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STATE AUDIT APPROACHES TO ASSESSING THE EFFECTIVENESS OF ENVIRONMENTAL EXPENDITURES IN KAZAKHSTAN

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Abstract. This article analyzes the role and approaches of state audit in assessing the effectiveness of environmental expenditures in Kazakhstan. The study is highly relevant due to the need to ensure the ecological efficiency of funds allocated from national and local budgets through comprehensive evaluation mechanisms. The authors examine planning, allocation, and monitoring processes for environmental expenditures based on the Environmental Code, the Budget Code, and the Law on State Audit and Financial Control. The methodology relies on systematic and comparative analysis as well as content analysis of documentary sources. The central hypothesis argues that integrating environmental indicators into public financial reporting, enhancing coordination of regional programs, and evaluating the achievement of tangible environmental outcomes will improve the quality of state audit. The main conclusion highlights the need to develop a unified methodological framework for auditing environmental expenditures, increase transparency in tariff policy, and strengthen monitoring and reporting systems. The results can be used to improve state audit practice, support evidence-based policy-making, and implement national sustainable development strategies aimed at environmental protection and the rational use of natural resources.

Keywords: state audit, environmental effectiveness, environmental expenditures, cost assessment, sustainable development, Kazakhstan, financial control

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ҚАЗАҚСТАНДАҒЫ ТАБИҒАТТЫ ҚОРҒАУ ШЫҒЫНДАРЫНЫҢ ТИІМДІЛІГІН БАҒАЛАУДАҒЫ МЕМЛЕКЕТТІК АУДИТТІҢ ҚОЛДАНЫЛАТЫН ТӘСІЛДЕРІ

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Аннотация. Мақалада Қазақстан Республикасында табиғатты қорғау шығындарының тиімділігін бағалауда мемлекеттік аудиттің рөлі мен қолданылатын тәсілдері қарастырылады. Зерттеудің өзектілігі – мемлекеттік және жергілікті бюджеттерден бөлінетін қаражаттың экологиялық нәтижелілігін қамтамасыз ету мақсатында олардың тиімділігін кешенді бағалау қажеттілігінде жатыр. Қазақстанда табиғатты қорғау шығындарын жүйелі есепке алу мен талдау үшін бірыңғай әдістеменің болмауы, экологиялық көрсеткіштердің жоспарлау және есептілік жүйесіне жеткіліксіз интеграциясы, сондай-ақ басқарушылық шешімдер қабылдау үшін деректердің шектеулілігі мемлекеттік аудиттің ұлттық және халықаралық экологиялық міндеттемелерді іске асыру тиімділігін бағалау құралы ретіндегі ғылыми-тәжірибелік әлеуетін айтарлықтай төмендетеді. Авторлар Экологиялық кодекс, Бюджет кодексі және «Мемлекеттік аудит және қаржылық бақылау туралы» заң негізінде табиғатты қорғау шығындарын жоспарлау, бөлу және бақылау процестерін талдады. Зерттеу әдістемесі жүйелі және салыстырмалы талдау, құжаттық деректерді контент-талдау арқылы жүргізілді. Негізгі гипотеза – экологиялық көрсеткіштерді мемлекеттік қаржылық есептілікке интеграциялау, өңірлік бағдарламаларды үйлестіруді күшейту және нақты экологиялық нәтижелерге қол жеткізуді бағалау мемлекеттік аудиттің сапасын арттырады. Қорытындысында табиғатты қорғау шығындарын аудиттеудің бірыңғай әдіснамасын әзірлеу, тарифтік саясаттың ашықтығын арттыру, мониторинг пен есептілік жүйесін

жетілдіру қажеттілігі көрсетіледі. Нәтижелер мемлекеттік аудит тәжірибесін жетілдіру, басқарушылық шешімдер қабылдауды ғылыми негіздеу және ұлттық тұрақты даму стратегияларын іске асыруда қолданылуы мүмкін.

