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DYNAMICS OF WATER POLLUTION IN KARAGANDA REGION

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Annotation. This article examines the state of river waters in Kazakhstan as one of the most pressing environmental issues. The country has studied the pollution of the waters of large rivers by the Aqaba waters of chemical production, oil refineries, machine-building industries and industrial enterprises such as non-ferrous metallurgy. The Karaganda region has basins of the Nura-Sarysu, Balkhash-Alakol, Yesil, Irtysh and Tobol-Torgai rivers. There are five hundred and ninety-nine water bodies in the region, including one hundred and seven rivers, eighty-three lakes, four hundred and nine artificial reservoirs, dams with hydraulic structures. The rivers belong to the basins of unsalted lakes of the Tengiz, Karasor, Balkhash and Irtysh rivers. The presence of low-lying terrain in the east and south-east of the region determines the main character of flat rivers fed by snow or snow-covered land. There are 558 rural settlements in the region. It ranks first in the republic in terms of industrial development. Two powerful industrial facilities have been created here. One is the Karaganda-Temirtau coal and metallurgical complex, and the other is the Balkhash non-ferrous metallurgy industrial complex. Currently, there are 290 agricultural enterprises in the region, 6238 farms and peasant farms, 1155 private subsidiary farms of the population that produce agricultural products. All this leads to pollution of the aquatic ecosystem. In addition, the dynamics of river water pollution levels for each year was demonstrated.

Keywords: Nura river, water quality, pollution, reservoir, drinking water, dynamics

The state of river waters in Kazakhstan is one of the most pressing environmental issues. In the country, the waters of large rivers are polluted by wastewater from chemical production, oil refineries, machine-building industries and industries such as non-ferrous metallurgy. In the Karaganda region there are basins of the Nura-Sarysu, Balkhash-Alakol, ESIL, Irtysh and Tobol-Turgai rivers. There are five hundred and ninety-nine water bodies in the region, including one hundred and seven rivers, eighty-three lakes, four hundred and nine artificial reservoirs, dams with hydraulic structures. The rivers belong to the basins of unsalted lakes of the Tengiz, Karasor, Balkhash and Irtysh rivers. The density of the river network decreases due to the surface from North to South. The eleven rivers have a length of more than 100 km.

The main waterway is the Nura River. There are also Rivers Sherubay-Nura, Tundyk, Taldy, Zharlyk, Kulanotpes, Terisakkan, Sarytorgai, Karotorgai, Atasu, Sarysu, Tokyrau, Ulyzhylanshyk, Moynty, Kalmykkyrgan, Zhamshi, Karabulak, Kusak. The presence of low-lying terrain in the East and south-east of the region predetermines the main character of flat rivers feeding snow or snowy terrain. A distinctive feature of the water regime is the spring flood, which usually begins in the first decade of April. When the water rises, several rivers flow at a distance of 0.5-1 km, and at the bottom of the Nura-2 km. The width of large rivers is up to 50-70 m, small watercourses reach 15-30 m. Their depth does not exceed 3-5 meters. Reservoirs and canals play an important role in the balance of the region's water supply. Reservoirs: Samarkand (on the Nura River), Sherubay-Nura (on the Sherubay-Nura River), Kengir (on the Kengir River), Zhezdy (on the Zhezdy River) and small streams have dozens of small reservoirs.

The location of the population of the Karaganda region is uneven by region. The average population density of the region is 3.1 people per 1 sq.km. There are 558 rural settlements in the region. The climate is too Continental and very dry. In terms of the level of industrial development,

it occupies the first place in the country. Two powerful industrial sites have been created there. One is the Karaganda-Temirtau coal and metallurgical complex, and the other is the Balkhash non-ferrous metallurgy industrial complex. Currently, there are 290 agricultural enterprises in the region, 6238 farms and farms, 1155 personal subsidiary farms of the population, which are engaged in the production of agricultural products. All this leads to pollution of the water ecosystem. Problems of pollution of such river waters are a big problem not only in Kazakhstan, but also around the world. Including in Mongolia, the Haraa River Basin is very high in terms of population density, agricultural and industrial activity. This, of course, puts pressure on the restriction of Water Resources on the quantitative and qualitative side. In addition to mineral works, the main sources of pollution of surface waters are the grazing of large amounts of livestock on river banks, as well as the discharge of untreated or poorly treated wastewater into rivers and soils. There are theoretical assumptions that because of the small groundwater and the use of river waters for people and livestock, water pollution can occur.

