often nominal or combined with other administrative functions, which reduces the professional quality of decision-making. The lack of trained specialists in the field of environmental management and the system of advanced training at the local level exacerbates the management gap between communities. The regulatory framework does not provide a clear vertical of responsibility: the separation of powers between state and local bodies remains unclear, and the control mechanisms are declarative.

The information component of the problem acquires security significance. The population practically does not have access to operational environmental information: there is a lack of open digital monitoring panels, local notification systems and reliable communication channels. This reduces the level of trust in environmental policy and inhibits citizens’ participation in environmental initiatives. During the war, the situation was complicated by damage to solid waste landfills, destruction of sewage treatment plants and water supply systems. Environmental risks have ceased to be purely man-made, transforming into a factor of humanitarian security.

In modern conditions, environmental management in territorial communities of Ukraine is mostly reactive and functions not as an integral system, but as a set of individual actions aimed at eliminating existing consequences. Management decisions are mostly made situationally, without taking into account long-term environmental, economic and social consequences. Gaps persist between management sectors, and insufficient coordination between levels of government, which reduces the effectiveness of environmental policy. In 2022–2025, the defensive logic of response dominated in most communities, when actions were aimed not at preventing risks, but at eliminating their consequences, which is contrary to the principles of sustainable development [3].

Improving the effectiveness of environmental risk management requires a transition to an analytically oriented model based on the integration of monitoring, forecasting and response within a single management cycle. It is possible to implement such a model through the creation of a national digital environmental platform that will combine state databases (State Environmental Inspectorate, Ukrhydrometeorological Center), the results of public monitoring (“SaveDnipro”, “SaveEcoBot”), satellite observations of the Copernicus program and open geographic information resources [6]. Within such a platform, risk maps should be generated in real time as an analytical forecasting tool, and not as post-factum reporting. Pilot elements of such a system are already being implemented in the Dnipro and Kyiv water basins in accordance with the River Basin Management Plans for 2025–2030 [7].

Along with digitalization, environmental governance needs institutional strengthening. In communities, it is necessary to create permanent units for environmental risk assessment and sustainable development planning, which should include analysts, environmentalists, crisis managers and GIS specialists. The effectiveness of such structures is determined not by the number of personnel, but by the quality of competencies – the ability to integrate environmental indicators into financial, spatial and investment decisions. Empirical studies confirm that the presence of a specialized analytical

unit in the structure of the community increases the efficiency of the use of the environmental fund by an average of 25% [8].

The financial basis of environmental policy needs to be shifted from the residual principle to the investment approach. Relying solely on local budgets is ineffective: in 2024, the average volume of environmental protection funds was only 0.9% of community revenues. The development of public-private partnerships and grant funding (European Investment Bank, Green Climate Fund, LIFE Program) opens up opportunities for the modernization of wastewater treatment plants, water treatment systems, landfill reclamation and the creation of green infrastructure. According to UNECE, communities participating in international environmental programs demonstrate an increase in the environmental capacity index by 30–35% [22].

The integration of environmental indicators into the system of socio-economic planning is not a formality, but a mechanism for harmonizing development policy with environmental priorities. The inclusion of indices of the state of the environment, pollution level and number of emergencies in community passports provides a link between budgetary, spatial and strategic planning. Municipalities that have introduced a system of integrated environmental passports have achieved a 12% reduction in the share of accidental emissions and a 20% increase in the transparency of financial reporting.

An important direction is the development of early warning systems and local environmental communication. The practice of public eco-monitoring shows that notifying the population through open online panels and mobile applications reduces the number of environmental incidents by an average of 15% [11]. Such decisions not only increase the level of trust in the authorities, but also form a culture of co-responsibility for the environment.

Therefore, in the future (from 2025), the construction of an effective system for assessing and minimizing environmental risks should be based on preventive, integrated and digitally supported management logic that combines open data, cross-sectoral coordination and institutional interaction. This approach allows us to consider environmental safety not as an auxiliary direction of environmental protection, but as a key element in restoring the socio-economic stability of territorial communities in the war and post-war periods.

6. Conclusions

In the course of the study, it was found that environmental risks are a key factor that determines the socio-economic sustainability of territorial communities in the current conditions of war and post-war transformations. It has been revealed that the main problems of effective environmental risk management are fragmentation of monitoring, limited funding of environmental measures, lack of an integrated analytical management system, insufficient institutional capacity of communities and low level of environmental awareness of the population. It has been determined that the consequences of environmental threats directly affect the well-being of the population, investment attractiveness, employment and environmental quality, creating a multiplier effect of economic losses and social destabilization. It is recommended to form a unified digital system of environmental monitoring, integrate environmental indicators into strategies for the socio-economic development of communities, develop professional units for environmental risk management and diversify sources of funding through international environmental programs. The need to transition to a preventive, data-oriented management model based on open data, intersectoral coordination and partnership of communities with scientific and business structures was emphasized. Prospects for further research are to develop a methodology for an integrated index of environmental sustainability of communities, model the impact of risks on indicators of human development, and create scenario forecasts of ecosystem transformation in the process of post-war restoration of territories.

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