



Factors affecting the ecological status of industrialized cities and measures to monitor them

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Received: 15-02-2022, **Revised:** 10-03-2022, **Accepted:** 15-03-2022, **Published:** 31-03-2022

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HOW TO CITE THIS

Karshiboevna & Faxriddin (2022) Factors affecting the ecological status of industrialized cities and measures to monitor them. *Mediterr J Pharm Pharm Sci.* 2 (1): 8 - 14. <https://doi.org/10.5281/zenodo.6397892>

Keywords: Biodiversity, bronchial asthma, environmental, green economy, hyperdynamic, metabolic disorder

Abstract: The development of science and technology proves once again how infinite human needs are. The concentration of the population in large cities, on the one hand, accelerates the process of urbanization and affects the level of development of the state. On the other hand, the state of the environment has a negative impact on urban ecology. From ancient times the population has been striving to create favourable conditions for themselves and such a process is still going on, especially when the negative consequences of this are clearly felt in the health of the population living in cities. Solving this problem is one of the main tasks of urboecology. The development of modern methods of geo-ecological monitoring of the ecological condition of cities, especially in areas with high industrial specialization. The development of measures to improve the health of the population in ecologically critical areas is of a great importance today. To this end, this article discusses in detail the industrialized Navoi region and its urban and ecological situation, the factors affecting it.

Introduction

It is known that the twenty-first century is more global in nature and requires the integration of knowledge and industries. This is especially evident in the regulation of the relationship between human-being and nature. As the needs of human-kind continue to grow, environmental challenges of various degrees are emerging, and such environmental problems require the rational use of available resources by the entire community. Cities

on the planet appeared 5 000 years ago on the banks of the Indus, Tigris, Euphrates and Nile rivers as well as their people were mainly involved in animal husbandry [1]. Over time, man's influence on nature has increased. As a result, environmental problems of various scales are emerging. Keeping the purity of the environment is one of the most important issues paid by the leadership of our country today. In this regard, the President of Uzbekistan Sh. M. Mirziyoyev

said: Take measures to increase the energy efficiency of the economy by 20% and reduce emissions by 20% by 2026 through the active introduction of green economy technologies in all the sectors [1]. It is no coincidence that the Decree on the Development Strategy of Uzbekistan specifically mentions this [2, 3]. It should be noted that there are more than 80 branches of ecology and the fact that urban ecology has its own practical qualities, the whole of humanity is witnessing the need to pay attention to the study of this area. Today, large cities are recognized as the centres of major environmental crises. Deterioration of the urban environment leads to many challenges such as uncontrolled production and waste, biodiversity in the city, atmospheric air pollution, drinking water and, unfortunately, the health of the urban population [1].

Urban infrastructure is an essential situation for urban development. Its use produces three benefits

which are social, economic and environmental benefits of urban infrastructure. In order to prevent these problems, to ensure the sustainable development of cities in the future, the necessary measures are being developed through environmental, medical-environmental, social and economic monitoring [4 - 6]. Of course, recent achievements also play a major role in conducting such monitoring. Modern research shows that the intended result can be achieved by starting with small areas to study a particular problem and find a solution to that problem. In this context, through a comprehensive study of cities and some of their parts, we can assess the urban infrastructure, its natural, ecological, social and economic condition [7]. It is known that according to the conclusions of the World Health Organization, the factors affecting the health of the population can be classified into four groups according to the degree of impact as shown in **Figure 1**.

