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Environmental Expenditures as a Tool to Influence the Development of Green Technologies

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Keywords : sustainable development, social well-being, economic development, circular economy, green economy, public spending.

Abstract: Objective: The objective of this study is to assess public and private investments in environmental protection. Methods : Research founded on the analysis of empirical data presented on official websites, as well as a comparative analysis of regional features of financing environmental protection measures published in open sources. Results: The results of the study showed a significant increase in financial investments in environmental protection activities, a change in the structure of investments with an increase in the share of air protection, as well as significant differences in financing between the regions of the Russian Federation. The dominance of energy taxes in the structure of environmental payments was revealed with a stable increase in payments for environmental pollution. Conclusions: The study confirms the effectiveness of the measures implemented to develop a "green economy", but indicates the need to improve the environmental investment management system and eliminate regional imbalances in the financing of environmental protection measures. The results contribute to the formation of a theoretical and methodological basis for the development of effective strategies for the transition to a sustainable development .

1 INTRODUCTION

The relevance of the study is due to the need for scientific substantiation and practical implementation of the concept of sustainable development in the context of the transformation of economic systems. The study is of particular importance in connection with significant regional disparities in the financing of environmental measures and the need to improve environmental regulation mechanisms. The practical significance of the study is determined by the need to form an effective system for managing environmental investments and develop strategies for the transition to sustainable development in the context of a transforming economy, which is especially important in the context of implementing the Sustainable Development Goals until 2030.

To create positive change in the modern world, it is essential to make the concept of sustainable development a reality for all people on the planet. The environment is facing significant damage as pollution and environmental degradation have reached unprecedented levels. The pursuit of human development has caused serious damage to the natural world. To address this issue, the United Nations established the Sustainable Development Goals (SDGs) in 2015 as a global initiative to end poverty, protect the environment, and promote peace and prosperity for all people by 2030. The key idea of sustainable development originated in developed countries in the late 1960s and early 1970s and was later adopted in Russia, where a decree on the concept of transition to sustainable development was adopted in 1996.

2 MATERIALS AND METHODS

The theoretical foundations of sustainable development are based on the need to create conditions for meeting the needs of current and future generations while preserving the natural resource

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potential. This requires the formation of an open and integrated economy with a high degree of diversification.

Of particular importance are developments in the field of the theory of economic dynamics, which serves as a methodological basis for the sustainable development of regional socio-economic systems. The scientific works of these researchers allow for a comprehensive consideration of regional development processes, taking into account the reproductive approach and synergetic paradigm.

The significant contribution of scientists is also manifested in the study of factors of interregional differentiation, the analysis of the impact of globalization and localization on the stability of regional systems, as well as in the development of mechanisms for innovative development of territories.

It should be noted that currently the countries of the world and the Russian Federation are focused on the use of innovative economic paradigms that serve as a foundation for ensuring sustainable development. Such models include: green economy (green economy), aimed at minimizing the negative impact on the environment; circular economy (circular economy), based on the principles of reuse of resources and reduction of waste; low - carbon economy economy), aimed at reducing greenhouse gas emissions; bioeconomy , using biological resources as a basis for the production of goods and services ; blue economy economy), is aimed at developing the marine economy while preserving the marine ecosystem and achieving sustainable use of marine resources (Figure 1).

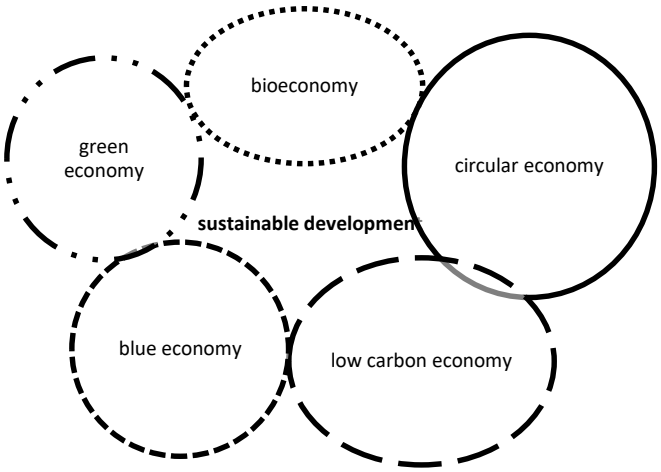

Figure 1: Models of sustainable economic development.