Түйін сөздер: мемлекеттік аудит, экологиялық тиімділік, табиғатты қорғау шығындары, шығындарды бағалау, тұрақты даму, Қазақстан; қаржылық бақылау

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ПОДХОДЫ ГОСУДАРСТВЕННОГО АУДИТА К ОЦЕНКЕ ЭФФЕКТИВНОСТИ ПРИРОДООХРАННЫХ РАСХОДОВ В КАЗАХСТАНЕ

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Аннотация. Статья посвящена анализу подходов государственного аудита к оценке эффективности природоохранных расходов в Казахстане, учитывая стратегический приоритет перехода к устойчивому развитию и зелёной экономике. В работе поднимается проблема отсутствия целостной и унифицированной методологии оценки результативности природоохранных мероприятий, что ограничивает возможность комплексного аудита использования бюджетных и внебюджетных средств. Применённый системный и сравнительный анализ включает изучение нормативно-правовой базы (Экологический кодекс, Бюджетный кодекс, Закон «О государственном аудите и финансовом контроле»), а также анализ данных государственных программ и статистической отчётности. Гипотеза исследования заключается в том, что повышение качества государственного аудита требует интеграции экологических индикаторов в планирование и контроль, оценки межрегиональной дифференциации расходов и реального вклада в достижение экологических целей. В качестве ключевых выводов предлагается разработка единой методологической базы аудита природоохранных расходов, усиление прозрачности тарифной политики, улучшение мониторинга и отчётности на всех уровнях управления. Практическое применение результатов возможно

в совершенствовании процедур государственного аудита, повышении обоснованности принятия управленческих решений, а также в формировании сбалансированной политики устойчивого развития с акцентом на охрану окружающей среды и рациональное использование природных ресурсов.

Ключевые слова: государственный аудит, экологическая эффективность, природоохранные расходы, оценка затрат, устойчивое развитие, Казахстан, финансовый контроль

Introduction. In the face of intensifying global challenges and Kazakhstan's commitments under the UN 2030 Agenda and the Paris Climate Agreement, the transition to a "green" economy has become a strategic priority of national policy. As an integrated part of the global economy and a major exporter of natural resources, Kazakhstan faces the imperative of developing a balanced model of economic growth that ensures both the sustainability of budget revenues and the rational use of natural resources in the interests of present and future generations. Within this context, the effectiveness of environmental expenditures and the quality of environmental program management are of particular significance. Despite the adoption of the new Environmental Code (2021) and the development of national initiatives such as Zhasyl Damu, Green Kazakhstan, and the Concept for Transition to a Green Economy, there remain persistent challenges in practice. These include the insufficient coherence of sectoral and regional environmental policies and the fragmented and limited availability of information on the targeted and efficient use of allocated funds.

Public audit, as a tool for ensuring transparency and accountability in government spending, is intended to play a key role in assessing the effectiveness of environmental expenditures. However, analysis reveals that a systemic approach to auditing in this domain in Kazakhstan is still in its early stages. The Law of the Republic of Kazakhstan "On State Audit and Financial Control" empowers the Supreme Audit Institution (SAI) to conduct performance audits, including in the area of environmental protection, yet such audits remain sporadic and do not provide a comprehensive assessment of the ecological outcomes of public spending. The core of the problem lies in the absence of a unified methodology for the systematic accounting and analysis of environmental expenditures, the weak integration of environmental indicators into planning and reporting processes, and the limited availability of reliable data for managerial decision-making. These factors undermine the potential of public audit as a mechanism for supporting the achievement of both national and international environmental objectives.

The aim of this study is to substantiate the need for developing public audit approaches to assess the effectiveness of environmental expenditures in Kazakhstan, to identify key problems in the current practices, and to outline directions for their improvement based on international experience and the country's national priorities in green economic transformation. Modern research emphasizes the necessity of integrating environmental accounting and auditing into public governance and

financial control systems to enhance the effectiveness of environmental expenditures. Kazakhstani scholars explore various facets of this issue: the development of environmental accounting models for industrial enterprises (Korabayev et al., 2024), the influence of environmental factors on the performance of public institutions (Sembayev, 2021), and key indicators of the state of the environment and natural resources in Kazakhstan (Alibekova & Sembieva, 2025). Particular attention is paid to comparative approaches in assessing environmental protection expenditures within public audit frameworks (Ceslovas, 2023) and the need to adapt international experience to improve the effectiveness of audit procedures (Rakhimov et al., 2023).

An increasingly important area of research is the audit of budgetary expenditures in the energy sector and the transition to renewable energy sources (Serikova, 2025), as well as the reform of the public audit system with an emphasis on strategic and social audits (Uspambayeva & Zeinelgabdin, 2025).

