



Modern Features of Water Supply to the Population of the Aral Region

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Annotation: *Supplying the housing stock with drinking water is a strategic task of the state to ensure the vital, sanitary and hygienic safety of the population. When selling water supply and sewerage products to the population, it is important not only to solve the problems of profitability of water supply and sanitation enterprises, but also to satisfy social needs.*

Keywords: *water supply, Aral Sea region, Khorezm, Khiva, Artesian wells, wells, GOST, Amu Darya.*

Abstract: *The supply of the housing stock with tap water of drinking quality is a strategic task of the state to ensure the vital and sanitary-hygienic safety of the population. When selling water supply and sewerage products to the population, it is important not only to solve the problems of profitability of water supply and sanitation enterprises, but also to meet the needs of a social nature.*

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Speaking about the peculiarities of water supply in the Aral Sea region, one cannot fail to mention the environmental problem of this region, and, unfortunately, it is not getting better[1,2,3,4].

Currently, the population of the Khorezm region receives water from several sources

1. Tap water
2. Tube well water
3. Water from mine wells
4. Water from artesian wells.

In our previous works, we noted that the population of this region uses mainly, in urban conditions, centralized sources of water supply, that is, tap water, and among the rural population, tap water is combined with water from tube and shaft wells[5,6].

It should be noted that in recent years the number of shaft wells has become much smaller, this is due to the fact that the population has begun to use more water from tube wells for domestic needs. With the help of mini-pumps, water is supplied to bathrooms and toilets; this is very important in the Aral Sea region, especially in the summer, when tap water is supplied at certain hours. And at the same time, we cannot help but note that this water does not meet the requirements of GOST. Drinking water-950 -2011. Speaking about the water supply of the population with drinking water, we can note the positive work on the dignity. education of the population, they began to understand the impact of the quality of drinking water on their health. A certain part of the population began to use water from artesian wells and water from tube wells, purified using various filtrates.

Currently, in the city of Khiva with a population of 92,156 people, there are about 30 wells, which supply the population with approximately 30,000 liters. purified water, that is 3.071 liters per person. Quantitative indicators that are sufficient in late autumn and winter months are, of course, not sufficient in spring and summer, so the population of this region, especially in the summer months,



are forced to use water that does not meet the requirements of GOST, drinking water, and this affects the incidence of infectious and non-infectious diseases in the population nasologies, this adversely affects the health of the younger generation.

The issues of ensuring economic and drinking water supply to the population of the Aral Sea region are becoming relevant and require in-depth study and the correct scientific approach at the current stage of development of our society[7,8].

All people consume approximately the same amount of water as food. The rest of the water used is simply polluted. Consequently, the more tap water is used in a household, the more it becomes polluted, which leads to an increase in the load on sewage treatment plants, an increase in the costs of wastewater treatment, as well as an increase in anthropogenic load on water bodies. In this regard, the possibility of selling water supply and sewerage products in a segmented market for the housing stock is of interest, which requires a new logic of relations between the supplier and consumers. Segmentation of the water supply and sewerage products market consists of dividing the population of consumers in the housing stock into narrow special groups according to the amount of water consumption, for each of which a corresponding price is set. The market for plumbing and sewerage products is proposed to be divided into five segments. In each segment, the value of specific water consumption is characterized by a range of values with upper and lower boundaries. For example, for the first segment, the social norm for specific water consumption and the social price of water supply and sewerage products are adopted. The boundaries of the range of changes in specific water consumption are determined taking into account the distribution of total income of the population, based on the fact that consumers with higher incomes have more opportunities to use more “water-intensive” engineering equipment in their household. Determining the boundaries of the market depends on the range of variations in water consumption values. The market for plumbing and sewerage products is proposed to be divided into five segments. In each segment, the value of specific water consumption is characterized by a range of values with upper and lower boundaries. For example, for the first segment, the social norm for specific water consumption and the social price of water supply and sewerage products are adopted. The boundaries of the range of changes in specific water consumption are determined taking into account the distribution of total income of the population, based on the fact that consumers with higher incomes have more opportunities to use more “water-intensive” engineering equipment in their household. Determining the boundaries of the market depends on the range of variations in water consumption values. In each segment, the value of specific water consumption is characterized by a range of values with upper and lower boundaries. For example, for the first segment, the social norm for specific water consumption and the social price of water supply and sewerage products are adopted. The boundaries of the range of changes in specific water consumption are determined taking into account the distribution of total income of the population, based on the fact that consumers with higher incomes have more opportunities to use more “water-intensive” engineering equipment in their household. Determining the boundaries of the market depends on the range of variations in water consumption values. In each segment, the value of specific water consumption is characterized by a range of values with upper and lower boundaries. For example, for the first segment, the social norm for specific water consumption and the social price of water supply and sewerage products are adopted. The boundaries of the range of changes in specific



