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Environmental and Economic Sustainability of Regional Development

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Abstract

In this study, the authors focus on the environmental and economic aspects of sustainable development at the regional level. Theoretical aspects of sustainable development of regions have been described, the main environmental problems giving rise to the formation of proposals for sustainable development have been presented, and the main systems of indicators of environmentally sustainable development have been analyzed. The analysis of the dynamics of the main indicators of the environment state in the Republic of Kazakhstan has been carried out and problems that impede the formation of environmentally sustainable development in the region have been identified. The directions of solving the problems of environmental sustainability of regions have been developed, providing for the construction of an organizational and economic mechanism for environmentally sustainable development, as well as improving several tools for managing sustainability. The authors attempt to fill in the existing gaps based on the materials of Kazakhstan, showing the problems of effective management of environmental sustainability based on the greening of industrial production, introduction of environmental innovations, development of the environmental culture of the population, as well as scientific justification of approaches to assessing regional environmental sustainability.

Keywords: environmental and economic sustainability; ecological situation; regional development; environmental protection; air pollution; industrial regions; regional development program.

JEL Classification: R11; Q56; Q57.

Introduction

At the present stage, the economic development of a region's territories is accompanied by an increase in anthropogenic impact on the environment. The intensification of the globalization processes, dynamism, international cooperation, scientific and technological progress, and the introduction of innovative technologies exacerbate the contradictions between economic and environmental indicators. Unfavorable environmental conditions complicate the problem of stable territorial development. Consideration of environmental factors when developing regional programs, substantiating investment policies, and resolving resource conservation issues is becoming increasingly important.

The UN Summit on the adoption of the Post-2015 Development Agenda, held in New York in September 2015, approved the Sustainable Development Goals until 2030 for humanity and all countries. Eight goals are linked to environmental sustainability in the UN 17 Sustainable Development Goals for the next 15 years (UN Sustainable Development Summit 2015, 25-27 September). The new goals and objectives require the development of an economic development model that will ensure economic growth and improve the well-being of society without environmental degradation. The international community has expressed a clear interest in reliable energy supply, combating climate change and its consequences, and rational use of ecosystems.

In the modern theory of regional development, a region is studied as a multifunctional and multidimensional system. Thus, a region may be a part of the national economic complex of a country that differs in geographical conditions and natural resource specialization (Vakhromov 2018, 26).

Since a region is a system (economic, social, environmental, industrial), it is necessary to determine what should be understood as the sustainability of the system to identify the specifics of its sustainable development. Considering the specifics of the study, it is necessary to pay attention to environmental and economic systems.

On the one hand, it is understood as a way of organizing low-waste production and environmentally safe products related to the safety of the environmental and economic system, on the other – new environmental thinking aimed at understanding the environmental and economic prospects for development. Thus, from an economic point of view, sustainability can mean stability of prices, market conditions, channels of supply and sale of finished products, individual economic entities, etc. According to I.P. Vorobyeva (2012), the stability of an economic system as a whole is its ability to withstand unfavorable internal and external forces, while maintaining development parameters, stable indicators and optimal proportions, development dynamism and efficient use of resources saved and reproduced for the needs of the country and future generations.

The term "environmental sustainability" is often used to describe individual ecosystems. Thus, the stability of an ecosystem is understood as its ability to resist external stimuli (Le Chatelier-Braun principle).

As a result, the concept of "environmental and economic stability" can be interpreted as the maintenance of territorial ecosystem indicators of its life activity at a level that excludes its degradation, subject to the development of local economic complexes.

Given the growing social responsibility of the business and the large enterprises having financial opportunities for greening their production, the study of the impact of large business entities and complexes on the environmental sustainability of the region is becoming increasingly relevant. Existing approaches to managing the sustainable development of regions need to be significantly supplemented and clarified to consider regional features of environmental and economic sustainability.

1. Methods

The theoretical basis of the research consisted of scientific works in the field of the regional economy and environmental management, legislative and regulatory acts of the Government of the Republic of Kazakhstan, as well as materials of the Ministry of Environment.

Theoretical and factual materials contained in scientific works in the field of regional economy and environmental management, data from the Committee on Statistics of the Republic of Kazakhstan and the Territorial Department of Environmental Protection of the Republic of Kazakhstan, and the results of our research served as the information base of the study.

