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THE ANALYSIS OF ECOLOGICAL SITUATIONS OF WATER RESOURCES OF SHIRVAN CITY OF THE REPUBLIC OF AZERBAIJAN

The article is devoted to providing the population with drinking water in the Shirvan city of the Azerbaijan Republic and surrounding areas, and showed the discharge of polluted water into the water bodies used by the population as one of the main environmental problem. As a result, in the basins of drinking water appears bacteria which causing disease. One of the important problem is the provision of drinking water to Shirvan city population according to sanitary and ecological norms. Moreover, using of Kur river water for drinking water supply has been analyzed and the impact on the human body has been ecologically estimated.

Key words: the major collector of Shirvan city, chemical pollution, thermal pollution, local reservoirs, water filtration systems, the Kur river.

Статья посвящена вопросам обеспечения населения питьевой водой в городе Ширван Азербайджанской Республики и прилегающих районах. Показан сброс загрязненных вод в водные объекты, используемые населением, в качестве одной из основных экологических проблем. В результате в бассейнах питьевой воды появляются бактерии, которые вызывают различные заболевания. Одной из важных проблем представлено обеспечение питьевой водой населения Ширвана в соответствии с санитарными и экологическими нормами. Кроме того, было проанализировано использование воды реки Кура для питьевого водоснабжения и дана экологическая оценка воздействия этой воды на организм человека.

Ключевые слова: главный коллектор города Ширван, химическое загрязнение, тепловое загрязнение, местные водохранилища, системы фильтрации воды, река Кура.

Нагиев Елнур. АНАЛІЗ ЕКОЛОГІЧНИХ СИТУАЦІЙ ВОДНИХ РЕСУРСІВ МІСТА ШИРВАН У РЕСПУБЛІЦІ АЗЕРБАЙДЖАН

Статтю присвячено питанням із забезпечення населення питною водою в місті Ширван Азербайджанської Республіки та прилеглих територіях. Показано, що скиди забрудненої води у водні об'єкти, що використовуються населенням, є однією з основних екологічних проблем. У результаті в басейнах питної води з'являються бактерії, що викликають різні захворювання. Однією з важливих проблем визначено забезпечення питною водою населення Ширвана відповідно до санітарно-екологічних норм. Крім того, було проаналізовано використання води річки Кури для питного водопостачання та екологічно оцінений вплив цієї води на організм людини.

Ключові слова: основний колектор міста Ширван, хімічне забруднення, теплове забруднення, місцеві водосховища, фільтрувальні системи, річка Кура.

One of the main problems is the availability of water resources, the organization of their effective use, providing the population with high-quality drinking water in the city of Shirvan and adjacent areas.

The Kur River is the main water resource of the city of Shirvan. In the center of the city there is a collector, which is designed by means of drainage to discharge streams of water. The main arising reason for the inefficient use of water resources and pollution of water bodies in the area of Shirvan, Hajigabul and other settlements of the region is poor equipment, deterioration of sewage treatment facilities, as well as insufficient use of manual labor. The Influence of anthropogenic pollution of water sources in the city and surrounding areas is

one of the main problems in the Republic. Industry, energy, agriculture, population growth – the main causes of groundwater pollution in the basin. The use of the waters of the Kur River involves a serious threat to the health of the population, since it passes in the area of high pollution. The water used in the city of Shirvan taking the 2nd place in the Republic after the city of Mingechevir

Enterprises which use natural water sources in the city of Shirvan:

- 1) Shirvan Power Plant;
- 2) Azerbaijan-British joint venture “Shirvan-Oil”;
- 3) Plant for the artificial cultivation of sturgeon;
- 4) Department of Water Sewerage.



99 percentage of used water is consumption for production needs (table 1).

