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# Evaluation And Water From Shamkir Water Storage Ecological Matters Under Oxygen Regime

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**Annotation.** Four water depots were built in 1953-2000 in the river of the Middle Kura, which belonged to the Republic of Azerbaijan. Shamkir was the first water depositor on the river. Microbiological and hydrobiological investigations have been carried out in the Shamkir water reservoir over time.It is understood that from the earliest times in the water reservoir, the phyto-bacterioplancton is developing intensely. Accepting organic, inorganic materials of alloxton origin brought by the curing river, Shamkir is going to enrich the organic matter in the water reservoir. In addition, the biogeocurrent of the Kura river contains biogenous elements in the amount of water deposited in the reservoir. Because of the increased transparency in the water, phytoplanktons are suitable for mass vegetation. As a result, the absorption of the first organic substances originating from avtoxton in the Shamkir water reservoir increases and the biodestruction phenomenon accelerates in the water. Thus, the oxidation of readily assimilable organic substances leads to the formation of dangerous environmental claims such as hypoxia.

**Key words:** anthropogen eutrophication, biogen flow, bacterioplankton, first crop, phytoplankton, biodestrucia.

## Introduction

The largest river of the Caucasus region, the basin of the Kura river is concerned with the five neighboring states (Turkey, the Islamic Republic of Iran, Armenia, Georgia and Azerbaijan)[ Campana M.E. et al., 2012]. It is understood that the Kura river takes its starting from the mountainous landscape of Turkey, and the big cities in the basin are stable in terms of environment since they are not industrial centers. Within the borders of the Republic of Turkey, the Kura-Araz rivers were studied by seasons in 2006-2015[]. In the Middle of Kura investigations were repeated many times in 1964-2004. In the Aras River basin (in the Armenian lands), microbiological and sanitary-hydrobiological studies were completed in 1976, 1986 and 1989. In addition, observations in the area of the Sederek region of Nakhchivan Autonomous Republic from the customs region of Armenia in the Aras stream by the Republic of Turkey have been continued.

Our main aim is to give a brief account of the above, and realize that it is the anthropogenic effects of the currents of the Cretaceous water collected in the Shamkir water reservoir. It is understood from our first reports that the muds of the Kura river basin are severely polluted in Armenia and Georgia. It has also been proved that the Kura river is circulated in Georgia along the 400 m long river, just like the territory of Azerbaijan from the border with Turkey [1; 14]. Thus, Middle Kura does not know how to neutralize the alloxton organic materials mixed with the water in the houses of Axaldaba, Hashuri cities of Borjom, mainly in Georgia. The waste added to the waters in Gori is mixed with the polluted water of Aragvi river of the city of Mtsxeti. In Tbilisi, Rustavi, Gardobani cities, the state of Polisaprob falls to the Kura self-cleaning is going very weak. It is understood that the contaminated Cure water which is enriched with the educts and the compound-containing pollyutants is collected for the first time in the Shamkir water reservoir.

As it is known, the Kura river belongs to the turbid water basins and the transparency is very low in the Kura stream which is selected by terrigenous particles in large quantities and solid sediments. So organic matter in the water is considered to be of alloxton origin. Although biogen elements in tea have sufficient concentration, they can not produce phytoplancton in turbid water and the first organic substances derived from avtoxton are not synthesized. Therefore, as in the Shamkir water store, organic substances in the cure waters are considered biodestructured from the edge. In the Shamkir water reservoir, the first organic substances easily synthesized by the microbiota, which they synthesize during the photosynthesis process of phytoplankton, which is intense vegetation in the basin, are confused with them. Thus, in both river waters and in Shamkir water reservoir conditions, the oxygen in the water becomes frequent in order to be biodegradable of organic substances. In the Shamkir water reservoir, phytoplankton is constantly developing at the level of flowering from the beginning of summer to the end of autumn (especially in summer). The possibility of poisoning of the water by phytoremia is increasing due to the alteration of the algae units. The amount of oxygen gas is reduced in deep water layers, and the development of conditions and facultative anaerobic bacteria accelerates. Thus, a hypoxia environment occurs and there is a danger for the life activities of hydrobionts, which are dominant in the basin and demand oxygen, and water quality becomes useless.

**Materials and methods of research**

First, it should be noted that the Shamkir water storage is in the second place according to its territorial area, water capacity, depth (after Mingechevir water storage). It was established in 1982 and has an area of 116 $km^2$, a length of 40 km, an average width of 3 km, a depth of 60 m and a water volume of 2.7 $km^3$. The water samples for the investigations were obtained from 9 sites of Shamkir water storage.