Significant contributions to the study of institutional and methodological aspects have been made by research on external audits of food security (Spatayeva et al., 2021), efficiency in the management of public assets (Shakharova et al., 2024), and analyses of global environmental audit practices in rural areas (Brunelli et al., 2022). International studies further broaden the scope by examining national environmental audits and energy efficiency practices (Jiang & Tan, 2021), public audit and environmental governance in China (Cao et al., 2022; Zeng et al., 2022), and approaches to evaluating environmental expenditure through intergovernmental fiscal relations and corporate responsibility strategies (Zhang et al., 2023). Collectively, these studies illustrate the diversity of methodological approaches and underscore the relevance of a comprehensive, integrated approach to public audit of environmental expenditures in achieving the Sustainable Development Goals.

Materials and Methods. To achieve the objectives of this study, a comprehensive methodological approach was employed, encompassing both theoretical exploration and practical analysis of public audit mechanisms in assessing the effectiveness of environmental expenditures in Kazakhstan. The primary empirical sources included official regulatory and legal acts of the Republic of Kazakhstan, such as the Environmental Code, the Budget Code, the Law "On State Audit and Financial Control," as well as approved national programs and action plans in the field of environmental protection. The methodological framework was based on systemic and comparative analysis. The systemic analysis facilitated the identification of interrelations between elements of the state audit system and the financing mechanisms for environmental initiatives. Comparative analysis of international environmental audit standards and domestic practices aimed to evaluate the potential for adapting best practices to the national audit framework. As part of the study, documentary analysis was conducted using official reports and materials from government agencies, including budget monitoring outcomes and data on the implementation of environmental programs at both the national and regional levels. Methods of content analysis and tabular data representation were applied for processing and visualizing the collected information. Special attention was given to identifying discrepancies

between planned and actual financing indicators, as well as to analyzing factors influencing the effectiveness of fund utilization.

This approach provided a robust basis for substantiating recommendations to improve the methodological foundations of public audit in the area of environmental expenditures in Kazakhstan.

Results and Discussion. The results of the conducted analysis indicate that Kazakhstan is in the process of developing a system of strategic management in the field of waste management; however, this system faces several structural challenges that directly affect the effectiveness of environmental expenditures and highlight the growing importance of public audit. According to the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan, over 4.5 million tons of municipal solid waste (MSW) are generated annually, yet the recycling rate in 2024 reached only 26%, falling short of the 30% national target. Significant underperformance has been recorded in several regions, including Ulytau, Almaty, and Mangystau oblasts, revealing spatial disparities in achieving national environmental targets and underlining the need for a region-specific performance analysis (Ministry of Ecology and Natural Resources of the Republic of Kazakhstan, 2025).

A significant step forward has been the approval of new investment projects for waste processing amounting to approximately 317 billion KZT. These projects are supported by mechanisms such as preferential financing through utilization payments and public-private partnerships. According to government data, 67 such projects have been approved, 43 of which are directly related to MSW processing. The full implementation of these initiatives is expected to enable the recycling of an additional 1.1 million tons of waste per year, potentially increasing the national recycling rate to 40%. However, analysis of the tariff policy reveals substantial barriers. Despite the requirements of the new Environmental Code, MSW tariffs have been revised in only 155 out of 211 districts and cities. In some cases, the approved tariffs do not economically cover the actual costs of waste management companies—for instance, in Atyrau, the approved tariff is 379 KZT, compared to an economically justified rate of 527 KZT. This demonstrates the urgent need for audit-based assessments of tariff justification and the development of recommendations to enhance transparency and financial sustainability in this area.

The situation regarding industrial waste management also warrants particular attention. According to estimates by the Ministry of Ecology, approximately 1 billion tons of industrial waste are generated annually, with the main contributors being the mining sector (70%), manufacturing (15.8%), and the energy sector (2%). From 2022 to 2024, more than 400 fines totaling 14.3 billion KZT were imposed for violations of environmental legislation in the area of waste management. Notably, major penalties include a 13.7 billion KZT fine against JSC “CaspiyNefit” among other significant sanctions. These findings underscore the need to strengthen public audit of compliance with the Environmental Code, promote the implementation of the “waste hierarchy” principle, and assess the effectiveness of waste management programs from both economic and ecological perspectives.

