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Analysis of environmental expenditure in Kazakhstan

Abstract. Environmental protection is an essential direction among the issues protecting the national interests of any state. Today the question is highly relevant; it becomes the subject of interest and new researches by academic economists. The future well-being of mankind and the sustainable development of the economy are due to the successful solution of the problem of environmental protection as one of the most debated issues of our time. To a large extent, the successful implementation of this activity depends on the volume of investments and the effectiveness of environmental protection measures. The purpose of the article is to analyze the expenditure of environmental protection for adequacy to high man-made loads. In the process of researching the expenditures of environmental activities, methods of logical, statistical and comparative analysis were used. In this research, firstly, identified priority areas for environmental activities in Kazakhstan, secondly, a decrease in the share of environmental protection expenditures as a percentage of the country's GDP, and also an analysis of the environmental costs of the Republic of Kazakhstan for 2013~2017 by regions. The research confirmed that despite the annual increase in the cost of environmental protection in Kazakhstan, environmental protection is ineffective. The results of the research show that in order to level the negative impact on the environment, it is necessary to increase the costs of environmental protection activities as a percentage of GDP, including research and development in the field of environmental protection.

Key-words: environment, environmental protection expenditures, "Green Economy", pollutants, environmental activities

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Introduction

Recently, the most important vector of economic development in the world has been considered the transition to "green economy" as the only way out of the crisis. The formation of a "consumer society" led to a collapse, both ecologically and economically.

A "green economy" option at the global level was proposed in 2008 as part of the Global Green New Course developed by the United Nations [1]. According to the authors of the course, global investment in restoring the destroyed financial system is about $3 trillion. At the same time, to achieve a critical mass of "green" and energy-efficient technologies and the transition to a sustainable economy, only half of this amount will be required [2].

Methodology

When analyzing the expenditures of Kazakhstan for environmental protection, general scientific methods have been applied, which provide system analysis and an interdisciplinary approach to research. To achieve the result, the methods of dialectical-logical approach, analysis-synthesis and induction-deduction as well as generalization of statistical data and comparison have been used.

Main results of researc**h**

Kazakhstan is actively implementing "green economy" principles. A number of basic documents has been adopted in the field of environmental protection and the transition of the

economy to a "green" track, including Concept on the transition of the Republic of Kazakhstan to a "green economy" approved in 2013 [3]. Environmental expenditures are necessary to bring about environment protection measures. The environmental protection expenditures are divided into capital and current. The expenditures structure for 2017 is presented in Figure1

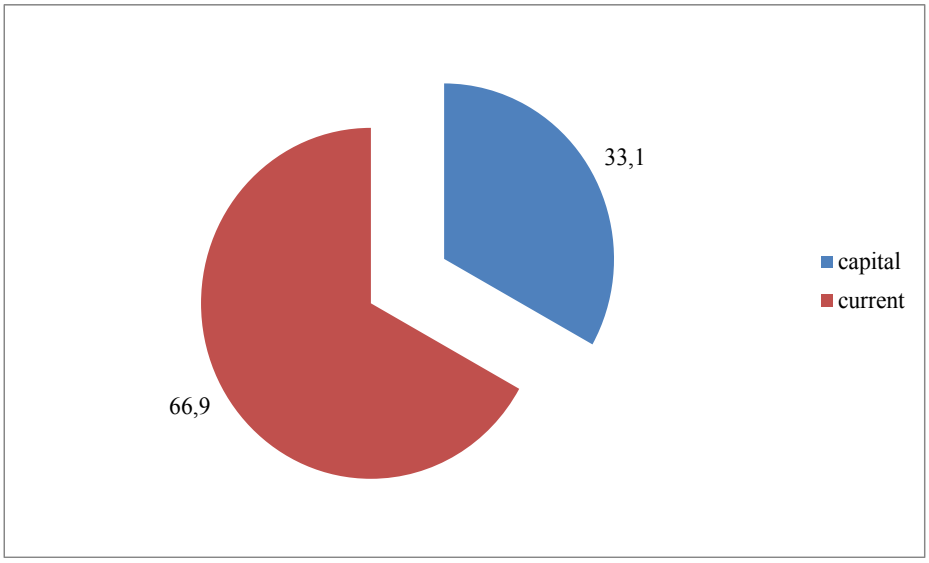

Figure 1.**Environmental expenditure structure in 2017 (%)**
Note – [4].

