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Environmental Protection Against Pollution by Domestic Drain in Uzbekistan

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Introduction

Domestic wastewater is an important, from an environmental point of view, sources of pollution of water bodies in the country. They usually account for up to 30 percent of all wastewater discharged into reservoirs [1].

Literary sources indicate that, the efficiency of currently used sewage treatments according to the total number of bacteria is: for sand traps 10-12 %, for septic tanks 25-75 %, for biological filters 80-95 %, for aeration tanks 90-98 %, after chlorination to 99 % [2].

In Uzbekistan, the lack of effectiveness of sewage treatment plants is usually associated with technical defects that were made during construction or violations of the rules of their operation. In such cases, the absolute values of most biological contaminants after cleaning remain above the maximum permissible concentrations established for them [3]. Poor-quality disinfection of domestic wastewater is characterized by a high degree of microbiological contamination: coli index is 10⁵-10⁷, pathogenic enterobacteria and enteroviruses are detected in the waste liquid [4].

The provision of rural population with sewage systems as of 02.01.2017 is 5.1%, i.e. 94.9% of rural residents for domestic waste water (water from showers, kitchens, laundry and sewage) use domestic cesspools. Sewage pollutes surface water and groundwater, which are sources of drinking water supply, contain organic, mineral substances, heavy metals, pathogenic intestinal microflora [5, 6]. Environmental pollution by household wastewater leads to the development of cancer and infectious diseases, the intensive indicators of which in the rural population significantly exceed those of the urban population [7].

The purpose of the research was to make an ecological and hygienic assessment of the effectiveness of the functioning of sewage systems in Uzbekistan and to develop recommendations for the protection of the environment from pollution by household wastewater.

Methodology

The study of materials of sanitary-technical efficiency of sewage systems, performed by units of the Ministry of Public Services of the Republic of Uzbekistan in the period 2014-2018, as well as territorial bodies of sanitary and epidemiological supervision of the Ministry of Health of the Republic of Uzbekistan are included in the research.

Evaluation of sewage systems was carried out in accordance with SNiP 2.04.03-97 "Sewerage, external networks and facilities"; SanPiN RUz №0129-02 "Hygienic requirements for sewerage systems in the conditions of Uzbekistan".

Results.

It was established that in the Republic of Uzbekistan as of 02.01.2018 there are 12,216 settlements, of which 119 cities, 1085 urban-type settlements (UTS) and 11,012 villages. From 119 cities, 79 have centralized sewerage systems, 53 have sewage out of 1,085 urban-type settlements, and 51 are sewed out of 1,1012 rural settlements. The provision of sewage systems in the republic as a whole in cities is 66.4 percent, in urban-type settlements 4.9 percent and in rural settlements 0.5 percent (Figure 1). In the republic as a whole, 17 % of the population use centralized sewage. The population of the sewers is 8335 thousand people. Of these, 3990 thousand people are connected to sewerage systems, which is 47.9 %.