In 2023, total environmental protection expenditures by economic entities in Kazakhstan reached 610 billion KZT, compared to 444 billion KZT in 2022, indicating a significant increase in investment activity within the environmental sector. The vast majority of these expenditures—97.2%—were made by industrial enterprises, underscoring their central role in financing environmental protection measures. A regional breakdown of the data reveals that the largest contributors were Akmola (20.9%), Atyrau (14.6%), and Pavlodar (9.7%) regions, which collectively invested 276.3 billion KZT, accounting for 45.3% of the total national environmental expenditures (Figure 1).

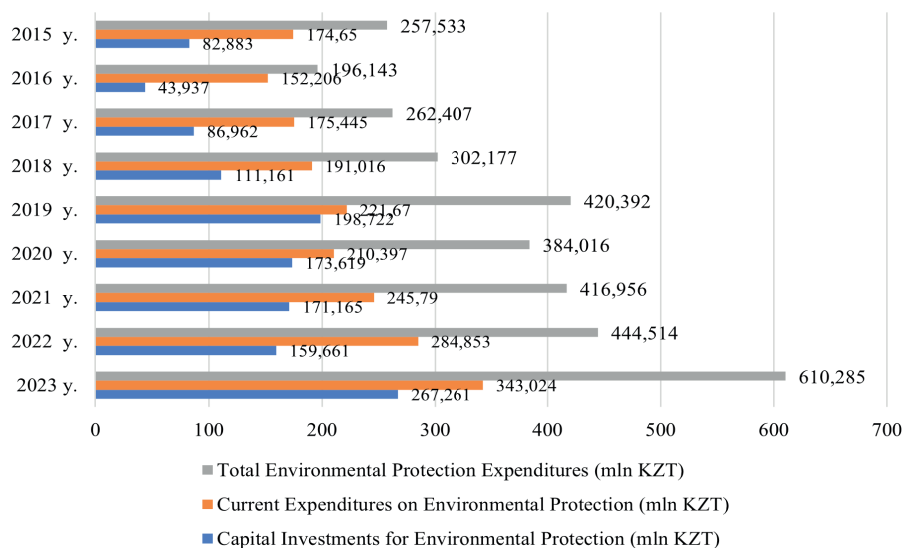


Figure 1 – Dynamics of Environmental Protection Expenditures

The analysis revealed that a key issue remains the insufficient coordination among government agencies, the absence of a centralized waste accounting and traceability system, and limited public reporting. In this context, public audit can play a crucial role in conducting a comprehensive assessment of the implementation of national and regional programs, analyzing the use of both budgetary and extra-budgetary resources, and developing recommendations for improving tariff regulation, encouraging investment, and enhancing corporate environmental responsibility. In 2023, total environmental protection expenditures in Kazakhstan rose to 610.3 billion KZT, compared to 444.5 billion KZT in 2022, reflecting the joint efforts of the state and businesses toward environmental modernization. However, the regional distribution of investments remains highly uneven: over 45% of total expenditures were concentrated in just three regions—Akmola (127.7 billion KZT), Atyrau (89.1 billion KZT), and Pavlodar (59.5 billion KZT). At the same time, several regions continue to show minimal spending levels, which may indicate underdeveloped regional programs and highlight the need to strengthen public audit to assess the justification of planning and resource allocation. The structure of current expenditures

also reveals a concentration in payments for third-party services (139.5 billion KZT) and material costs (131.2 billion KZT), which calls for a thorough analysis of the cost-effectiveness of such contracts and the targeted use of both public and corporate funds (Figure 2).

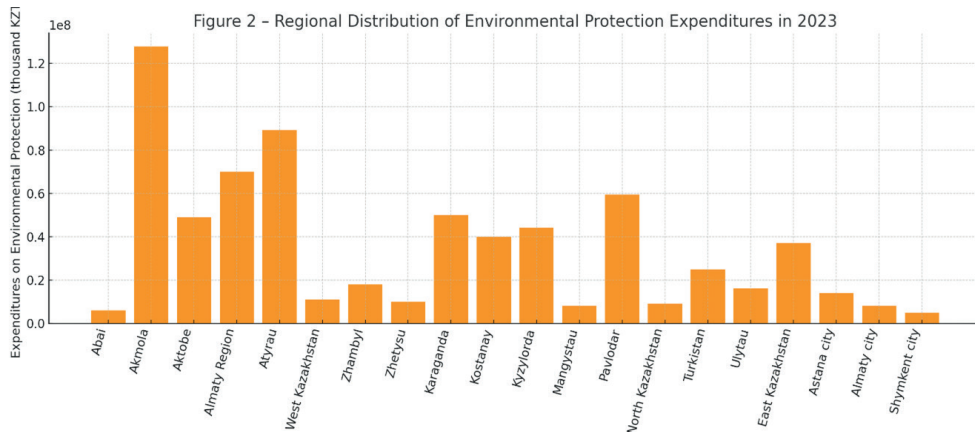


Figure 2 – Regional Distribution of Environmental Protection Expenditures in 2023

