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ХАБАРЛАРЫ

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН
Satbayev University

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IMPACT OF URBAN LANDSCAPE POLLUTION ON HUMAN HEALTH

Abstract. Some projects for prevention of the factors negatively affecting the environment and improvement of the ecological state have been realized and are presently going on in Azerbaijan and in the world. As a continuation of this work the renovation landscaping work has been carried out in Ganja and Mingachevir cities in our republic. A special attention was given to the good environment creation for the people to live in a clean environment in these cities which we note.

The article examines the impact of the medical and sanitary conditions of the landscapes of Ganja and Mingachevir on the health of the urban population, draws up a table and makes comparisons with other countries. The most common diseases and their causes have been identified in Ganja and Mingachevir. Identified diseases and ways to eliminate them based on their causes are also identified and reflected in the article. The article also compiles the maps of ecological risk zones of Ganja and Mingachevir. İn these maps, ecological risky zones of urban landscapes are grouped according to the degree of danger. Five ecological risk zones have been identified for both cities. At last it has been concluded that these statistics indicators have decreased with the improvement of the ecological conditions of cities.

Key words: urban landscapes, diseases, areas of disease spreading, ecological situation, ecological norms, optimization of landscapes.

Introduction. A man gets and uses from nature what is important for him-air, water, material blessings, raw materials for industry and so on. The natural landscapes have undergone serious changes as a result of spontaneous use of these resources for long years. This situation exacerbated in the period of scientific and technological progress. Increase of the world population, expansion of their need, increase in the exploitation of minerals, application of new technology and enlargement of production in the areas of energetics industry, agriculture, transport, anthropogenic change of the world landscapes, complication of the international farming relations are observed. These or other factors caused intensification of mutual relation of nature with society and increase of anthropogenic load for natural landscapes [13, 14].

Materials and research methods. Innovations of GIC technologies, historical-territorial, statistic-mathematic, comparison, cartography, zoning, systematic analysis and other methods and collected primary field research methods have been used in realization of the research work.

It is impossible to predict the preservation of the natural environment in a livable state, to make efficient use of natural resources without deep mastering ecological knowledge not knowing ecological balance, its complex and interconnected mechanisms [3, 8]. From this point of view the need and interest in solving landscape-environment problems and shortages in environmental protection grow [9]. The negative changes arrest attention in urban population's health. It is clear that use of the industrial waste with minimum impact on environment and human health must be the basis of nature protection measures. Realization of the appropriate measures must be selected on the basis of sensitivity of the environment, physico-chemical characters, amount, regeneration and use ability in the inhabited zones [2]. The areas of origin and spread of the diseases in the cities under study also correspond to ecologically dense zones.

Population morbidity in Ganja and Mingachevir by main disease classes in 2018 (patients registered for the list time, in person) [15]

Table 1.

Cities	Diseases					
	Diseases of the nervous system and sensory organs.	Diseases of the blood circulatory system	Diseases of the respiratory organs	Diseases of the digestive system	Diseases of the skin and subcutaneous tissue	Diseases of the muscular-skeletal system and connective tissues
Ganja	11944	8830	18578	4295	2091	2135
Mingachevir	2907	1020	6366	2449	78	-

Source: State Statistics Committee of the Republic of Azerbaijan [15]

The available statistics on diseases of Ganja and Mingachevir cities has been reflected on table 1. According to statistics of 2018 (334,0 thousand in Ganja, 105,4 thousand in Mingachevir) 3,64% of the population suffers from diseases of the nervous system and sensory organs in Ganja, 2,76% in Mingachevir, 5,66% in Ganja, 6,06% in Mingachevir, 1,30% in Ganja, 2,33% in Mingachevir, 0,64% in Ganja, 0,07% in Mingachevir, 0,65% in Ganja.

Research results. The calculations were based on the ratio of the number of people suffering from various diseases to the population number of that year. The analyses show that the highest index belongs to the diseases of the respiratory organs and diseases of the nervous system. The lowest index was observed on diseases of the skin. Mainly the respiratory and nervous diseases, partially blood circulatory diseases are atmospheric contamination and entering of pollutants the atmosphere many times above the norm [1]. Bone, muscular-skeletal system diseases and digestive system diseases are mainly related to the contamination with water and soil resources [5]. As, well, it causes disorder of noise norm in the urban environment and intensification, formation of nervous diseases. The fact that these diseases are more common in the study areas is due to the fact that the degree of population in the territory of these cities is many times higher than the permissible concentration.

