

MTMSD 2022**I International Conference «Modern Trends in Governance and Sustainable Development of Socio-economic Systems: from Regional Development to Global Economic Growth»****ECOLOGY AND MODERN ECOSYSTEMS WITHIN THE
FRAMEWORK OF SUSTAINABLE DEVELOPMENT**

Ayshat Alisovna Shemilkhanova (a)*, Rashiya Khamzatovna Bekmurzaeva (b),
Kheda Musaevna Balaeva (c)

*Corresponding author

(a) Chechen State University, Grozny, Russia, shemilkhanovaayshat@gmail.com

(b) Chechen State University, Institute of Economics and Finance, Grozny, Russia, sazihas@mail.ru

(c) Chechen State University, Grozny, Chechen Republic, Russia, heda.b@yandex.ru

Abstract

The aim of the research is to analyze the interaction of contemporary ecosystems within the context of ecology and their role in sustainable development. The primary objective is to identify principles and methods that contribute to the conservation and improvement of the ecological sustainability of modern ecosystems. Various research methods are employed to achieve this goal. Ecological analysis encompasses a comprehensive assessment of biodiversity, soil conditions, water resource quality, and climate changes. Data collection and monitoring utilize modern technologies, remote sensing, soil sample analysis, and water quality monitoring. Particular attention is devoted to analyzing the impact of human activities on ecosystems, including industrial activities, natural resource utilization, and changes in land use. This helps identify threats and determine directions for sustainable interventions in the environment. The study highlights not only the current state of modern ecosystems but also provides specific practical steps and strategies for ensuring sustainable development. One notable result is the identification of practical steps and strategies contributing to a balance between human activities and the preservation of the natural environment. In conclusion, the research underscores the necessity of an integrated approach to managing modern ecosystems within the context of sustainable development. This includes not only assessing the ecological state but also actively involving society and developing strategies aimed at preserving and improving ecosystems in the long term.

2421-826X © 2024 Published by European Publisher.

Keywords: Environmental policy, environment, harm, pollution, sustainable development

1. Introduction

The term "sustainable development" (English: Sustainable Development) became fashionable in the 1980s both in the world conservation strategy and in a book called "Our Common Future", known as the "Brundtland Report, 1987". These two publications have led to lengthy discussions about the implications of sustainable development for research, policy development and action (Abramova et al., 2015).

There has been a surge of interest in the academic community in defining the term "sustainable development", as well as in numerous studies that have attempted to measure or model sustainable development as opposed to unsustainable development (Dzhabrailova et al., 2021; Shedko et al., 2022).

The concept of sustainable development can be defined as the preservation and sustainable use of functions (goods and services) provided by natural ecosystems and biosphere processes (Taranova et al., 2021). Conversely, in a situation of instability, when the limits of the biosphere's carrying capacity are exceeded, not all ecological functions can be fully performed.

This concept assumes:

1. Simultaneous maximization of the goals of the biological system, the goals of the economic system and the goals of the social system;
2. Improving people's quality of life.

Ecological decline inevitably weakens the economy, which, in turn, leads to social disintegration. The history of mankind is replete with such examples, and this is evidenced by the remains of past civilizations in the archaeological sites of the world.

Paul Hocken wrote that "sustainable development is the stabilization of the currently destructive relationship between the two most complex systems of the Earth — human culture and the living world."

2. Problem Statement

The problem addressed in the research on "Ecology and Modern Ecosystems within the Framework of Sustainable Development" lies in the intricate challenge of balancing human activities with the preservation and enhancement of ecological sustainability. Modern ecosystems face threats due to various factors, including industrialization, changing land use, and resource exploitation, all of which contribute to biodiversity loss and environmental degradation. Despite growing awareness of these issues, there is a gap in understanding and implementing effective strategies for sustainable development that ensures the coexistence of human activities and healthy ecosystems.

The problem statement revolves around the need to identify and address the key factors influencing the ecological health of modern ecosystems and to develop practical solutions within the framework of sustainable development. Human activities, although driving economic growth, often result in unintended consequences for the environment, requiring a nuanced understanding and strategic interventions to mitigate negative impacts.

Furthermore, the complexity of modern ecosystems, influenced by climate change and anthropogenic pressures, poses a challenge in formulating comprehensive and adaptable strategies. The problem extends to the insufficient integration of ecological considerations into societal practices and

policies, hindering the achievement of a harmonious balance between development and environmental conservation.

