



# International Journal for Innovative Engineering and Management Research

A Peer Reviewed Open Access International Journal

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IJIEMR Transactions, online available on 28th March 2021. Link

<https://ijiemr.org/downloads/Volume-10/ISSUE-3>

**DOI: 10.48047/IJIEMR/V10/I03/110**

Title: **Changes in water quality river Zarafshan within the pool**

Volume 10, Issue 03, Pages: 509-512.

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## Changes in water quality river Zarafshan within the pool

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**Abstract:** This article examines the chemical composition and water pollution of the Zarafshan River. The least polluted water of the Zarafshan River is observed at the Rawat- Khoja section, and in the middle and lower reaches it is polluted with various ingredients. The most toxic ingredients are the following heavy metals: mercury, lead, hexavalent chromium, cadmium, nickel, copper, zinc.

And also the article analyzes the long-term change in mineralization , total nitrogen, COD, copper and hexavalent chromium in the Zarafshan River at the sections of the downstream of the Pervomayskaya dam and the city of Navoi.

**Keywords:** mineralization, chemical composition of water, section, collector-drainage, chemical ingredient.

### Introduction

The chemical composition of the river. Zarafshan on the territory of Uzbekistan is formed under the influence of pollution entering the river with wastewater from enterprises of Samarkand, Navoi and Bukhara regions, as well as from collector- drainage waters of irrigated areas.

The chemical composition of the river. Zarafshan described according to " Uzhydromet " for 2003-2017 years. according to data from eight sections.

The oxygen regime is satisfactory, the concentration of dissolved oxygen ranges from 6.57 to 11.22 mg O<sub>2</sub>/l. Oxygen is essential for the existence of most organisms that inhabit water bodies. As a strong oxidizing agent, oxygen plays an important sanitary and hygienic role, contributing to the rapid mineralization of organic residues.

Down the river. In Zarafshan, the content of organic substances by the value of the chemical oxygen demand (COD) varied in the range of 2.68–15.71 mg O / L, and by the value of the biochemical oxygen demand for 5 days

(BOD<sub>5</sub>) - from 0.45 to 2.54 mg O<sub>2</sub>/l (MPC = 3.0 mg O<sub>2</sub>/l).

Fluctuations of ammonium nitrogen are 0.01-0.08 mg / l (MPC = 0.39), nitrate nitrogen - 0.253 - 3.50 mg / l (MPC = 9.1) and nitrite nitrogen - 0.07-0, 05 (MPC = 0.02 mg / l), which indicates some pollution of river water with nitrites.

The content of phenols along the river course varied in the range of 0.000 - 0.004 mg / l (MPC = 0.001 mg / l), which indicates the pollution of river water with phenols (mainly in the middle and lower reaches of the river).

The pollution of river water with oil products varied from 0.018 to 0.110 mg / l (MPC = 0.05 mg / l), an increased content of oil products was noted at the Akkaradarya water divider and at the Talikurgyan discharge.

The content of heavy metals changed as follows: chromium from 0.090 to 1.90 mg / l (MPC = 0.001 mg / l), copper — from 0.558 to 1.8 mg / l (MPC = 0.001 mg / l), zinc — from 0.16 to 10.2 mg / l (MPC = 0.1 mg / l), iron, 0.003 to 0.022 mg / l (MPC = 0, 5 mg / l), myshyaka -from 0.00 to 5, 5 mg / l (0.05 mg / l), i.e. water p. Zarafshan is contaminated with most of these metals.

The presence of HCH isomers was noted at the level of 0.000 - 0.005 mg / L (MPC = 0.001 mg / L), i.e. sometimes exceeded the maximum permissible concentration.

The smallest values of mineralization are observed at the Rawat- Khoja sections (downstream of the Pervomayskaya dam) and at the Akkaradarya water divider - 0.27 - 0.29 g / l, at other sections it gradually increases to 0.33 - 0.57 g / l, and at the alignment of the city of Navoi, below the discharges of the Navoiazot Production Association, it increases to 0.97 - 1.00 g / l.

The content of synthetically active surface substances (SAS) varies from 0.000 to 0.02 mg / l (MPC = 0.1 mg / l).

Thus, it may be noted that the less contaminated water Zarafshan river occurs in the alignment Rawat -Hodzha, and in the middle and lower reaches it is contaminated with a variety of ingredients.

As already noted, the following heavy metals are the most toxic ingredients: mercury, lead, hexavalent chromium, cadmium, nickel, copper, zinc.