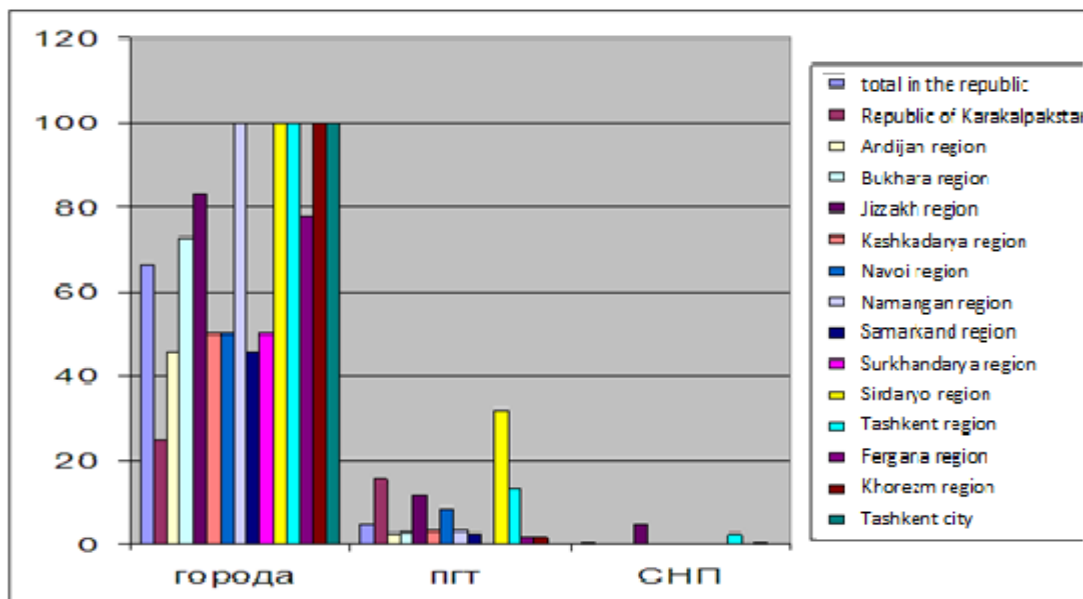


Figure 1. Provision of cities, urban-type settlements and rural settlements with sewerage, %

The provision of a number of cities and villages with sewerage systems is presented in Figure 2, from which it follows that in the republic as a whole only 132 of the 1204 cities and towns of urban type are provided with sewerage systems.

Tashkent, Syrdarya, Namangan and Fergana regions are in the best position. In the Tashkent region, 29 cities and urban-type settlements of the total number (113) are covered by centralized sewers. In the Syrdarya region, the ratio is 13 out of 30, in the Namangan region 12 out of 128 and in the Fergana region 11 out of 206.

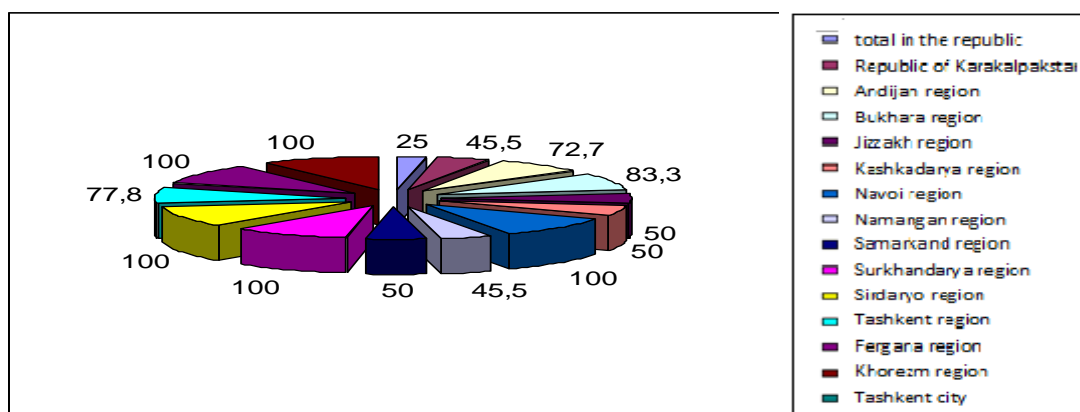


Figure 2, Level of sewage coverage of regions of the republic, %

Khorezm region is in the worst condition, in which only 4 out of 61 cities and urban-type settlements have sewage systems. The same situation is observed in the Surkhandarya region, where out of the 122 cities and urban-type settlements, only 4 have sewage systems.

Tashkent city, cities of Tashkent region, Namangan, Syrdarya and Khorezm regions are fully covered by sewerage systems. Karakalpakstan is in the worst position - 25 % of the provision of sewage, Andijan and Samarkand regions - 45.5 %, Navoi region - 50 % of coverage.

Rural settlements are in distress. So, the percentage of sewage coverage in rural areas throughout the country is only 0.5 %, including 4.6 % in the Jizzakh region, 2.5 % in the Tashkent region, 0.4 % in the Khorezm region, 0.3 % in the Kashkadarya region, and in other areas: Surkhandarya, Namangan, Andijan, Fergana, Navoi, Syrdarya, Bukhara, Samarkand and the Republic of Karakalpakstan there are no sewage systems.

