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Strategic Approaches for stabilization of environmental safety in Kazakhstan

Abstract. *In the last decade, environmental protection has reached a new level. Along with the growth of production and consumption, anthropogenic pollution of soil, water, and air in Kazakhstan is increasing. In this regard, ensuring environmental safety is becoming one of the most important conditions for the sustainable development of the state. In the context of the constantly deteriorating environmental situation in the country, it becomes necessary to search for new ways and approaches to solving environmental problems. The purpose of the study is to study the strategic aspects of the environmental safety of industrial enterprises in Kazakhstan and the development of measures for the protection of natural resources based on increasing the effectiveness of state policy in the field of environmental safety. There were used the methods of comparison and generalization, scientific abstraction, analysis, and synthesis in the article. There was made an attempt to systematize modern problems of ensuring environmental safety by studying the state of the ecological situation in the country in the following directions: identifying the most significant impact factors of functioning of industrial enterprises in Kazakhstan to the environment, analyzing the state of the ecological situation in the country, studying the level and cost-effectiveness for environmental protection, determining the impact of investment on environmental protection in the context of regions and studying the main environmental problems of Kazakhstan.*

Keywords: *ecological safety; environmental management; environmental pollution; environmental protection costs; investments in environmental protection.*

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Introduction

Achievement of a high level of quality of life of the population is possible only if the existing state of the environment is improved. Therefore, the main strategic goals of ensuring environmental safety are the conservation and renewal of natural systems, maintaining the quality of the environment at the level necessary for human life, and sustainable economic development.

The problems associated with the need for scientific substantiation and development of strategic aspects of environmental safety in Kazakhstan are of great importance today. Deep theoretical research, comprehensive analysis, and development on this basis of sound recommendations for environmental management are required. This requires new approaches to the development and implementation of mechanisms related to

solving environmental and economic problems of environmental management in the Republic of Kazakhstan.

Environmental protection is possible only with the rational use of natural resources. Emissions from enterprises, animal waste, pesticides and fertilizers, and exhaust gas pollution negatively affect the ecological state of the country. In these conditions, it is extremely important to implement environmentally oriented problems through the development of new scientific research, considering modern requirements.

The irresponsible and negligent attitude of the world population towards nature manifested itself during COVID-19, President of Kazakhstan Kassym-Zhomart Tokayev noted. He appealed to the world community with an appeal to unite in the name of saving the planet from an ecological catastrophe [1].

A characteristic feature of the domestic economy today is a significant gap between industries in terms of technological development and innovation potential. In this regard, the need to search for new ways and approaches to solving environmental problems of any production becomes more and more obvious.

This should be the task of paramount importance to ensure a high quality of life for the population and preserve the ecological balance, which should be based on a comprehensive assessment of both industrial enterprises and other sectors of the national economy, considering their multifunctionality.

Methodology

The main research methods are methods of comparison and generalization, scientific abstraction, as well as analysis and synthesis. In particular, the methods of scientific abstraction and generalization were used when considering the features of environmental problems in Kazakhstan and ways to solve them. Methods of economic and graphical analysis were used to identify modern trends in the development of environmental management in Kazakhstan.

The information and analytical basis of the study were composed of works published on the economics and management of environmental protection in Kazakhstan, materials on the Internet on similar topics, regulatory legal acts of the Republic of Kazakhstan, as well as reports of the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan, data from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan.

Discussion

In accordance with the Ecological Safety Concept of the Republic of Kazakhstan, nowadays environmental problems associated with pollution of atmospheric air, water, soil cover, insufficient water resources, land degradation, reduction of biological diversity, and accumulation of waste are the most acute [2]. The concept of sustainable development focused on balanced, environmentally friendly socio-economic development without exhausting the natural resource potential. The essence of introducing the concept of sustainable development is to minimize harm to the environment that surrounds us and not lead humanity to an environmental disaster [3]. The success of socio-economic transformations largely depends on the country›s environmental policy, which is reflected in government decisions [4].

Kazakhstan in the ranking of countries in the world in terms of environmental efficiency in 2016 took 69th place out of 180 possible, and in 2018 - 101st place. The environmental performance index in 2016 was 73.29 [5], in 2018 - 54.56 [6]. During the analyzed period, the state of the ecological situation in the Republic of Kazakhstan has deteriorated, which is confirmed by additional data.

It should be noted that Kazakhstan is one of the five countries in the world in terms of carbon dioxide emissions per unit of GDP. And the amount of carbon dioxide per capita exceeds the global average level by almost 2 times [7]. In terms of emissions of harmful substances into the atmosphere from stationary sources, Kazakhstan is in the top three, which accounts for more than half of the emissions of all CIS countries.

Table 1

Key indicators characterizing the protection and use of water resources, in million cubic meters

Years	2014	2015	2016	2017	2018
Water abstraction from natural water sources	23 266	22 852	24 623	25 279	25 096
out of which:					
from underground horizons	1 051	1 056	1 051	1 032	1 020
Water losses during transportation	2 855	2 490	2 517	2 993	3 719
Water consumption (water use)	20 411	20 352	20 213	21 721	20 511
out of which for production needs	5 592	5 385	5 228	5 235	5 351
Volume of circulating and sequential use of water	8 415	8 620	8 257	8 933	9 540
Percentage of reused and recycled water in the total volume of water used	41	42	41	41	47
Discharge volume of standard treated water	271	227	196	197	309
The volume of discharged contaminated wastewater (without treatment and not sufficiently treated)	153	197	149	50	...
out of which without cleaning	152	131	93	0,1	0,9
Source: [9]					

"The results of environmental monitoring of atmospheric air show that out of 45 settlements, the high levels of air pollution include cities: Nur-Sultan, Almaty, Karaganda, Temirtau, Atyrau, Aktobe, Balkhash, Ust-Kamenogorsk, Zhezkazgan, Ridder. One of the tools to reduce the negative impact on the environment is state environmental control [8].

