

The Impact of Industrial Enterprises of Navoi City on The Environment of The Lower Zarafshan Oasis (The 1980s–1990s of the XXth century)

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ABSTRACT

The article examines how, during the 1980s and 1990s, large industrial enterprises in the chemical, energy, and construction sectors located in Navoi city discharged various types of industrial waste into the environment in violation of established environmental standards. It demonstrates that these enterprises constituted the principal sources of air, water, and soil pollution in the lower parts of the Zarafshan oasis, particularly in Navoi city and its adjacent territories. The article also provides evidence of the adverse impact of these factors on the health of the local population.

Keywords: - Chemical industry, Navoiazot Production Association, Navoi Electrochemical Plant, Navoi Mining and Metallurgical Combine, Samarkand Superphosphate Plant, Kattakurgan Oil and Fat Combine, pollution of the Zarafshan River.

INTRODUCTION

After gaining independence, the Republic of Uzbekistan inherited a complex environmental situation resulting from numerous problems in the management of the environment and natural resources caused by serious structural distortions in agriculture, energy, and industry during the Soviet period. In Uzbekistan, such problems as drinking water scarcity, air pollution, the loss of biodiversity, and declining agricultural productivity have continued to intensify [1]. Therefore, a profound understanding of existing realities, the identification of the causes of environmental problems, a serious approach to mitigating their consequences, and the search for solutions based on scientific and technological achievements while taking into account the laws of nature remain highly relevant.

METHODS

The acute environmental situation that emerged in the lower Zarafshan oasis and its socio-economic consequences have been reflected in the works of R.M. Qarshiyev, H.Yu. Salamova, X.R. Raupov, A.M. Aminova, and Sh.B. Xoliqulova. In particular, in his scholarly work “The Socio-Economic and Cultural Development of Navoi City: Experience and Problems (1958-1990)”, R.M. Qarshiyev discusses the role of large industrial enterprises in the formation of Navoi city and, in this context, addresses their negative impact on the environment [2]. In the brochure “Some Reflections on the Ecological Crisis in Navoi and Measures to Prevent It”, published by the same author in co-authorship with H.Yu. Salamova, the ecological crisis that had emerged in Navoi city on

the eve of independence and its consequences are examined [3]. In his research “The Formation and Development of the Mining and Metallurgical Industry in Uzbekistan (1943-2024)”, X.R. Raupov reveals the discovery of gold and uranium deposits in Navoi region, the establishment of processing plants, and their role in strengthening the country’s economic potential, while also touching upon their negative influence on the oasis environment [4]. Analyzing the economic changes in the lower Zarafshan oasis from 1991 to 2021, A.M. Aminova demonstrates the impact of environmental problems caused by industrial enterprises in the Navoi and Bukhara regions on the social life of the population [5]. In her scholarly study, Sh.B. Xoliqulova investigates industrial production processes in the lower Zarafshan oasis and presents her observations on the environmental impact of large industrial enterprises [6].

In preparing the present text on the impact of Navoi city’s industrial enterprises on the environment and public health of the lower Zarafshan oasis on the eve of independence, such scholarly methods and principles as historicism, comparative-logical analysis, and objectivity were employed.

RESULTS

On the eve of independence, stationary sources in the republic emitted nearly 1.4 million tons of harmful substances, while emissions from mobile sources amounted to 2.8 million tons, accounting for 70.6 percent of total emissions. In 1986–1990, the most polluted areas in the republic were the Tashkent and Fergana territorial-industrial districts, the Sariosiyo district of Surkhandarya region, and the Navoi district of Bukhara region [7]. The emergence of such an environmental crisis was caused by several factors: the rapid industrialization that took place in Uzbekistan in the 1960s, as in other Soviet republics, accompanied by the construction of plants and factories that failed to meet environmental standards; the pursuit of production targets in agriculture; and the excessive use of mineral fertilizers and defoliant. By the 1980s, these factors had led to an acute ecological crisis in the country. During this period, industrial enterprises and motor vehicles in Uzbekistan emitted approximately 4.2 million tons of harmful substances into the atmosphere. In the air of many

cities, sulfur dioxide exceeded the maximum permissible concentration (MPC) by 10 times, nitrogen oxide by 7 times, and dust by 15 times; of the 50 cities in the Soviet Union with excessively polluted air, 6 were located directly in Uzbekistan [8].

Unlike other regions of the republic, the concentration of industrial enterprises in one location in Navoi region caused severe pollution of air, water, and soil resources in and around Navoi city during the 1980s, resulting in a serious deterioration of the ecological situation. By that time, the amount of toxic substances emitted into the atmosphere by the city’s pollution sources averaged 500 kg per capita [9].