Dynamics of maximal concentration of noxious substances in atmospheric air in the Ganja city (mg/m^3)

Table 2.

Indicators	norms (mg/m^3)	Years (mg/m^3)				
		2012	2013	2014	2015	2016
Dust	0,15	0,4	0,43	0,49	0,51	0,48
Sulfur gas	0,05	0,054	0.059	0.054	0.061	0.052
Nitrogen 4- oxide	0,04	0,23	0.06	0.05	0.06	0.05
Nitric 2 oxide	0,06	0,04	0.04	0.05	0.04	0.05
Hydrogen sulfide	0,003	0,008	0.004	0.004	0.004	0.003
Hydrogen fluoride	0,005	0,009	0.009	0.009	0.009	0.009

Source: The Ministry of Environment and Natural Resources of Azerbaijan Republic [16]

The maximal concentration indicators of noxious substances in the atmosphere the Ganja city are reflected on table 2.

The density indicators were 2,7 times more than the permissible concentration norm of dust in 2021; 2,9 times more in 2013; 3,3, times more in 2014; 3,4 times more in 2015; 3,2 times more in 2016. An amount sulfur dioxide was more than the norm; 1,08 in 2012; 1,18 in 2013; 1.08 in 2014; 1,22 in 2015; 1,04 in 2016. A quantity of Nitric oxide 4 was more; 5,75 in 2012; 1,5 in 2013; 1,25 in 2014; 1,5 in 2015; 1,25 in 2016. An amount of Nitric oxide 2 was less: 0,3 in 2012; 0,3 in 2013; 0,2 in 2014; 0,3 in 2015; 0,2 in 2016. A quantity of hydrogen fluoride was more than the norm (1,8 times) in 2012-2016. Contamination of the air of the cities with pollutants many times more than the norm causes spreading of the skin and respitatary organ diseases among the people.

Maximal concentrations of noxious substances in the atmospheric air of the Mingachevir city (mg/m^3)

Table 3

Indicators	YVQH (mg/m^3)	years (mg/m^3)				
		2012	2013	2014	2015	2016
Dust	0,15	0.7	0,5	0,7	0,8	0.7
Sulfur gas	0,05	0.030	0,028	0,020	0,087	0.021
Carbon monoxide	3	4	5	5	5	6

Nitric 4 oxide	0,04	0.07	0,16	0,06	0,06	0.06
Nitric 2 oxide	0,06	0.12	0,05	0,05	0,05	0.04
Phenol	0,003	0.009	0,009	0,009	0,009	0.009

Source: The Ministry of Environment and Natural Resources of the Azerbaijan Republic [16].

The maximal concentration indicators of noxious substances in the atmosphere of the Mingachevir city on 2012-2016 years were reflected on table 3. These indicators were more than the permissible concentration limit norm of dust in Mingachevir; 4,7 in 2012; 3.3 in 2013; 4.7 in 2014; 5,3 in 2015; 4,7 in 2016. The sulfur dioxide was less than the norm: 0,4 in 2012; 0,44 in 2013; 0,6 in 2014; but it was 1,74 times more in 2015; 0,58 times less in 2016 again. Carbon monoxide was more: 1,3 in 2012; 1,7 in 2013-2015; 2 in 2016. Nitric oxide 4 is more: 1,75 in 2012; 4 in 2013; 1,5 in 2014-2016. Nitric oxide 2 times more than the norm in 2012; 0,2 in 2013-2015; 0,3 times less in 2016. Phenol was 3 times more than the permissible concentration limit in 2012-2016. An analysis of both tables shows total and different aspects in the atmospheric contamination of Ganja and Mingachevir cities.

Pollutants emitted into the atmosphere of the country's cities in 2018 by road transport (thousand tons).