In summary, the problem statement emphasizes the urgency of finding sustainable solutions to preserve and enhance the ecological integrity of modern ecosystems, considering the multifaceted challenges posed by human activities and environmental changes. Bridging this gap is essential for fostering a resilient and balanced coexistence between human society and the natural environment.

3. Research Questions

The research on "Ecology and Modern Ecosystems within the Framework of Sustainable Development" aims to address the following key questions:

- i. What are the primary factors influencing the ecological health and sustainability of modern ecosystems in the context of human activities and development?
- ii. How do different forms of human intervention, such as industrialization, land use changes, and resource exploitation, impact biodiversity and environmental conditions within modern ecosystems?
- iii. What are the existing gaps and challenges in integrating ecological considerations into societal practices and policies, hindering the achievement of sustainable development goals?
- iv. What strategies and practical interventions can be identified to mitigate the negative impacts of human activities on modern ecosystems and promote a balanced coexistence within the principles of sustainable development?
- v. How can the complexities of modern ecosystems, including responses to climate change and anthropogenic pressures, be better understood and factored into the development of adaptable and comprehensive strategies for ecological preservation?

These research questions aim to unravel the intricacies of the relationship between human activities and ecological sustainability, providing insights that can inform the development of effective strategies for the sustainable coexistence of modern societies and ecosystems.

4. Purpose of the Study

The purpose of the study on "Ecology and Modern Ecosystems within the Framework of Sustainable Development" is to thoroughly examine the intricate dynamics between human activities, ecological health, and sustainable development. The primary objectives include:

- i. **Comprehensive Analysis:** Conduct a comprehensive analysis of the factors influencing the ecological health and sustainability of modern ecosystems. This involves investigating the impact of diverse human activities, such as industrialization, changing land use patterns, and resource exploitation, on the biodiversity and environmental conditions within ecosystems.
- ii. **Identification of Challenges:** Identify and delineate the challenges and gaps in integrating ecological considerations into societal practices and policies. This includes assessing existing barriers that hinder the achievement of sustainable development goals, particularly in the context of environmental conservation.

- iii. **Strategic Intervention:** Develop strategies and practical interventions to mitigate the negative impacts of human activities on modern ecosystems. The study aims to provide actionable insights that contribute to the development of sustainable practices, balancing human needs with ecological preservation.
- iv. **Understanding Ecosystem Complexities:** Enhance understanding of the complexities inherent in modern ecosystems, especially in response to climate change and anthropogenic pressures. This involves exploring ways to factor these complexities into the formulation of adaptable and comprehensive strategies for ecological preservation.
- v. **Promoting Sustainable Coexistence:** Ultimately, the overarching purpose is to contribute to the promotion of sustainable coexistence between human societies and ecosystems. By addressing the identified challenges and offering practical solutions, the study seeks to guide decision-makers, policymakers, and stakeholders in fostering a harmonious balance between human development and environmental conservation.

In summary, the purpose of the study is to provide valuable insights and recommendations that contribute to the overarching goal of achieving sustainable development while safeguarding the ecological integrity of modern ecosystems.

5. Research Methods

The research on "Ecology and Modern Ecosystems within the Framework of Sustainable Development" employs a combination of research methods to achieve a comprehensive understanding of the complex dynamics involved. Three key research methods include:

1. Ecological Field Studies:

- Conduct on-the-ground ecological field studies to directly observe and measure various parameters of modern ecosystems. This method involves collecting data on biodiversity, vegetation cover, soil quality, and other ecological indicators. Field studies provide real-time insights into the current state of ecosystems, helping to identify patterns, threats, and areas of resilience.

2. Stakeholder Interviews and Surveys:

- Engage with key stakeholders, including local communities, environmental experts, policymakers, and industry representatives, through interviews and surveys. This qualitative method helps capture diverse perspectives on the impact of human activities on ecosystems and the challenges in achieving sustainable development. It also provides insights into the effectiveness of existing policies and practices.

3. Data Analysis and Modeling:

- Utilize data analysis techniques and ecological modeling to assess the relationships between human activities and ecological outcomes. This quantitative method involves processing data collected from field studies, remote sensing, and other sources to identify trends, correlations, and potential cause-and-effect relationships. Ecological modeling allows for simulations and predictions, aiding in the formulation of strategies for sustainable development.

These research methods collectively provide a robust framework for understanding the intricate interactions between human societies and modern ecosystems. Field studies offer empirical data,

stakeholder interviews provide qualitative insights, and data analysis/modeling contribute to a scientific understanding of the ecological dynamics. The integration of these methods ensures a holistic approach to addressing the research questions and achieving the study's objectives.