We have studied the main indicators characterizing the impact of economic activities on the environment and the use of natural resources of the Republic of Kazakhstan. Analysis of the main indicators characterizing the protection and use of water resources states that for 2014-2018, water intake from natural water sources ranges from 23 266 to 25 099 million cubic meters (Table 1).

The same can be said about water consumption –from 20411 to 20 511, the volume of recycled and sequential use of water –from 8415 to 9 540, and the volume of discharge of normatively treated water –from 271 to 309 million cubic meters.

We analyzed emissions of pollutants into the atmosphere from stationary sources, which in Kazakhstan over the past 7 years increased by 8.1% (from 2256.70 to 2441.0 thousand tons). In the regions of Kazakhstan, emissions are uneven. In the Pavlodar region, emissions fluctuate either upward by 8.2% (from 610.2 to 721.5 thousand tons), or downward to 542.7 thousand tons (2016). In the Karaganda region, emissions increased by 6.25% (from 603.6 to 641.3 thousand tons), and in the Mangistau region - by 26% (from 88.3 to 64.5 thousand tons), which is explained by the introduction of environmental management systems. In Atyrau and Kostanay regions, an increase in emissions of harmful substances into the atmosphere is observed every year. All this can be seen in Table 2.

The information obtained above states that more than half (58.34%) of all gross emissions of the country come into the atmosphere mainly from the territory of three regions: Pavlodar, Karaganda, and East Kazakhstan. The highest level of anthropogenic pollution is characterized by the Pavlodar region, where the largest pollutants are located, such as an oil refinery, a thermal power plant, energy-intensive

Table 2

Emissions of air pollutants from stationary sources in the regions of Kazakhstan, in thousand of tons

By Region	2014	2015	2016	2017	2018	2019	2020
The Republic of Kazakhstan (total)	2,256.7	2,180.0	2,271.6	2 357,8	2 446,7	2 483,1	2441.0
Akmola	84.6	85.7	94.5	86.9	84.5	77.2	76.7
Aktobe	121.8	134.3	155.6	169.5	158.1	135.1	136.6
Almaty	51.6	55.1	50.3	43.4	50.2	46.3	48.1
Atyrau	109.1	110.7	167.1	177	172.3	154.3	164.5
West Kazakhstan	44.7	42.4	42.5	41.5	48.2	30/8	41.2
Zhambyl	38.2	41.9	52.4	52	52	55.0	55/8
Karaganda	603.6	596.3	593	598.7	587.5	627.2	641.3
Kostanai	103.8	91.6	98.7	114.8	124	123.4	130.5
Kyzylorda	30.8	30.1	30	27.5	26	28.3	24.4
Mangystau	88.3	72.5	65.8	62.6	65.5	72.5	64.5
Pavlodar	610.2	552.9	542.7	609.8	709.2	723.0	721.5
North Kazakhstan	71.9	74.9	77.7	76.4	75.5	76/0	74.7
Turkistan	28.3	27.8	30.2	27.6	30	28.1	33.5
East Kazakhstan	129.6	127.2	128.6	129.3	130.7	127.2	128.7
Nur-Sultan city	65.1	56.3	61.6	59.2	56.4	62.4	65.1
Almaty city	43.5	39.1	38.8	41.1	43	44.5	46.1
Shymkent city	31.5	41.2	41.7	40.6	33.4	29.6	29.8
Source:[10, 11, 12]							

aluminum industry, and energy-intensive production of ferroalloys, which creates a very toxic environment.

All the largest centers of atmospheric air pollution are concentrated in the Karaganda region (the cities of Balkhash, Zhezkazgan, and Temirtau). Ammonium sulphate is produced using coking waste in Temirtau, which contributes to solving several environmental problems.

Accelerated industrialization results in environmental problems in Ust-Kamenogorsk and Ridder, where the smelting of titanium, magnesium, lead, and zinc is a source of highly toxic emissions, which are produced on domestic own concentrates. The result of accelerated industrialization is environmental problems in Ust-Kamenogorsk and Ridder, where the smelting of titanium, magnesium, lead, and zinc is a source of highly toxic emissions that operate on our own concentrates.

The main air pollutants in the Republic of Kazakhstan are particulate matter (dust and ash), sulfur dioxide, nitrogen oxides, carbon oxides, VOCs, ammonia, hydrogen sulfide. It should be noted that they have been increasing in the last five years. The data of the analysis of the emission of the most common air pollutants emitted from stationary sources (thousand tons) are shown in Fig. 1, which is compiled based on the data [9, 11, 12].

Figure 1 shows that emissions fluctuate significantly upward (2016-2020) and downward (2015); including hard ones, decreased in 2015 and increased from 2018 to 2020; gaseous and liquid substances - decreased in 2015 and grew sharply in subsequent years, so in 2020 compared