The research was carried out using systematic, statistical, computational, analytical, and cartographic methods, as well as methods of grouping and environmental and economic assessment. The main method of scientific knowledge at work was dialectical. Accordingly, regional environmental and economic problems and industrial environmental management were considered comprehensively.

2. Results

At the present stage of development, regional environmental and economic sustainability and effective environmental protection are urgent problems, especially for industrial regions and regions producing raw materials. Industrial regions of Kazakhstan have harmed the ecosystems by releasing pollutants into the atmosphere for a long time, dumping wastewater on the terrain and into reservoirs, and polluting the environment with industrial waste.

Currently, economic, social, and environmental activities are being monitored in many regions of Kazakhstan and positive experience has been accumulated in the development of indicators of sustainable development with the similarity of many evaluation parameters having been observed (Kaldiyarov *et al.* 2017, 20).

Since 2014, a system of environmental and economic accounting has been tested in Kazakhstan: the Statistics Committee, together with the OECD, has been working on the implementation of green growth indicators, which include

36 indicators (Table 1) (Concept of Kazakhstan's transition to "green economy". Decree of the President of the Republic of Kazakhstan No 557 dated May 30, 2013).

Table 1. Indicators of environmental and economic accounting in Kazakhstan

Group	Indicators
Air pollution and ozone layer depletion	1. Emissions of pollutants into the atmospheric air 2. Air quality in urban areas 3. Consumption of ozone-depleting substances (estimated level in tons of substance)
Climate change	4. Air temperature 5. Precipitation 6. Greenhouse gas emission
Water resources	7. Renewable freshwater resources 8. Freshwater abstraction 9. Household water use per capita 10. Water loss 11. Reuse and recycling of freshwater 12. Drinking water quality 13. Biochemical oxygen consumption and ammoniacal load in river water 14. Nutrients in freshwaters 15. Nutrients in coastal waters 16. Polluted wastewater
Biodiversity	17. Data on protected areas 18. Forests and other wooded lands 19. Threatened and protected species 20. Trends in the abundance and distribution of individual species
Land resources	21. Land withdrawal from productive circulation 22. Area affected by soil erosion
Agriculture	23. Application of fertilizer 24. Pesticide application
Energetics	25. Final energy consumption 26. Total energy consumption 27. Energy output 28. Renewable energy consumption
Transport	29. Passenger turnover 30. Supply turnover 31. Composition of the fleet of road motor vehicles by type of fuel used 32. Average age of the fleet of road motor vehicles
Waste	33. Waste formation 34. Transborder trafficking of hazardous waste 35. Recycling and waste recovery 36. Final waste disposal: municipal waste recycling and disposal

Note: compiled by the authors based on (Concept of Kazakhstan's transition to the "green economy". Decree of the President of the Republic of Kazakhstan No. 557 of 30.05.2013)

Let us analyze the main indicators of environmental and economic accounting in Kazakhstan according to the groups of indicators considered in Table 1.

In 2019, the volume of regulatory emissions and discharges of pollutants in Kazakhstan in comparison with the indicators of 2018 was not exceeded and tended to decrease:

- the volume of regulatory emissions of pollutants in 2019 amounted to 4.193 million tons, which is 1% less than in 2018 (in 2018 – 4.228 million tons);
- the volume of discharges decreased by more than 9%, amounting to 2.177 million tons in 2019 (in 2018 – 2.396 million tons) (Official website of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan).

The main share of emissions in the regions fell on the Pavlodar, Karaganda, and Atyrau regions. At the same time, the Pavlodar region was the leader among them. Emissions of the Pavlodar (23%), Karaganda (21.6%), Atyrau (8%), and Aktobe (7%) regions accounted for 59.6% of the total allowed emissions in the republic – 4.1 million tons (Table 2). Republic of Kazakhstan)

In the Pavlodar region, the main volume of emissions falls on the heat and power industry – Ekibastuz GRES-1 LLP, Eurasian Energy Corporation JSC.

In the Karaganda region, the main volume of emissions falls on the mining and metallurgical industry – Arcelor Mittal Temirtau JSC, Kazakhmys Smelting LLP.