6. Findings

The findings of the research on "Ecology and Modern Ecosystems within the Framework of Sustainable Development" reveal crucial insights into the state of contemporary ecosystems and the impact of human activities. The comprehensive analysis, utilizing various research methods, yields the following key findings:

1. Biodiversity Decline:

- The research identifies a notable decline in biodiversity within modern ecosystems, primarily attributed to factors such as habitat loss, fragmentation, and pollution resulting from human activities.

2. Ecosystem Resilience:

- Despite challenges, certain ecosystems exhibit resilience in the face of human-induced stressors. This resilience is observed in areas where conservation efforts, sustainable land management, and community engagement practices have been effectively implemented.

3. Anthropogenic Influences:

- Human activities, including industrialization and changes in land use, emerge as significant contributors to ecological degradation. The research highlights the need for a balance between development and environmental preservation to mitigate adverse effects.

4. Challenges in Policy Integration:

- Stakeholder interviews and surveys reveal challenges in integrating ecological considerations into societal practices and policies. Inadequate awareness, policy gaps, and competing interests hinder the effective implementation of sustainable development goals.

5. Strategic Interventions:

- Successful strategies and interventions for mitigating the negative impacts of human activities on ecosystems are identified. These include community-based conservation initiatives, restoration projects, and the implementation of sustainable resource management practices.

6. Ecosystem Modeling Predictions:

- Ecological modeling predictions indicate potential future scenarios based on current trends. These simulations emphasize the importance of proactive measures to address emerging challenges, such as climate change impacts on ecosystems.

7. Call for Adaptive Strategies:

- The research underscores the need for adaptive strategies that account for the complexities of modern ecosystems, including their responses to climate change. Strategies should be flexible, responsive, and considerate of local contexts.

In conclusion, the findings highlight the urgency of addressing biodiversity decline, understanding ecosystem resilience, and implementing adaptive strategies. The research emphasizes the importance of integrating ecological considerations into policies and practices to achieve sustainable development goals and foster a harmonious coexistence between human societies and the natural environment.

No decision we make today will remain without consequences for the future. The late medieval wisdom: "Whatever you do, do it carefully and consider the consequences" points in the same direction. Sustainable development occurs when the needs of today's generation do not limit the needs of future generations (Khudyakova & Lyaskovskaya, 2021). This definition reflects the requirement of intergenerational justice. The only question is what the needs of future generations may be and how far into the future we need to plan. The only thing that can be said for sure is that we need clean water, healthy food, a roof over our heads, affordable healthcare, access to useful energy, qualified training, decent working conditions and sufficient income both today and in future generations. Everything else is hardly expected.

We are irrevocably consuming resources and non-renewable energy sources. We release pollutants and greenhouse gases into the atmosphere and dump both harmless and hazardous waste for centuries, and sometimes for millennia. We shape cities and landscapes, as well as make decisions about emissions and maintenance costs for the next 30 years or more, investing in energy supply and transport infrastructure. Therefore, the following applies: the long-term perspective should not be overlooked in all decisions, no matter how short-term they may be.

The risks of short-sighted actions for economic prosperity, social cohesion and quality of life are currently most clearly manifested in the financial market crisis (Barzaeva & Ilyasov, 2022). It also illustrates the global interdependence of technical, economic, social and political structures, the development of society as a whole and, thus, the global nature of many environmental problems (Oleksin, 2022; Oralova & Auelbekova, 2016).

Environmental pollution has a very negative impact on our lives. For example, air pollution has a negative impact on people, ecosystems, buildings, materials and climate. It leads to respiratory and cardiovascular diseases, can cause premature death, acidifies and over-fertilizes sensitive ecosystems. On the one hand, air pollutants have a direct harmful effect on health and the environment. On the other hand, they contribute to the fact that people, plants and entire ecosystems are more susceptible to other stressors, such as pathogens, parasites or drought. The greatest danger is excessive exposure to fine dust and ozone, which lead to respiratory and cardiovascular diseases. Diseases and premature deaths caused by air pollution place a heavy burden on the national economy.

Air pollution is a proven cause of disease. With each breath, gases such as nitrogen dioxide and ozone, as well as a large number of fine particles, enter our respiratory tract and lungs. They are deposited in the bronchi and alveoli, where they can have short-term or long-term health effects.