In 2023, the largest share of environmental protection expenditures in Kazakhstan was allocated to the implementation of energy-saving technologies and improvements in energy efficiency (33.2%), waste management (21.6%), and air protection and climate change mitigation (20%). Notably, there was a significant increase in spending on waste management—from 107.1 billion KZT in 2022 to 131.9 billion KZT in 2023—reflecting the growing importance of modernizing infrastructure for waste disposal and sorting. Meanwhile, expenditures on wastewater treatment and greenhouse gas emissions reduction showed steady, albeit more moderate, growth. These trends underscore the need for a comprehensive public audit approach to assess financing priorities, the effectiveness of environmental initiatives, and their contribution to national ecological targets.

According to the Bureau of National Statistics (2024), environmental protection expenditures in Kazakhstan totaled 610 billion KZT in 2023, representing a 37.2% increase compared to 2022 (444.5 billion KZT). This sharp rise signals increasing national attention to environmental policy. A structural breakdown reveals that industrial enterprises accounted for a dominant 97.2% of total expenditures, confirming their critical role in advancing sustainable development and the importance of integrating corporate environmental responsibility. Regionally, the leading contributors were Akmola Region with 127.7 billion KZT (20.9% of the national total), followed by Atyrau (89.1 billion KZT), Pavlodar (59.4 billion KZT), and Aktobe (51.2 billion KZT). In contrast, the lowest investment level was observed in Zhetysay Region (1.5 billion KZT). This indicates a strong concentration of investment in industrialized regions, where environmental pressures are traditionally higher.

In terms of environmental protection activities, the main areas of expenditure remain focused on energy efficiency (33.2%), waste management (21.6%), and air protection with consideration of climate challenges (20%). This expenditure structure reflects the priorities of state environmental policy, which targets carbon footprint reduction, waste minimization, and climate change mitigation. However, the uneven regional distribution of resources highlights the need for coordinated and comprehensive public auditing, policy harmonization, and the promotion of interregional exchange of best practices to achieve balanced and effective environmental outcomes nationwide.

Special attention in evaluating the effectiveness of environmental expenditures must be given to national strategic documents, particularly the *Concept for the Development of Environmental Culture “Taza Kazakhstan” for 2024–2029*, approved by Resolution No. 910 of the Government of the Republic of Kazakhstan dated October 31, 2024. This concept is aimed at fostering ecological awareness and responsible behavior among the population, promoting energy conservation, developing waste sorting and recycling systems, and encouraging environmentally responsible consumption.

For the public audit system, this entails the need to move beyond formal compliance monitoring of program implementation and toward assessing the actual social, economic, and environmental outcomes of spending. It also highlights the importance of developing recommendations for more balanced and targeted financing of environmental activities—especially in light of significant interregional disparities and mounting ecological challenges.

