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Introduction of innovative solutions to ensure the preservation of the country's natural ecosystems

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Abstract . In the context of increasing anthropogenic impact on the environment, the preservation of Russia's natural ecosystems is of paramount importance. Degradation of biogeocenoses, loss of biodiversity, pollution of water resources and atmospheric air, climate change - these challenges require the immediate search and implementation of innovative solutions. Research into innovation opportunities should cover a wide range of areas, i.e. include the development and application of new methods for monitoring the state of ecosystems, the introduction of technologies for treating wastewater and air emissions, the development of renewable energy sources, biotechnologies and methods for reclamation of disturbed lands. Particular attention should be paid to exploring the potential of using digital technologies, including artificial intelligence, big data and the Internet of things, to optimize natural resource management and predict environmental risks. The introduction of innovative solutions in the field of environmental protection requires an integrated approach, including scientific research, development of a regulatory framework, economic incentive mechanisms and educational work with the population. Only this approach will ensure the preservation of Russia's natural ecosystems for future generations.

1 Introduction

The conservation of natural ecosystems in Russia is a multifaceted challenge that requires innovative solutions to mitigate anthropogenic impacts and protect biodiversity. Meeting this challenge requires an integrated approach that integrates environmental principles, technological advances and policy frameworks.

In recent years, innovative solutions that go beyond technological advances have become increasingly important. Some researchers note that environmental innovation to ensure the conservation of natural ecosystems in Russia spans policy frameworks and community engagement initiatives. The creation of protected areas and the implementation of zoning regulations are fundamental strategies for mitigating habitat fragmentation and land use conflicts.

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In addition, incentivizing ecosystem services through modern payment schemes encourages landowners and stakeholders to adopt practices that promote conservation. By recognizing the intrinsic value of natural capital and quantifying ecosystem services such as carbon capture and water purification, the innovative schemes presented stimulate economic incentives for environmental conservation.

2 Materials and methods

At the present stage, the study of innovative ecology in order to develop and implement innovative solutions to ensure the preservation of natural ecosystems in Russia includes a variety of methods and approaches aimed at analyzing and understanding innovative solutions in the field of environmental protection and sustainable use of natural resources. Some of the main methods for studying innovation ecology include methods that make it possible to provide a scientific basis for research results.

Of no small importance in the topic under study is given to conducting various experiments on site, as well as in laboratory conditions, which allows one to study the impact of new technologies and methods on ecosystems, as well as evaluate their effectiveness and sustainability [3].

The next important method in the study of our topic is the use of mathematical models and computer simulations to predict changes in ecological systems under various scenarios of climate change or the impact of human activity.

And finally, one cannot fail to note this method of studying the influence of innovative ecology on ensuring the preservation of natural ecosystems in Russia as a method of interdisciplinary interaction.

3 Results and discussion

At this stage of development of society, the issue of environmental innovation is one of the most relevant and priority areas in the development of production.

The level of scientific and technological progress will make it possible to develop existing production technologies and create fundamentally new, previously unused methods of construction and production, assembly of parts, structures, etc. taking into account the trend of greening .

Environmental innovation is not only a huge contribution to the conservation of resources, reasonable use of energy, and reduction of CO2 emissions into the atmosphere, but also an excellent marketing ploy for enterprises. Eco-friendly materials and production technologies inspire confidence among consumers; this factor can help bring the organization to a new level of development and provide an opportunity to create a competitive advantage.

In this article we will analyze the general statistics of the application of environmental innovations in various spheres of economic activity in Russia [4].

Based on the general statistics provided (Fig . 1), it can be noted that, relative to other areas, the leading place is occupied by "reducing environmental pollution."

This direction can be implemented through the following measures :

1. Organization of tanks for separate waste collection .
2. Creation of secondary processing plants .
3. Application of the latest technologies for cleaning emissions in production .
4. State assistance in popularizing areas of environmental innovation .
5. Conducting lectures on the state of the environment and the influence of people on it
6. Standardization of production regarding the degree of environmental friendliness of produced materials .

7. The least popular direction is “replacing raw materials and materials with safe ones. This may be due to .

8. Reluctance of manufacturers to change the usual production process .

9. environmentally friendly materials and raw materials on the territory of Russia .