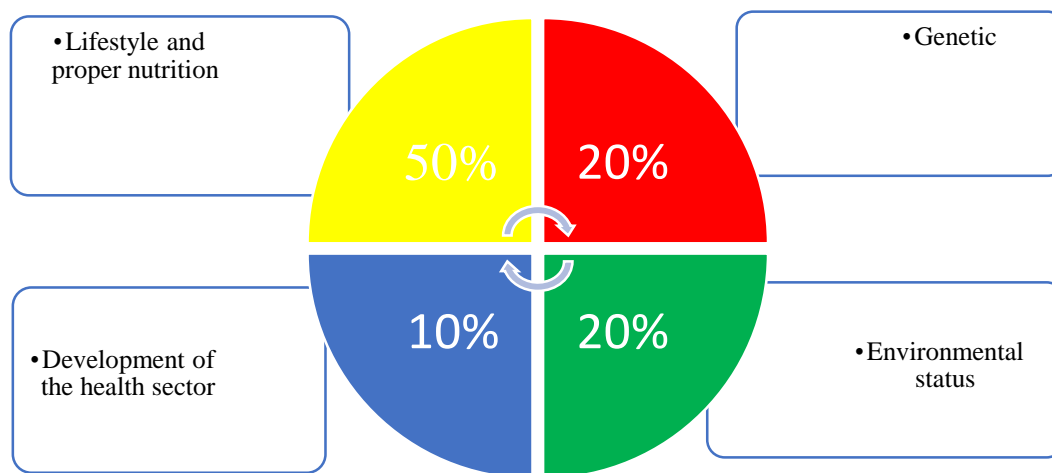


Figure 1: Based on data from World Health Organization

In large urban areas, as a result of factors such as noise, hyperdynamic and strong air pollution, urban residents suffer from hypertension, ischemic heart disease, diabetes, bronchial asthma, metabolic disorders [7]. Medical and ecological monitoring of urban areas in accord with scientific and technical achievements, especially the analysis of data using

geoinformation systems in developed countries began in the 80 - 90s of the last century. The difference of this approach from conventional analyzes is characterized by high accuracy and efficiency. In industrialized countries such as the United States, Germany, Sweden and Japan, views on automated data began to emerge in the 1960s. In

the Scandinavian countries, for example, a personal account has been opened to verify the health of each individual [8]. Consequently, urban infrastructure economic, social and environmental settlement should be highlighted similarly and developed in synchronization. Urban infrastructure advantage will be raised only if these benefits are well synchronized [9]. This creates the basis for the self-formation of the health statistics of the population. Innovative solutions for environmental protection are being implemented in the cities of developed countries, for example, the analysis of average daily, monthly and annual data by automated measurement of atmospheric air pollution through automated systems, elements of urban climate change, the ecological situation in which areas of the city. Systems that allow you to be aware of what changes are taking place in the health of the people living in the area have proven to be much more effective. If we conclude from innovative approaches to the urban-ecological situation in developed countries, the first issue to improve the ecological status of the industrial city of Navoi region is, first of all, grouping the factors affecting the ecological status of the regions as the main classifier. As every urban complex is illustrated by a precise mix of social, ecological and economic interdependencies and its possess settlement and building structure, it is intricate to simplify on scientific findings about urban complexes. These factors can be classified as follows: Atmospheric air condition, Composition of drinking water, Soil layer quality, Noise level and Conservation of biodiversity.

Despite the fact that the Navoi region is the smallest administrative unit of the Republic, it occupies a leading position in terms of industrial production [1]. Studies show that atmospheric air pollution is the most important factor in determining the state of the

living environment. Atmospheric pollution causes external respiration, impaired cardiovascular function. The number of patients with respiratory problems in the province increased from 246 in 2015 to 277 in 2018 and the number of patients with the vascular disease increased from 17, 400 to 18, 300, respectively, indicating an important concern about atmospheric air problems in the province and the atmospheric aerosols have posed a health confront by their existence in the atmosphere (**Figure 2**). Non-ferrous metallurgy, chemical and construction industries are particularly developed in the region, which is reflected in the health of the population in the cities and suburbs of the region. For example, in cities with a developed metallurgical industry, children's physical and neuropsychological development is slower than in other regions [10]. Sequentially to manage them, they have to be implicit in terms of their interactions in the air, their length of suspension and their transportation. In addition to atmospheric pollution, factors such as the quality of drinking water and the condition of the soil cover also affect the ecological condition of cities. The quality of drinking water is especially important because it is widely believed that the substances in water that adversely affect human health can cause gastrointestinal and urological diseases. The total number of people with digestive problems in the province reached 74 700 in 2019, and by 2020, the figure had risen to 87 600. If the process continues with this trend, the region is likely to become a major contender for the status of a nosogeographic hotbed of the Republic. Chemical pollution of the surface water be able to generate health risks, because such waterways are often used directly as drinking water sources or linked with shallow wells used for drinking water. Additionally, waterways have significant roles for cleaning and washing, for fishing and fish farming and for recreation.