Table 1

Use of water in this district

Territory	Shirvan			
	Years			
Total consumption of water	739	553	536	621
Household needs and drinking	721	512	527	610
Watering and water supply	2	3	1,2	3
Total				

Only 1% of water is used for drinking and domestic needs. On average, over the past few years, 100-120 thousand m³ are supposed per inhabitant of the city (in 2013 112 thousand m³) of water. The amount of water per capita has decreased 2 times, than in the 90s years (157,000 m³).

Reservoirs, which receive sewage water in Shirvan, in volume, take first place in the country. This process developed rapidly during the 10-16 summer period (1990-2013). If in 1990 year the share of sewage entering the reservoirs in the city of Shirvan was 14%, then in 2015 this share is 50-60% (table 2).

Due to the lack of treatment facilities for cleaning industrial and domestic water in Shirvan and Hajigabul, Kur's wastewater is discharged into Hajigabul Lake and to the major collector of Shirvan. As a result, a high level of physi-

cal, biological, chemical and thermal pollution of territorial waters is observed. Only 1-2% of sewage discharged into reservoirs is discharged into watercourses after mechanical treatment (table 3).

It should be noted that the total percentage of sewage discharged to the main reservoir of Shirvan is 1809930 thousand m³ of groundwater.

To the treatment facilities in this district are the water basins. In the city of Shirvan:

- 1) Shirvan Power Plant;
- 2) Department of Water Sewerage
- 3) Shirvan Joint Stock Company "Oil-Fat";
- 4) Management of production and exploitation of water pipes of the river Kur of Hajigabul region.

98-99% of the consumed water in the city of Shirvan is used from a power plant. Mainly, the water from the station is used to cool the condenser turbine. As a result, the volume of discharged process wastewater is large, while the content is different. The diversity of pollutants in wastewater depends on the technological nature of the power plant. During the process of wastewater treatment, technical facilities are being built in the station.

1) Cooling of steam condensers when the water of the exhaust steam is heated;

2) Transition of water to condensate during oil production;

3) Washing of thermal installations with chemical products.

Table 2

Sewage water entering the local reservoirs

Settlements	Years							
	2000	2005	2010	2011	2012	2013	2014	2015
Shirvan	716	1936	2195	2994	2221	2225	2336	2422
Hajigabul	-	25	24	-	-	25	0,1	0,19
Total	716	1961	2219	2294	2221	2251	2336.1	2422.2

Table 3

Discharge of sewage into reservoirs (2015)

Waste Source	Total	Non-polluted water	Contaminated water	Including Cleared water	
				Total	In particular, with the norm
Kur River	609461	608936	525	-	-
Main collector of Shirvan	1814108	-	1812000	217	217
Hajigabul Lake	192	-	191	-	-
Total	2423761	608936	1812717	217	217

In accordance with the operation of the power plant, the discharge of heat contamination of sewage (35-400°C) into water basins.

Another enterprise that discharges sewage into the water supply is the water and sewage department of Shirvan. Management on the basis of an agreement with the city's population and individual entrepreneurs is supplied with water resources. In enterprises sewage is formed during the washing of algae. Wastewater is mainly composed of sludge. The mineral wastewater residues that arise by washing algae are discharged into the Kur River. At the same time, the sewage management in the city of Shirvan merges the municipal waste of individual objects and urban population into the main collector of the Kur River. The length of the sewage system in the city of Shirvan is 15800 m. It is an open sewerage with a length of 4360 m., has access to 6 sewerage systems, 3 on the Kur River, 3 going to the main Shirvan Canal. Until recently, one of the exits to the river Kur is closed. 25% of the wastewater merges into the Kur River, and 75% into the main reservoir of Shirvan, where there are no control plants. In 2003, 525 thousand m³ of polluted water from local enterprises merges into the Kur River, and 3,070 m³ into the Main Shirvan Reservoir.

As a result of biological water pollution, an happens increase in the bacterial saprophytic activity (table 4).