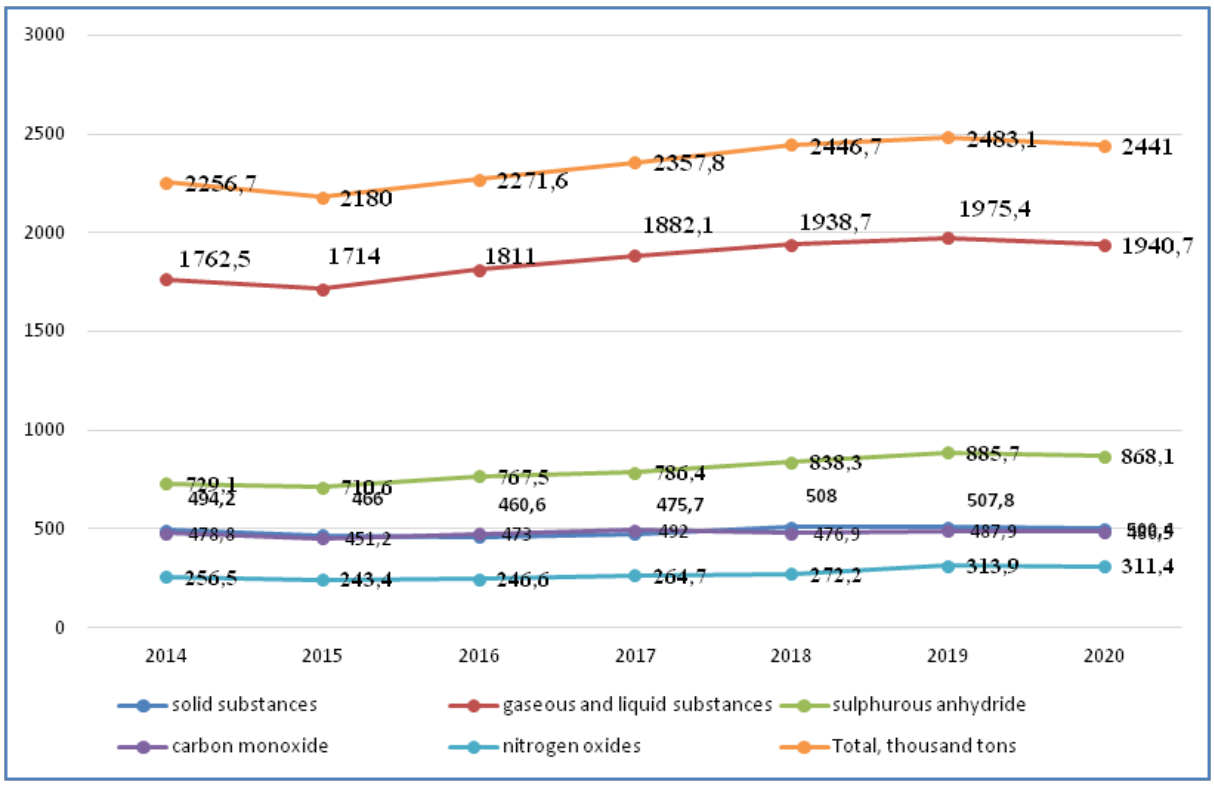

Figure 1 – Emissions of the most common air pollutants from stationary sources, in thousand tons
Source: [9, 11, 12]

to 2014 increased by 10.1%, and the following data are shown only from 2016 to 2018, where - hydrocarbons decreased by 43.1% (from 62.0 to 35.3 tons), and volatile organic compounds - by 19, 9% (from 114.4 to 91.7 tons) [9].

Intensive pollution of air, water, and soil, degradation of the animal and plant world, depletion of natural resources led to the destruction of ecosystems, desertification and significant losses of biological and landscape diversity, an increase in morbidity and mortality. The consequence of such changes is a decrease in the quality of life of the population and the unstable development of the republic. At the same time, government spending on environmental protection remains the lowest among the countries of Eurasia. They amount to no more than 0.5 $ per year per person in Kazakhstan.

The main sources of pollution are emissions into the atmosphere, solid and liquid waste from industrial enterprises, energy, the military-industrial complex, household waste, vehicles. The most dangerous type is radioactive contamination. In the Republic of Kazakhstan there are 6 large uranium-bearing provinces, many small deposits, and ore occurrences of uranium, which cause an increased level of natural radioactivity.

Acute environmental problems concern not only the territory where the low-enriched uranium bank is in Ust-Kamenogorsk but also the use of radioactive materials in the country. Large mining of uranium soil was carried out in the Mangystau region. The largest territory of radioactive contamination is the territory of the former Semipalatinsk nuclear test site, where environmental studies are carried out. During the period of activity of the uranium mining industry on the territory of Kazakhstan, about 200 million tons of radioactive waste were generated [10].

Utilization, neutralization, burial, transboundary transportation of waste are among the most pressing problems in the country. In 2018, the Republic of Kazakhstan generated 295.5 million tons of non-hazardous waste, 149.96 million tons of hazardous waste and 0.13 million

Table 3

Current expenditures on environmental protection by type of environmental protection activity, in thousand tenge 191 015 579

Regions	2014	2015	2016	2017	2018	2019	2020
Republic of Kazakhstan (total)	140 578 609	174 650 049	152 205 626	175 445 180	191 015 579	221 670 479	210 397 122
Akmola	604 221	1 200 707	2 128 605	2 049 453	2 715 372	3 165 432	3 261 696
Aktobe	16 382 464	18 308 916	17 711 122	19 018 457	23 454 296	24 811 608	26 847 144
Almaty	1 608 070	2 431 904	1 793 189	844 376	841 212	1 287 082	1 786 108
Atyrau	25 159 288	40 254 371	26 218 442	36 827 790	38 408 581	51 198 333	39 940 657
West Kazakhstan	4 964 179	3 793 821	7 533 073	10 744 087	9 659 834	12 631 764	13 685 551
Zhambyl	2 181 832	3 245 330	3 599 495	3 424 138	3 629 200	4 782 879	4 591 362
Karaganda	16 968 507	23 881 108	17 040 221	24 231 114	24 045 627	26 874 954	28 503 150
Kostanay	16 572 796	5 171 019	8 303 476	6 946 069	8 400 631	8 797 401	10 423 346
Kyzylorda	2 428 958	2 904 693	2 708 568	2 401 904	2 639 628	2 853 868	2 863 434
Mangystau	14 651 455	29 093 197	18 427 462	14 265 688	11 809 507	11 127 425	9 632 475
South Kazakhstan	4 045 632	4 988 206	5 461 879	5 911 514	-	-	-
Pavlodar	16 265 835	16 696 011	19 015 796	22 983 128	29 016 058	33 159 437	25 259 670
North Kazakhstan	772 392	1 864 711	1 994 908	2 488 085	2 700 396	3 688 821	3 102 405
Turkestan	-	-	-	-	1 279 159	1 581 227	1 294 883
East Kazakhstan	13 316 733	15 838 119	15 063 348	17 783 490	21 125 691	22 885 867	25 635 452
Nur-Sultan city	992 053	1 584 670	2 424 693	2 211 120	2 032 590	1 678 216	1 032 748
Almaty city	3 664 194	3 393 266	2 781 349	3 314 767	3 918 314	4 512 795	4 984 200
Shymkent city	-	-	-	-	5 339 483	6 633 370	7 552 841
Source: [10, 13]							

