

Ensuring environmental safety in the region

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Abstract. The article examines the influence of the regional economy on the state of the environment of the Bryansk region, examines the development of the economic potential of the region, and examines the results of the influence of industrial production directions on the state of environmental safety of the state of atmospheric air, water resources and soil cover. Research on the state of environmental safety was carried out using economic and statistical methods; a conclusion was made on the state of natural resources in the Bryansk region

1 Introduction

The Bryansk region administratively belongs to the Central Federal District, territorially located in the southwest of the Russian Federation, bordering the republics of Belarus and Ukraine and four regions of the Russian Federation. The length of the Bryansk region border is more than 3000 km. The area of the region is 34,857 km², the region's territory is populated by forests - 34.0%, agricultural lands - 53.8%, surface water bodies, including swamps, account for 3.1%, other occupied territories - 9.2%. In 2022, gross regional product (GRP) was estimated at 502.1 billion rubles

Purpose of research. Investigate the impact on the regional economy on the state of the environment, assess the consequences of the influence of pollutants on the state of the atmosphere, water resources and soil.

2 Materials and methods

In the structure of GRP, the leading position is occupied by the industries presented in Figure 1.

From the information presented in Figure 1, we see that the listed industries account for 88% of the gross regional product produced; among the leading areas of the economy are agriculture and manufacturing. The structure of manufacturing industries, the percentage in the general economy sector is shown in Figure 2.

The region has a well-developed transport network. The length of paved roads is 11.2 thousand km (71.8% of the total length of roads), the length of railway tracks is 1.1 thousand km, pipeline transport is 1287.6 thousand km, there are no other types of transport, for example, airborne due to a special military operation.

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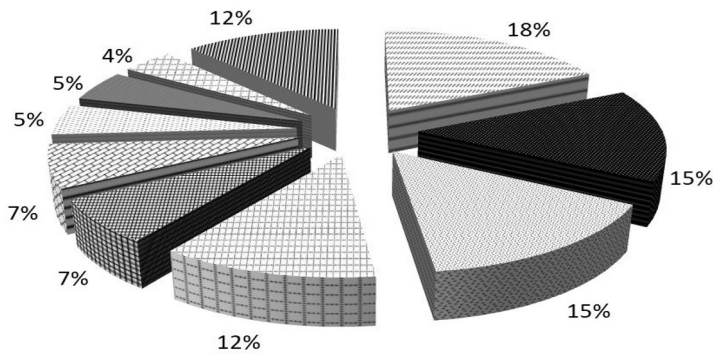


Fig. 1. Structure of the gross regional product of the Bryansk region, %: agriculture, forestry, hunting, fishing and fish farming - 18%; manufacturing industries - 15%; Wholesale and retail trade, repair of vehicles and motorcycles - 15%; activities related to real estate transactions – 12%; transportation and storage – 7%; public administration and military security – 7%; construction – 5%; activities in the field of health and social services - 5%; education – 4%; others - 12%.

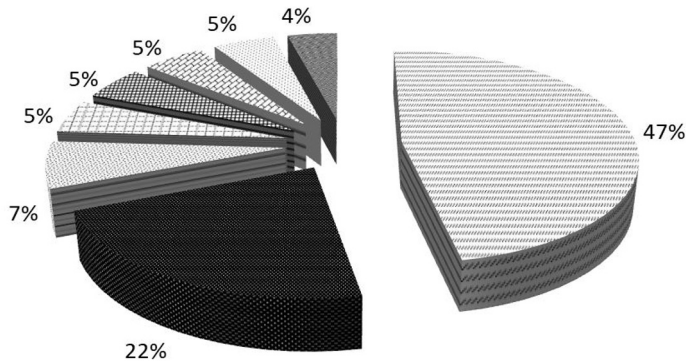


Fig. 2. Structure of manufacturing industries, %: food production – 47%; production of other vehicles and equipment – 22%; production of other non-metallic mineral products – 7%; metallurgical production – 5%; Production of motor vehicles, trailers and semi-trailers – 5%; production of paper and paper products – 5%; production of chemicals and chemical products – 5%; production of machinery and equipment not included in other groups – 4%.