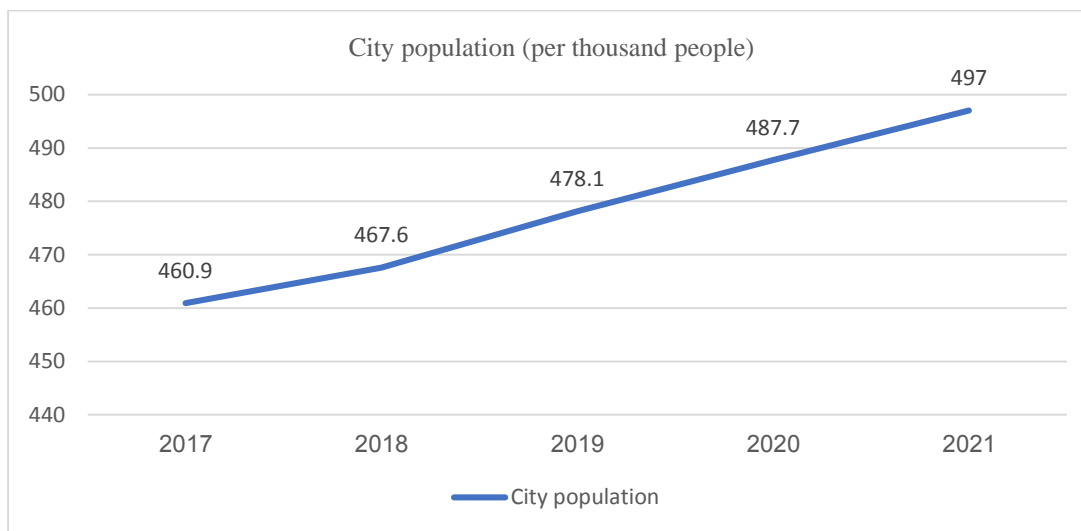


Figure 2: Share of urban population in Navoi region.

The state of soil pollution is also an important factor in the ecological situation of the city because the products of widespread consumption are grown precisely through the soil. Deterioration of the geochemical condition of the soil is associated with liver, kidney and nerve diseases. In the industrialized region, this is also a matter of concern, as dust in the city moves not only in the city but also around the city, causing significant damage to the surface layer of the soil in the Karmana and Navbahor areas adjacent to the city. Given that the above-named administrative units are the number one regions supplying the city with agricultural products, chemically contaminated agricultural products return again for urban consumption as a circulating chain, which serves as a basis for functional changes in the urban population [11]. The grinding of ores and the ensuing processing with water lead to discharges of fine silt with toxic metals into waterways except proper precautions are taken, such as the utilize of sedimentation ponds. Although noise is an invisible factor at first glance, the fact that industrial enterprises are located close to residential areas and the movement of the transport network, in our opinion, is sufficient to analyze this factor

separately. Analyzes show that high noise levels in large cities affect the nervous system of people and are the main reason for the decline in the ability of employees to work, to be in a tired mood throughout the day.

Biodiversity needs to be addressed globally, not just in cities but around the world. Representatives of the green world are an incomparable force that affects the quality of atmospheric air. They are referred to as "oxygen factories" because they convert carbon dioxide into oxygen. Studies show that one spruce produces enough oxygen for 10 people a year. This shows that biodiversity in cities, especially tree care, is important and crucial for human life. In another study, the facade of a multi-storey house was renovated in a modern look, while the second building has a simple facade but is surrounded by trees. The results of the observations showed that the atmospheric air around the multi-storey house built on a simple facade was twice as clean as that of a building built on a modern facade (**Figure 3**). Trees help to contest global warming by absorbing carbon dioxide, removing and storing carbon while releasing oxygen back into the air.