According to data on toxic emissions released into the atmosphere by major industrial enterprises in Navoi region, these enterprises in Navoi city discharged 57.691 thousand tons of various harmful wastes into the environment in 1989 alone [10]. Both in the Soviet era and today, one of the largest sources of air pollution in Navoi city has remained the Navoiazot Production Association. When the enterprise was constructed according to a 1960s design, no provision was made for filtration systems to capture harmful gases and solid waste emitted into the atmosphere, nor for facilities to treat wastewater generated during production. As a result, by the 1980s-1990s, 20.3 percent of all harmful atmospheric emissions in Navoi city were directly attributable to this enterprise [11]. In the mid-1980s, the association had 436 sources emitting harmful substances into the air, but only 24 of them were equipped with gas and dust purification devices. Consequently, the enterprise continued to release harmful substances into the atmosphere, and the concentration of nitrogen oxide alone exceeded the MPC by 25 times [12].

Another major source of environmental pollution in the Zarafshan oasis was the Navoi Electrochemical Combine, which produced chemical substances necessary for the national economy. At that time, there were only three such plants in the world. The first was located in the Sahara Desert, at a distance of 110-140 km from residential areas due to the highly toxic substances produced there, while its control panel was installed 3,200 meters away from the facility. The second was situated on Bexhus Island, 390 km from New Zealand, where a French company

manufactured chemical weapons and pharmaceuticals. The third was established in Uzbekistan, directly near Navoi city, in close proximity to an area inhabited by people for centuries [13]. During this period, the Navoi Electrochemical Plant produced dozens of chemical agents used to protect agricultural crops; in the production of the toxic substance “kotoran,” it emitted 24 types of harmful substances into the atmosphere, while in the production of “fozalon,” it released 31 types [14]. Until 1988, the enterprise used the substance “dinoseb” in the production of “izofen.” This highly toxic substance impaired human pigment function and internal organs, especially the liver, and caused infertility in women. Workers in the “treflan” workshop, where plant protection agents were manufactured, had to change their protective clothing every shift because it became unusable after a single use [15]. The enterprise’s wastewater reservoir – covering an area of 125 hectares and reaching a depth of 23 meters – became a major source of ecological disaster, containing more than 7.0 million cubic meters of acidic wastewater. As toxic effluents seeped and overflowed from the reservoir, the groundwater of the Zarafshan oasis became contaminated [16]. In the 1980s, workers of the Navoi Electrochemical Combine were reportedly called “green people,” because their hair and nails turned green under the influence of toxic substances; even newborns of female workers were said to have been born with a greenish tint.

Another major enterprise was the Navoi State District Power Plant (GRES), located on the banks of the Zarafshan River, which supplied uninterrupted energy to the industrial enterprises and population of the region while simultaneously functioning as one of the principal users and polluters of river water. The plant continuously emitted harmful substances into the atmosphere and, in 1990 alone, released 18 thousand tons of acidic vapor. During this period, it discharged annually into the Zarafshan River 1,800 tons of sulfuric acid and 21.3 thousand tons of oil and petroleum compounds [17]. At the meeting of the State Committee for Nature Protection of the Republic of Uzbekistan held on January 24, 1992 (Collegium No. II-2), the impact of enterprises in the republican energy system on the environment in 1991 was discussed. It was emphasized that emissions of nitrogen oxides exceeded permissible norms by 2.2 times at Syrdarya GRES, by 3.8 times

at Tashkent GRES, and by 10.3 times at Navoi GRES, while the responsible authorities were failing to take the necessary measures [18].

Another source of atmospheric pollution in Navoi region was the cement plant built 7–8 km from Navoi city, which, according to the project, was designed to produce 2.3 million tons of cement annually for the national economy [19]. Because the plant was built according to a design intended for humid and rainy climates, it generated persistent harmful “white clouds” suspended in the dry and hot sky of Navoi. Thus, this poorly conceived industrial project came to account for the largest share of harmful emissions released into the atmosphere of Navoi city in the mid-1980s – 53.5 percent [20].

DISCUSSION

On the eve of independence, in addition to atmospheric pollution, the protection of water resources was also an acute issue in Navoi region. In 1990, major industrial enterprises in the region discharged 938.2 million cubic meters of wastewater annually during the production process, a significant portion of which was released directly into open water bodies. As a consequence, pollution of the Zarafshan River – the region’s principal water artery – with nitrites exceeded the MPC by 1–4 times in 1990, by 6–7 times in 1991, and by 5–9 times in 1992 [21]. The overall hardness of groundwater in the districts of Pakhtachi, Narpay, and Navoi (now Karmana), whose populations consumed water from the river, exceeded permissible norms by 4–5 times. In 1988, staff of the Navoi Regional Sanitary and Epidemiological Station (SES) collected and tested 861 water samples from the Zarafshan River; in 457 cases, the river water was found to be completely unsuitable for drinking [22]. The severe pollution of the river was also caused by industrial enterprises, social facilities, and the population in Samarkand region, located upstream, which discharged various industrial, domestic, and wastewater effluents directly into the river. Particularly significant were the overflow of sludge storage ponds at the Samarkand Superphosphate Plant in December 1988 and at the Kattakurgan Oil and Fat Combine in February 1990, as well as accidents at wastewater treatment facilities in Samarkand in September 1991 and in Kattakurgan in July 1992, which resulted in accumulated harmful wastewater being dumped