10. High cost, increasing costs .

11. Little awareness of manufacturers about the availability of alternative, more environmentally friendly materials .

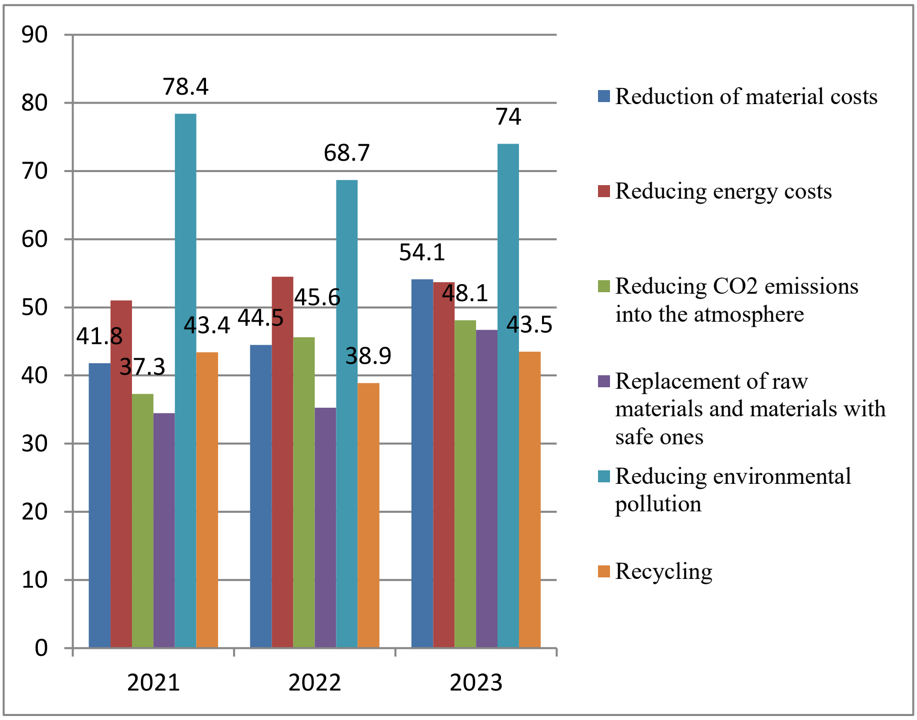

Fig. 1. Statistics on the use of environmental innovations

Next, we will draw conclusions about the application of environmental innovations in various areas of production.

If we talk about statistics on the use of environmental innovations in the field of mining , here we can note that a priority area is also the reduction of environmental pollution, the least popular areas are the reduction of CO2 emissions into the atmosphere and the replacement of raw materials and materials with safe ones [2].

We can also note that for this area of activity, 2021 was the most active year, relative to other years; during this period, innovations in the field of ecology were used most often.

The highest priority in 2023 was the reduction of environmental pollution. The least priority is recycling.

The priority direction in the industry of using environmental innovations in the field of energy supply is the reduction of environmental pollution, the least popular is recycling. The remaining directions vary approximately at the same level. Indicators in all areas, with the exception of the most popular, are less than 50%.

As for the construction sector, rather weak indicators can be noted here, with the exception of the 2023 indicators in the direction of “reducing CO ^{2} emissions into the atmosphere ” and indicators in the direction of “reducing environmental pollution ”, varying around the 50% mark. Which indicates that the industry’s innovative potential is not operating at full capacity.

The highest priority area in the construction industry is the reduction of environmental pollution. The remaining directions vary at approximately the same level.

As a positive trend, it can be noted that over the years, the percentage of innovative environmental support is growing in almost all directions.

4 Discussion

We believe that at the present stage, the introduction of innovative technologies plays a key role in monitoring and managing environmental dynamics. Remote sensing techniques such as satellite imagery and LiDAR (light detection and ranging) provide invaluable information about the structure, composition and spatial distribution of ecosystems. These data sources make it easier to identify sensitive areas and enable targeted conservation measures.

Moreover, the use of new technologies such as unmanned aerial vehicles (UAVs) and sensor networks enhances real-time monitoring capabilities. UAVs equipped with multispectral cameras and thermal sensors can accurately map habitat characteristics and detect environmental disturbances. Integrating these data streams into geographic information systems (GIS) facilitates informed decision making and adaptive management strategies [6].

In our opinion, increasing environmental literacy and public awareness is necessary to develop a culture of conservation and instill a sense of responsibility towards natural ecosystems. Educational campaigns, citizen science initiatives, and ecotourism programs promote environmental conservation and enable local communities to actively participate in conservation efforts [7].

Some researchers believe that promoting scientific research and interdisciplinary collaboration are important elements in stimulating innovation in ecosystem conservation. By promoting partnerships between academia, government agencies, and industry stakeholders, synergistic approaches can be developed to address complex environmental problems.