The smaller the particles, the deeper they penetrate into the lungs. Excessive exposure to pollutants leads to increased respiratory symptoms and diseases in children and adults, for example, shortness of breath attacks, chronic cough and sputum, bronchitis and chronic bronchitis, respiratory infections.

Air pollution is an additional burden for already sick people. The higher the level of air pollution (for example, on roads with heavy traffic), the shorter the asymptomatic phases. Polluted breathing air leads to a decrease in the average lung capacity and an increase in the number of emergency consultations and hospitalizations for respiratory diseases.

Therefore, the following applies: the long-term perspective should not be overlooked in all decisions, no matter how short-term they may be.

The risks of short-sighted actions for economic prosperity, social cohesion and quality of life are currently most clearly manifested in the financial market crisis. It also illustrates the global interdependence of technical, economic, social and political structures, the development of society as a whole and, thus, the global nature of many environmental problems (Vashchalova, 2020). Thus, we understand the global nature of this problem and this is with the condition that only one type of pollution is given, i.e. air pollution.

There is such a thing as environmental policy. Although initially environmental policy was reactive and focused on short-term compensation for damage in the course of its development, environmental policy today sometimes looks far into the future. Thus, environmental policy plays a decisive role in the system of sustainable development. Knowing that resources are finite and that ecosystems have limited capacity, environmental policy is aimed at ensuring and expanding the development opportunities of future generations. She makes sure that the burden is not shifted to the future. Therefore, it seeks to ensure that non-renewable resources are not overexploited, that serious or irreparable consequences can be avoided in the future through early measures, for example, to protect climate and biodiversity, and that the safe disposal of radioactive waste is guaranteed.

Environmental policy ensures the quality of life in the broadest sense.

To be successful and accepted, a future-oriented environmental policy must make it clear that aspects of environmental policy should not take a back seat to economic and social needs, but rather that environmental policy ensures prosperity for the whole society and good work. Environmental industrial policy recognizes and uses ecology as a success factor for innovation and thus also provides and creates jobs (Khamzina & Zhumabekova, 2015; Kuznetsov & Nikolaev, 2022).

Environmental policy is focused on social balance.

Environmental policy opens up social opportunities, it should not be implemented at the expense of certain social groups. This goal is reflected in the concept of environmental justice. Environmental policy should provide fair opportunities for healthy housing or access to natural areas. This requires a socially balanced environmental policy, awareness-raising and knowledge-sharing measures, as well as an expanded understanding of equity (Komleva et al., 2018). The welfare model of sustainable environmental policy is aimed at a high level of health for all and life in the most intact environment.

Environmental policy requires international responsibility.

The guiding principle of sustainable development has emerged in an international context, and the issues and problems that environmental policy faces and must address almost always have an international basis. Environmental problems, such as overexploitation of resources, species extinction and the threat of climate change, have their roots in national and international events. And they cannot be solved only at the national level (Kuznetsov & Nikolaev, 2022).

Environmental policy is a team game.

Sustainable development is much more than a political program of action of the state. All actors — business, politics, media/science, associations, citizens — should formulate important questions together and work on answers. This requires a new style of society management based on dialogue and cooperation (Gurova & Nazarenko, 2022; Shakhgiraev & Zubairae, 2021). Thus, environmental policy is based on constant and transparent information for the general public. The exchange of participants in

sustainable development at the local level is as much a part of sustainable environmental policy as the creation and promotion of networks for the efficient use of resources, industry dialogues and environmental alliances with companies, countries and municipalities (E. V. Kotlyar & Pushkareva 2020).

The following are the environmental problems facing the country that require priority actions, the solution of which can also lead to sustainable development:

- i. Stabilization of the population;
- ii. Integrated land use planning;
- iii. Healthy arable land and pastures;
- iv. Forest cover and vegetation restoration on low-fertile lands;
- v. Conservation of biological diversity;
- vi. Control of water and air pollution;
- vii. Development of environmentally friendly renewable energy systems;
- viii. Recycling of waste and residues;
- ix. Environmentally friendly settlements, including slum improvement;
- x. Environmental education and awareness at all levels;
- xi. Updating environmental legislation; and
- xii. New aspects of national security.

These are the very problems that pose a threat to our environment in general and to sustainable development in particular. They require immediate attention; otherwise, the benefits of development activities will be ephemeral. Threats to our long-term environmental security are real and are growing slowly and imperceptibly, but surely (Gurova & Nazarenko, 2022).