Due to the lack of the necessary instruments and reagents when monitoring the qualitative composition of river water, the specialists of " Uzhydromet " do not determine such hazardous components as antimony and selenium.

Let us consider the intra-annual dynamics of toxic ingredients in the water of the Zarafshan River at two sections: a) the downstream of the Pervomayskaya dam and b) the city of Navoi, below the wastewater discharges of the Navoiazot Production Association.

Within 2017 in alignment at the downstream dam Pervomajskaya mercury ( $Hg^{+2}$ ) in the river water is not substantially observed, the lead content ( $Pb^{+2}$ ) varied from 0.00 to 3.50 g / l (MPC = 0.03 mg / l); hexavalent chromium ( $Cr^{+6}$ ) - from 0.0 to 0.41  $\mu g$  / l (MPC = 0.001 mg / l); cadmium ( $Cd^{+2}$ ) - from 0.00 to 0.36  $\mu g$  / l (MPC = 0.005 mg / l); nickel ( $Ni^{+}$ ) - not found; copper ( $Cu^{+2}$ ) - from 0.0 to 3.5  $\mu g$  / l (MPC = 0.001

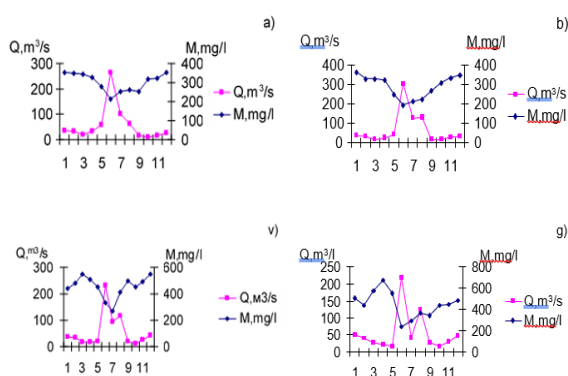
mg / l); and zinc ( $Zn^{+2}$ ) - from 1.2 to 3.9 mg / l (MPC = 0.01 mg / l).

At the section below the wastewater discharges of the Navoiazot Production Association, the content of mercury in river water varied from 0.00 to 0.30  $\mu g$  / l, lead - from 0.0 to 0.3  $\mu g$  / l, hexavalent chromium - from 0.0 to 1.4  $\mu g$  / L; cadmium — from 0.00 to 0.71  $\mu g$  / l; nickel - not found; copper — from 0.5 to 3.5  $\mu g$  / l, zinc — from 0.6 to 4.3  $\mu g$  / l.

Thus, it can be seen that in recent years, river water has been polluted with hexavalent chromium, zinc, and copper.

The value of water salinity in the lower reaches of the river varies within a year from 0.98 to 1.62 g / l, which is due to the increased content of magnesium, sodium and sulfate ion. This fact is reflected in the irrigation quality of river water. A more detailed picture of the intra-annual changes in the content of mineralization and main ions at all eight river sections is shown in Fig. 1.1, it can be seen that the value of mineralization and the content of the main ions slightly decrease in June – August, which is associated with an increase in water discharge in the river during these months.

Of great practical interest is the identification of mathematical relationships between the value of water salinity (M, mg / l) and water consumption (Q,  $m^3$  / s). These dependences for some of the sections under consideration are shown in Fig. 1.2. The most successful dependencies are observed at the sections of the settlement. Khatyrchi and the city of Navoi - 0.8 km below the wastewater discharges of the Navoiazot Production Association.



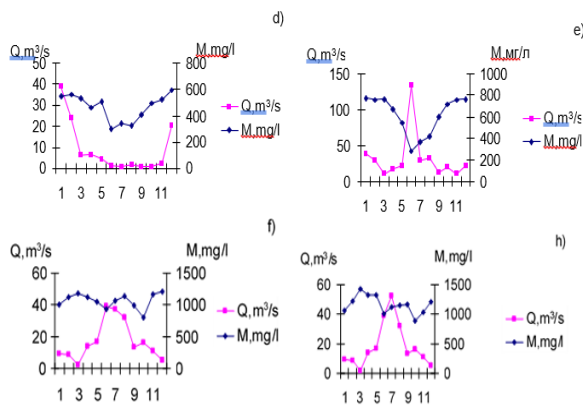


Fig. 1.1. Intra-annual changes in the value of salinity ( $M$  mg / l) and water consumption ( $Q$ ,  $m^3 / s$ ) in the water of the river. Zarafshan average 2012-2017. Sides: a) downstream of the Rawat- Khadja dam ; b) Samarkand city, 1,5 km above the Akkaradarya water divider ; v) Samarkand, 0,5 km below the mouth of kol.Siab ; d) Samarkand city , 3.7 km below the mouth of the Taligulyan discharge; e) Kattakurgan city (above the river mouth 0.8 km below the mouth; f) Khatyrchi village , 2 km south of the village; f) Navoi city , 1 km above the wastewater discharges of the Navoiazot Production Association ; h) Navoi city , 0.8 km below the wastewater discharges of the Navoiazot Production Association .