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However, the water from tube wells, which in most cases is used by force, is practically unsuitable not only for consumption, but also for economic purposes. Thus, it does not comply with hygienic standards for the content of harmful substances in drinking water, because characterized by high mineralization and hardness, increased salt content, chlorides, sulfates, iron, boron, bromine and other ingredients, which can lead to the widespread spread of a number of specific diseases[9,10,11,12].

Coverage of the population in the republic with centralized water supply systems in 2017 reached approximately 80.2% (Table 1).

The highest percentage of coverage with centralized water supply services was noted in the city of Tashkent (99.5%), as well as in the cities of Samarkand, Fergana and Andijan regions (about 93-98%). The lowest percentage of population coverage in urban areas is observed in the Jizzakh region (75%).

As for the rural population, the highest percentage of coverage is observed in Fergana and Andijan regions (80-87%), and the lowest among the rural population of Bukhara and Khorezm regions (42.4% and 56.8%, respectively), which clearly reflects shortage of fresh surface and ground water resources in these two areas.

8,910 rural settlements out of 11,012 have centralized water supply.

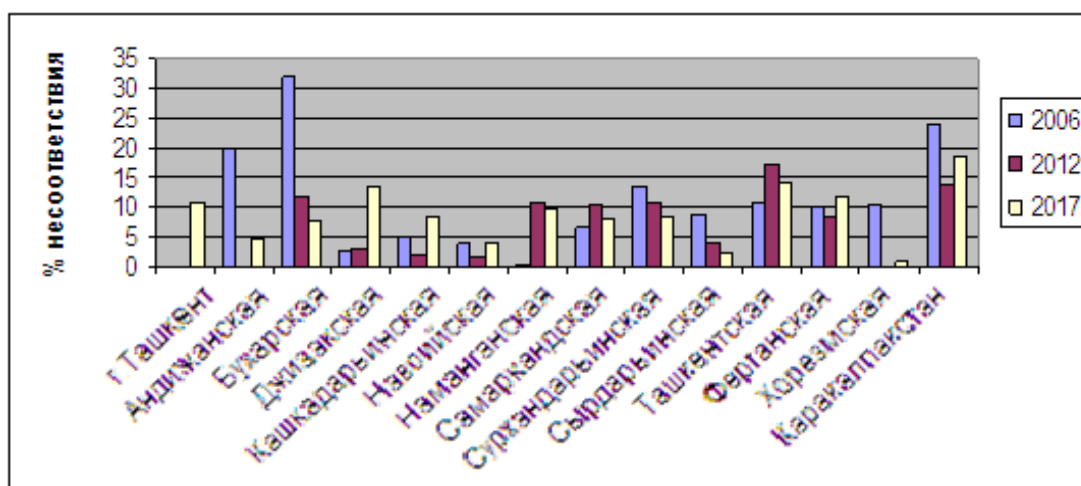
Table 1 -Population coverage with centralized water supply systems (in%)

Regions	Total	as of 01/01/2018		Total	as of 01/01/2019	
		in urban areas	in the countryside		in urban areas	in the countryside
The Republic of Uzbekistan	81.4	89.9	71.1	80.2	89.3	69.3
Republic of Karakalpakstan region:	67.7	73.3	61.3	66.6	72.0	60.5
Andijan	91.9	94.2	89.6	90.4	93.3	87.2