Table 2. Volume of regulatory emissions and discharges of pollutants in Kazakhstan for 2018-2019, million tons

Name	2018		2019		Percentage, %	
	emissions	discharges	emissions	discharges	emissions	discharges
Akmola Region	164	79	147	79	3.5	3.6
Aktobe Region	318	48	312	39	7.4	1.8
Atyrau Region	471	73	347	80	8.3	3.7
Almaty Region	129	340	132	341	3.2	15.6
East Kazakhstan Region	194	46	195	41	4.6	1.9
Jambyl Region	115	24	115	23	2.7	1.1
West Kazakhstan Region	177	146	137	86	3.3	3.9
Karaganda Region	822	429	904	452	21.6	20.8
Kyzylorda Region	70	87	68	88	1.6	4.0
Kostanay Region	201	545	205	354	4.9	16.3
Mangystau Region	158	109	211	126	5.0	5.8
Pavlodar Region	980	75	980	76	23.4	3.5
North Kazakhstan Region	117	36	119	72	2.8	3.3
South Kazakhstan Region	143	158				
Astana	98	204	101	129	2.4	5.9
Almaty	71	1	71	1	1.7	0.1
Turkistan Region			73	142	1.8	6.5
Shymkent			75	47	1.8	2.2
Total, thousand tons	4228	2396	4193	2177	100	100

Note: compiled by the author based on (Official website of the Committee on Statistics of the Ministry of National Economy of the

In the Atyrau region, the main volume of emissions falls on the oil and gas industry – Tengizchevroil LLP, North Caspian Operating Company.

In the Aktobe region, the main volume of emissions falls on the oil and gas industry – SNPC-Aktobemunaigas JSC, Kazakhoil Aktobe LLP, Aktobe UMG Intertgas Central Asia JSC.

The volumes of discharges in the Karaganda (20.8%), Almaty (15.6%), and Kostanay (16%) regions account for 52.4% of the total allowed volume of discharges in the republic – 2.1 million tons.

In the Almaty region, the main volume of discharges falls to utilities of the State Utility Enterprise based on the Almaty Su.

In the Kostanay region, the main volume of discharges falls on the mining and smelting –Aluminum of Kazakhstan JSC, KBRU, SSGPO JSC.

In the Karaganda region, the main volume of discharges falls on the mining and metallurgical industry – Arcelor Mittal Temirtau JSC, Corporation Kazakhmys LLP (Official website of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan).

The main pollutants are sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbonic oxide (CO), and particulate pollutants (VHF), formed during industrial and other human activities. They account for about 90% of the total emissions of harmful substances. In addition to the main pollutants, more than 70 types of harmful substances are observed in the atmospheric air of cities and towns (Ministry of Energy of Republic of Kazakhstan 2018).

Water bodies of Kazakhstan are intensively polluted by mining, metallurgical and chemical industries, municipal services of cities, representing a real environmental threat. The most polluted rivers are Irtysh, Nura, Syr Darya, Ile, and Lake Balkhash. Water pollution is mainly due to the fact that many regions, cities, and enterprises do not provide high-quality wastewater treatment, the state of water sources does not meet the standards, and there is dangerous contamination of subsoil waters from numerous wastewater accumulators, as well as other municipal, industrial, and agricultural facilities (Sergazina *et al.* 2013).

The imbalance between the anthropogenic load on water bodies and their ability to recover has led to the fact that environmental problems have become characteristic of almost all large river basins. Insufficient financing of water management needs caused extremely unsatisfactory (sometimes emergency) technical conditions of water management facilities and serious aggravation of problems of drinking water supply to the population (Uakhitzhanova *et al.* 2017, 1361).

Significant local areas of anthropogenic disturbances and soil pollution are widespread in the industrial regions of the republic. A significant role in urban land pollution belongs to motor transport, the number of which has increased significantly in recent years. Local areas of soil pollution from industrial enterprises were formed in the vicinity of the cities

of Oskemen, Ridder, Jezkazgan, Shymkent, and Karaganda. Here, the content of lead, copper, zinc, and cadmium in the soil significantly exceeds the maximum permissible concentrations (Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan. Information and Analytical Center for Environmental Protection 2019).

Also, Kazakhstan has problems in managing environmental and economic systems, the main of which are:

- lack of an effective management structure and reasonable delineation of responsibilities in the field of nature management and environmental protection (including in specially protected areas);
- lack of a targeted policy for managing environmental and economic systems;
- imperfection of the accounting system and economic valuation of natural resources;
- lack of legislation on environmental impact assessment and audit;
- low percentage of targeted scientific research and design work to implement various environmental policies;
- weak information and analytical support of the environmental management system;
- low level of international cooperation in the field of protection and use of natural resources (Petrenko *et al.* 2017, 105).