Water samples for hydrobiology-hydrochemical analyzes are Knudsen, microbiological investigations for waters with following aseptic rules, taken by Y. Isorokin's batometers []. The transparency of the water is determined by white colored plaques and the temperature is determined by the mercury thermometer for deep water. The first crop of phytoplankton and the amount of organic substances in water were determined by the method of Vinkler-Vinberq [2; 3]. Microbiological cultures were made according to the methods of V.I.Romanenko, S.I.Kuznetsovun [10] and A.Q.Rodinan [8]. Saprophytic bacteria were obtained from BPA (fish peptone agar) nutrient medium, and the colonies were calculated after 10-12 days. The amount of the bacteria belonging to the physiological group was determined after 25-28 days. The amount of general organic substances and biodestructural indicators were measured after one day exposure.

**Biogenic elements in water.**Oxygen in water was determined with the MW 600 branded instrument from Milwaukee and biogen elements were determined with the photometric instrument from Polintest.

**The results and their explanations**

It has been understood from the researches carried out in a large number of water storages formed under various geographical climatic conditions that, in the first year of this water storages, the underground soil cover which is rich in organic matter is eroded in the water, the biogen elements are multiplying in the water and the decay processes are accelerating and as a result oxygen mesrefaction increases, transient hypoxia is seen in many biotopes [9; 13; 14].Such events are considered to be a kind of law in the water storages, and physical, chemical and biological processes have been adjusted since the establishment of "puberty" - stability in the basin. It has also been proved that the environmental conditions in the water storages formed during the continuous exposure to anthropogenic effects of water are tense, the physical and chemical properties of the water change, the hydrobionts suffocate and so on. [7]. For this reason, Shamkir water storage is created 32-33 years later, but the processes of enrichment, biodestruc- ture with organic matter in the basin are fixed (table 1).

It is clear from the table that over the course of 30 years (1985-2015), the amount of the first organic substances, which are the main biological product of hydrobionts and the main source of energy in the Shamkir water storage, increased by 3-3.5 times to mineralize destroying substrates.

**Table 1** The first crop of phytoplancton in Shamkir water storage and organic matter (Mg C / l-sutka) changes over the years (summer season)

| The station-precinct | Initial product | | | | Biodestruction | | | |
|---|---|---|---|---|---|---|---|---|
| | 1985 | 1990 | 2000 | 2015 | 1985 | 1990 | 2000 | 2015 |
| 1 | 0,30 | 0,51 | 0,63 | 0,82 | 1,20 | 1,66 | 2,60 | 3,10 |
| 2 | 0,26 | 0,64 | 0,84 | 1,60 | 1,50 | 2,40 | 3,20 | 4,30 |
| 3 | 0,84 | 0,96 | 1,20 | 2,36 | 1,25 | 2,10 | 3,10 | 3,90 |
| 4 | 0,40 | 1,10 | 1,66 | 3,10 | – | – | – | – |
| 5 | 1,25 | 2,40 | 3,00 | 4,46 | 1,48 | 2,35 | 3,00 | 4,20 |
| 6 | 1,46 | 2,20 | 2,80 | 4,30 | 1,20 | 2,30 | 2,80 | 3,10 |
| 7 | 1,50 | 2,60 | 3,10 | 4,40 | 1,80 | 2,50 | 3,30 | 4,10 |
| 8 | 1,66 | 2,50 | 3,00 | 4,70 | 1,90 | 3,60 | 4,70 | 5,10 |
| 9 | 1,40 | 2,10 | 2,40 | 4,10 | 2,00 | 3,90 | 4,90 | 5,70 |
| Middle | 1,00 | 1,70 | 2,10 | 3,40 | 1,60 | 2,50 | 3,50 | 3,80 |

Thus, it is understood that anthropogen eutrophication continues in the Shamkir water storage, and the concentration of oxidation of general organic substances improves accordingly. The enrichment of the Shamkir water storage with the first organic matter is more visible when compared to the water storage formed on other rivers exposed to anthropogenic effects (table 2).

It is understood from the table that the average annual amount of the first organic substances synthesized by anthropogen eutrophication in the Shamkir water storage is twice as high as that of the Kremenchuk water depot counted as avtotroph.

It’s interesting that the total mass of the alloxtonic organic materials brought by the Kura river to the Shamkir water storage is equal to 79%, while the total organic matter content is 19%, the first product mass synthesized by phytoplankton [6].