In 2022, the total population of the Bryansk region was 1168.8 thousand people, of which 660.5 thousand were able-bodied people, every fourth resident of the region was a pensioner. The majority of the region's population are women, 54.5% of the population. Among people of retirement age, there are 2.5 times more women than men. In 2022, the population of the region decreased by 13,911 people (1.2%). 825.1 thousand (70.4%) live in cities and urban-type settlements, 343.7 thousand (29.6%) live in rural areas.

The development of the economy and agriculture has a negative impact on the environment, and given that in 1986 the region suffered from the Chernobyl disaster, such consequences are getting worse every year.

3 Results and Discussion

The state of atmospheric air is decisive for the living of the population in the region; the health and potential opportunities for economic development of the region depend on its quality. Air quality in 2022 was monitored at 76 monitoring points. A total of 7607 air samples were examined. The predominant part of the studied samples (6616 - 87%) were collected in cities and urban settlements, in rural areas - 991 samples (13%).

Analysis of the air condition in the samples showed that in cities and urban settlements, 19 (0.2%) samples did not meet hygienic standards, which is six times lower than in 2021 (1.2%), but 10 times more than 2019 (0.02%). I would like to note that in rural areas since 2019, not a single sample has been registered that does not meet hygienic standards. When studying the sources of negative impacts on the atmospheric air in the region, it was found that a number of specific pollutants enter it, with a total volume of 38,521 tons per year. The largest number of such pollutants is represented by methane (Figure 3).

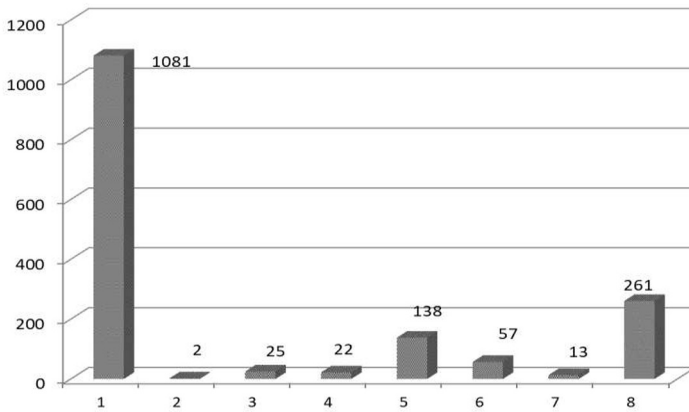


Fig. 3. Emissions of specific pollutants in the region: 1 – ammonia; 2 – chlorine; 3 – gasoline; 4 – mineral petroleum oil; 5 – hydrogen sulfide; 6 – formaldehyde; 7 – feed dust; 8 – soot.

The Bryansk region has an extensive network of rivers with a length of 12.89 thousand km, with a total of 2867 rivers. The distribution of rivers by length and number is shown in Figure 4.

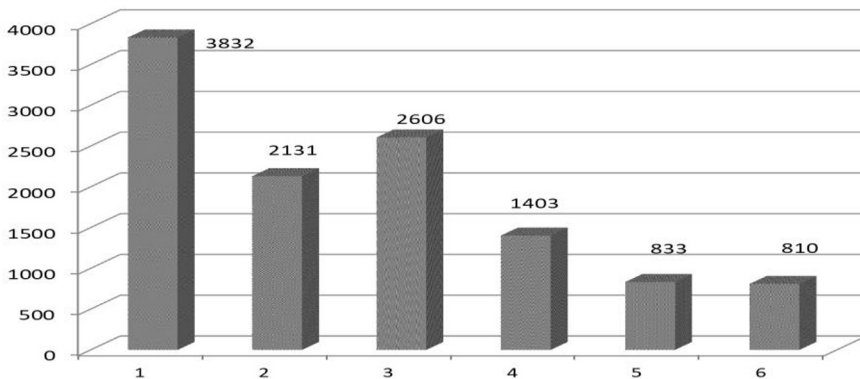


Fig. 4. Distribution of rivers by number and length, km: 1 – from 0.2 to 5; 2 – from 5 to 10; 3 – from 10 to 25; 4 – from 25 to 50; 5 – from 50 to 100; 6 – over 100.

The annual flow of the Desna, Sudost, Bolva and Nerussa rivers accounts for 63% of the Bryansk region. On the territory of the Bryansk region there are 47 (1050 hectares) natural reservoirs. Along with natural reservoirs, artificial reservoirs with an area of 1,897 hectares of reservoirs and 5,958 hectares of ponds have been built in the region; the volume of water they contain exceeds 126 million m³.