tons of radioactive waste. 97.2% of the generated hazardous waste is waste from the "green list", 2.7% is waste from the "amber" list and 0.1% is waste from the "red" list. Analysis of ENI EP data shows that in 2018 the largest volume of waste from the "red" list was generated in East Kazakhstan (39.0 tons), the "amber" list in Pavlodar (1713 850 523 tons), and the "green list" in Kostanay (75 329,400, 828 tons) areas. In the city of Almaty, the volume of waste generated from the "red" list was only 0.1 tons [10].

To this day, toxic waste is stored in various storage facilities, often without complying with relevant environmental standards and requirements. As a result, the soil, ground, and surface waters of many regions are subject to intense pollution. In addition to industrial sources of pollution, the share of anthropogenic pollutants is growing. One of the most important areas of environmental protection is the rational organization of the process of handling production and consumption waste. An important role in this is played by economic stimulation of the introduction of low-waste and non-waste technologies, waste processing for the purpose of their neutralization and disposal.

We conducted studies to analyze the current costs of environmental protection by type of

Table 4

Environmental Investment, in thousand tenge

Regions	2014	2015	2016	2017	2018
Republic of Kazakhstan (total)	103 492 239	82 883 241	43 936 904	86 961 995	111 161 429
Akmola	1 297 414	8 802 732	1 689 004	5 682 105	27 368 480
Aktobe	1 216 752	1 098 845	2 100 592	712 326	3 818 054
Almaty	35 738	381 385	79 646	1 087 688	2 417 089
Atyrau	47 453 365	18 377 439	5 217 350	5 885 328	1 311 424
West Kazakhstan	2 992 317	1 812 890	5 602 083	8 152 537	5 116 827
Zhambyl	922 046	2 526 175	16 748	13 983 583	18 611 484
Karaganda	10 196 214	11 935 630	1 339 089	3 342 386	12 259 845
Kostanay	1 977 000	116 947	65 464	419 406	107 739
Kyzylorda	3 514 154	1 954 722	1 850 625	1 864 505	447 071
Mangystau	4 473 686	9 956 210	2 937 456	10 398 596	15 459 191
Pavlodar	12 408 206	7 661 024	2 483 027	2 474 682	5 624 492
North Kazakhstan	1 033 825	3 526 246	4 528 477	-	118 172,0
Turkestan	170 269	181 194	202 685	3 400 062	5 726 247
East Kazakhstan	6 601 925	6 653 044	6 327 969	6 943 049	5 329 867
Nur-sultan city	5 572 947	6 520 213	6 317 621	21 483 454	6 360 840
Almaty city	3 346 800	1 323 612	3 158 153	1 129 575	1 066 328
Shymkent city	279 581	54 933	20 915	2 713	18 279
Source: [10]					

environmental activity and the distribution of investments in environmental protection by type of economic activity of the investor by region (Table 3).

Current expenditures on environmental protection for the analyzed period increased by 49.66%. Most of all, the growth of current expenditures occurred in the regions: in Western Kazakhstan by 2.75 times; in Vostochno-Kazastanskiy by 1.92 times; in the Karaganda region, it increases by 67.98%; in Aktobe by 63.88%; in Atyrau by 58.75%; in Pavlodar by 55.29%; and in the Kostanay region, expenses decreased by 37.11%, and the Mangistau region with such data: at first it sharply increases from 14 651 455 to 29 093 197, and falls every year and in 2020 is only 9 632 475 thousand rubles. [10, 13].

Based on the analysis for the last two years in the regional structure in terms of the volume of costs in 2019, the leaders are Atyrau (13.2%), Aktobe and Zhambyl (12.9% and 12.6%, respectively), Karaganda (11.7%) regions; and in 2020 the leaders are Akmola (16.7%), Atyrau (11.4%), Pavlodar (10.5%) and East Kazakhstan (10.3%) regions.

It is also necessary to highlight three areas of environmental protection spending as the highest priority. For example, according to statistical data [12, 13] for 2019 and 2020, the total volume without costs, respectively, was: air protection (34% and 34.7%); waste management 30% and 29.5%; waste water treatment 25% and 26.2%.

From the analysis data (Table 4), the total volume of investments in environmental protection is of an abrupt nature, sharply decreases (2016), and then increases by almost 2 times and then steadily grows.

During the analyzed period, the total volume of investments in environmental protection increased from 103 492 239 to 173.6 billion 111

Table 5

Analysis of indicators for environmental protection for 2000-2020

Years	Current expenditures for environmental protection, million tenge	Number of stationary sources of pollution, units	Emissions into the atmosphere of pollutants from stationary sources, thousandtons	Air emissions of pollutants from stationary sources, per capita, kg	Pollutants caught and neutralized, thousand tons	Emissions of solid pollutants, thousand tons	Emissions of liquid and gaseous pollutants, thousand tons
2000	16 705	58 356	2 429,4	163	17 292,2	668,5	1 760,9
2005	43 558	108 576	2 968,8	196,0	21 656,4	713,7	2 255,1
2010	99 653	168 712	2 226,6	136,4	25 858,5	639,3	1 587,2
2015	157 650	235 049	2 180,0	124,3	27 949,7	466,0	1 714,0
2020	210 397	266 703	2 440,7	130,1	33 004,8	500,4	1 940,7

161 429, i.e. by 67.74%. It should be noted that the volume of investments in 2016 decreased by almost half compared to previous years.