Table 4

Cities	Total (thousand tons)	Form them		
		Carbon oxides	Nitric oxides	Carbon hydrogens
Ganja	30,3	20,5	2,6	6,9
Mingachevir	24,2	20,5	0,6	2,7

Source: The Ministry of Environment and Natural Resources of the Azerbaijan Republic [16].

Pollutants emitted into the atmosphere air by the automobile transport in Ganja and Mingachevir were reflected on table 4. Increase of the number of automobile every year and pollutants emitted into the atmosphere are important factor in air contamination of the research cities. While comparing the indicators, it is determined that these statistics are at a more dangerous level in Ganja.

The number of automobiles on research zones.

Table 5

Country, regions and cities	Years							
	1990	1995	2000	2005	2010	2015	2018	2019
Country	398761	392165	438626	612069	982553	1322610	1370574	1418404
Ganja-Gazakh	48663	60205	63348	70673	90925	130102	150136	156092
Aran	81533	82337	80705	81163	95404	140149	177834	189115
Ganja	13834	14734	17895	24848	34530	43498	45269	46340
Mingachevir	5112	4614	4345	4611	6121	9049	10174	10717

Source: The Ministry of Environment and Natural Resources of the Azerbaijan Republic [16].

The number of automobiles regularly grew since 1990 expect for 1995. The cities of Ganja and Mingachevir which are the research area, have developed in proportion to the developed dynamics of the region within the economic geographical region to which they belong.

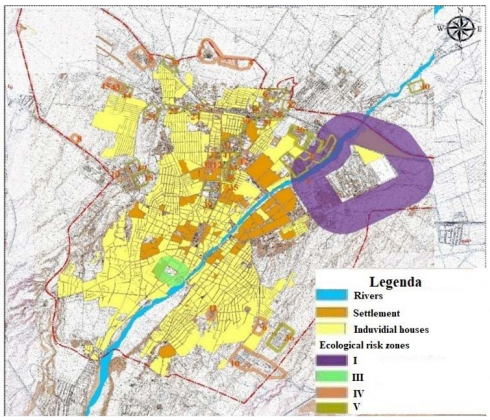

Fig. 1. Ecological risk zones of Ganja

The ecological risky zones of the urban landscapes are grouped for the riskness degree. Five ecological risk categories are distinguished:

1. With a radius of 1000-2000 m;
2. With a radius 1000-500 m;
3. With a radius 500-300 m;
4. With a radius 300-100 m;
5. With a radius less than 100 m.

This group belongs to 4 risky zones: one, three, four and fifth group (Fig.1.).

There are 4 zones in the chain of ecological risk category in Ganja, and 3 zones in Mingachevir. The reason for its large number is due to the fact that Ganja is the largest city in the country which leads to the fact that the urban landscapes in Ganja occupy more area than Mingachevir (here the exact figures must be added in connection with the industry). Such zones form 20% of the total area of the city. On the contrary, they are 1,4/110, 6/100. Three of the ecological risk zones belong to the first, second and fourth groups in Mingachevir (Fig 2). So, fulfilment the measures which are optimized with the scientific methods of geosystems considering the available condition in Azerbaijan is a main method to achieve resistant social-economic and ecological condition [4].