The expenditures of economic entities in 2017 aimed at protecting the environment was increased by 24.9% compared to 2016 and amounted to KZT 262.4 billion.

Of the total current expenditures, material costs comprised KZT 52.8 billion, of which 43.5% was shared to air protection, 29.5% to wastewater pollution, 23.8% to by waste management and 2.9% to soil, groundwater and surface water sources protection and restoration.

Table 1 data presenting the republic as a whole, reveals that, according to the results of 2017, the growth rate of environmental protection costs amounted to 20% compared with the same indicator in 2013. A significant proportion of environmental expenditures (84.3%) is carried out by industrial enterprises, mainly at the expense of enterprises of Atyrau, Karaganda, East Kazakhstan and Mangystau regions. The analysis of environmental expenditures by region (see Table 1) has displayed an increase in costs every year, with the exception of 2016.

Table 1

Environmental costs dynamics in the context of Kazakhstani regions (unit: 1,000 KZT)

Region	2013	2014	2015	2016	2017	Relative changes, % in comparison to 2013
Republic of Kazakhstan	218,908,687.3	243,063,407	257,533,290	196,142,530	262,407,175	20
Akmola	1,434,674.7	1,206,992	10,003,439	3,817,609	7,731,558	**439**
Aktuybinsk	16,583,119.2	18,245,899	19,407,761	19,811,714	19,730,783	19
Almaty	3,303,913.6	2,119,182	2,813,289	1,872,835	1,932,064	-42
Atyrau	60,535,737.8	73,531,257	58,631,810	31,435,792	42,713,118	-29
East Kazakhstan	7,793,978.4	8,731,713	5,606,711	13,135,156	18,896,624	142
Zhambyl	3,082,265.0	3,217,747	5,771,505	3,616,243	17,407,721	**465**
West Kazakhstan	30,324,744.3	27,523,659	35,816,738	18,379,310	27,573,500	-9
Karaganda	14,730,368.6	19,223,070	5,287,966	8,368,940	7,365,475	-50
Kostanay	5,151,308.2	4,160,167	4,859,415	4,559,193	4,266,409	-17
Kyzylorda	19,270,198.6	21,183,904	39,049,407	21,364,918	24,664,284	28
Mangystau	4,639,059.4	5,008,345	5,224,333	5,685,479	9,314,289	101
Pavlodar	25,907,091.4	29,641,100	24,357,035	21,498,823	25,457,810	-2
North Kazakhstan	3,777,308.1	3,886,558	5,390,957	6,523,385	2,488,085	-34
South Kazakhstan	15,193,706.0	17,830,685	22,491,163	21,391,317	24,726,539	63
Astana city	1,421,949.8	1,371,967	8,104,883	8,742,314	23,694,574	**1,566**
Almaty city	5,759,264.2	6,180,712	4,716,878	5,939,502	4,444,342	-23
Note – it is compiled by the author on the base of reference [4].						

As it can be seen from Table 1 data, environmental protection costs in the Karaganda region were the most reduced (-50%), while the city of Astana (1,566%), Zhambyl and Akmola regions (465% and 439% correspondingly) show positive dynamics in 2017 compared to 2013.Reducing the cost of environmental protection in some regions (for example, Almaty, West Kazakhstan and Kostanay regions) may be associated with a decrease in emissions of pollutants into the atmosphere, which can be traced according to Table 3. However, the cost reduction in the Karaganda region, which consistently enters the three most polluted regions of Kazakhstan, Atyrau, North Kazakhstan regions and the Almaty city led to an increase in emissions of pollutants into the atmosphere in 2017 compared to 2013.The decrease in environmental protection expenditures in 2016 is due to the stagnation of the economy of Kazakhstan and a slight increase in GDP (1.1%) in real terms, associated with oil prices reduction.

In general, expenditures increase led to a decrease in the amount of pollutants from all stationary sources of pollution, as evidenced by the data in Table 2.