This analysis shows that in 2018 the largest volume of investments was directed in the following areas: Akmola region - 24.62%; Zhambyl - 16.74%; Karagada - 11.03% and Mangistau - 13.9% of the total volume - 111161429 thousand tenge. It should also be noted that Atyrau and Pavlodar regions in 2018 were allocated with scanty investments, although the current costs of environmental protection by type of environmental activity for the analyzed period increased in both Pavlodar and Atyrau regions [10].

According to statistical data [10]. total costs formed from investments in fixed assets in 2019 amounted to 198.7 billion tenge, and in 2020 - 173.6 billion tenge, data on the regions of Kazakhstan could not be provided.

The New Environmental Code of Kazakhstan provides for mandatory financing of environmental measures at the expense of incoming environmental payments in the amount of 100%, and local executive bodies allocate an average of 45% for environmental protection [11].

According to the Association of Ecological Organizations annually nature users pay from 70 to 120 billion tenge to the treasury of Kazkahstan. These are payments for emissions into the environment, the use of wildlife, as well as environmental fines. However, sometimes no more than 3% of this amount is directed to solve environmental problems. To solve the country›s environmental problems, the allocated investment in environmental protection could be more significant, environmentalists say [12].

Based on the above, in Kazakhstan a lot of work is being done to solve environmental problems and protect the environment (Table 5).

We have carried out an analysis of the environmental protection of Kazakhstan over the past 20 years with an interval of 5 years. Current expenditures on environmental protection for the analyzed period increased from 16 705 to 210 397 million tenge, i.e. 12.6 times; the number of stationary sources of pollution increased from 58 356 to 266 703 units, i.e. 4.6 times; emissions into the atmosphere of pollutants from stationary sources fluctuate up and down from 2,429.4 to 2,440.7 thousand. tons, and per capita emissions decreased from 163 to 130.1 kg, i.e. by 20.2%. Pollutants from 17,292.2 to 33,004.8 thousand tons were captured and neutralized, i.e. 1.9 times more. Emissions of solid pollutants, thousand tons, decreased by 25.1%; and emissions of liquid and gaseous pollutants increased from 1,760.9 to 1,940.7 thousand tons, i.e. by 10.2%. These data state the current ecological state of Kazakhstan and testify to the implementation of significant measures to stabilize environmental safety in the country.

Results

We investigated the environmental problems of Kazakhstan and ways to solve them. As a result of analyzing the main indicators characterizing the use of natural resources of the Republic of Kazakhstan, studying the emissions of the most common air pollutants, we propose the following measures:

1. Carrying out the state policy in the field of greening the economy and production, the development of nature-saving technologies. Installation of environmental technologies and equipment at the pre-investment stage of projects costs the company 3-4 times cheaper than the subsequent installation [13]. In addition, a small amount of funds is allocated for modern treatment facilities, and the issues of industrial and domestic waste are not resolved at the proper level. All additional funds are sought by enterprise managers to invest in the development of production, due attention is not paid to environmental protection measures, so old environmental problems are not solved, but new ones appear. Therefore, we propose to introduce subsidies for businesses dealing with environmental issues and financially support enterprises that reduce emissions into the environment, as well as establish strict control over the company›s emissions from the Ministry of Environment.

2. Reducing the volume of air pollution. The atmosphere can be improved by reducing industrial emissions by purchasing powerful systems for cleaning gaseous waste. It is necessary to modernize the production and processing of oil and gas at environmental costs, while 1-2% of the total investment will prevent losses of 3-5% of the gross national product and reduce emissions into the air. It is proposed to install electric vehicles, trolleybus, and tram lines in all major cities of Kazakhstan and expand the network of bike paths.

3. Improvement of water resources. It is proposed to reduce the consumption of water from rivers for irrigation, for example, by replacing crops that require irrigation with less demanding ones or to carry out other agro-technical measures (work), etc. It is possible to suspend the disappearance of the Aral Sea and solve the problems of Lake Balkhash only at the international level (since they are fed by rivers from neighboring countries) based on joint steps with neighboring Central Asian countries. There is great hope for the improvement of the Caspian water through the joint efforts of the states located on its shores according to the Caspian ecological program, subject to their observance of uniform normative and legal documents.

4. Improvement of land resources. In our opinion, the issue of recycling, neutralization, burial, and trans-boundary transportation of waste in compliance with the relevant environmental standards and requirements and a decrease in the maximum permissible concentration of lead, nickel, and copper, etc. It is proposed to promote economic incentives for the introduction of low-waste and non-waste technologies, waste processing to neutralize and utilize them. Removal of radioactive contamination is envisaged by reclamation of the territory of the Semipalatinsk nuclear test site under the Semipalatinsk Region Rehabilitation Program.

5. Introduction of ecological culture, i.e. the importance of environmental education for ensuring the country›s environmental safety in the light of sustainable development. A significant part of the population is not aware of the fullness of the environmental hazard, remains indifferent to environmental safety issues due to the low level of environmental education. The lack of the required level of literacy in the field of ecology also leads to impunity for their actions. We propose to carry out the process of introducing environmental awareness by increasing environmental culture and environmental education starting from school.