It was established that in 2017, throughout the country, 904.5 million m³ of wastewater was passed through the sewer network, of which 897.6 million m³ in cities and 6.8 million m³ in villages (Table 1).

Table 1. The functioning of sewage systems in Uzbekistan (million cubic meters / year)

№	Region	Missed sewage			From the population			In percents	
		Total	city	village	Total	city	village	city	village
	Total in the republic	904,5	897,6	6,8	391,1	388,9	2,2	43,3	31,6
1	Republic of Karakalpakstan	6	6	-	2,2	2,2	-	36,6	-
2	Andijan	15,2	15,2	-	0,1	0,1	-	0,5	-
3	Bukhara	13,3	13,3	-	8,8	8,8	-	66,8	-
4	Jizzakh	4,4	4,4	-	2,8	2,8	-	63	-
5	Kashkadarya	7,3	7,1	0,1	6,8	6,6	0,1	92,9	100
6	Navoi	44,4	44,4	-	16,6	16,6	-	37,4	-
7	Namangan	23,1	23,1	-	9,3	9,3	-	40,2	-
8	Samarkand	29,6	29,6	-	18,6	18,6	-	62,8	-
9	Surkhandarya	8,7	8,7	-	3,7	3,7	-	42,4	-

10	Sirdarya	10,1	10,1	-	8,2	8,2	-	80,6	-
11	Tashkent	79,1	72,4	6,7	28,6	26,6	2	36,7	30,2
12	Fergana	95,4	95,4	-	46,3	46,3	-	48,6	-
13	Khorezm	4,7	4,7	-	2,8	2,7	-	59	67,5
14	Tashkent city	563,2	563,2	-	236,4	236,4	-	42	-

Wherein only 391.1 million m³ of cubic meters / m are generated from the population, of which 388.9 million m³ from cities and 2.2 million m³ from villages. As a percentage of the total volume of waste flow through the sewage system, urban wastewater accounts for 43.2 % and rural wastewaters for 31.6 %. In terms of regions, sewage systems are used to the greatest extent in regional cities, where almost full coverage takes place. The sewage system capacity is used in the republic at the level of 59 %, in the city of Tashkent 81 %, and in the other cities 34% on average.

Analysis of the data points that the work of sewage systems in the country is unsatisfactory. The amount of wastewater entering the sewer network in the republic is 2,007.3 million m³ / year, of which 1,758.8 million m³ / year goes to the city network, and 348.7 million m³ / year to the villages' network. In terms of regions, the largest volume of wastewater flows into the sewer network in Tashkent city of 811.8 million m³ / year and in Navoi Oblast 219.5 million m³ / year.

It has been established that the efficiency of sewage systems in the republic and in the context of the regions does not meet the hygienic requirements (Figure 3).