Table 2

Amount of pollutants from all stationary sources (unit: 1,000 tons)

	2013	2014	2015	2016	2017	change, %in comparison with 2013
Amount of pollutants from all stationary sources	35,661.4	31,930.2	30,129.8	29,757.4	30,564.5	-14
Emitted into the atmospheric air in the reported period	2,282.7	2,256.7	2,180.0	2,271.6	2,357.8	3

Note – it is compiled by the author on the base of reference [4].

From the data of Table 2 it follows that the amount of pollutants from all stationary sources had decreased by the end of 2017 by 14% compared with 2013. It should be noted the increase in emissions of pollutants into the atmosphere during the period under research, which adversely affects the health of the population. Production growth in Kazakhstan is accompanied by an annual increase in air pollution (see Table 3).

Table 3

Main indicators on emissions of pollutants into atmospheric air produced by stationary sources

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
(unit: 1,000 tons)								
Republic of Kazakhstan	**2,226.6**	**2,346.3**	**2,384.3**	**2,282.7**	**2,256.7**	**2,180.0**	**2,271.6**	**2,357.8**
Akmola	72.9	77.8	105.7	83.8	84.6	85.6	94.5	86.9
Aktobe	125.3	119.8	123.9	125.4	121.8	134.3	155.6	*169.5*
Almaty	74.7	73.4	64.3	68.4	51.6	55.0	50.3	43.4
Atyrau	97.8	107.4	133.1	138.4	109.1	110.7	167.1	*177.0*
East Kazakhstan	147.0	147.2	140.0	124.9	129.6	127.2	128.6	129.3
Zhambyl	19.3	24.9	40.7	33.6	38.2	41.9	52.4	*52*
West Kazakhstan	58.1	55.9	62.0	60.4	44.7	42.4	42.5	41.5
Karaganda	661.2	691.3	641.4	572.6	603.6	596.4	593.0	598.7
Kostanay	114.5	109.4	100.6	115.4	103.8	91.6	98.7	114.8
Kyzylorda	29.0	31.9	31.1	31.2	30.8	30.1	30.1	27.5
Mangystau	68.6	75.8	64.2	77.5	88.3	72.5	65.8	62.6
Pavlodar	572.5	632.2	676.0	650.4	610.2	552.9	542.7	***609.8***
North Kazakhstan	77.8	77.0	75.7	71.4	71.9	74.9	77.7	76.4
South Kazakhstan	40.7	47.1	48.6	56.3	59.9	69.0	72.1	*68.2*
Astana city	56.1	63.5	64.9	60.5	65.1	56.3	61.6	*59.2*
Almaty city	11.0	11.6	12.1	12.4	43.5	39.1	38.8	*41.1*

Note – it is compiled by the author on the base of reference [4].

As it can be seen from Table 2 within 2010~2017, there was an annual increase in air pollution both in the Republic of Kazakhstan as a whole and in Aktobe, Atyrau and South Kazakhstan regions, Astana and Almaty cities. Air emissions in different regions of the Republic of Kazakhstan differ significantly, both in terms of emissions and types of pollutants. These indicators depend on the level of industrial development of the region, types of production activities; equipment used and air treatment systems. Pavlodar, Karaganda, Atyrau, Aktobe and East Kazakhstan regions are the most industrialized and, as a result, the most polluted in the Republic of Kazakhstan. In 2017, emissions of pollutants into the air from stationary sources amounted to 2.357.8 million tons, and their level compared with the previous year increased by 3.8%.According to Statistical Office, the largest amount of emissions of pollutants into the atmosphere in the Republic of Kazakhstan in 2017 was produced by Pavlodar region in the amount of 609,000.8 tones.[4].

According to Environmental State Newsletter in the Republic of Kazakhstan for 2018, atmospheric air has been monitored during the year at 47 locations, of which 12 were classified as of low-rate, 22 as elevated, and 13 as high-rate of air pollution.