6. Introduction of a green economy. The green economy uses innovative «green» technologies that are based on energy and resource conservation, reduction of carbon sources of energy [14]. The extractive industries of Kazakhstan›s economic growth, combined with outdated technologies and productivity

standards, lack of resource diversification, and lack of conditions for the development of market investments, are holding back the country›s transition to a green (environmentally friendly) economy. The transition to a green economy should be carried out at the level of small and medium-sized businesses. This requires modern social protection programs and standards to enable workers to take advantage of new opportunities. In addition, it is necessary to reform the system of budgetary relations (for example, introduce environmental taxes), develop a "green" business, and create a sustainable infrastructure

Conclusion

The study made it possible to draw the following conclusions:

1The state of the environment in Kazakhstan remains tense. It has the lowest population density, and industrial centers are located next to the mining and processing facilities of the environmental management industry. But the main pollutants remain large industrial enterprises, where they use old ineffective cleaning systems, because of which tons of harmful substances are released into the atmosphere. An ecological disaster is the creation of large production facilities without the required degree of purification in the regions of Central, Eastern, and partly Northern Kazakhstan. Oil and gas enterprises in the West Kazakhstan, Atyrau, and Mangistau regions play a negative role in air pollution. During oil and gas production, associated gas is flared, accompanied by soot emissions into the atmosphere.

2. Pollution of water resources in Kazakhstan is a catastrophic situation with some natural reservoirs. Further socio-economic development, the solution of environmental problems will be determined to a large extent by the validity of the choice of the strategy for the country›s water resources management.

3. The test sites of the military space and test complexes have a negative impact on the environment. Under these conditions, the assessment of the state of the environment occupies an important position in solving the problem of preventing and eliminating man-made impacts in the places of production, testing, storage, and operation of space vehicles, military equipment, military facilities, etc.

4. The ecological safety of Kazakhstan and the improvement of the living conditions of the population are largely associated with the profound socio-economic transformations taking place in the country. In this regard, the need to search for new ways and approaches to solving environmental problems is becoming increasingly obvious. At the same time, special attention should be paid to environmental culture, imperfection of legal regulations in the field of environmental legislation, etc. to ensure the country›s environmental safety in the light of sustainable development.

Currently, Kazakhstan faces fundamental tasks to modernize the economy within the framework of technical and technological structural transformations that ensure the formation and widespread dissemination of competitive products based on new environmental-oriented management methods, which leads to an imbalance in the economic and ecological systems. The preservation of the ecological balance should be based on a comprehensive assessment of both industrial enterprises and other sectors of the national economy, considering their multi-functionality. Therefore, we consider environmental safety as an integral part of the national security of the Republic of Kazakhstan.

5. It is currently not possible to solve the problem of nature protection only by administrative and legal means based on simple prohibitions, any restrictions. Therefore, it will be justified to develop certain economic mechanisms based on the material interest of enterprises and organizations (to economically motivate them to use new environmental technologies). By establishing tax incentives for the introduction of «clean», waste-free technologies, the use of secondary raw materials, payments for the use of natural resources and fees for their pollution, exemption of environmental funds from taxation, and several other measures.

References

1. Токаев К.К. Сохраним для потомков мир в чистоте и безопасности. [Электрон. ресурс] – URL: https://khabar.kz/ru/news/obshchestvo/item/123149-k-tokaev-sokhranim-dlya-potomkov-mir-v-chistote-i-bezopasnosti (дата обращения: 15.08.2021)

2. Чумаченко Т.Н. О некоторых этапах реформирования экологической политики республики Казахстан // Вестник КазНПУ. – 2016. – Т. 46. - № 3. – С. 13-16.

3. Концепция перехода Республики Казахстан к устойчивому развитию на 2007-2024 годы // Казахстанская правда. – 2006. – № 249. – С. 6.

4. Экологический кодекс Республики Казахстан. Кодекс Республики Казахстан от 2 января 2021 года № 400-VI ЗРК. [Электрон. ресурс] – URL: https://adilet.zan.kz/rus/docs/K2100000400/info (дата обращения: 03.08.2021)

5. Hsu A., Esty D.S., Levy M.A., Sherbinin A.De. The 2016 Environmental Performance Index Report. – New Haven, CT: Yale Center for Environmental Law and Policy, 2016. – 123 p. doi: 10.13140/RG.2.2.19868.90249

6. Wendling Z., Esty D., Emerson J., Levy M., Sherbinin A.de. The 2018 Environmental Performance Index Report. – New Haven, CT: Yale Center for Environmental Law and Policy, 2018. – 193 p.

7. Чаус Ю., Ветлугин С., Бовкис В. В регионах Казахстана решают экологические проблемы. [Электрон. ресурс] – URL: https://khabar.kz/ru/news/item/110641-v-regionakh-kazakhstana-reshayutsya-ekologicheskie-problemy (дата обращения: 26.08.2020)

8. В Минэкологии Казахстана назвали города с высоким уровнем загрязнения воздуха. [Электрон. ресурс] – URL: https://www.kt.kz/rus/ecology/v_minekologii_kazahstana_nazvali_goroda_s_vysokim_urovnem_1377911833.html 18.02.2021 (дата обращения: 21.09.2021)

9. Охрана окружающей среды и устойчивое развитие Казахстана. Статистический сборник. [Электрон. ресурс] – URL: https://stat.gov.kz/edition/publication/collection (дата обращения: 26.08.2020)

10. Национальный доклад о состоянии окружающей среды и об использовании природных ресурсов за 2019 год. [Электрон. ресурс] – URL: https://ecogosfond.kz/orhusskaja-konvencija/dostup-k-jekologicheskoj-informacii/jekologijaly-zha-daj/r-orsha-an-ortany-zhaj-k-ji-turaly-ltty-bajandamalar/ (дата обращения: 26.08.2020)

11. О выбросах загрязняющих веществ в атмосферный воздух в Республике Казахстан. № 36-05-02-36 / 2507-ВН от 7 августа 2020 года. БНС АСПР РК. [Электрон. ресурс] – URL: www.stat.gov.kz/ (дата обращения: 09.11.2021)