With a population density of 2.0 inhabitants / km2 (according to the National Statistics Organization of Mongolia in 2017), Mongolia is the least populated country in the world. However, the sharp continental climate, increased competition for water from the agricultural, mining and urban sectors, as well as the uneven distribution of the population, lead to serious problems with water. The Haara River Basin is characterized not only by the most densely populated settlements, but also by intensive agriculture, cattle breeding and mining.

Restrictions on the availability of natural waters, insufficient water supply and the creation of infrastructure for the Prevention of wastewater in urban and rural areas are necessary. In 2000, the Mongolian government took up the achievement of development goals. Water and sanitation-related plans should cover 80% for" improved "drinking water sources and 70% for" improved " sanitation (UNDP, 2010). However, current data show that these goals may not be achieved, especially in rural and urban areas. Mongolian yurt living in low-income areas or living in ordinary private houses, partly informal settlements. In this case, diseases can occur through water; however, empirical data on the microbiological quality of water and the prevalence of diseases caused by water are extremely rare [1-4].

Since 1973, the Irtysh-Karaganda canal has been operating on the territory of the region - a large hydroelectric power plant with a length of 458 km, providing drinking water for the cities of Karaganda and Temirtau. The average volume of water coming from the canals is 75 cubic meters per second. One of the features of the canals lies in the fact that the unique water is supplied from below (relative to sea level) to a high-altitude level, to which about twenty pumping stations are involved. In order to regulate water relations and prevent pollution, to prevent pollution and depletion of surface waters, water protection zones and modes of their economic use are established on the basis of approved projects. Since 2008, water protection zones and belts have been installed on fifty-eight water bodies, including fourteen sites in 2012 [5].

In the period from 2017 to 2022, an analysis of the data of "Kazhydromet" was carried out. Kazhydromet bulletins analyzed the dynamics of data from hydrochemical plants on the Nura River in the Karaganda region over the past five years.

According to the analysis of the materials of Kazhydromet, the growth of MPC in the Nura River in different years was different. According to hydrochemical indicators, the indicators of copper, zinc, sulfates, manganese, petroleum products, nitrogen nitrite, iron, phenol in the Nura River have exceeded the MPC over the past five years. (Table 1).

Table 1. The indicator of pollutants exceeding the MPC on the Nura river for the period from 2017 to 2024.

Pollutants / years	2017	2018	2019	2020	2021	2024
Copper	3,4	3,8	4,4	3,3	2,4	-
Sulfate	2,9	2,2	1,8	2,0	2,1	1,8

Oil products	2,2	1,4	-	-	-	-
Nitrogen nitrite	2,0	-	-	1,2	-	-
Zinc	-	1,5	2,3	1,6	1,2	1,1
Manganese	4,1	5,3	9,3	8,3	4,0	3,0
Iron	-	-	-	4,4	-	-
Phenol	-	-	-	-	-	1,3

The growth of copper MPC was observed in the amount of 3.4 in 2017, 3.8 in 2018, 3.3 in 2019, 2.4 in 2020, 2.4 in 2021, and 2.5 in 2024. (Figure 1).