Cities with high levels of pollution are Astana, Karaganda, Temirtau, Aktau, Atyrau, Aktobe, Balkhash, Ust-Kamenogorsk, Zhezkazgan, Almaty, Ekibastuz, Petropavlovsk and the settlement of Beineu. Cities of Kokshetau, Taldykorgan, Kulsary, Semey, Zyryanovsk, Uralsk, Aksai, Zhanaozen, Taraz, Zhanatas, Karatau, Shu, Kostanay, Ridder, Pavlodar, Aksu, Turkestan, Kentau, Shymkent, Kyzylorda, Saran and Glubokoe settlement have been detected as residences with elevated level of pollution. Low rate pollution cities are Stepnogorsk, Rudny, Arkalyk, Zhitikara, Lisakovsk, the Borovoye monitoring station, Shchuchinsko-Borovskaya resort area, settlements of Akai and Toretam, villages of Karabalyk, Korday and Yanvartsevo [5].

Compared to 2015, the level of air pollution has a positive trend (decreased) in the cities of Taldykorgan, Uralsk, Balkhash, Temirtau, Arkalyk, Kyzylorda, Shymkent and Ridder [4].

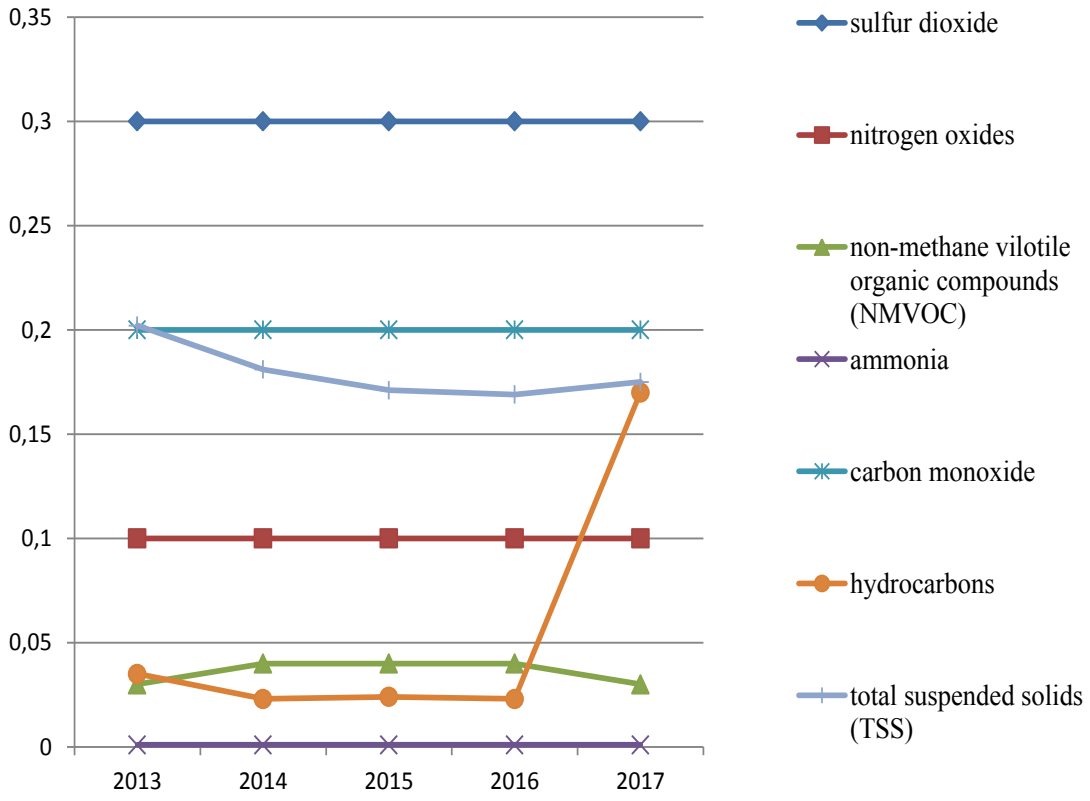

Figure 2.**Emissions of priority pollutants per square unit (unit: t/ km2)**

Note – it is compiled by the author on the base of reference [4].

Within the period of 2013 ~ 2017, the main share of emissions of pollutants into the air in the Republic of Kazakhstan was sulfur dioxide and suspended solids.

The expenditure analysis of environmental activities (see Table 4) has exposed the following matters: atmospheric air and water resources protection expenditures and waste management prevail over other types of environmental protection activities; as a result, the expenditures for research and development (R&D) reach only 2% of the total expenditure.