12. О выбросах загрязняющих веществ в атмосферный воздух в Республике Казахстан. 6097-вн от 9 августа 2021г. БНС АСПР РК. [Электрон. ресурс] – URL: www.stat.gov.kz/ (дата обращения: 09.11.2021)

13. О затратах на охрану окружающей среды в Республике Казахстан. № 36-05-01-36 / 3181-вн от 9 сентября 2020 г. БНС АСПР РК. [Электрон. ресурс] – URL: www.stat.gov.kz/ (дата обращения: 09.11.2021)

14. О затратах на охрану окружающей среды в Республике Казахстан. №6882-вн от 9 сентября 2021 года. БНС АСПР РК. [Электрон. ресурс] – URL: www.stat.gov.kz/ (дата обращения: 09.11.2021)

15. Вклад в окружающую среду должен быть выше. 24.kz, 2019. [Электрон. ресурс] - URL: https://24.kz/ru/news/delovye-novosti/item/297568-spetsialisty-vklad-v-ekologiyu-dolzhen-byt-vyshe (дата обращения: 31.07.2020)

16. Охрана окружающей среды. Агентство стратегического планирования и реформ Республики Казахстан Бюро национальной статистики. [Электрон. ресурс] – URL: https://stat.gov.kz/official/industry/157/statistic/8 (дата обращения: 09.04.2021)

17. Баимбетов Н.С., Идирисова Б.Ш. Проблемы экологической безопасности Республики Казахстан // Вестник КазНУ. Сер. юрид. - 2012. - № 2. - С. 129-139.

18. Лясковская Е.А., Григорьева К.М. Формирование «зеленой» экономики и устойчивое развитие страны и регионов // Вестник ЮУрГУ. Серия: Экономика и менеджмент. - 2018. - № 1. - С. 15-22.

References

1. Tokaev K.K. Sohranim dlja potomkov mir v chistote i bezopasnosti [Let's keep the world clean and safe for posterity]. [Electronic resource] - Available at: https://khabar.kz/ru/news/obshchestvo/item/123149-k-tokaev-sokhranim-dlya-potomkov-mir-v-chistote-i-bezopasnosti (Accessed: 15.08.2021).

2. Chumachenko T.N. O nekotoryh jetapah reformirovanija jekologicheskoj politiki respubliki Kazahstan, Vestnik KazNPU [On some stages of reforming the environmental policy of the Republic of Kazakhstan, Bulletin of the Kazakh National Pedagogical University], 3(46), 13-16 (2016). [in Russian]

3. Koncepcija perehoda Respubliki Kazahstan k ustojchivomu razvitiju na 2007-2024 gody. Kazahstanskaja Pravda [The concept of the transition of the Republic of Kazakhstan to sustainable development for 2007-2024. Truth of Kazakhstan], 249, 6 (2006). [in Russian]

4. Jekologicheskij kodeks Respubliki Kazahstan. Kodeks Respubliki Kazahstan ot 2 janvarja 2021 goda № 400-VI ZRK [Environmental Code of the Republic of Kazakhstan. Code of the Republic of Kazakhstan dated January 2, 2021 No. 400-VI.]. [Electronic resource] - Available at: https://adilet.zan.kz/rus/docs/K2100000400/info (Accessed: 03.08.2021).

5. Hsu A., Esty D.S., Levy M.A., Sherbinin A.De. The 2016 Environmental Performance Index Report (New Haven, CT: Yale Center for Environmental Law and Policy, 2016, 123 p.). doi: 10.13140/RG.2.2.19868.90249

6. Wendling Z., Esty D., Emerson J., Levy M., Sherbinin A.de. The 2018 Environmental Performance Index Report (New Haven, CT: Yale Center for Environmental Law and Policy, 2018, 193 p.).

7. Chaus Ju., Vetlugin S., Bovkis V. V regionah Kazahstana reshajut jekologicheskie problemy [Environmental problems are being addressed in the regions of Kazakhstan]. [Electronic resource] - Available at: https://khabar.kz/ru/news/item/110641-v-regionakh-kazakhstana-reshayutsya-ekologicheskie-problemy (Accessed: 26.09.2020).

8. V Minjekologii Kazahstana nazvali goroda s vysokim urovnem zagrjaznenija vozduha [The Ministry of Ecology of Kazakhstan named cities with a high level of air pollution]. [Electronic resource] - Available at: https://www.kt.kz/rus/ecology/v_minekologii_kazahstana_nazvali_goroda_s_vysokim_urovnem_1377911833.html (Accessed: 18.02.2021).

9. Ohrana okruzhajushhej sredy v Respublike Kazahstan [Environmental protection in the Republic of Kazakhstan]. [Electronic resource] - Available at: https://stat.gov.kz/edition/publication/collection (Accessed: 26.08.2020)

10. Nacional'nyj doklad o sostojanii okruzhajushhej sredy i ob ispol'zovanii prirodnyh resursov za 2019 god [National report on the state of the environment and the use of natural resources for 2019]. [Electronic resource] - Available at: https://ecogosfond.kz/orhusskaja-konvencija/dostup-k-jekologicheskoj-informacii/jekologijaly-zha-daj/r-orsha-an-ortany-zhaj-k-ji-turaly-ltty-bajandamalar/ (Accessed: 26.08.2020)

11. O vybrosah zagrjaznjajushhih veshhestv v atmosfernyj vozduh v Respublike Kazahstan. No. 36-05-02-36 / 2507-VN dated August 7, 2020. Agency for Strategic Planning and Reforms of the Republic of Kazakhstan Bureau of National Statistics [On emissions of pollutants into the air in the Republic of Kazakhstan]. [Electronic resource] - Available at: www.stat.gov.kz (Accessed: 09.11.2021)