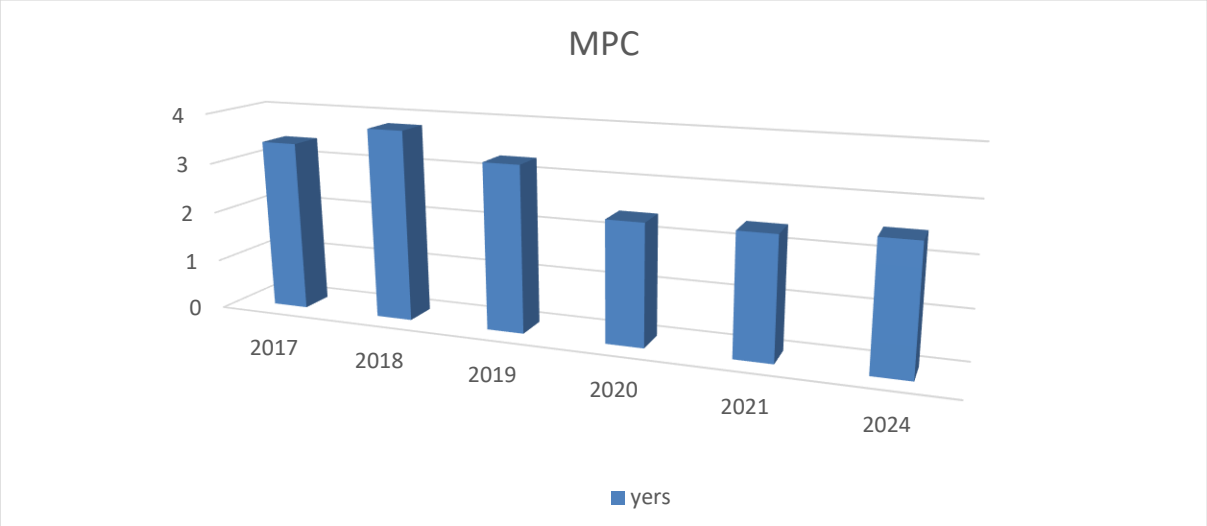

Figure 1. Nura River in the period from 2017 to 2024 indicators of copper growth from MPC

The increase in the MPC of sulfate was 2.9 in 2017, 2.2 in 2018, 1.8 in 2019, 2.0 in 2020, 2.1 in 2021 and 1.8 in the first half of 2024 (Figure 2).

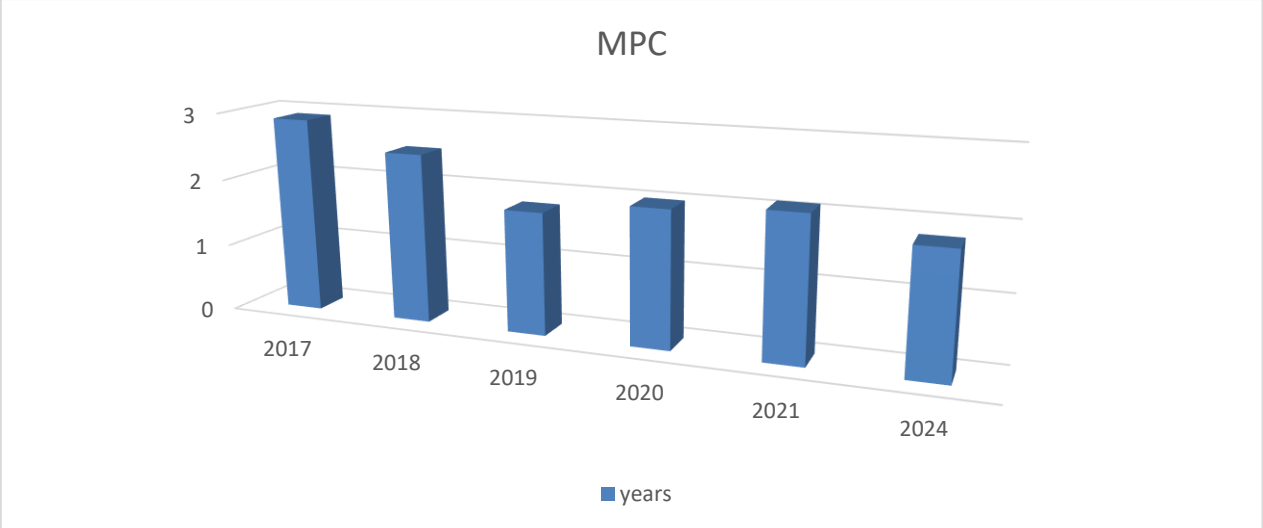

Figure 2. The Nura River from 2017 to 2024, the growth rates of the MPC of sulfate.