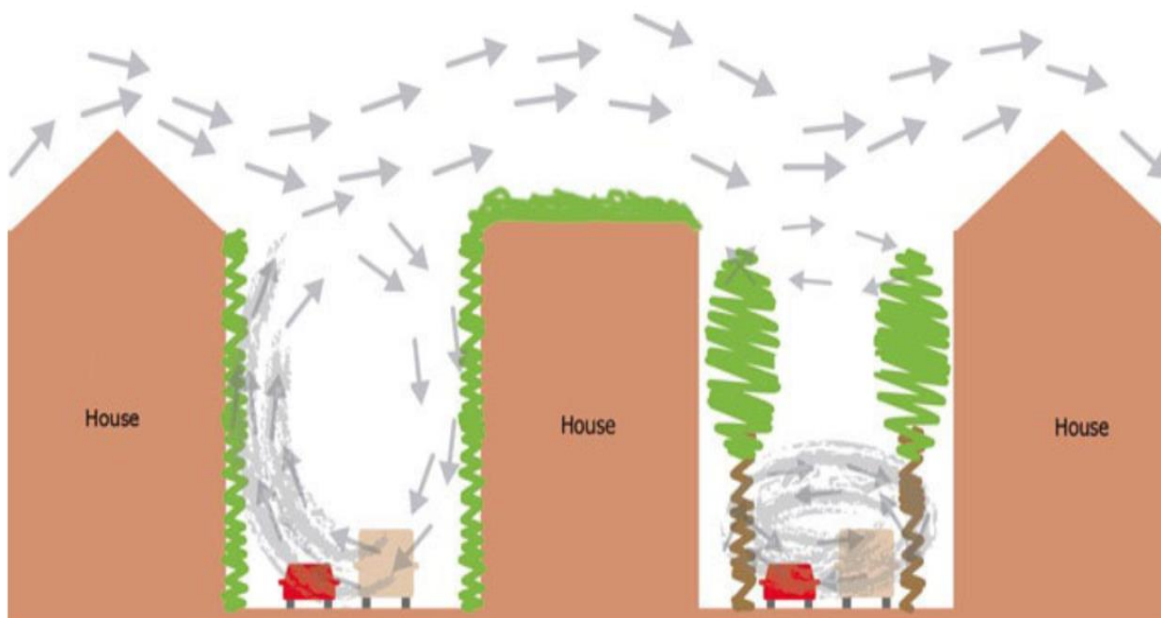


Figure 3: Based on analysis by Marc Ottel , Delft University of Technology

The 79th goal of the Decree of President Sh. M. Mirziyoev on the Development Strategy of the Republic of Uzbekistan for 2022 - 2026 dated 28th of January, 2022, is elimination of existing environmental problems that harm the health of the population and the gene pool, which states:

1. Sampling and analysis of 685 sources of pollution of economic entities (301 atmospheric air objects, 150 soil polluting objects and 234 sewage objects) within the framework of environmental monitoring.
2. Inclusion of monitoring results in the electronic database of state monitoring of the environment.
3. Entering data from the electronic database of state monitoring of the environment into the Single Geoinformation Database.

Objective 80: Ecology and environmental protection, in terms of improving the environmental situation in cities and districts, the implementation of the national project "Green Space", the following is planned: Organize planting of 125 million bushes in spring 2022 and 75 million bushes in autumn. Introduction of a system of storage and care of planted seedlings. Attach the planted seedlings to the organization and introduce a system of issuing

extracts from the "tree register". As part of the nationwide project "Green Space", the International Center for Molecular Allergology will establish a system of pollen monitoring of the relationship between the pollination of allergenic plants, clinical exacerbations of allergic diseases (rhinitis, bronchial asthma), including: Constant monitoring of allergen potential of plants on the basis of Lanzoni (pollen cap) installed in two areas of Tashkent by aerobiological and multiplex allergochip method; Regular aerobiological monitoring based on the installation of pollen traps in eight regions of the country; Develop a proposal for allergen-free seedlings when planting trees in cities. In order to improve the material and technical base of analytical laboratories in the system of the State Committee for Ecology and Environmental Protection, it is planned to increase the provision of analytical laboratories of the Republic of Karakalpakstan, regions and the city of Tashkent with laboratory furniture, measuring instruments and mobile laboratories [12]. It should be noted that in order to reduce the negative impact of industrial and manufacturing enterprises, transport and other factors on human health, the natural environment, the following should be done:

1. For a healthy environment, great care should be taken not to exceed the permissible levels of pollutants in the air,
2. Use of landscaping trees, bushes and lawns in the formation of sanitary zones (1000, 500, 300 meters) around industrial enterprises,
3. Planting of high dust-resistant trees on the parts of existing roadways, highways or other roads where traffic lights are located,
4. Establishment of trees, green walls, suitable for this condition, based on the natural and ecological conditions of each area,
5. Transition to safe modes of transport,
6. Waste water treatment in various ways and added to water basins,
7. Application of modern technologies in maintaining the purity of the environment,
8. Training of highly moral and ecologically cultured personnel - improving the ecological condition of the environment while protecting nature,
9. In the protection of nature, it is necessary to pay attention to its aspects (health, economic, cultural, educational, aesthetic) among the general public, to carry out advocacy work.

Urban complexes in the Uzbekistan catchment are likely to experience climate change impacts within wide-ranging contexts: to urban services and technical infrastructure, to buildings and arrangement structures and to the urban economy or population. Impacts will diverge depending on the position of the urban complex: in different parts of Uzbekistan. Uzbekistan government should look for out ways of enabling forms of urbanization that contribute to growth, poverty reduction and environmental sustainability, moderately than encouraging (or discouraging) urbanization by itself.

Author contributions: KNK conceived and design of the study, data analysis and drafting the manuscript. NFL collected data and preform the analysis. The authors have approved the final form of the manuscript.

Conflict of interest: Both authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Data availability statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical issues: Including plagiarism, informed consent, data fabrication or falsification and double publication or submission have completely been observed by authors.

Author declarations: the authors confirm all relevant ethical guidelines have been followed and any necessary IRB and/or ethics committee approvals have been obtained.

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