Table 4

Expenditure on environmental protection by types of environmental activities (unit: 1,000,000KZT)

Total	Atmospheric air & climate protection	Water resources protection from sewage	Waste management	Soil, ground and surface water sources protection and restoration	Noise and vibration control (excluding in-factory safety activities)	Biodiversity and landscape protection	Radioactivity protection (excluding issues of external state security)	Research and development (R&D)	Other types of environmental protection activities
2013									
218,909	67,444	74,467	42,583	26,996	17	674	594	3,138	2,995
%	30.8	34.0	19.5	12.3	-	0.3	0.3	1.4	1.4
2014									
243,063	65,579	83,954	55,901	26,290	18	1,750	788	4,096	4,687
%	27.0	34.5	23.0	10.8	-	0.7	0.3	1.7	1.9
2015									
257,533	75,549	61,406	66,014	21,447	31	1,591	1,312	3,268	26,915
%	29.3	23.8	25.6	8.3	-	0.6	0.5	1.3	10.5
2016									
196,143	59,752	54,295	50,569	20,460	39	1,341	1,201	3,954	4,531
%	30.5	27.7	25.8	10.4	-	0.7	0.6	2.0	2.3
2017									
262,407	71,676	53,808	56,362	22,404	39	1,055	1,216	4,167	51,680
%	27.3	20.5	21.5	8.5	-	0.4	0.5	1.6	19.7

Note – it is compiled by the author on the base of reference [4].

As we can see from the data of Table 4, in 2017 the environmental expenditures of enterprises and organizations amounted to KZT 262.4 billion. The main share (27.3%) in the expenditure structure is accounted for air and climate protection. In addition, 20.5% is for protection of water sources from sewage pollution, 21.5% is for waste management and 8.5% is shared to for protection and restoration of soil, groundwater and surface water sources.

For comparison, in the European Union (EU) by the results of 2017, 50% of the total general government expenditure on environmental protection is divided by waste management, 12.5% by waste water management, pollution abatement, protection of biodiversity and landscape and environmental protection [6].

At the same time, it should be noted that the comparison of indicators should be done with caution, as the definitions and sectors coverage could differ by countries. Nevertheless, European countries are focusing their attention on waste management, as evidenced by the fact that from 2021 EU will stop producing and selling disposable plastic products. Indeed, over the past 70 years, humanity has produced 8.3 billion tons of plastic; at a pace by 2050 this figure will grow to 34 billion tons, which is detrimental to the environment [7]. Kazakhstan should also pay special attention to the waste problem, since only a small part of municipal waste (14.8% in 2017) was recycled and incinerated.

R&D expenditures include activities aimed at protecting the environment: identifying and analyzing pollution sources and mechanisms of dispersion of pollutants in the environment, as well as their impact on humans, biological species and the biosphere. This category covers R&D to prevent and eliminate all forms of pollution, as well as R&D focused on equipment and instruments for measuring and analyzing pollution. Increasing the amount of this item of expenditure may, in a positive scenario, reduce the environmental costs as a whole.

It is worth mentioning that Europe in 2017 spent €4,699 million on R&D expenditure for environmental protection from general government expenditure [6]. Korea in 2015 allocated 0.11% of GDP for an environmentally related R&D expenditure according to the Organization for Economic Cooperation and Development (OECD) [8]. From this, it becomes obvious that Kazakhstan should take into account the experience of the developed countries and increase the share of R&D expenditures in the field of environmental protection.

In order to develop a "green economy", Kazakhstan as a whole should review the amount of funding for environmental protection. During 2013~2017, Kazakhstan has spent 0.42~0.63% of its gross domestic product (GDP) on environmental protection (Figure 3), with a generally negative trend in this indicator. The United Nations recommends about 2% of the country's GDP to be directed to environmental protection [9].