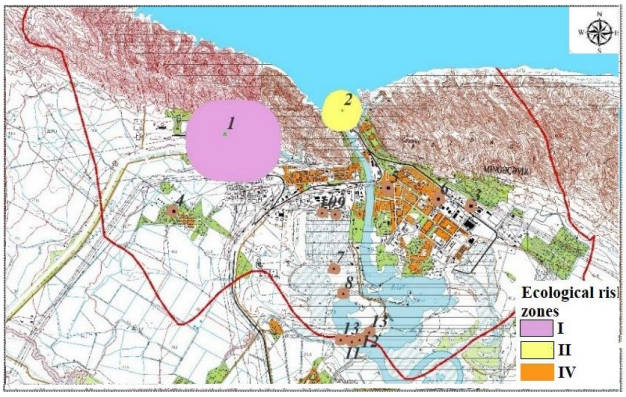

Fig. 2. Ecological risk zones of Mingachevir

Discussions. The parks in the city center are better for people who can't afford to go out town than the parks on the outskirts. The outskirts in London are surrounded with "Green belt". At present numerous pathologies are observed in such big cities. Depending on the intensity and frequency of the sound, it causes headaches, tinnitus, hearing loss, insomnia and even deafness, general phychological distress and serious gastrointestinal, brain, nerve and heart diseases. The street noise causes 80% migraine, 52% memory disorders [12]. One on five patients (20%) in a psychiatric clinic in France is diagnosed with noise [11]. In New York noisy neighborhoods have been found to slow down children's height and weight growth. The noise leads to aging and shortened life expectancy by 8-12 years, as well as aggression, suicide and crime. But the air contamination forms mental activity, imporing vision, asthma, dizziness, nausea, memory loss, bronchitis, lung cancer.

According to the researches in Great Britain the cancer mortality rate is higher in densely populated areas [7]. Release of toxic substances from cars manifests itself in rapidly increasing cardiovascular, cancer, lung and other diseases. Contamination of the city air with lead is especially dangerous [8]. This element which enters the human's organism by the car gas, accumulates there and affects the hematopoietic centers in the bone marrow, nervous system. The English scientists defined that police officers who regulate street traffic are four times more likely to develop lung cancer than the people who work in the fields [8]. Heavy metals and a number of gaseous compounds from the exhaust gases of cars fall to the surface of plants, from where they pass though the leaf and root systems to the plant, resulting in the poisoning of the landscape with the toxic chemical elements [1]. As a result, the same noxious components fall in the human's organism, destroy cells of the nervous system, cause human (especially child) death. For example, the number of the infant mortality up to 1 year was 31 in Ganja in 2018, but it was 16 in Mingachevir.

The researchers determined that skin disease is related to carbon dioxide in Los-Angeles, but the others defined that this disease is related to atmospheric dust (the experiment was performed on mice) in Paris [6]. Some researches proved that the percentage of chronic bronchitis among men aged 40-60 is 13% in large cities and 6% in small cities [11]. Loss of greenery creates conditions for the people's reflexes weakening

and growth of the number of street and work accidents. 54% of French, 40% of Americans and 39% of Dutch don't leave the city during the holidays, they spend their time in the rest centers and parks of the city. Landscaping is more important and urgent than construction. The man needs more trees, plants and grass than concrete, stone and asphalt [9]. Self-restoration of the natural environment and measures to improve the environment are separate components of the most important work to be done in cities. It is very important to clean the changed and spoiled natural landscape complexes from pollutants [10].

Definitions of resort work in state policy conception are more precisely defined. The activity of balneology occurs the sides of prophylaxis on the basis of activity medical treatment stocks, organization and implementation of treatment and rehabilitation, study of their composition and impact mechanism, complex measures on study of their composition and impact mechanism, organization, construction, management of resort, the citizen's treatment and provision of cultural and household services, and all the kinds of scientific-practical activity on resorts' sanitary protection [5].

One or some natural treatment factors can be available in the resort place depending on geographical location and a feature of the climate condition. The most common type of climate resorts are seaside resorts. The sea climate positively affects prevention of numerous diseases. It possesses healing effect in blood diseases, bone tissue, lymph node diseases [4]. Recreation – this is a restoration of the man's strength spent on labour process. Bioclimate – is a factor which identifies an impact of climate on human's organism. Unlike bioclimatic parameters the meteorologic parameters usually have a complex effect of air masses on the human body (temperature, air humidity, wind velocity, atmospheric pressure and so on). A main impact of the climate on human organism is a climate forming factor. The absolute stipulation of fitness of natural recreation resources consists of suitability of the ecological situation of the nature and environment. The climate features of the seashores depend on geographical location, landscape of shore and wind velocity. The hot and dry climate (or humid) of the south latitude has a healing feature [4]. The fresh air with microcrystal salt restores nourishing of the human skin, stimulates secretor and excretory functions, regeneration processes in different organs. The rhythmic sound of the waves crashing on the shore, the sea air rich in bromides and iodides restores the ratio of delay-excitation processes in the cerebral cortex. This process is called thalassotherapy. It is expedient to implement it in Mingachevir. In order to improve the ecological situation in Ganja, it is possible to implement by expanding the park areas by laying green belts surrounding the central parts of the city and those central zones in connection with the suburbs. The available statistics prove that it is scientifically necessary to expand serious optimization steps in research cities. The experience of building such parks is typical for the European region and cities. Therefore, parks are being built both in the interior and on the outskirts of cities.