Increase in zinc MPC in 2017, there was no increase in MPC, in 2018 there was an increase of 1.5, in 2019-2.3, in 2020-1.6, in 2021-1.2, and in the first half of 2024-1.1. (Figure 3).

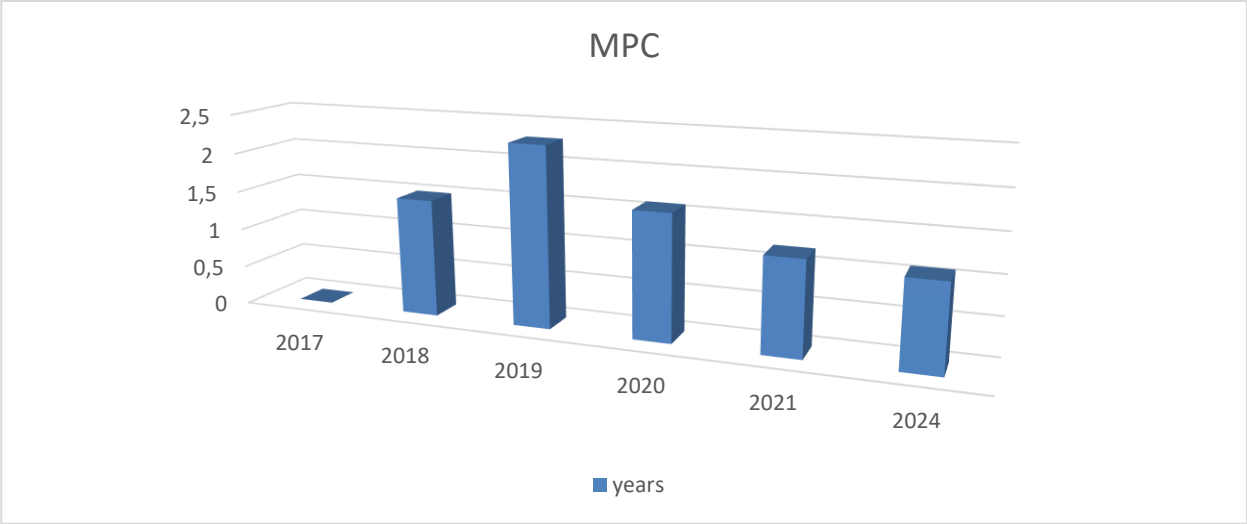

Figure 3. The Nura River from 2017 to 2022, the growth rates of zinc MPC.

The MPC of manganese increased by 4.1 in 2017, 5.3 in 2018, 9.3 in 2019, 8.3 in 2020, 4.0 in 2021 and 3.0 in the first half of 2024.(Figure 4).