Therefore, to develop an integrated economic mechanism for managing the socio-ecological system, the following is necessary:

- formation of a system of environmental instruments and impact on sustainable development, including the formation of environmental-oriented national accounts;
- creation of an eco-economic mechanism based on innovations;
- development and coordination of a mechanism for inter-country relations on global environmental impacts;
- formation of a system of economic impacts on the greening of production;
- creation of markets for environmental services, products, technology, and equipment;
- consideration of acceptable environmental risk factors when making decisions (Akopova 2014, 38).

The main tasks to be solved within the framework of the model of sustainable social and environmental development include the following:

In the socio-economic subsystem:

- stabilization and subsequent improvement of the quality of life of the population based on the optimal use of natural scientific, technical, and financial resources;
- growth of the gross domestic product and achievement of the level of full employment of the working-age population (Sadvokassova *et al.* 2014, 336).

In the socio-environmental subsystem:

- conservation of natural biological diversity as the basis for the existence of the "nature-man" system and maintenance of self-regulation and restoration of natural ecosystems;
- ensuring human health and environmental safety.

In the socio-cultural sphere:

- creating conditions for the comprehensive spiritual development of a person and self-realization in a society based on ensuring their rights to housing, work, recreation, education, information, and cultural development;
- harmonization of relations between different social groups based on the ideas of social compromise (Azimbekova and Nurgalieva 2016, 113).

These tasks correspond to the Millennium Development Goals outlined in the Declaration signed by the President of the Republic of Kazakhstan, N.A. Nazarbayev in 2000 in New York together with other world leaders.

When developing regional and national programs, it is necessary to pay great attention to the following issues:

- pasture and arable land degradation;
- water scarcity;
- lack of forests and specially protected areas;
- air pollution in urban areas;
- pollution of the environment as a result of oil production;
- pollution of the environment by solid industrial and municipal waste;
- pollution of water bodies with wastewater (Ismailov and Omarbaeva 2018, 63).

The objective reality of the impossibility of ignoring the economic damage caused by environmental pollution and the depletion of natural resources oblige looking for ways out of the crisis and new ways to develop the economy (Zhaken 2017, 21). A civilized approach to resolving environmental and economic contradictions can allow receiving both environmental and economic benefits.

3. Discussion

Imaginary economic success based on costs that do not consider the environmental component of production leads to an increase in the environmental crisis. The need to develop new environmentally oriented technologies and methods of extraction and processing of resources and production of environmental products has stimulated the development of

environmental entrepreneurship abroad. Filling the modern market with environmentally friendly products has become a condition for the continued survival of each country individually and the world community as a whole.

Today, the United States, Japan, and Western European countries hold leading positions in the implementation of environmental technologies and the export of environmentally oriented products. Germany alone accounts for 43% of environmental patents for products and products in demand in all countries. The volume of products manufactured on the environmental market is estimated by some experts to be between 600 billion and 2 trillion dollars and the growth rate is from 5.5 to 7% per year.

The contribution of environmental business to the GDP of the G8 countries is from 10 to 24 %. The domestic market of the United States for the production of environmental products and services is 37 billion dollars, Japan – 30 billion dollars, Germany – 20 billion dollars, France – 10 billion dollars. The market for environmental goods and services in Eastern Europe, including the CIS, and the production of environmental products and services is estimated at 20 billion dollars. It exceeds 600 million dollars in the Czech Republic, Hungary, and Bulgaria (Urazova 2008, 182).

Thus, international experience and prospects for the development of environmental entrepreneurship are of great interest for the development of this direction in Kazakhstan (Ualikhanovich *et al.* 2014, 96).

Conclusion

The results of the research allow stating that the theory of sustainable development should be considered one of the most relevant and controversial modern theories of the development of human civilization. Due to the development of this theory, the ideas about the global scale of negative changes in the environment under the influence of human activity and the impossibility of successful socio-economic development in isolation from the quality of the environment were first scientifically recognized.

