

# Formation of a sustainable urban environment in Bukhara: problems and conflicts

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**Abstract.** In this article, opinions are expressed about the existing problems in the formation of a sustainable urban environment in Bukhara and the factors that caused these problems. A sustainable city is a city that supports the ecological environment, eco-economy, and healthy lifestyle aimed at improving the quality of life of people. In the article, one of the important rules of a sustainable city is the prevention and elimination of environmental problems. It was mentioned that the environmental problems in the city are the result of the policies implemented in the beginning.

## 1 Introduction

Today, approximately 51 percent of the population of Uzbekistan lives in cities, and this number is increasing year by year. Already in the future, the increasing importance of cities in people's lives, poverty, climate change, health and education problems are waiting for their solution.

A sustainable city is a city that supports an eco-economy aimed at improving the quality of life of people, and is aimed at establishing a healthy lifestyle. The term sustainable city was first used by Richard Register in 1987[1]. In such a city, the practical work of citizens aimed at the development of society shows results, and partnership relations between all sectors and non-governmental non-commercial organizations are formed in the city in every way. According to experts, the system of urban indicators covers all areas of sustainable development. In particular, the development of ecological, economic, social and cultural spheres is ensured. A sustainable city, unlike traditional city planning, focuses on all aspects of society, that is, not only illegal housing, but also ecosystem protection, citizen participation in political processes, citizen participation in the implementation of decisions, issues such as city safety, gross regional product per capita, paid services, life expectancy, general morbidity, and crime rate are important.

## 2 Materials and methods

During the years of independence, practical work was carried out on the development of urban development and the creation of conditions for the formation of a stable urban environment. Reforms have been implemented in a number of cities of the republic regarding

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the establishment of socio-economic infrastructure, the creation of modern urban planning infrastructure that is convenient for the population. Such a process has started to be implemented in the city of Bukhara, which has great tourism potential. First of all, every monument located in the historical area of the city should be scientifically adapted to the goals of modern society, that is, the formation of tourism infrastructure that meets world standards, from the creation of a generally stable urban environment, to the practical use and beautification of memorial buildings, to the alleviation of environmental problems. The range of issues that make up complex tasks has also expanded.

One of the important principles of a sustainable city is the prevention and elimination of environmental problems. In 1992, the Law of the Republic of Uzbekistan on "Nature Protection" [2] was adopted and the State Committee for Environmental Protection was established. The committee has developed plans for the protection of the enterprises emitting toxic substances in the atmosphere, in the areas of production economy system and sanitary hygiene[3, p.106]. In each city, Environmental Monitoring was established to control the situation in industrial enterprises. In 1998, the "National Program for Environmental Protection" was adopted, and the directions and principles of activities for 25-30 years were defined[4]. On the basis of this program, "Program of environmental protection in the Republic of Uzbekistan in 1999-2005"[5] and "Program of environmental protection in the Republic of Uzbekistan in 2008-2012" were developed. These programs were approved by the Cabinet of Ministers of the Republic of Uzbekistan and put into practice. Based on the adopted programs, individual measures were developed in each city.

It is known that there is a trend of cross-border pollution in the atmospheric air of Bukhara region[6, p.7]. The region is surrounded by the industrial enterprise of Navoi region, Kashkadarya region and oil and gas industry enterprises of Lebob region of Turkmenistan. Of course, such a situation will not affect the ecology of Bukhara region. There are environmental problems in the area that have been formed for many years, including:

- ✓ Disruption of soil composition;
- ✓ Air pollution;
- ✓ drying up of the Aral Sea;
- ✓ Increasing desertification and drying of the climate
- ✓ Destruction of cultural monuments;
- ✓ Pollution of underground and surface water;
- ✓ Accumulation of solid waste, including toxic industrial waste;
- ✓ Such as insufficient supply of clean drinking water to the population.