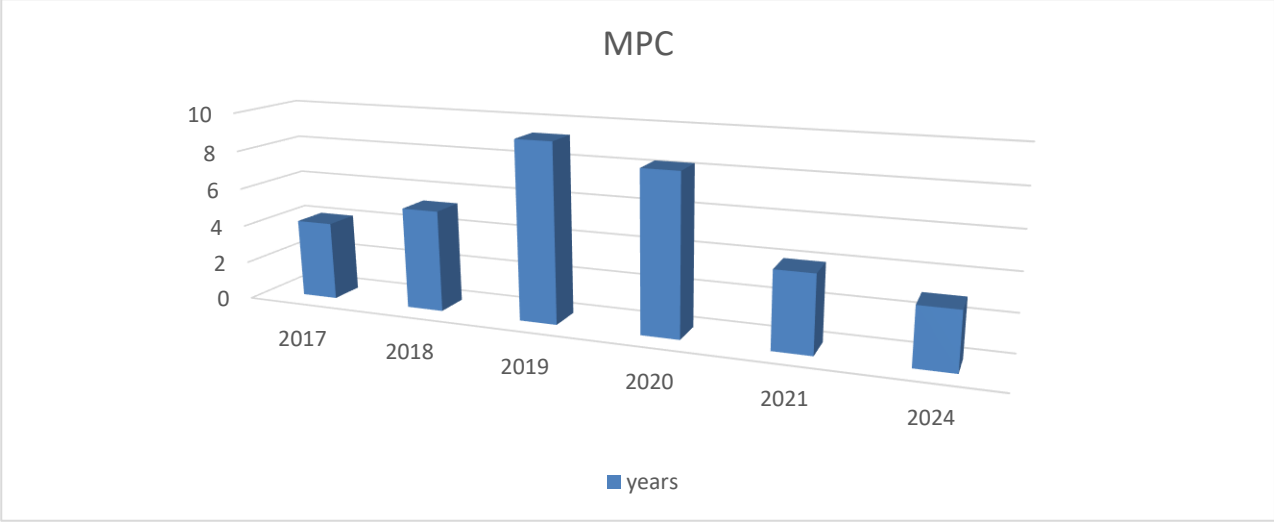

Figure 4. The Nura River from 2017 to 2024, the growth rates of the MPC of manganese.

The increase in the maximum permissible concentration of petroleum products in 2017 was 2.2, in 2018-1.4, and in subsequent years there was no increase in the maximum permissible concentration. The increase in the MPC of nitrogen nitrite was 2.0 in 2017 and 1.2 in 2020, and in the remaining years there was no increase in MPC. The increase in the MAC of iron in 2020 was 4.4, and in other years there was no increase in MAC. The increase in the maximum permissible concentration of phenol was not observed in the period from 2017 to 2021 and amounted to 1.3 in 2024.

In addition, when checking the quality of surface waters, the total number of water bodies was estimated in 2017: water is "moderately polluted" - the Nura River, the Samarkand reservoir, the Irtysh-Karaganda canal; water is "polluted" - the Kengir reservoir; water is "dirty" - the Kara-Kengir River, Sherubai-Nura. And in 2018, the same water remained "moderately polluted" - the Nura River, the Samarkand reservoir, the Irtysh-Karaganda canal; the water was "polluted" - the Kengir reservoir.; The "dirty" water is the Kara-Kengir River, the "very dirty" water is the Sherubai-Nura River, and pollution has decreased by one level compared to 2017.

In 2019, the water is "polluted" - the Samarkand reservoir, the Irtysh-Karaganda canal, the level of pollution decreased compared to 2018; the water is "dirty" - pollution decreased by two levels

-the Nura River, the Kengir reservoir, less polluted than in 2018; the water is "very dirty" added, compared to Since last year, a large amount of polluted water has been noted by the Kara-Kengir and Sherubai-Nura rivers.

In 2020, in the territory of the Karaganda region, the water quality of water bodies was assessed at the level of "high pollution" - Nurinsky, Sherubai-Nurinsky, Kara-Kengir, Kengir reservoir, Samarkand, Irtysh-Karaganda canal. (Table 2).

Pollution level / water bodies	Nura River	Samarkand reservoir	Irtysh-Karaganda canal	Kengir reservoir	Kara-Kengir River	Sherubai-Nura River
2017						
"Moderately polluted"						
"Polluted"						
"Dirty"						
"Very dirty"						
2018						
"Moderately polluted"						
"Polluted"						
"Dirty"						
"Very dirty"						
2019						
"Moderately polluted"						
"Polluted"						
"Dirty"						
"Very dirty"						
2020						
"Moderately polluted"						
"Polluted"						
"Dirty"						
"Very dirty"						

In 2021, ninety-one cases of upstream pollution were recorded on the Nura River. They are the Sokur River, the Sherubai-Nura River, the Kokpekty River, the Aqaba water canal of ArcelorMittal Temirtau JSC and Temirtau Electrometallurgical Combine JSC, the Samarkand reservoir, lakes of the Korgalzhynsky reserve: Sholak, Yesey, Sultankeldy, Nura-Yesil.

Due to the high degree of pollution in the first half of 2024 on the Nura River, the Aqaba water canal, the Sokur River, and the Sherubai-Nura River [5-8].

As a result, in the period from 2017 to 2024, the ecological state of the water resources of the Karaganda region is deteriorating annually. This indicates insufficient environmental protection and the need to implement organized measures to improve the condition of rivers and lakes in the Karaganda region.