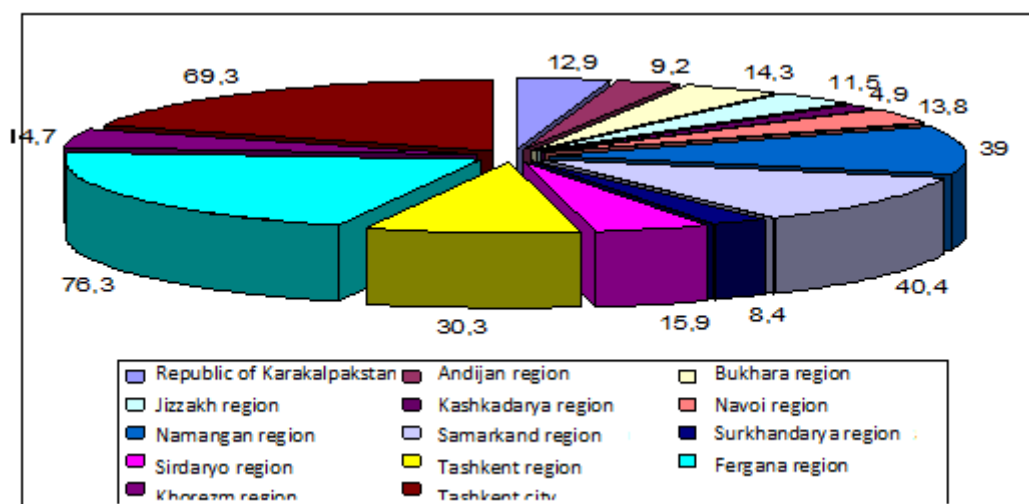


Figure 3. The amount of treated wastewater discharged to the treatment plants, %

So, if the total volume of wastewater entering the sewage network of the whole country is 2,007.3 million m³ / year, only 846.9 million m³ / year is discharged to the treatment plant. A similar dynamic of a significant difference between the amount of wastewater entering the sewer network and the volume of their treatment at

sewage treatment plants is observed in all regions, cities and especially villages of the republic. In general, in the republic, only 40.2 % of the wastewater of the total amount entering the sewer network is subjected to the treatment process.

Analysis of materials for the removal and discharge of wastewater from sewage systems shows that only in the city of Tashkent there is a complete discharge of wastewater, while this indicator is unsatisfactory in other regions of the republic, especially in rural areas. The minimum level of wastewater disposal is set for the cities of Surkhandarya region and is 40.6 %. In the Republic of Karakalpakstan, wastewater disposal is 93.5 %. The percentage of wastewater disposal in rural areas is 0.24 % in the republic as a whole, in the Kashkadarya region - 4.0 % and in the Tashkent region - 26 %. In rural areas of the remaining regions of the republic, wastewater is not diverted.

Based on the results of the research, recommendations have been developed for assessing the conditions for the formation and purification of domestic wastewater and the hygienic requirements of discharging them to environmental objects, which were sent to the Ministry of Health of the Republic of Uzbekistan for approval.

Conclusion

1. It has been established that in the Republic of Uzbekistan as of 02/01/2018 there are 12,216 settlements, of which 119 cities, 1085 urban-type settlements and 11,012 rural settlements. Among the 119 cities, 79 have centralized sewage systems, 53 out of 1,085 urban-type settlements, 51 have been sewed from 1,1012 rural settlements.
2. The provision of sewage systems in the republic as a whole in the cities is 66.4 %, in urban-type settlements 4.9% and in rural settlements 0.5 %.
3. Ecological and hygienic efficiency of sewage systems in the republic and in the context of regions is not satisfactory, since only 40.2 % (846.9 million cubic meters / year) of wastewater from the total amount (2107.3 million cubic meters / year) entering the sewer network is subjected to the treatment process.
4. The above materials indicate that there is a low level of coverage of the population with sewage systems, unsatisfactory efficiency of sewage treatment plants, the disproportion between water consumption and drainage.

Bibliography

1. Voronov Yu.V. Wastewater disposal and wastewater treatment. - M.: Publishing House of the Association of Building Universities, 2006.-702p.
2. Ilinsky I.I. Hygiene of rural water supply. -Tashkent Medicine, 1986.-159p.
3. Fayzieva D.Kh., Alimov F.B. Water factor and public health in a changing climate, Tashkent, 2011. // In collection. rep. scientific and practical conf. "Actual problems of hygienic science and sanitary-epidemiological service in Uzbekistan". - p.170-172.
4. Aitmetova K. Sanitary-bacteriological characteristics of the water of the Akhangaran river / Abstracts of the scientific and practical conference on topical issues of the biosphere. -Tashkent, 1985. - p.19.
5. Kutkovsky K.A. Types of wastewater and the main methods of analyzing pollutants. // Young scientist - 2013.-№9 -C.p.119 -122
6. Yakovlev S.V., Karelin Y.A. Wastewater and wastewater treatment. - M.: Stroyizdat, 1996.-59p.

7. Fayzieva D.Kh., Usmanov I.A. Issues of developing water safety plans (WSPs) in the conditions of Uzbekistan. // In the collection. rep. scientific and practical conf. "Actual problems of hygiene and sanitation in Uzbekistan." - Tashkent, 2012, p. 392-395.