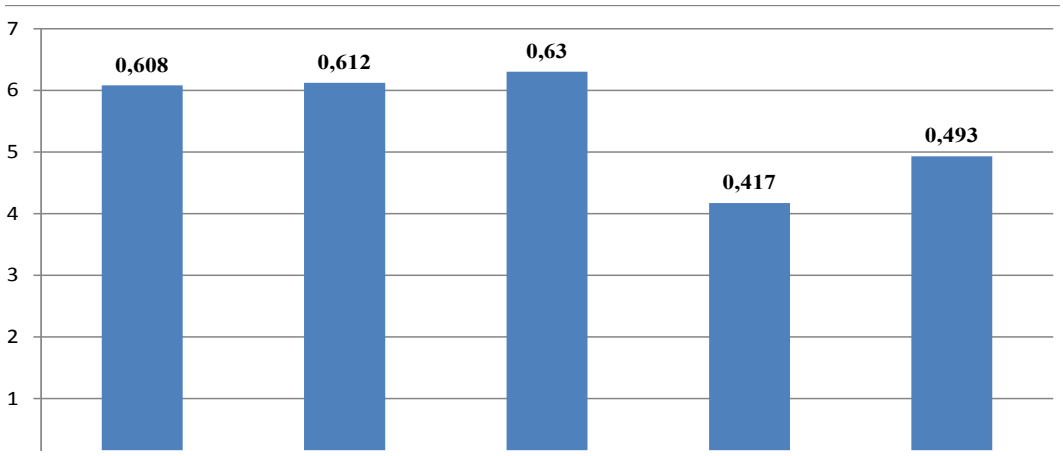

Figure 3. **Dynamics of costs on environmental protection (% of GDP)**

Note – it is compiled by the author on the base of reference [4].

According to Figure 3 data, in the period of 2013~2015, Kazakhstan gradually increased the amount of expenditures on environmental activities from 0.608 to 0.63% of GDP. However, the subsequent stagnation of the country's economy in 2016 with almost minimal GDP growth led to a decrease in the volume of expenditures in nominal terms and a decrease in costs in% of GDP. Despite the improvement in the situation in 2017 and, accordingly, an increase in expenditures in nominal terms by 20% compared with 2013 (see Table 1), the share was only 0.493%, which is lower than 2013. GDP growth directly depends on the growth rate of industrial production, which in turn entails an increase in environmental pollution.

Therefore, the negative trend of environmental protection costs as a percentage of GDP is alarming. After all, this is a good indicator of attention to the environment, because it shows how much of its national income a country is ready to allocate for goals related to environmental protection. This indicator reflects the priority level of environmental protection in the structure of the national economy depending on its economic possibilities.Europe's experience in this regard deserves attention, since according to the data of the European Union in 2017, it allocated 0.8% of GDP for environmental protection (€115,620.48 million), while Greece total general government expenditure on environmental protection comprised 3% of GDP and the Netherlands is 1.4%. The EU's national expenditures on environmental protection, in 2017 they amounted to 2.06% of GDP or €316 billion [6]. The Russian Federation allocates 0.7% of its GDP for environmental expenditures; this indicator has remained unchanged since 2012.

Conclusion

The analysis has shown that Kazakhstan is systematically elaborating measures to strengthen environmental protection. The results of the analysis allow us to draw some particular conclusions of interest for our study:

1. The positive dynamics of environmental costs under the period of research from 2013 to 2017 gives grounds to say that Kazakhstan pays great attention to environmental protection activities. But as it is clear from the date mentioned above, the share of costs in 2017 (in% of GDP) decreased in comparison with the same indicator in 2013 by 0.115% and amounted to 0.493% of GDP. Based on the recommendations of the UN and the experience of the developed countries of the world, it is necessary to allocate at least 1% of the national income to environmental protection;

2. The main share of expenditures by type of environmental activities falls on the protection of atmospheric air, water sources and waste management, while the share of R&D costs in the study period is from 1.3 to 2% of the total expenditures on environmental protection. An effective solution to the problem of environmental pollution in Kazakhstan requires a review of the structure of environmental protection expenditures in the direction of increasing the share of expenditures on research in the field of environmental protection. It would decrease the rate of pollution due to the use of more environmentally friendly technologies in production, and as a consequence, the improvement of the environment.

In addition to increasing the amount of expenditures on environmental protection, it is necessary to pay more attention to the greening technology strategy by enhancing the share of R&D costs in the field of environmental activities. That will reduce the burden on the environment.