In 2022, 62.832 million m³ of waste, transit and other water were discharged across the region, in which the presence of pollutants of iron, boron, strontium and alpha radioactivity, nitrates up to 1.3 MPC, petroleum products from 0.11 mg/l to 4.0 mg was noted /l (40 MPC), groundwater contamination was detected at 8 industrial sites, 3 solid waste landfills, and 5 filtration fields.

Water pollution with pollutants of hazard class 1 was not detected throughout the region in 2022.

In 2022, the land fund of the Bryansk region amounted to 3485.7 thousand hectares. The distribution of fund lands by category is shown in Figure 5, in thousand hectares.

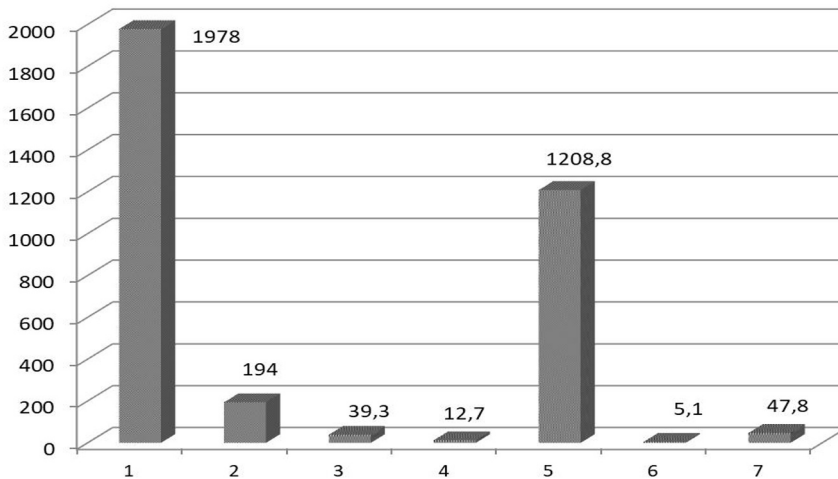


Fig. 5. Land fund of the Bryansk region by land category: 1 – agricultural land; 2 - land of populated areas; 3- land of transport, communications industry; 4 - land of specially protected areas; 5 - forest land; 6 - water fund land; 7 - reserve land.

In 2022, an extensive study was carried out on soil conditions in the region. For this purpose, 118 monitoring points were selected, at which 1836 soil samples were collected and analyzed. This allowed us to obtain a more accurate picture of the current state of the soils. Of the 455 samples selected for analysis of sanitary and chemical indicators, 7 did not correspond to standard values. This represents approximately 1.5% of the total number of samples. Comparing with last year, it can be noted that the number of samples that do not meet the standards increased by 0.2 percentage points. This may be due to various factors (use of fertilizers, use of pesticides). Analysis of microbiological indicators was carried out on 716 soil samples. As a result, it was found that 7 of them do not correspond to standard values. Compared to 2021, this figure decreased by 3.5%.

When analyzing parasitological parameters on 665 soil samples, it was found that 16 of them did not correspond to standard values. This represents approximately 2.4% of the total number of samples. Comparing with the previous year, one can notice a slight increase in the number of samples that do not meet the standards by 1.2 percentage points.

These data indicate the need for more careful monitoring of soil conditions and the need to take appropriate measures to improve the situation. Maintaining healthy and fertile soil is

an important task for us, since the quality of our agricultural products and the ecological balance depend on it. Therefore, it is necessary to continue monitoring and take measures aimed at improving the condition of the soil and preserving its natural resources for future generations.

4 Conclusion

Research on ensuring environmental safety in the Bryansk region in 2022 showed:

- The atmospheric air of the region was polluted by 20,314 sources from 1,562 anthropogenic objects, the amount of pollutants amounted to 54.3 thousand tons.
- According to microbiological and sanitary-chemical standards, the quality of water in reservoirs of category 1 has deteriorated; in reservoirs of category 2, these indicators are much higher than the Russian average.
- The condition of the soil in residential areas showed that the number of samples that do not meet hygienic, microbiological and parasitological standards has decreased, and the number of samples for sanitary and chemical indicators has increased.

The authors believe that the main reason for the unsatisfactory results of air, water and soil tests is poor compliance with environmental measures in some areas of the region.

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