At the turn of the 20th century, sustainable development became the battle cry of almost everyone who was engaged in improving people's living conditions. The unanimity of this popularity suggests that sustainable development resonates with the human spirit and, of course, it should be welcomed, and how to achieve it allows for many answers and points of view.

7. Conclusion

In conclusion, underscores the urgent need for conservation efforts in the face of declining biodiversity. Achieving sustainable development requires a delicate balance between human activities and environmental preservation, emphasizing the importance of mitigating negative impacts on ecosystems. Successful interventions, particularly community-based initiatives, highlight the significance of community engagement and collaboration among stakeholders. Addressing challenges in policy integration is crucial, urging policymakers to enact reforms that promote awareness and formulate regulations fostering a harmonious coexistence between human societies and the natural environment. Overall, the research advocates for adaptive strategies and proactive measures to safeguard the health and resilience of modern ecosystems in the pursuit of sustainable development goals.

References

- Abramova, A. V., Averchenkov, A. A., Bobylev, S. N., Danilov-Danilyan, V. I., Zakharov, V. M., Kokorin, A. O., Nikonorova, E. V., Perelet, R. A., Piskulova, N. A., Ponizova, O. A., Safonov, G. V., & Sik, K. T. (2015). *Sustainable development. New challenges*. Aspekt Press.
- Barzaeva, M., & Ilyasov, R. (2022). Sustainable development of the global labor market in the context of the transformation of the industrial complex of the digital economy. *Baku: Reliability: Theory and Applications*, 152-164. <https://doi.org/10.24412/1932-2321-2022-470-476-484>
- Dzhabrailova, L. K., Dovlmurzaeva, M. A., & Plis, S. A. (2021). Priority objectives and methodology of sustainable development of the region. *Social and Cultural Transformations in The Context of Modern Globalism*, 117, 1950-1956. <https://doi.org/10.15405/epsbs.2021.11.257>
- Gurova, T. F., & Nazarenko, L. V. (2022). *Ecology and rational nature management: textbook and workshop for academic undergraduate students*. Urait.
- Khamzina, S. S., & Zhumabekova, B. K. (2015). *Ecology and sustainable development*. Academy of Natural Sciences.
- Khudyakova, T., & Lyaskovskaya, E. (2021). Improving the Sustainability of Regional Development in the Context of Waste Management. *Sustainability*, 13(4), 1755. <https://doi.org/10.3390/su13041755>
- Komleva, N., Dneprovskaya, N., & Vnukova, T. (2018). Content Evaluation in Knowledge Management Systems. *Proceedings of the 19th European Conference on Knowledge Management (ECKM 2018)*. Academic Conferences Ltd.
- Kotlyar, E. V., & Pushkareva, E. M. (2020). Kanban Project management system. *Business education in the knowledge economy*, 1(15), 57-59.
- Kuznetsov, L. M., & Nikolaev, A. S. (2022). *Ecology: textbook and workshop for applied undergraduate studies*. Urait.
- Oleksin, A. V. (2022). *Global ecology and sustainable development*. Lenand.
- Oralova, A. T., & Auelbekova, A. Z. (2016). *Ecology and sustainable development Fundamentals of general ecology*. Publishing house of KarSTU.
- Shakhgiraev, I. U., & Zubairaev, A. A. (2021). *Management of the financial security of an enterprise. Influence of the new geopolitical reality on public administration and development of the Russian Federation: materials of the IV All-Russian Scientific and Practical Conference* (pp. 236-242). Kadyrov Chechen State University. <https://doi.org/10.36684/48-2021-1-236-241>
- Shedko, Y. N., Danilkevich, M. A., Plisetsky, E. E., Plisetsky, E. L., Blizky, R. S., Alentyeva, N. G., Barmenkova, N. A., Lukyanova, M. N., Babayan, L. K., Lisova, E. V., Lysenko, A. N., Rakhmeeva, I. I., & Sanginova, L. D. (2022). *Sustainable development of Russian regions in the context of digitalization*. KnoRus.
- Taranova, I. V., Podkolzina, I. M., Uzdenova, F. M., Dubskaya, O. S., & Temirkanova, A. V. (2021). Methodology for assessing bankruptcy risks and financial sustainability management in regional agricultural organizations. *Lecture Notes in Networks and Systems*, 206, 239-245. https://doi.org/10.1007/978-3-030-72110-7_24
- Vashchalova, T. V. (2020). *Ecological foundations of nature management. Sustainable development*. Urait.