Conclusion. It was determined that according to the level of tension in the ecological condition of the landscapes of Ganja and Mingachevir, the study area, various diseases occur in the city and these diseases are more widespread among the urban population. The statistical indicators and percentage ratio were identified in the number dynamics of the diseases and they were scheduled.

The measures which can have a positive influence on the landscapes of both cities to improve the existing environmental conditions of urban landscapes for the proper analysis and implementation were offered in the article.

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ҚАЛА ЛАНДШАФТЫНЫҢ ЛАСТАНУЫНЫҢ АДАМ ДЕНСАУЛЫҒЫНА ӘСЕРІ

Аннотация. Қазіргі уақытта Әзірбайжанда және әлемде қоршаған ортаға теріс әсер ететін факторлардың алдын алу және экологиялық жағдайды жақсарту бойынша әртүрлі жобалар жүзеге асырылуда. Осы жұмыстардың жалғасы ретінде республикамыздың Гянджа және Мингачевир қалаларында абаттандыру жұмыстары жүргізілді. Бұл қалаларда халықтың таза ортада өмір сүруі үшін қолайлы ортаның жасалуына ерекше көңіл бөлінді.

Мақалада Гянджа мен Мингачевир ландшафттарының медициналық-санитарлық жағдайының қала тұрғындарының денсаулығына әсері зерттеліп, кесте құрастырылып, басқа елдермен салыстырулар жасалған. Ең жиі кездесетін аурулар мен олардың себептері Гянджа мен Мингачевирде анықталды. Анықталған аурулар мен олардың себептеріне қарай оларды жою жолдары да анықталып, мақалада көрсетілген. Мақалада Гянджа мен Мингачевирдің экологиялық қауіпті аймақтарының карталары да құрастырылған. Бұл карталарда қалалық ландшафттардың экологиялық қауіпті аймақтары қауіптілік дәрежесіне қарай топтастырылған. Екі қала үшін бес экологиялық қауіпті аймақ анықталды. Ақырында бұл статистикалық көрсеткіштер қалалардың экологиялық жағдайының жақсаруына байланысты төмендеді деген қорытынды жасалды.

Түйінді сөздер: қала ландшафттары, аурулар, аурудың таралу аймақтары, экологиялық жағдай, экологиялық нормалар, ландшафттарды оңтайландыру.

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ВЛИЯНИЕ ЗАГРЯЗНЕНИЯ ГОРОДСКОГО ЛАНДШАФТА НА ЗДОРОВЬЕ ЧЕЛОВЕКА

Аннотация. Некоторые проекты по предотвращению факторов, негативно влияющих на окружающую среду и улучшению экологического состояния, были реализованы и в настоящее время реализуются в Азербайджане и в мире. В продолжение этой работы проведены работы по благоустройству территории в городах Гянджа и Мингячевир в нашей республике. Особое внимание было уделено созданию благоприятной среды для проживания людей в чистой окружающей среде в этих городах, что мы отмечаем.

В статье исследуется влияние медико-санитарных условий ландшафтов Гянджи и Мингячевира на здоровье городского населения, составляется таблица и проводится сравнение с другими странами. Наиболее распространенные заболевания и их причины выявлены в Гяндже и Мингячевире. Выявленные заболевания и способы их устранения с учетом их причин также выявлены и отражены в статье. В статье также составлены карты зон экологического риска Гянджи и Мингячевира. На этих картах экологически опасные зоны городских ландшафтов сгруппированы по степени опасности. Для обоих городов выделено пять зон экологического риска. Наконец, был сделан вывод, что эти статистические показатели уменьшились с улучшением экологического состояния городов.

Ключевые слова: городские ландшафты, болезни, районы распространения болезней, экологическая ситуация, экологические нормы, оптимизация ландшафтов.

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