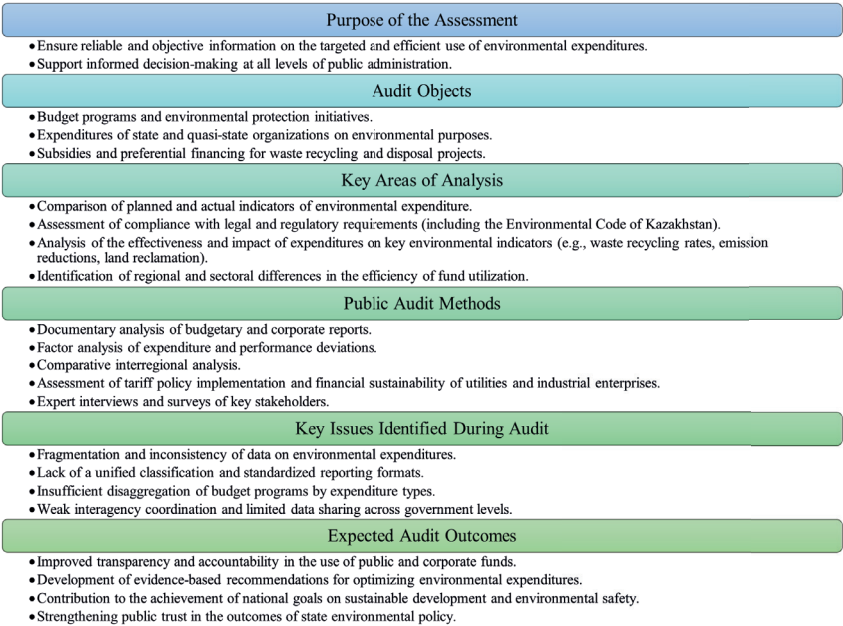


Figure 3 – Public Audit Approaches to Assessing the Effectiveness of Environmental Expenditures in Kazakhstan

Despite a substantial increase in total environmental protection expenditures in Kazakhstan—reaching 610 billion KZT in 2023—there is a pronounced imbalance in their distribution across regions and types of environmental activities. The largest expenditures are concentrated in industrially developed regions (Akmola, Atyrau, and Pavlodar), while less industrialized areas, such as Zhetysu Region, remain underfunded. This leads to increasing environmental inequality: in regions with lower environmental pressure, the opportunities for preventive and restorative measures are limited by insufficient funding. Moreover, more than 97% of all environmental expenditures are made by industrial enterprises, indicating a relatively low level of engagement from the general public and small businesses in environmental policy implementation, as well as a dominance of compensatory measures over systematic pollution prevention.

A critical issue is the limited share of targeted investments directed at reducing greenhouse gas emissions, transitioning to renewable energy sources (RES), and achieving carbon neutrality—despite energy-saving technologies and energy efficiency formally accounting for the largest portion (33.2%) of expenditures. The insufficient integration of climate risks into budget planning and the absence of well-developed economic incentives (such as tax benefits, green bonds, and targeted subsidies) hinder the implementation of large-scale environmental projects. Furthermore, existing control and reporting mechanisms for the use of environmental funds are fragmented and lack transparency, which reduces the effectiveness of public audit and complicates the assessment of the impact of expenditures on achieving target environmental indicators. The absence of comprehensive regional strategies and weak interagency coordination exacerbate the risk of duplication and inefficient use of funds.

Another major challenge is the low level of environmental awareness among the population and the limited readiness to adopt eco-friendly behavior, including waste separation and resource conservation. According to sociological surveys, only about one-quarter of the population regularly separates waste or uses reusable goods. Meanwhile, waste separation infrastructure has been introduced in only about two-thirds of cities and districts, and the municipal solid waste (MSW) recycling rate remains below 30%. The lack of public motivation, economic incentives, and awareness-raising programs undermines the effectiveness of investments already allocated to recycling development and energy-saving technologies.

Thus, Kazakhstan urgently requires a systemic reassessment of its environmental policy and public audit priorities—one that goes beyond financial inputs to focus on the actual environmental and socio-economic outcomes of those investments.

Conclusion. In the context of Kazakhstan's pursuit of sustainable development, a systemic approach to evaluating the effectiveness of environmental expenditures is of critical importance. The analysis conducted reveals that, despite the overall growth in environmental protection spending—reaching 610 billion KZT in 2023—significant imbalances remain in both the regional distribution of funds and in the prioritization of their use. Certain regions receive high levels of financing due to

their industrial profiles and associated environmental pressures, while less developed areas remain under-resourced, limiting their capacity to implement comprehensive environmental policies.

The primary task of public audit in this sphere is not merely to verify the targeted use of allocated funds, but to assess their effectiveness in achieving national environmental goals and fulfilling international commitments. This necessitates the development of comprehensive audit methodologies that go beyond financial flows and incorporate indicators such as reductions in anthropogenic impact, the effectiveness of energy-saving technologies, and the degree of engagement of both the public and private sectors in environmental initiatives. Special attention must be given to establishing a transparent system for monitoring and reporting, as well as enhancing coordination across sectors and levels of governance.

Thus, improving public audit approaches to assessing the effectiveness of environmental expenditures is a strategic prerequisite for enhancing ecological safety, improving population well-being, and advancing Kazakhstan's transition toward a sustainable green economy. In this context, not only are institutional reforms of auditing bodies required, but also the promotion of environmental awareness, the development of public participation mechanisms, and the implementation of economic incentives that encourage environmentally responsible behavior among all economic actors.

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