3 RESULTS AND DISCUSSION

For example, the authors in the article " Circular economy , bioeconomy , and Sustainable Development Goals : a systematic literature review », using bibliometric analysis, identified gaps in research concerning the following issues: insufficient representation of authors from developing regions (Latin America, Africa); the main emphasis is on the goals of sustainable development in terms of the "green economy", solving production and industry issues, but at the same time minimally touching on issues of education and the fight against poverty.

If we consider the development of the concept of a "green economy" as a basis for sustainable development, we can begin by assessing the costs and investments of the state in ensuring environmental protection.

For example, when analyzing publications, the authors highlighted the features of the concepts of circular economy and bioeconomy . Noting that with the simultaneous use of these models in production, a synergistic effect will be observed in various sectors of the economy.

The costs of environmental protection measures and their role in the development and implementation of state environmental policy are considered in the authors' research.

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An analysis of the dynamics of investments in fixed capital aimed at environmental protection and rational use of natural resources in the Russian Federation reveals a number of key trends (data are provided without taking into account investments from the state) (Figure 2).

For 2020–2022, there has been a general positive trend in investment volume, with an increase from RUB 195.9 million in 2020 to RUB 306.9 million in 2022 (an increase of 56.6%). At the same time, the structure of investments is undergoing changes: in particular, there has been a significant increase in the share of investments aimed at protecting atmospheric air, from 35.5% in 2020 to 45.4% (RUB 139.3 million) in 2022.

Since 2023, the names of the areas of environmental protection activities are determined on the basis of the All-Russian Classifier of Areas of Environmental Protection and Natural Resource Management Activities (OKPDUPR) (Figure 3). For 2023-2024, the total volume of investments in fixed assets also continues to grow, although the growth is no longer as rapid as it was in the previous period (the growth was 1%). Note that the investment structure in 2024 has changed compared to 2021, and other investment items have appeared. In 2024, there was a decrease in the item "air protection and climate change prevention" by 5.71%).

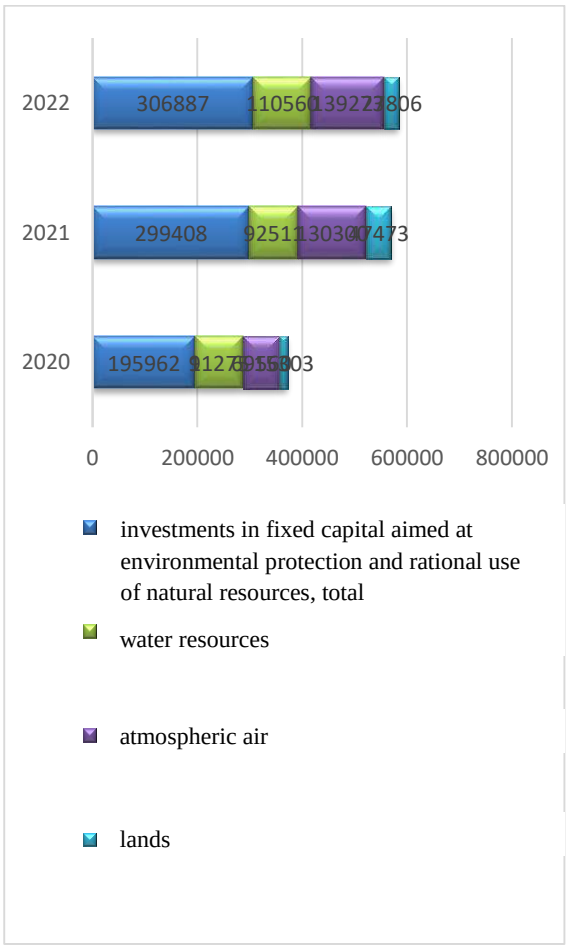

Figure 2: Investments in fixed capital aimed at environmental protection and rational use of natural resources, million rubles (2020-2022).