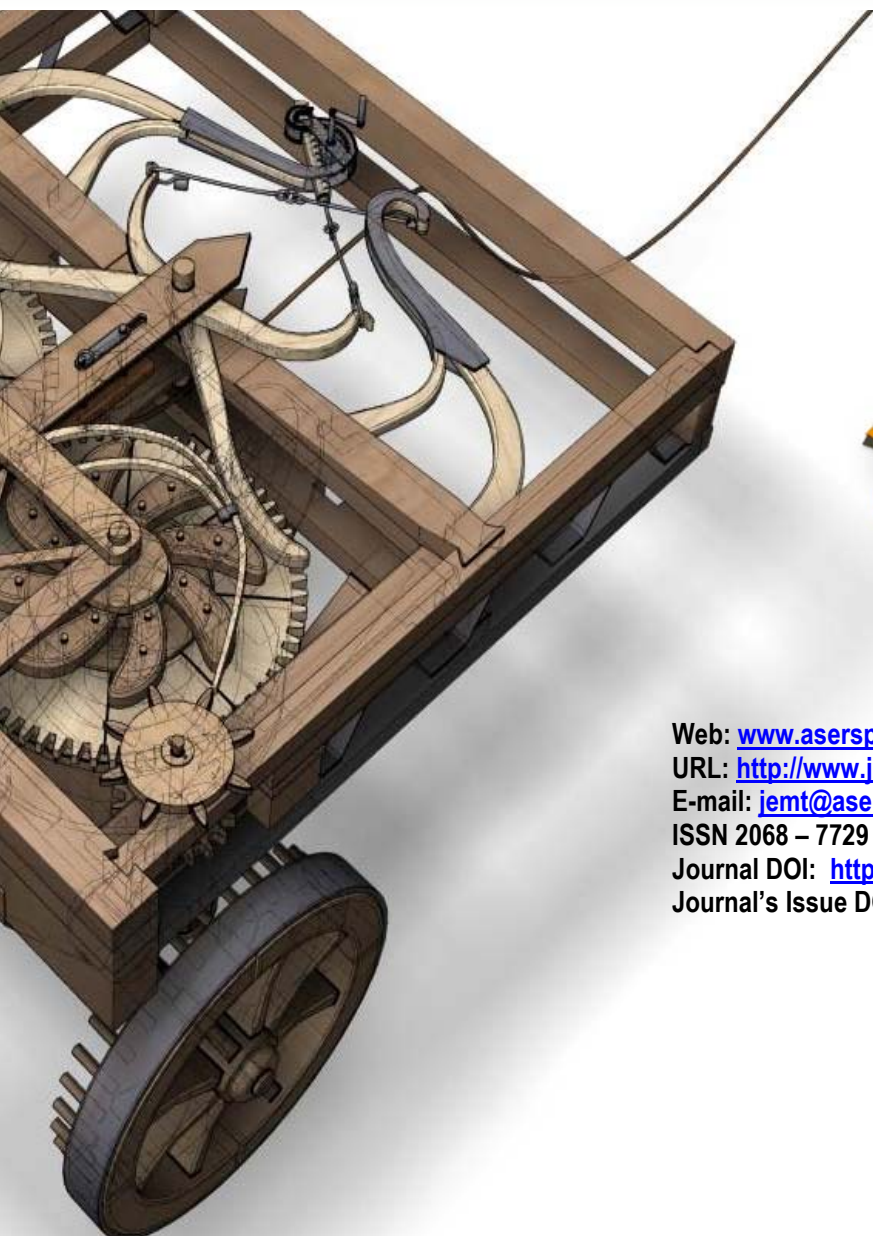
The problems of sustainable development are important for Kazakh science, as the preservation of the dynamic balance of the regional socio-environmental and economic system guarantees the security, stability, reliability, and integrity of the development of the regions of Kazakhstan. The regional socio-economic system acts as a nature-saving system, combining environmental, economic, and social components. The process of achieving the goals of sustainable development, managing this process, and evaluating the effectiveness of the means used and the level of achievement of the goals require the development of appropriate criteria and indicators of sustainable development. Indicators of sustainable development should reflect the economic, social, and environmental aspects of meeting the needs of the modern generation without limiting the needs of future generations to meet their own needs. It is also necessary to develop environmental entrepreneurship, which has a powerful potential to launch a mechanism for self-development of the environmental industry with effective support from the state. These problems must be addressed through environmentally balanced economic reforms and the creation of an appropriate economic environment at the macroeconomic level.

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