Bukhara	57.7	83.7	43.4	56.6	82.9	42.4
Jizzakh	70.3	75.8	65.9	68.9	74.9	64.2
Kashkadarya	73.9	86.6	62.9	72.8	85.7	61.7
Navoi	80.1	84.2	73.3	78.7	83.8	70.2
Namangan	77.5	85.4	66.8	76.1	85.0	64.5
Samarkand	86.6	98.1	77.3	85.8	98.1	75.9
Surkhandarya	80.5	84.4	78.1	78.5	83.3	75.5
Syrdarya	82.4	80.0	84.2	81.6	79.7	83.1
Tashkent	78.8	85.2	70.9	77.7	84.8	69.0
Fergana	89.8	94.2	83.3	88.8	93.9	1.5
Khorezm	67.5	83.5	58.2	66.3	82.9	56.8
Tashkent	100.0	100.0	-	99.5	99.5	-

The dynamics of changes in the quality of drinking water in the Republic of Uzbekistan over the past ten years is characterized by the fact that in a number of regions there is a tendency for the quality of supplied water to improve by 2017 compared to 2006, while in other areas it has deteriorated. In 2017, compared to 2006, there was a dynamic deterioration in the quality of drinking water in terms of chemical indicators (Figure 1):





Picture 1- Dynamics of changes in the quality of drinking water according to chemical indicators

At the moment, the Aral Sea and the Aral Sea region, which is a zone of environmental disaster, are on the verge of complete degradation and extinction. The water problem in the Aral-Amu Darya water basin as a whole is that the surface water resources here are completely exhausted. In the Aral region, the entire territory of the water management basin is occupied by the Amudarya complex groundwater basin of the 1st order, consisting of a number of artesian basins of smaller orders. The main groundwater resources are concentrated in the Neogene-Quaternary, Paleogene and Upper Cretaceous aquifer complexes. The predicted resources of groundwater with mineralization up to 1 g/dm³ are 4.25 km³/year; 1-3 g/dm³ - 3.33; from 3-10 - 1.86 km³/year. The total value of explored groundwater reserves is 1.4 km³/year,

Research materials made it possible to assert that the formation of negatively acting factors of the human environment in the Aral region is directly related to the processes that determined the emergence of the Aral environmental crisis and the destabilization of the production sector of the Aral region. Groundwater has significant hardness, high mineralization and a high content of iron, boron and borates, exceeding the maximum permissible concentration 6 times. In addition, the content of iron, sulfates, chlorides, bromine and iodine exceeds the MPC several times. To date, the following main methods of water desalination have been identified in world practice: distillation, ion exchange, electro dialysis, freezing, solar desalination and reverse osmosis (hyperfiltration). The combination of these factors significantly complicates water purification, especially the processes of coagulation and filtration,

Morbidity statistics made it possible to assert that some forms of nasology are directly related to water factors:

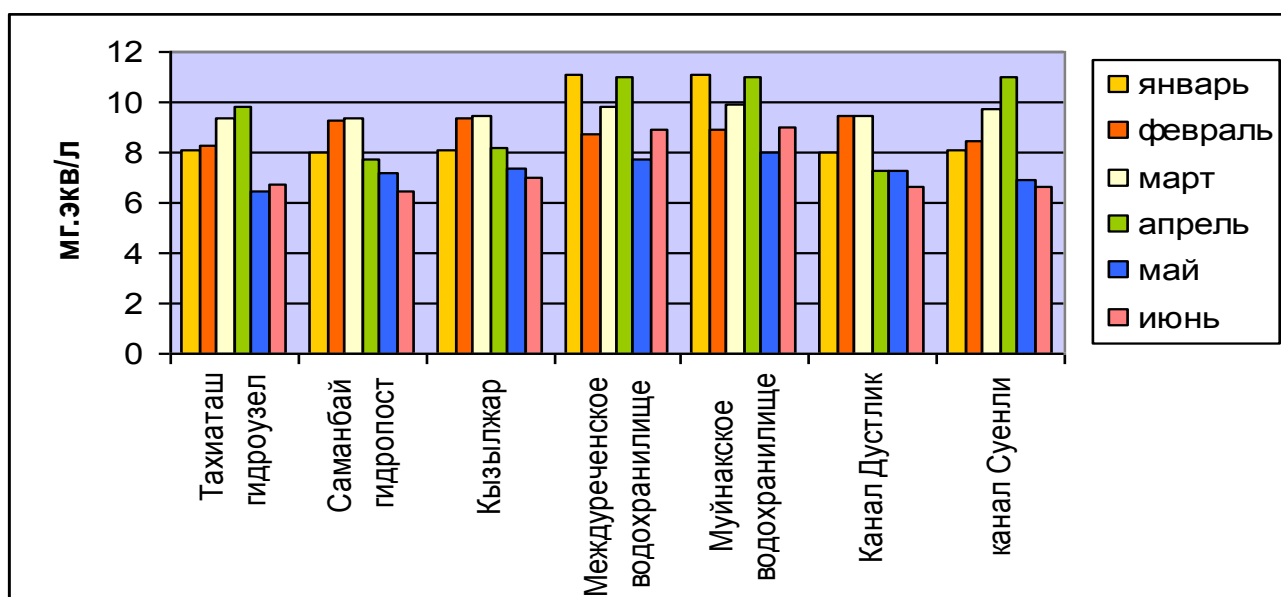
Morbidity indicators in dispensary control of the population (2016-2020)

No.	Cities and districts	2016		2017		2018		2019		2020	
		Total	Rate per 100 thousand population	Total	Rate per 100 thousand population	Total	Rate per 100 thousand population	Total	Rate per 100 thousand population	Total	Rate per 100 thousand population
1	Urgench city	31	22.3	26	18.6	33	23.4	40	28.0	35	24.2
2	Tuprokkala	53	110.6	18	36.9	24	40.4	22	3.7	24	3.3
3	Khiva city					166	184.5	63	68.9	39	42.0



4	Bagat	28 6	18 5.5	32 4	20 6.7	2 56	16 0.5	1 91	1 17.7	1 33	8 0.5
5	Gurlan	6	4.3	67	47. 1	1 13	78. 3	1 09	7 4.4	1 05	7 0.7
6	Kushkup ir	28 4	17 5.8	14 5	88. 3	1 12	67. 0	8 3	4 8.8	7 2	4 1.7
7	Urganch r	16 2	88. 1	11 4	60. 6	1 60	83. 4	2 16	1 10.4	2 60	1 30.4
8	Khazoras p	44 3	23 8.4	38 5	20 3.9	3 33	17 3.5	2 79	1 42.9	2 21	1 13.8
9	Honka	15 0	85. 7	10 7	60. 1	1 13	62. 4	1 13	6 1.4	1 45	7 7.6
10	Khiva r.	71 5	31 9.8	67 2	29 5.6	3 50	24 7.8	2 90	2 01.8	3 51	2 40.2
eleven	Shovot	32 0	20 1.1	34 0	20 9.9	3 12	18 9.2	2 89	1 72.2	3 04	1 78.3
12	Yangiari k	12 9	11 8.1	12 3	11 0.8	1 19	10 5.5	1 15	1 00.3	1 11	9 5.4
13	Yangibaz ar	14 6	17 7.8	14 3	17 1.2	1 39	16 3.7	1 06	1 22.8	7 3	8 3.4
	By region	27 25	29 6.4	24 64	13 7.6	2 226	12 2.3	1 916	1 03.5	1 873	9 9.6

Indicators of general water hardness of the river. Amu Darya



Conclusion: 1. An analysis of existing water purification methods was carried out. Based on the results of the analysis, the most acceptable treatment option used in the technological scheme was determined.

2. As a result of the research, the feasibility of using the developed method of water purification in a combined technological scheme of water treatment for the Aral Sea region was established.

3. A new technological scheme has been developed with the combined use of three installations for stage-by-stage water purification. Based on the results of the experiments, the quality of water meeting the regulatory requirements was obtained, having passed all stages of technological purification.

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