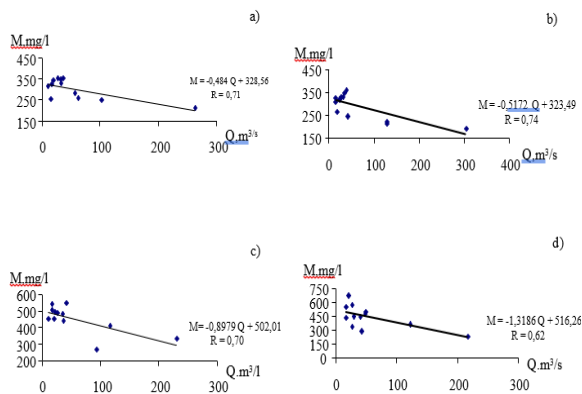


Fig. 1.2. Dependence of mineralization ( $M$ , mg / l) on water consumption ( $Q$ ,  $M3 / s$ ) for the river. Zarafshan 20 15 g. cross-sections: a) downstream of the dam Rawat -Hodzha; b) Samarkand city 1.5 km above the Akdarya water divider ; c) Samarkand 0.5 km below the

mouth of the Siab Kol . d) Samarkand city , 3.7 km downstream of the mouth of the Talidikuyrgan fault .

Long-term changes in mineralization, total nitrogen, COD, copper and hexavalent chromium in the river. Zarafshan at the sections of the downstream of the Pervomayskaya dam and the city of Navoi are shown in Fig. 2.3–2.4.

At the site of the Pervomaiskaya dam, the most polluted river water was in 1979-1988, in subsequent years, the degree of river water pollution has noticeably decreased

At the Navoi site, the following long-term changes in chemical ingredients are observed : the average annual mineralization remains at the level of 1.3–1.6 g / l, the total nitrogen content increased in 1980–1984. and in periodic increases and decreases; the copper content for the years under consideration decreased to  $2.0 \mu g / l$ , the content of hexavalent chromium decreased to  $1.0 \mu g / l$ .

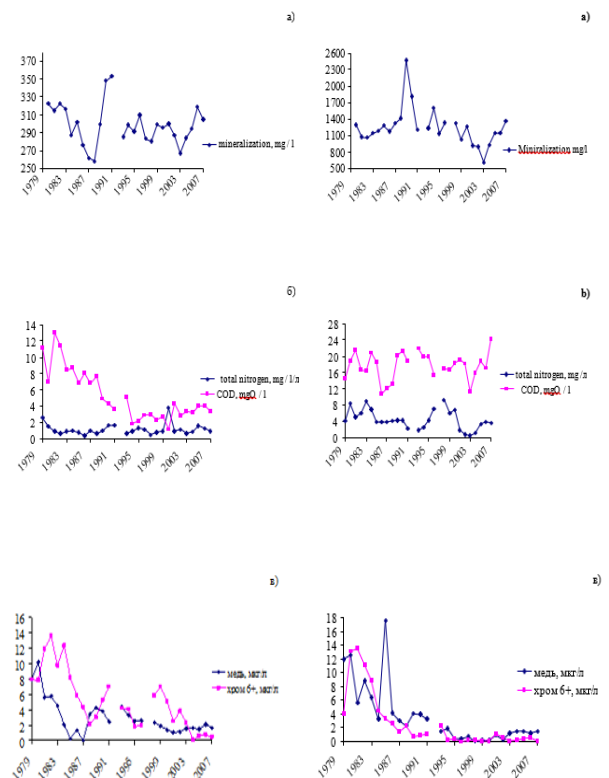




Fig. 1 .3. Changes in the content of mineralization (a); total nitrogen, COD (b); copper, hexavalent chromium (v) for 1979-2007 in the water of the river. Zarafshan - sv Rawat- Khoja.

Fig. 1 .4. Changes in the content of mineralization (a); total nitrogen, COD (b); copper, hexavalent chromium (v) for 1979-2007 in the water of the river. Zarafshan - Navoi city (below PO " Navoiazot " ).

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