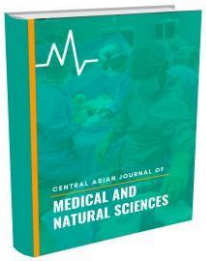

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Article

Environmental Assessment of Transport Noise in the City of Samarkand and Its Impact on the Human Body

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Abstract: This article describes the results of scientific observations on one of the main problems of cities: car noise and its impact on the environment. The level of road noise at Registan Square, Siab Market on Rudaki Street, tram crossing on Rudaki Street, Medical University on Shakhrukh Mirzo Street, Mirzo Ulugbek Street in the city of Samarkand was determined in decibels and compared with the State Standard. In our country, the problem of ecology in the conditions of modern cities is becoming more acute every day, therefore, the study of the urban environment and the reduction of the impact of various man-made resources on it remains a relevant topic. In addition, noise has a negative effect on the auditory and nervous systems of the human body, in addition to increased blood pressure, dilated pupils, gastrointestinal disorders, heart rate and blood pressure, insomnia, and hearing loss. Exposure to high-frequency noise reduces labor productivity by 10-15%, causes hearing failure and deterioration of the general health of a person. Nowadays, city dwellers face the inconvenience of constant and periodic noise at any time of their daily lives: at work, in transport, during leisure and tourist trips, and even during sleep. As was emphasized, the identification of noise sources in the city of Samarkand, the development of measures for their standardization, and the creation of a map of noise sources in the city are of current importance.

Keywords: noise, acoustics, urbanization, decibel, transport, Rudakiy, Mirzo Ulugbek, infrasound, ultrasound

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1. Introduction

Nowadays, car noise is relevant, and every resident faces this problem. First of all, this is due to the development of socio-economic relations, the development of transport routes, industrial and communal facilities and other technical structures that contribute to noise pollution. People live in conditions of road noise, the level of which exceeds 65 dB daily, the noise level of less than 60 dB is safe for hearing. Noise is one of the main harmful factors of modern cities, it cannot be touched, seen or handled. Sound is the perception by people using sound devices of mechanical vibration of the external environment with a frequency of 16-20,000 Gs per second. High frequency sound is called ultrasound, and low frequency is infrasound. High-frequency sounds create noise. In the following years, as a result of technological development, various types of noise began to appear. According to data, over the next 50 years, the noise power in all cities increased by an average of 10-15 times. The annual increase in the number of different types of cars, buses, passenger cars and trucks leads to an increase in noise levels in cities. According to literary sources, the maximum noise level on the main streets of cities is 85-90 dB [1].

In the modern conditions of globalization, urbanization processes are intensifying, the number of cities and their scale are constantly growing. As a result, it is the focus of various studies and observations, since it has been proven that constant noise pollution of urban areas has a significant impact on human health and labor efficiency. It is evident that the negative impact of noise on people increases, if measures to regulate it are not taken into account, this can cause social and economic damage not only to people, but also to the environment [2].

Noise pollution is currently the focus of various studies and observations due to its proven significant impact on human health and work efficiency. Noise in big cities shortens human life. Excessive noise can cause nervous exhaustion, mental depression, vegetative neuroses, gastric ulcer, endocrine and cardiovascular system disorders. Noise disrupts people's work and rest, reduces labor productivity [3].

The environment of a modern big city is very different from the environment of natural ecological systems. Noise seriously worsens the living environment of a big city, and as a result of industrial development and modern lifestyle, noise sources are increasing every day, causing inconvenience and discomfort to the mental and physical health of people, so studying the problem is relevant [4].

One of the factors that causes great harm to human health is noise as an environmental problem. Today it is difficult to find a place that is not exposed to noise. Noise in urbanized cities causes many nervous diseases and worsens the psychological state of a person. In the modern age of science and technology, it can be said with confidence that noise is one of the factors that disrupt the ecological balance of the atmosphere.

It is clear that the largest source of noise in cities is transport noise, which accounts for 80% of all sources of municipal noise [5].

Although the development of industry and production, the increase in the number of vehicles serve to improve the living conditions of the population, the increase in the noise they produce also causes discomfort. The influence of transport noise is especially strong in the recreation areas of large cities, in public places where there are many people, in tourist areas, in residential areas. If you look at the world, now every fifth mental illness is caused by noise [6,7].

Purpose of the study:

Research of transport noise in the city of Samarkand, the impact of vehicle noise on the environment and the human body and its consequences.

2. Materials and Methods

During the research, the document of the Interstate Council for Standardization, Metrology and Certification (ICS) Interstate STANDARD, GOST 20444-2014 "Noise, Transport flows, Methods for determining noise characteristics" (ISO 1996-1:2003, NEQ), (ISO 1996-2:2007, NEQ), Standard information of the city of Moscow 2015 defines methods for measuring the noise characteristics of these standard vehicles, and these methods were used in the article. To determine the dangerous noise level and its impact, it is measured in decibels (dB) using a special device called "Sound Meter" (Ecophysics - noise meter). Noise meter, vibration meter, sound level measurement, sound equivalent, sound and frequency analysis in the infrasound and ultrasonic range, vibration acceleration levels, frequency analysis in the general and local vibration ranges. Noise measurements were taken on roads with constant noise near residential areas. Measurements were taken at different intensities and densities of vehicle traffic [8,9,10].