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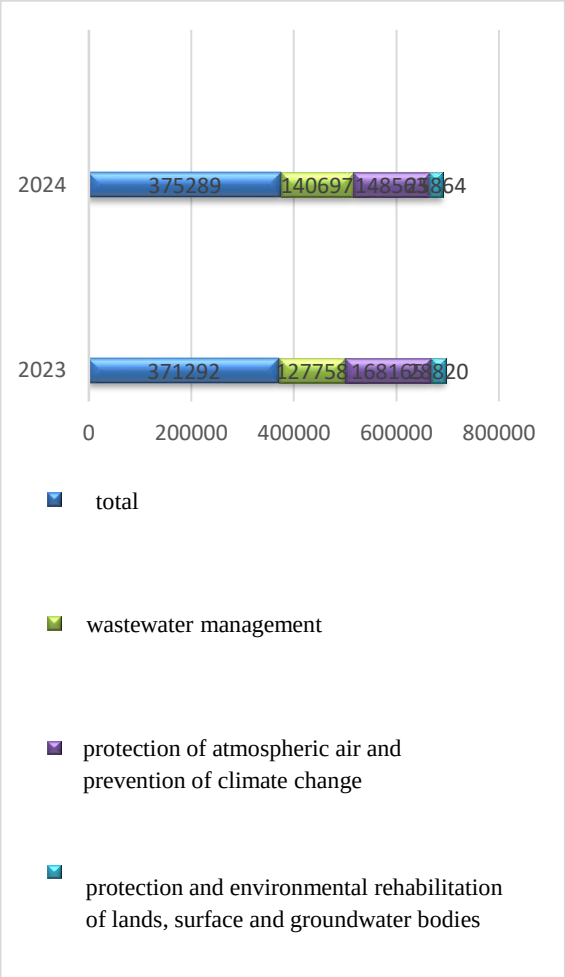

Figure 3: Investments in fixed capital aimed at environmental protection and rational use of natural resources, million rubles (2023-2024).

An analysis of data on the costs of major repairs of fixed assets aimed at environmental protection reveals heterogeneity in the distribution of financial resources between different areas of environmental protection activities in the period from 2020 to 2022 .

The largest volumes of investment were accumulated in the areas related to water resources and atmospheric air management, which emphasizes the priority of these areas in environmental policy. In particular, "Wastewater collection and treatment" and "Air protection and climate change prevention" demonstrate the most significant absolute values of costs throughout the analyzed period.

At the same time, fluctuations in investment dynamics in certain areas are observed. For example, in the area of "Research and development to reduce negative anthropogenic impacts on the environment", a sharp reduction in costs is noted by 2022, which may indicate a redistribution of priorities or a change in the financing methodology.

In addition, the analysis shows significant differences in funding levels between the different areas. “Protection of the environment from noise, vibration and other types of physical impact” and “Preservation of biodiversity and protection of natural areas” are characterized by relatively low levels of expenditure compared to other areas.

Overall, the cost structure reflects the complex nature of environmental issues and the diversity of approaches to addressing them, while the dynamics of change indicate the need to adapt financing strategies to changing environmental challenges and priorities.

If we look at the same indicator, but only in the context of the subjects of the Russian Federation, we will see the following picture (Figure 4).

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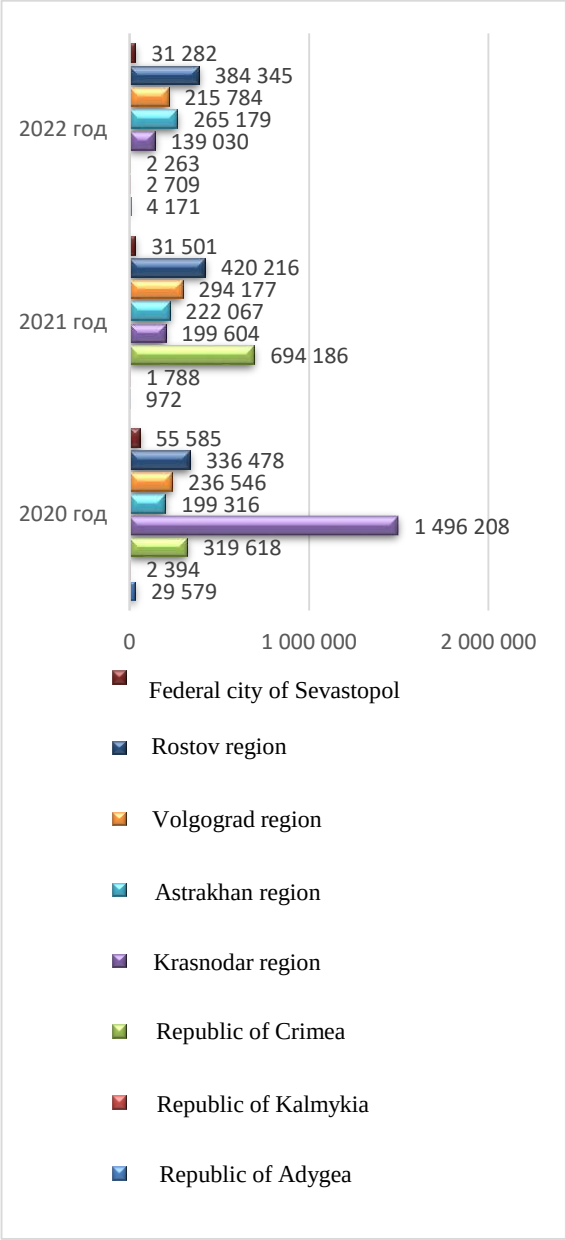

Figure 4: Costs for major repairs of fixed assets for environmental protection, thousand rubles.