into the Zarafshan River [23]. Having already become polluted in neighboring Samarkand region, the river then received wastewater from 18 additional sources upon entering Navoi region and became unfit for use [24]. This situation was reflected in a letter of the Prosecutor General's Office of the Republic of Uzbekistan sent to the Supreme Council on November 25, 1992 (No. 7/18-92), which stated that the condition of the Zarafshan River water absolutely failed to meet the GOST standards for "Drinking Water." According to the letter, inspections conducted in 1991 revealed severe pollution of the river basin around Navoi city: the water contained phenol at 14 times the MPC, petroleum products at 3 times, chromium at 17 times, copper at 4 times, and nitrates at 9 times the permissible level, which necessitated the adoption of appropriate decisions [25].

Under Soviet rule, the Navoi Mining and Metallurgical Combine (NMMC), which was directly subordinated to the Union center, generated severe ecological hazards through industrial waste produced in the course of its operations. The disposal site (polygon) for radioactive waste resulting from uranium processing became an ecologically dangerous "source of hazardous contamination." The fact that this radioactive waste disposal site was located close to residential areas serves as a vivid example of the central authorities' disregard for the capabilities and interests of the republic. In the 1980s-1990s, radioactive residues from NMMC waste were carried by the wind as far as the collective farms "Qizil Uzbekistan," "Lenin Yoli," and "Kommunizm," as well as the settlements of Durman and Tinchlik located near Navoi city, thereby endangering the health of their inhabitants. Because the disposal site, situated adjacent to residential areas, was poorly guarded, local residents removed irradiated pipes, stones, and wire mesh from the site and used them in the construction of their homes. As a result, in November 1990 and January 1991, the dosimetric service of NMMC, together with the SES of Navoi district and the sanitary police, discovered 58 radioactive objects in 30 households in the collective farms "Qizil Uzbekistan" and "Lenin Yoli," while in April they identified radioactive waste in private homes in the settlement of Durman [26]. Commenting on these incidents in an interview with the newspaper *Khalk Sozi* in 1991, NMMC Director N.I. Kucherskiy stated: "In areas near the industrial site and within the sanitary

protection zone, gamma activity is 30-40 $\mu\text{R}/\text{hour}$, while at a distance of 150–200 meters from the places where radioactive ores are handled, this figure is 15-20 $\mu\text{R}/\text{hour}$," thereby concealing the actual extent of radioactive exposure detected in residential homes [27]. By the second half of the 1980s, public activists had raised alarm about the grave ecological situation in Navoi region in various republican and regional newspapers and journals. The situation was taken under state control, and in July 1990 it was discussed at a meeting of the Committee on Ecology and Rational Use of Natural Resources of the Supreme Council of the Republic of Uzbekistan, which adopted the resolution "On the Unsatisfactory Ecological Situation in Navoi City and Adjacent Territories and Measures for Its Improvement" [28].

Along with gaining state independence, the Republic of Uzbekistan inherited an unhealthy ecological environment from the former Soviet Union. By the beginning of the twenty-first century, centers of ecological instability existed in almost all regions, particularly in Navoi and Bukhara within the lower Zarafshan oasis. This situation was directly caused by the large industrial enterprises operating in Navoi city. As a result, only 27 percent of Uzbekistan's territory remained in compliance with national standards for environmental water, air, and soil quality. According to the zoning data on the degree of ecological crisis in different territories, the Republic of Karakalpakstan was in the gravest condition, while the neighboring Aral Sea areas – including Navoi region – were classified as experiencing a severe ecological crisis; the ecological situations in Samarkand and Bukhara regions were assessed as being at a moderate crisis level [29].

CONCLUSION

As a result of the ruthless exploitation of Uzbekistan's natural resources by the Soviet government beginning in the second half of the twentieth century, not only valleys and oases across the republic, but also the air, water resources, and soil of Navoi city and its surrounding areas in the lower Zarafshan oasis became polluted with various industrial and household wastes, as well as chemical substances used in agriculture. The use of the Zarafshan River – the principal lifeline of the oasis – by major industrial enterprises in Navoi region as a collector

for toxic discharges, and its continual contamination with hazardous substances, eventually rendered its water unsuitable for use in the national economy. The failure to pay adequate attention to preventing severe air, soil, and water pollution in the oasis, as well as the disregard for the necessity of environmental protection, led to this territory becoming one of the most environmentally and medically distressed regions of the republic.

In sum, by the late 1980s, as in the republic as a whole, a large-scale ecological disaster had emerged in the lower Zarafshan oasis as a result of a combination of factors, including the excessive use of chemicals in agriculture and the operation of industrial enterprises and transport facilities that failed to meet environmental requirements. The consequences of this crisis began to be felt in the socio-economic life of the country.

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