Another ecological threat in the Bukhara region appeared and developed during the Soviet era. For many years, the Soviet government used an extensive method of developing the national economy, which had a negative impact on nature and the environment. As a result of the forced expansion of the cotton monopoly, the dynamics of the use of chemicals and the year-by-year increase in the amount of toxic agents, along with the deterioration of the ecological environment, an epidemiological situation has arisen in the region. Especially, by the mid-80s, more than 70 percent of adults and more than 80 percent of children in Bukhara, Khorezm, and Karakalpakstan were infected with various diseases[7, p.556]. In her research, R. Karimova mentions that the indicators of allergic diseases among children aged 6-10 years in Bukhara city are increasing sharply, and when the reasons are studied, the exhaust gases in the natural gas industry enterprises in the Bukhara region are more than the norm in the atmospheric air [8, p.45].

### **3 Result and discussion**

About 70 types of chemical drugs were applied to the cotton plantations due to the increase of cotton cultivation in the territory of Soviet Davida Bukhara. In 1985, 241 kg of

nitrogen, 120 kg of phosphorus and 51.6 kg of potassium were used per hectare of cotton field, and a total of 412.6 kg of mineral fertilizers were used per year [9, B.531]. Only 1% of the pesticides used against the cotton pest, and the remaining 99% pollute the air, water, soil and living organisms. In 1975-1985, the amount of toxic gases in atmospheric air increased by 1.5-2.5 times [10, B.48]. The water of the river and other water sources is used mainly for agricultural and industrial purposes, and the remaining part is allowed to be used for personal purposes of the population.

The construction of production enterprises in Bukhara city and its surroundings also led to the emergence of various environmental problems, air and water pollution, and an increase in waste. An annual plan was established from the center for industrial enterprises built between 1950-1980 in Bukhara, including nitrogen-fertilizer combine, cotton, oil-oil extract, cement, brick, repair-mechanics, stone block and beer factories. Problems such as atmospheric air pollution, soil and water pollution were considered as a secondary issue. It has been confirmed that cement and brick factories are the most dangerous industrial enterprises in polluting the environment [11, B.12]. Under the influence of these factors, the balance of the environment of the city of Bukhara has been disturbed, and many environmental problems have arisen.

On November 23, 1988, a regional committee for nature protection was formed in Bukhara region, and this committee conducted an investigation by the end of the year and identified more than 20,000 cases of various levels of environmental damage in Bukhara. It was noted that 280 industrial enterprises in the Bukhara region release more than 256 thousand tons of various toxic gases into the air, only 46 percent of these enterprises have installed gas-dust catchers, and they are the main sources of air poisoning [12].

Industrial enterprises built in and around Bukhara, including the construction of the Bukhara-Ural gas pipeline, turned Bukhara into a major natural gas processing industry center. Since the 1970s, due to lack of attention to the cleaning of gas pipelines and the control of technical and sanitary conditions, the leakage of toxic gases started to poison the air [13, B.60-69]. As a result, the urban environment has moved to the stage of transboundary pollution. By the end of 1990, only 9 out of 19 car dealerships in Bukhara were found to have toxic gas detection equipment, but no smoke detectors. In addition, in 1990, it was found that the drinking water of the population of Bukhara region was contaminated by petroleum products when the conditions of the drinking water and nearby ditches were checked [14]. Although the city's ecological environment is deteriorating, the industrial enterprises that are fighting for the benefit of the center have been operating in defiance of environmental protection laws.

In the early years of independence, the Regional Committee for Nature Protection developed a series of proposals to maintain environmental balance in the Bukhara region. These proposals included the relocation of environmentally harmful enterprises to the outskirts of the city, the establishment of a highway bypass outside the city, and the provision of non-incineration of waste. In 2001-2021, increased attention to the ecological environment, reduction of emissions from motor vehicles in terms of atmospheric air protection, conversion to environmentally friendly fuel, natural gas, and repair and installation of new gas and dust cleaning equipment installed at the sources of industrial enterprises. High work efficiency was achieved due to installation. As a result of the reforms carried out in this area, the level of atmospheric pollution (IZA) in Bukhara has decreased from 6.9 to 3.6, but the limited level of dust concentration is 10-15 PDK (the limit of high concentration of substances harmful to the life of humans and living creatures in atmospheric air). is doing The level of atmospheric air pollution in the region remains high due to natural sources [15, B.7]. Air pollution higher than the regular PDK leads to a sharp increase in the level of morbidity of the population. In 2003, 130,000 tons of toxic substances were released into the atmosphere in the Bukhara region, which corresponded to 100 kg per person in the