Thus, for the development of a "green economy", Kazakhstan should review the amount of spending on environmental protection for attaining 1% of the country's GDP.

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Қазақстандағы қоршаған ортаны қорғауға жұмсалатын шығындарды талдау

Аңдатпа. Қоршаған ортаны қорғау мемлекеттің ұлттық мүдделерін қорғаудағы маңызды және басым бағыттарға жатады. Бүгінгі таңда бұл мәселе өте өзекті, ғалым-экономистердің қызығушылығы мен жаңа зерттеулерінің құралы болып отыр. Адамзаттың болашақта әл-ауқаты және экономиканың тұрақты дамуы қазіргі заманғы ең талқыланатын мәселелердің бірі ретінде қоршаған ортаны қорғау мәселесін табысты шешуге негізделген. Маңызды түрде бұл қызметті табысты іске асыру қоршаған ортаны қорғауға байланысты салымдар көлеміне және іс-шаралардың тиімділігіне тәуелді. Мақаланың мақсаты қоршаған ортаны қорғауға жұмсалатын шығындарды жоғары технологиялық жүктемелерге баламалы тұрғысынан талдау болып табылады. Табиғатты қорғау қызметіне жұмсалған шығындарды зерттеу барысында логикалық, статистикалық, салыстырмалы талдау әдістері қолданылды. Бұл зерттеуде, біріншіден, Қазақстанның табиғатты қорғау қызметінің басым бағыттары анықталды, екіншіден, елдің ЖІӨ-нен қоршаған ортаны қорғауға арналған шығыстар үлесінің төмендеуі пайызбен көрсетілді, сондай-ақ Қазақстан Республикасының өңірлер бөлінісінде 2013-2017 жылдардағы қоршаған ортаны қорғауға арналған шығындарына талдау жүргізілді. Қазақстанның Қоршаған ортаны қорғауға жұмсалған шығындарының жыл сайын ұлғаюына қарамастан, табиғатты қорғау қызметінің тиімділігінің аз екендігін зерттеулер растады. Зерттеу нәтижелері қоршаған ортаға теріс салдарды нивелирлеу үшін ІЖӨ-ден пайыздық арақатынаста табиғат қорғау қызметіне, оның ішінде қоршаған ортаны қорғау саласындағы ғылыми зерттеулер мен әзірлемелерге жұмсалатын шығындарды ұлғайту қажет екендігін көрсетеді.

Түйін сөздер: қоршаған орта, қоршаған ортаны қорғауға арналған шығындар, «жасыл экономика», ластаушы заттар, табиғатты қорғау қызметі

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Анализ затрат на охрану окружающей среды в Казахстане

Аннотация. Охрана окружающей среды относится к важным и приоритетным направлениям в защите национальных интересов государства. На сегодняшний день этот вопрос весьма актуален, становится предметом интереса и новых исследований ученых-экономистов. Благополучие человечества в будущем и устойчивое развитие экономики обусловлено успешным решением проблемы охраны окружающей среды как одного из наиболее обсуждаемых вопросов современности. В значительной степени успешная реализация этой деятельности зависит от объема вложений и эффективности мероприятий по охране окружающей среды. Целью статьи является анализ затрат на охрану окружающей среды на предмет адекватности высоким техногенным нагрузкам. В процессе исследования затрат на природоохранную деятельность использовались методы логического, статистического, сравнительного анализа. В данном исследовании, во-первых, определены приоритетные направления природоохранной деятельности Казахстана, во-вторых, показано снижение доли расходов на защиту окружающей среды в процентах от ВВП страны, а также проведен анализ затрат Республики Казахстан на охрану окружающей среды за 2013-2017 годы в разрезе регионов. Исследование подтвердило, что несмотря на ежегодное увеличение затрат Казахстана на защиту окружающей среды, природоохранная деятельность является малоэффективной. Результаты исследования показывают, что для нивелирования негативных последствий на окружающую среду необходимо увеличение затрат на природоохранную деятельность в процентном соотношении от ВВП, в том числе на научные исследования и разработки в сфере охраны окружающей среды.

Ключевые слова: окружающая среда, затраты на охрану окружающей среды, «зеленая экономика», загрязняющие вещества, природоохранная деятельность

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