Open joint-stock company "Oil-Fat" is one of the enterprises exporting water from the department of water supply and sewerage of Shirvan for sewage. The plant regulates the treatment of waste water treatment plants and unloads to the main channel of the Shirvan Canal (58 thousand m³, 2013).

Because of the discharge of oil waste and oil products into the water bodies of the city in the Kur River, a high level of oil and phenol was registered. Observations show that especially in the hot periods of the year (summer months) this rate is exceeded (3 times) (table 5).

The underground waters of this district, formed as a result of melioration, for discharge into the Caspian Sea, using the main channel of Shirvan. The drainage network of the collector of Shirvan and Hajigabul district is 52.3 km length and has an area of 1400 hectares, 3 pumping stations drain groundwater into the reservoir. The groundwater consists mainly of CaCO₂ and NaCO₂. Recently, in the river Kur, near the city of Shirvan, the share of the actual amount of organic chlorinated pesticides is 0.1-0.3 mg./L. The reason is that the city of Shirvan is surrounded by a zone of highly developed agriculture. As a result of soil fertilization and the use of chemicals against pests of organic chlorinated pesticides, rainwater, groundwater, river water were involved in this process. In 2013, 1809930 thousand m³ groundwater flowed into the Caspian Sea through the Shirvan collector. Since 1990, the volume of annual groundwater has been increased by 1-1.5 billion m³. In addition, the enterprises also dumped sewage into the sewer. From 2003, due to the closure of the outlet of water from the lake, it has become stagnant. All flora and fauna was destroyed, and the water in the lake became dirty. As a result, the level of water in the lake gradually began to fall.

The discharge of sewage into the lake in the city of Hajigabul made this catastrophe even more appalling. Due to the lack of a sewerage system in Hajigabul, domestic sewage is discharged directly

Table 4

Oscillations the number of bacteria - saprophyte in the Kur River near the city of Shirvan

Years	1960	1962	1964	2000	2013	2014	2015	Increasing frequency
Amount	19	26	31	64	190	200	197	8.0

Table 5

Change the norm of oil and phenol in the Kur River near the city of Shirvan associated with the change of seasons in 2013-2015

Pollutants	Seasons	Winter	Spring	Summer	Autumn
	Oil		10.7	16.0	28.1
Phenol		0.04	0.02	0.0	0.05



into the lake. Another important question is providing drinking water to the population of Shirvan city in according to environmental standards. As is known, in order to provide drinking water to the population, the water of the Kur River is used.

In recent years, in Shirvan city people have been used 6-7 million m³, in the Hajigabul region (especially increased in recent years) in 2002 to 10 million m³, in 2013 to 177 million m³ of water. (Thus, the exploitation of the water pipe in Hajigabul put into use in the 70's provided the majority of the population with drinking water). But, as we know, water from the Kur River does not meet ecological standards and is not suitable for drinking water.

The low quality indicators for drinking and household water supply relevance to International norms in the Shirvan city of the Republic of Azerbaijan are still waiting for their solution. Currently, it is not possible to find a residential settlement with normal water supply in the country. The quality of water in the water supply sources used in the Republic of Azerbaijan has been studied extensively in sanitary-chemical, sanitary-and-bacteriological aspects of 10 hydro geological zones. During the research process using physiological, biochemical and toxicological methods the impact of water on to the organisms of experimental animals have been widely studied (Academician V.Y.Akhundov, prof. K.F.Akhundov and et al. 1977). The quality of water is polluted by industrial and agricultural

water, and this leads to human health, ecological and aesthetic dangers. In addition, solid household wastes and city drainage waters also have a negative impact on the quality of water. Taking into account the fact that the Kur River, the settlements along the river and the people of Shirvan city are the source of drinking water, it is easy to see that quality of water is inadequate to standards and dangerous for the population. Therefore, the environmental situation of the water basins should be normalized and all these problems should be eliminated.

Existing ecological problems with the water bodies of the city of Shirvan and adjacent areas require strict control measures and special protection.

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