region[16, B.125]. As a result of the measures taken, according to the information of the Bukhara Regional Department of Ecology and Environmental Protection, the amount of waste released into the atmosphere has decreased from 300,000 tons in 1992 to 118,000 tons in 2018. The year-by-year decrease in the amount of waste emitted into the atmosphere is due to the reduction of production products of a number of enterprises, the main reason is the pollution of the atmosphere by the enterprises, including cotton gins, construction organizations, asphalt, concrete plants, oil and gas industry enterprises, motor transport enterprises. activity was brought under control. During the activities of enterprises, sulfur oxides, carbon oxides, and nitrogen oxides are released into the atmosphere. Therefore, a number of industrial enterprises located in Bukhara were moved outside the city in order to clean the city's air, that is, to prevent dust from factory production. In particular, the Bukhara cotton ginning plant was moved out of the city to Galaasia in 2001, and the oil extraction plant was moved to Kogon district.

Another main source of air pollution in Bukhara is vehicles. If 10,000-15,000 cars move in the city of Bukhara every day, 32-48 tons of carbon dioxide will be released into the city air. In 2015, the amount of benzopyrene in the air was 2.5 times higher than REM due to the operation of city vehicles and buses [17, B.155].

At the end of 2017, in order to reduce the emission of harmful substances into the atmosphere by the Department of Ecology and Environmental Protection, 2,239 vehicles of various types, gasoline, diesel ran on fuel and the release of 1890.4 tons of poisonous gas into the atmosphere was stopped [18, B.36]. Also, in 2019, 353,000 tons of air-poisoning waste were released from enterprises in Bukhara, and 79,100 tons in 2020, which is 4.5 times less than in 2019.

Another reason for the increase in air temperature in the city and disturbance of the ecological balance is that the asphalt and concrete roads, squares and roofs of buildings built of various materials in the city area have created their own "heat islands". Various industrial wastes and urban heating networks also contribute to this [19, B.112]. In the construction of high-rise buildings, the use of construction raw materials such as glass, concrete, reinforced concrete, lime, plaster, granite, marble is not suitable for the cities located in the desert zone, it causes the city to become "hotter" and some of them does not suit the arid (desert region with high temperature) zone at all. Therefore, in the conditions of Bukhara, it is more beneficial to build houses from bricks than from concrete.

Historical sources confirm that the architects and builders of Bukhara used building materials taking into account the natural and geographical location and climate. They also focused on building ponds to moderate the hot climate and create a microclimate in the city. At the end of the 19th century - the beginning of the 20th century, there were about 360 ponds in the Emirate of Bukhara, and there were 85 ponds in the capital city [20, B.624]. In addition to providing water to the population, the ponds moderated the air in the city. In the first quarter of the 20th century, the ponds became polluted due to the lack of regular clean water, which caused the development of various diseases among the population. As a result of the increased number of deaths due to disease in the city, the use of water from the ponds was banned and the ponds were buried. In 1927, under the leadership of F. Khojayev, construction of water pipelines began in Bukhara city to provide water to the population.

Currently, the city's Labi Pool, Bolo Pool and Sitorai Mohi Khossa pools are being filled with water. Renovating and filling the pond in front of Havzi Nav and Gavkushon madrasah, which has no water, but has been preserved to this day, will be useful for creating a microclimate in the city.

It is worth mentioning that in 2004, Havzi Nav was cleaned and several attempts were made to fill it with water. But the water has been absorbed into the ground (The expressed opinion is based on an interview with Olim Adizov, the chief architect of the Bukhara Regional Construction Directorate).

## 4 Conclusion

In conclusion, it can be said that in the years of independence a number of measures have been implemented to create conditions for the formation of a sustainable urban environment. City reforms were carried out in order to create a modern urban planning infrastructure convenient for the residents. Initially, the formation of the tourism infrastructure was started with the restoration and restoration of cultural heritage monuments located in the historical area of the city. Attention was paid to the rational use of all resources in the city, that any innovation does not harm people and nature, and does not endanger the environment. Although environmental problems in the city of Bukhara have been growing since the time of the Soviet Union, efforts have been made to reduce or eliminate them during the years of independence. In order to improve the ecological environment of the city, some enterprises were moved to the outskirts of the city.

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