Intraregional analysis reveals heterogeneity in resource distribution. Thus, within the Southern Federal District, Krasnodar Krai and Rostov Oblast act as regions with relatively high expenditure indicators, while the Republic of Kalmykia is characterized by significantly lower volumes of funding for environmental protection measures. Although, this indicator in dynamics for Krasnodar Krai decreased by 10 times in 2022 compared to 2020.

The data presented in Figure 5 demonstrate the dynamics of receipts of environmental taxes and payments to the budget system of the Russian Federation from 2020 to 2023. An analysis of the structure of receipts reveals the dominant role of payments related to the exploitation of natural resources in the formation of the revenue side of the budget in the area under consideration.

The main share in the structure of environmental taxes is occupied by taxes on energy resources, which emphasizes the dependence of the budget revenue on this category. At the same time, there is volatility in revenues from taxes on energy resources, with a peak in 2022 (RUB 3,763.7 billion) and a subsequent decrease in 2023 (RUB 2,111.1 billion).

Revenues from environmental pollution taxes also demonstrate growth dynamics, increasing from RUB 382.8 billion in 2020 to RUB 684.6 billion in 2023, with the exception of a decrease in 2022. Transport taxes demonstrate relative stability, while taxes on natural resources are characterized by a downward trend throughout the analyzed period.

In the structure of other environmental payments, the largest share falls on payments for oil and natural gas production, which indicates the importance of the oil and gas sector in the formation of environmental payments. The total volume of other environmental payments increased from 4219.7 billion rubles in 2020 to 11222.1 billion rubles in 2022, with a subsequent decrease to 10016.7 billion rubles in 2023. Payments for land use demonstrate an insignificant share in the overall structure, but their increase is noted in 2022. Fines for environmental violations have the smallest share in the structure of other environmental payments.

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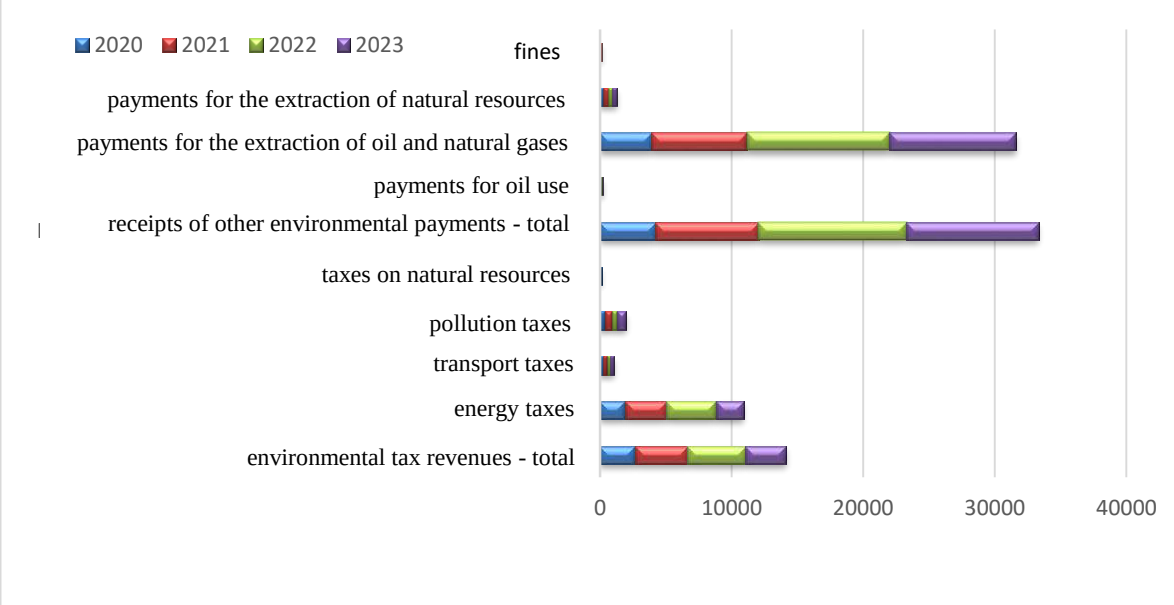

Figure 5: Revenues from environmental taxes and payments by category in the Russian Federation (billions of rubles).