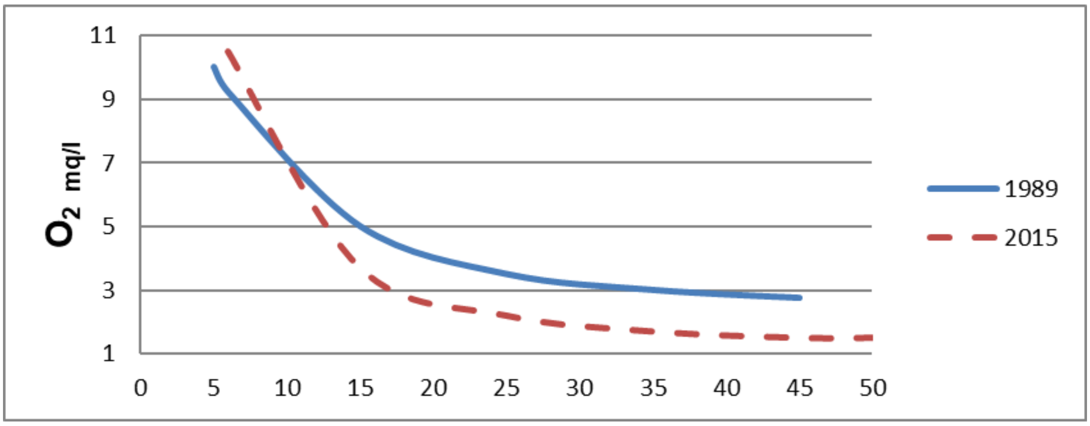
**Table 2** A comparison of the initial product of phytoplankton indicators water storages which is created in Volga, Dnieper and Kura rivers flow

| Water storages | Rivers | Area, $km^2$ | All basin C / min t. | q $C/m^2$ | Authors |
|---|---|---|---|---|---|
| Rıbinski | Volga | 4550 | 346 | 76 | [ 15] |
| Kuibyshev | Volga | 6450 | 550 | 100 | [4] |
| Kiev | Dnepr | 922 | 132 | 144 | [7] |
| Kremenchuk | Dnepr | 2250 | 783 | 348 | [ 9] |
| Zaporozhye | Dnepr | 410 | 84 | 205 | [9] |
| Mingachevir | Kura | 600 | 196 | 303 | [ 5] |
| Varvara | Kura | 21 | 5,5 | 258 | [ 11] |
| Shamkir | Kura | 116 | 59 | 669 | our information |

From the factors that cause the oxygen regime to be strained in Shamkir water storage, the intensivial nature of the silty water underground destructive processes and the water-induced temperature jump from the second half of summer to the end of autumn should not be forgotten specially.

It is understood that in the Shamkir water, 20% of the first product is collected silty waterunderground. Over the course of the year, the bottom of the depression is more than 16 thousand tons of organic matter (C) Mineralized, which is equal to 22% of the general biodegradation. Anthropogen eutrophication accelerates the initial time, bacterioplankton vegetation. Aerobic heterotrophic microbes that multiply repeatedly in a short time increase oxygen mesrefaction. For example, the total amount of 1989 microspheres was 7.1 million / ml in water, compared to 16.3 million / ml in 2001 and 24.3 million / ml in 2015.

It should be noted that hypoxia was not observed in any of the waterfalls formed in the Middle Curs as in Shamkir water storage. It has also been determined that the depth of oxygen reduction has continued since the basin was established (Pic 1.).




Depth, M

**Pic 1.** Depth of the amount of oxygen in the water (summer, 8th).

Pic clearly shows that after 25-6 years the oxygen content in the water gradually decreases starting from a depth of 15 m in the Shamkir water storage.The interesting point is that as time goes on, the concentration of oxygen in these waters increases more than doubled (table 3). From table 3 it can be seen that the amount of oxygen dissolved in the depths of water of the Shamkir water storage in the past 27 years has decreased by an average of 2 times.

**Table 3** In Shamkir water storage, oxygen (O2 mg / l) change over the years (summer)

| The precinct- station | Depth, M | 1987 | 1993 | 2004 | 2015 |
|---|---|---|---|---|---|
| 5 | Top - 0.5 | 10,2 | 11,1 | 9,8 | 10,0 |
| | Average - 15.0 | 6,4 | 5,2 | 4,4 | 3,3 |
| | Bottom - 30 | 4,9 | 4,0 | 3,0 | 1,3 |
| Middle | | 7,0 | 6,7 | 5,6 | 4,6 |
| | Top - 0.5 | 10,6 | 9,4 | 9,0 | 9,0 |
| | Average - 26 | 4,6 | 4,0 | 1,7 | 1,5 |
| | Bottom - 50 | 4,2 | 3,1 | 2,0 | 0,9 |
| Middle | | 6,4 | 5,3 | 4,3 | 3,6 |

It is quite typical that the anthropogen eutrophication in the Shamkir water storage has created a favorable ground for increasing the use of oxygen at the basin and also for the growth of general microbiota vegetation, especially anaerobic bacteria. The amount of bacteria of Vibriodenitrificans and Clostridium pasterianum species in the bottom layer in the biotopes of Shamkir water storage, which is deep between 15-20 meters, increased twice in the last 25 years. In addition, lil-underground fakultative and obliqat anaerobic bacteria developed in bulk. The spread of the anaerobic bacteria in the water and silty water - grunof the Shamkir water storage is in a very relevant situation. For example, while the number of bacteria forming hydrogen sulphide ($H_2S$) in silty water –grun at stations 3, 4 and 6 (depth 3-5 m) is 18-66 / g, these bacteria at bottoms of stations 5, 8 and 9 are 260-320 / q .

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