12. O vybrosah zagrjaznjajushhih veshhestv v atmosfernyj vozduh v Respublike Kazahstan. [Agency for Strategic Planning and Reforms of the Republic of Kazakhstan Bureau of National Statistics]. [Electronic resource] - Available at: www.stat.gov.kz (Accessed: 09.11.2021)

13. O zatratah na ohranu okruzhajushhej sredy v Respublike Kazahstan. No. 36-05-01-36 / 3181-vn dated September 9, 2020 [On the costs of environmental protection in the Republic of Kazakhstan]. [Electronic resource] - Available at: www.stat.gov.kz (Accessed: 09.11.2021)

14. O zatratah na ohranu okruzhajushhej sredy v Respublike Kazahstan. No. 6882-vn dated September 9, 2021 [On the costs of environmental protection in the Republic of Kazakhstan]. [Electronic resource] - Available at: www.stat.gov.kz (Accessed: 09.11.2021)

15. Contribution to the environment must be higher. 24.kz, 2019. [Electronic resource] - Available at: https://24.kz/ru/news/delovye-novosti/item/297568-spetsialisty-vklad-v-ekologiyu-dolzhen-byt-vyshe (Accessed: 09.11.2021)

16. Ohrana okruzhayushchej sredy. Agentstvo strategicheskogo planirovaniya i reform Respubliki Kazahstan Byuro nacional'noj statistiki [Environmental protection. Agency for Strategic Planning and Reforms of the Republic of Kazakhstan Bureau of National Statistics]. [Electronic resource] - Available at: https://stat.gov.kz/official/industry/157/statistic/8 (Accessed: 04.09.2021)

17. Baimbetov N.S., Idirisova B.Sh. Problemy ekologicheskoj bezopasnosti Respubliki Kazahstan, Vestnik KazNU. Ser. yurid [Problems of ecological safety of the Republic of Kazakhstan, Bulletin of KazNU. Ser. jurid.], 2, 129-139 (2012). [in Russian]

18. Lyaskovskaya E.A., Grigorieva K.M. Formirovanie «zelenoj» ekonomiki i ustojchivoe razvitie strany i regionov, Vestnik YUUrGU. Seriya: Ekonomika i menedzhment [Formation of a «green» economy and sustainable development of the country and regions, Bulletin of SUSU. Series: Economics and Management], 1, 15-22 (2018). [in Russian]

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Қазақстандағы экологиялық қауіпсіздікті тұрақтандырудың стратегиялық тәсілдері

Аннотация. Соңғы онжылдықта қоршаған ортаны қорғау мәселесі жаңа деңгейге көтерілді. Қазақстанда өндіріс пен тұтынудың өсуімен қатар топырақтың, судың және ауаның антропогендік ластануы артып келеді. Осыған байланысты экологиялық қауіпсіздікті қамтамасыз ету мемлекеттің тұрақты дамуының маңызды шарттарының біріне айналуда. Еліміздегі экологиялық жағдайдың нашарлауы жағдайында экологиялық мәселелерді шешудің жаңа жолдары мен тәсілдерін іздеу қажет. Зерттеудің мақсаты – Қазақстандағы өнеркәсіптік кәсіпорындардың экологиялық қауіпсіздігінің стратегиялық аспектілерін зерделеу негізінде табиғи ресурстарды қорғау және экологиялық қауіпсіздік саласындағы мемлекеттік саясаттың тиімділігін арттыру шараларын әзірлеу. Жұмыста салыстыру және жалпылау, ғылыми абстракция, талдау және синтез әдістері қолданылды. Авторлар Қазақстан Республикасындағы экологиялық қауіпсіздікті қамтамасыз етудің заманауи мәселелерін жүйелеуге талпыныс жасаған, ол үшін келесі бағыттар бойынша елдегі экологиялық жағдайдың жай-күйін зерттеген: Қазақстанның өнеркәсіптік кәсіпорындарының жұмыс істеуінің қоршаған ортаға әсерінің маңызды факторларын анықтау, елдегі экологиялық жағдайды талдау, қоршаған ортаны қорғаудың экономикалық тиімділігін зерттеу, қоршаған ортаны қорғау саласындағы инвестицияларды аймақтар кескінінде талдау.

Түйін сөздер: экологиялық қауіпсіздік; экологиялық менеджмент; қоршаған ортаның ластануы; қоршаған ортаны қорғау шығындары; қоршаған ортаны қорғауға инвестициялар.

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Стратегические подходы к стабилизации экологической безопасности в Казахстане

Аннотация. В последнее десятилетие охрана окружающей среды вышла на новый уровень. Наряду с ростом производства и потребления в Казахстане увеличивается антропогенное загрязнение почвы, воды и воздуха. В этой связи обеспечение экологической безопасности становится одним из важнейших условий устойчивого развития государства. В условиях постоянно ухудшающейся экологической ситуации в стране возникает необходимость поиска новых путей и подходов к решению экологических проблем. Цель исследования – изучение стратегических аспектов экологической безопасности промышленных предприятий Казахстана и разработка мер по охране природных ресурсов на основе повышения эффективности государственной политики в области обеспечения экологической безопасности. В работе использованы методы сравнения и обобщения, научной абстракции, анализ и синтез. Авторами разработаны рекомендации по обеспечению экологической безопасности в Республике Казахстан. В работе сделана попытка систематизировать современные проблемы обеспечения экологической безопасности путем изучения состояния экологической ситуации в стране по следующим направлениям: выявление наиболее значимых факторов воздействия функционирования промышленных предприятий Казахста-

на на окружающую среду, анализ состояния экологической ситуации в стране, изучение экономической эффективности охраны окружающей среды, анализ инвестиций в охрану окружающей среды в разрезе регионов.

Ключевые слова: экологическая безопасность; экологический менеджмент; загрязнение окружающей среды; расходы на охрану окружающей среды; инвестиции в охрану окружающей среды.

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