Thus, the analysis of receipts from environmental taxes and payments reveals a complex structure and dynamics, determined by various factors, including the energy market situation, changes in legislation and the effectiveness of environmental monitoring and supervision activities.

4 CONCLUSION

According to the research data, it can be concluded that the state and business are consistently implementing a strategy for the transition to environmentally sustainable development, which is reflected in the following indicators.

An analysis of the dynamics of investments in environmental protection activities showed a significant increase in financial investments, amounting to 56.6% for the period 2020-2022, while the structure of investments demonstrates a positive reorientation.

It was revealed that the system of environmental taxation is characterized by the dominance of taxes on energy resources with a stable increase in payments for environmental pollution, which indicates an increase in the environmental responsibility of economic agents.

A study of the regional specifics of financing environmental protection measures revealed significant differences between the subjects of the Russian Federation, requiring adjustments to approaches to the distribution of financial resources.

It has been established that in order to achieve sustainable development goals, it is necessary to ensure a more even distribution of environmental investments between regions and improve environmental regulation mechanisms.

The results of the study confirm the effectiveness of the measures implemented to develop the “green economy”, but indicate the need for further improvement of the environmental investment management system and the elimination of regional imbalances in the financing of environmental protection measures.

The obtained data contribute to the formation of a theoretical and methodological basis for the development of effective strategies for the transition to sustainable development in the context of a transforming economy.

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REFERENCES

17 Goals to Transform Our World https://www.un.org/sustainabledevelopment/ru/sustainable-development-goals/ (data obrashcheniya : 14.04.2025).

United Nations Conference on Environment and Development (1992). Rio Declaration on Environment and Development. A/CONF.151/26/Rev.1 (vol.I). Rio de Janeiro, Brazil, 3-14 June 1992.

Ukaz President of the Russian Federation from April 1, 1996, No. 440 "On the concept perekhoda Russian Federations to the persistent development ". Collection Legislation of the Russian Federation. 1996. No. 15. Article 1572.

Cooke, P., Lazzeretti , L., 2023. Regional innovation systems and sustainable development. *Journal of Economic Geography* , 23(3), 457-476.

Stephenson, P.J., Damerell , A., 2022. Bioeconomy and Circular Economy Approaches Need to Enhance the Focus on Biodiversity to Achieve Sustainability. *Sustainability.* 14(17):10643.

Popescu , Cristina Raluca Gh ., 2023. Applying The Principles Of Green Economy: Focusing On Circular Economy And Sustainable Development.

Ferraz , D., Pyka , A., 2023. Circular economy, bioeconomy , and sustainable development goals: a systematic literature review. Environ Sci Pollut Res.

Berto , P., Diogo , F., Daisy, R., 2022. The Circular Economy, Bioeconomy , and Green Investments: A Systematic Review of the Literature . *Revista Production Guide Operações e Sistemas* . 17. 46-63.

Miloš , S., Becić , S. , Stojanović , G., 2022. Participation of environmental taxes in government expenditures for environmental protection: The case of selected EU countries. Bizinfo Blace . 13. 11-18.

Blauvelt, R., 2014. State Environmental Expenditures and Their Correlation with Seven Econometric Factors. Journal of Environment and Ecology. 5.172.

Young, C.E., Rocha, E., Bakker, L., Santoro, A., 2012. How green is my budget? Public environmental expenditures in Brazil.

Bayram , V., 2023. Transition to Circular Economy: Importance of Environmental Protection Expenditures and Investments in Business Strategies.

Zhou, Ch., Li, M., Zhao, Y., 2025. Driving effect of government environmental protection expenditure on green technology from the perspective of fiscal transparency. *Humanities and Social Sciences Communications.* 12.

Investing in the main capital . – URL: https://rosstat.gov.ru/folder/11194 (data obrashcheniya 03.04.2025).

Okruzhayushchaya Wednesday . Investing in the main capital . – URL: https://rosstat.gov.ru/folder/11194 (data obrashcheniya 03.04.2025).

Okruzhayushchaya Wednesday . Expenses na capital remont . – URL: https://rosstat.gov.ru/folder/11194 (data obrashcheniya 03.04.2025) .

Okruzhayushchaya Wednesday . Expenses na capital remont basic fondov po ohrane surrounding sredy . – URL: URL: https://rosstat.gov.ru/folder/11194 (data obrashcheniya 30.03.2025).

Postupleniya ecology tax i platezhej po categories in Russia Federacii . - URL: https://rosstat.gov.ru/storage/mediabank/Oxrana_okruj_sredi_2024.pdf (data obrashcheniya 01.04.2025).