Investments in research infrastructure and capacity-building initiatives strengthen scientific knowledge and technical expertise, enabling the development of cutting-edge solutions tailored to the unique ecological context of Russian landscapes. According to S.V. Alekseev, the development of international cooperation and knowledge sharing networks contributes to the implementation of best practices and lessons learned from global environmental initiatives [1].

In recent years, the integration of traditional ecological knowledge and indigenous perspectives into conservation strategies has become increasingly important in innovative solutions to ensure the conservation of natural ecosystems in Russia, increasing the sustainability and effectiveness of conservation efforts.

Promoting resilience-based approaches addresses the dynamic nature of ecosystems and the inherent uncertainty associated with climate change and human-induced disturbances [8]. Implementing adaptive management strategies that prioritize flexibility and responsiveness allows conservation efforts to evolve in response to changing environmental conditions and emerging threats.

environmental monitoring systems have played a great role in the implementation of innovative solutions to ensure the preservation of natural ecosystems in Russia .

Nowadays, innovative solutions based on end-to-end digital technologies are increasingly being used for environmental monitoring. These are, for example, platform solutions and online services, the data sources of which can be drones and other equipment with special sensors for observations. Such systems can be local, within a specific region, or global, on the scale of one or several countries [5].

Of the industries examined, the minerals sector is the one that most actively applies environmental innovations. Environmental innovations are least relevant for the healthcare sector .

In all industries, the most popular area of application of environmental innovation is the reduction of environmental pollution . The least popular area is recycling.

Indicators in all considered areas vary around 50%. To summarize, it is worth noting that industries, in particular construction, make little use of environmental innovations; this trend can be caused by a number of reasons: the high cost of environmentally friendly materials, the lack of production of certain environmentally friendly goods in Russia, the difficult geopolitical situation and problems with logistics and supply of materials, lack of funding for scientific institutes and long lead times for the development of new technologies and materials, outdated legislation, lack of qualified specialists, low level of environmental culture of society [5].

Solutions to this problem may include the following activities: popularization of the idea of environmentally friendly goods and materials among the population , state support in the development of environmental innovations, creation of conditions for environmentally friendly production, financing of scientific and technical developments , construction of the necessary factories for various processing, changes in legislation .

5 Conclusions

Thus, we can say that the process of greening in Russia is just beginning and can already provide some positive results. Based on statistical data, it is worth noting that manufacturers have begun to pay more attention to environmental safety; perhaps soon we will see positive trends in dynamics relative to other areas.

In conclusion, we can say that the implementation of innovative solutions to ensure the conservation of natural ecosystems in Russia requires compliance with a large number of factors, including technological innovation, environmental policy reform, public involvement in environmental activities, the creation of a network of scientific institutes and the implementation of scientific research based on them . The introduction of innovative solutions is of paramount importance to ensure the conservation of natural ecosystems in Russia by integrating technological advances, policy frameworks and community engagement initiatives. As a result of the implementation of these activities, it is possible to improve sustainable strategies for the conservation of biodiversity and the integrity of ecosystems for current and future generations, as well as introduce new systems that are significantly superior to existing ones in terms of reliability.

References

1. S.V. Alekseev, Scientific notes of Transbaikal State University, **19(1)**, 36-44 (2024)
2. E.A. Balabaeva, Problems of development of modern society in from the collection of scientific articles of the 9th All-Russian National Scientific and Practical Conference, January 23–24, 2024, Kursk, Russia (2024)
3. R.R. Bashirov, Student , **11-2(265)**, 12-14 (2024)
4. N.V. Borovskikh, Socio-economic problems and prospects for the development of labor relations in an innovative economy in the Materials of the All-Russian Scientific and Practical Conference with International Participation, April 22, 2022, Omsk, Russia (2022)
5. T.S. Mastsevaya, Bulletin of Science, **7(64)**, 358-361 (2023)

6. E.M. Smirnova, P.A. Ilyin, Economics and management in the service sector: current state and development prospects in the Materials of the XXI All-Russian Scientific and Practical Conference , February 6, 2024, St. Petersburg, Russia (2024)
7. M.V. Chigirinova, Materials of the Interregional Scientific and Practical Conference, May 28–29, 2021, St. Petersburg, Russia (2022)
8. O.A. Konkov, G.S. Edich, M.S. Naboychenko, Innovation and investment, **1**, 431-433 (2024)