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ҚАРАҒАНДЫ ОБЛЫСЫНДАҒЫ СУ РЕСУРСТАРЫНЫҢ ЛАСТАНУ ДИНАМИКАСЫ

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Аңдатпа. Бұл мақалада Қазақстанда өзен суларының жағдайы экологиялық өзекті мәселелердің бірі. Елімізде ірі өзендердің сулары химиялық өндірістен, мұнай өңдейтін зауыттардан, машина жасау өндірістерінен және түсті металлургия секілді өнеркәсіп орындарынан шыққан ақаба сулармен ластануы зерттелген. Қарағанды облысында Нұра-Сарысу, Балқаш-Алакөл, Есіл, Ертіс және Тобыл-Торғай өзендерінің бассейндері бар. Облыста бес жүз тоқсан тоғыз су объектісі бар, оның ішінде, жүз жетісі өзен, сексен үші көл, төрт жүз тоғызы жасанды су қоймасы, гидротехникалық құрылыстары бар бөгеттер. Өзендер Теңіз, Қарасор, Балқаш және Ертіс өзендерінің тұзсыз көлдерінің бассейндеріне жатады. Облыстың шығыс және оңтүстік-шығысындағы төменгі рельефтің болуы қардың немесе қарлы жерді қоректендірудің жазық өзендерінің негізгі сипатын алдын ала анықтайды. Облыста 558 ауылдық елді мекендер бар. Өнеркәсіптік даму деңгейі тұрғысында республика бойынша бірінші орын алады. Онда қуатты екі өнеркәсіптік орын құрылған. Бірі Қарағанды-Теміртау көмір-металлургиялық кешені, ал екіншісі Балқаш түсті металлургия өнеркәсіптік кешені. Қазіргі кезде облыста 290 ауыл шаруашылығы кәсіпорындары, 6238 фермерлік және шаруа қожалықтары, 1155 халықтың жеке қосалқы шаруашлықтары бар, олар ауыл шаруашылығы өнімдерін өндірумен айналысады. Осының бәрі су экожүйесінің ластануына әкеледі. Сонымен қатар, өзен суларының әр жылда ластану деңгейінің динамикасы көрсетілді.

Түйін сөздер: Нұра өзені, судың сапасы, ластану, су қоймасы, ауыз су, динамика

ДИНАМИКА ЗАГРЯЗНЕНИЯ ВОДНЫХ РЕСУРСОВ КАРАГАНДИНСКОЙ ОБЛАСТИ

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Аннотация. В этой статье рассматривается состояние речных вод в Казахстане как один из наиболее актуальных экологических вопросов. В стране изучено загрязнение вод крупных рек акабскими водами химического производства, нефтеперерабатывающих заводов,

машиностроительных производств и таких промышленных предприятий, как цветная металлургия. В Карагандинской области имеются бассейны рек Нура-Сарысу, Балхаш-Алаколь, Есиль, Иртыш и Тобол-Торгай. В области пятьсот девяносто девять водных объектов, в том числе сто семь рек, восемьдесят три озера, четыреста девять искусственных водоемов, плотины с гидротехническими сооружениями. Реки относятся к бассейнам несоленых озер рек Тенгиз, Карасор, Балхаш и Иртыш. Наличие низменного рельефа на востоке и юго-востоке области предопределяет основной характер равнинных рек, питающихся снегом или снежной землей. В области 558 сельских населенных пунктов. Занимает первое место по республике по уровню промышленного развития. Здесь созданы два мощных промышленных объекта. Один-угольно-металлургический комплекс Караганда-Темиртау, а другой-промышленный комплекс Балхашской цветной металлургии. В настоящее время в области насчитывается 290 сельхозпредприятий, 6238 фермерских и крестьянских хозяйств, 1155 личных подсобных хозяйств населения, которые занимаются производством сельскохозяйственной продукции. Все это приводит к загрязнению водной экосистемы. Кроме того, была продемонстрирована динамика уровня загрязнения речных вод за каждый год.

Ключевое слово: река Нура, качество воды, загрязнение, водохранилище, питьевая вода, динамика