3. Results and Discussion

The measurements were taken on city roads where the main noise of the city is high. A total of 12 points were measured on University Avenue, Dagbitsky Street, Rudakiy Street, Mirzo Ulugbek Street, Registan Street and Shakhrukh Mirzo Street. The noise level on these streets was higher than the reference standard. According to GOST, the noise level of motor vehicles is 60-65 dB. But the noise index reached 80-85 dB on Dagbitisky Street, 75-80 dB on Rudakiy Street and 70-81 dB on Mirzo Ulugbek Street. This indicator is very high on Dagbitisky and Mirzo Ulugbek Streets (Figure 1).

There are sound limitations that negatively affect a person's mood and activity, and we will touch on some of them. If a space rocket makes 150-170 decibels of noise before takeoff, a truck or bus - 80-90 decibels, a tram - 80 decibels, the sound of a tractor 15 meters away or a car passing you - 70, and the metro during crowded times - 90-100, the sound of an airplane landing or taking off at a distance of one kilometer - 100 decibels. A sound of 130 decibels causes pain in the human body. At 150 decibels, a person loses consciousness. At 180 decibels, metal begins to disintegrate, such a strong sound kills a person immediately.

At the research sites, vehicle noise levels were determined along the research contour and the results were recorded for 5 minutes, 50 meters before or after the intersection, by setting the device at a height of 7.5 meters and at a height of 1.5 meters above the ground for 10-15 minutes (Table 1).

(https://yandex.com/maps/10334/samarkand/?ll=66.965851%2C39.651421&mode=usermaps&source=constructorLink&um=constructor%3Ae311ee1ca5fb0836f16da3b83053e3b18fc2ebac606b4ad651d449f73f7d37b0&z=16).

Table 1. Indicators of the level of road traffic and noise generated in the city of Samarkand

No	Research sites	Number and type of vehicles at first measurement				Number and type of vehicles in the second measurement				Number and type of vehicles in the third measurement			
		Max	Leq dBA	Easy	Heavy	Max	Leq dBA	Easy	Heavy	Max	Leq dBA	Easy	Heavy
1.	University Avenue (Continental, Hotel)	79	74	124	6	77,4	68,7	102	4	76,3	66,5	103	7
2.	University Avenue (SamSU Physics)	77,3	70,5	95	5	85,5	73,9	116	4	75,1	70,6	124	6
3.	In front of Registan Square	71,9	64,3	98	11	72,8	64,1	106	6	73,4	61,0	93	4
4.	Registan "Labi g'or"	77,5	71,0	150	10	77,4	69,6	161	11	72,4	69,6	182	11
5.	Bustansaray street	67,8	64,2	87	4	67,6	65,3	94	2	68,1	66,2	105	3
6.	Registan street	80,4	71,6	236	8	75,2	68,7	229	4	76,6	70,3	322	6
7.	Rudaki street, Siab market	85,3	73,3	263	25	81,5	71,7	252	44	88,0	74,8	308	34
8.	Tram crossing on Rudaki street	76,8	69,6	259	22	77,4	71,0	249	35	78,2	70,8	295	30

9.	SamSM University, Shokhrukh Mirzo street	75,7	64,5	123	2	79,2	65,2	110	5	67,2	64,1	97	6
10.	Mirzo Ulugbek Street CDS	87,1	72,0	239	7	75,8	71,1	262	13	74,6	71,0	210	13
11.	University Avenue (Namazgokh Street)	71,1	66,6	209	2	70,5	67,4	226	4	76,9	68,3	220	11

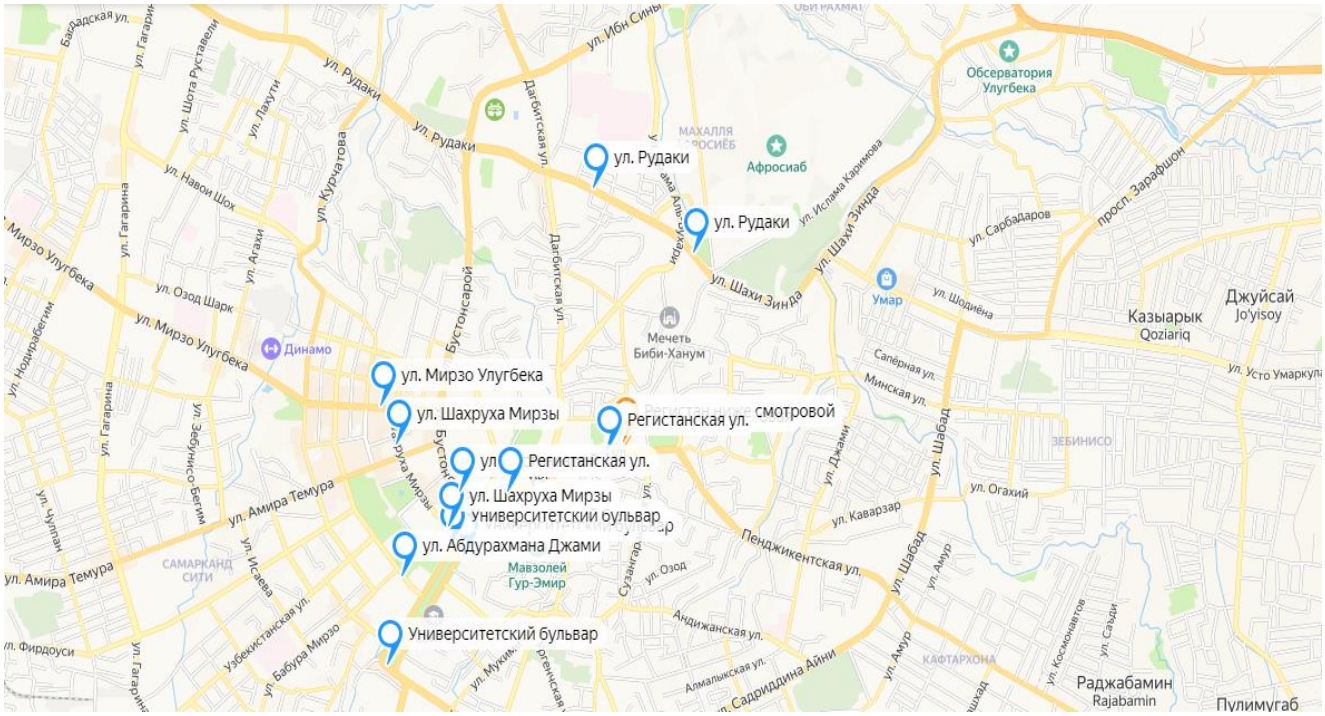

Figure 1. Points where research and measurements were carried out in the city of Samarkand

The impact of noise on human health can be grouped as follows:

- Physical consequences (e.g. temporary or permanent hearing loss)
- Physiological effects (e.g. increased blood pressure, rapid breathing, circulatory problems, slow heart rate and sudden reactions)
- Psychological impact (e.g. excessive nervousness, stress and various behavioral disorders)
- Performance (e.g. decreased productivity, lack of concentration, slow movements)

In cities, the noise impact of distribution sources is always considered local, the noise from cars is strong and persists for a long time, the share of noise from motor transport (80-85%) is the greatest inconvenience for residents compared to industrial and domestic noise. When collecting data and researching, the Noise Meter-Ecophysics 110 A determines the level of noise sources, which consists of the following housings: Figure: 1) microphone 2) housing 3) screen 4) control buttons (Figure 2).

Figure 2. The territory was surveyed using the Ecophysics 110 A device (noise meter)

Considering the above, it is important to study the noise pollution of the city of Samarkand by motor vehicles and its significance.

According to the data provided, traffic noise in the city of Samarkand is associated with the daily increase in the number of cars, which, in turn, is associated with the congestion of the city streets.

To reduce road noise in the city of Samarkand it is necessary:

- Development of events with noise reduction effect, development of urban programs and schemes for development of urban transport systems;
- Discussion of issues related to changes in noise conditions during the development of targeted urban programs in Samarkand;
- With the introduction of the "green transport" system, taking into account the fact that motor transport also produces noise, vehicles are classified into "low-noise", "medium-noise" and "high-noise" environmental categories, marked with "green", "yellow" and "red" colors;
- Implementation of the use of noise-absorbing road surfaces during construction, reconstruction and major repairs of highways;
- Development of a system of restrictive measures for the night movement of vehicles (for example, motorcycles and heavy trucks) within certain types of urban settlements;
- The use of noise reduction technologies in the reconstruction and construction of tram tracks, as well as the phased replacement of trams;
- Monitoring compliance with external requirements for vehicle noise levels and inspection of vehicles during state inspection;
- Planting of bedding and flowering plants and trees around roads;
- Underground roads should be organized in such a way as to reduce traffic noise.

4. Conclusion

According to scientific sources, people staying in a noisy environment for several hours causes a decrease in labor activity, maintaining its negative effect for several days. So, according to simple calculations, we can say that being at noisy weddings and in public places once a week leads to a decrease in productivity in future work.

Based on the results of our research, the noise level in the city of Samarkand and its negative impact on the environment were studied.

Based on this, many positive events are being held in our republic, including to a certain extent limiting the sound of music in restaurants and wedding halls, equipping them with sound-absorbing devices, reconstructing motorways and transport roads, implementing actions and events, such as reducing the noise level of industrial and manufacturing enterprises or introducing new modern technologies, are of great importance for human health and its interests.

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