

ANNUAL STUDY OF THE HYDROCHEMICAL ANALYSIS OF THE LOWER REACHES OF THE AMUDARYA RIVER

Khodjaeva Gulya Ashirbaevna¹, Eshboev Navro'z Panji o'g'li², Rakhimbaev Otabek Davlatbaevich³.

C.G.S. Associate Professor of Geography and Hydrometeorology, Karakalpak State University named after Berdakh¹, Student of the Department of Geography and Hydrometeorology, Karakalpak State University named after Berdakh², Rakhimbaev Otabek Davlatbaevich³. Student of the Department of Geography and Hydrometeorology, Karakalpak State University named after Berdakh³,
guli.68@mail.ru¹, Ericaviator26@gmail.com², Gidro-otabek@mail.ru³

ABSTRACT

This paper presents the results of the analysis of long-term hydrochemical data on the Amudarya river for the period 2013-2019.

Key words: *water resources, river, hydrochemical regime, mineralization, biogenic and organic substances.*

INTRODUCTION

In recent years, as a result of the rapid development of industry and agriculture in the Republic of Karakalpakstan, as well as population growth, the use of water resources in all sectors of the economy is growing from year to year. This, in turn, is due to the increase in the amount of water from the Amudarya to the canals in the supply of water to the economy, the pollution of water quality in canals from the river as a result of discharge of collector-drainage water from irrigated areas. Given these circumstances, the issues of efficient use of water resources and their protection from pollution are one of the most pressing issues today. In this paper, we consider this issue in the case of the lower reaches of the Amudarya River.

METHODS

The main purpose of the study is to assess the annual changes in the hydrochemical regime of the lower reaches of the Amudarya River. To achieve this goal, the following key tasks were considered and addressed in the study: assessment of the change in the level of mineralization of river water over the years; analysis of the current state of changes in the chemical composition of river water over time under the influence of mineralization. In carrying out the tasks set in the research, we used the standard data of the Department of the Hydrometeorological Service of the Republic of Karakalpakstan and the State Committee for Ecology and Environmental Protection for the last 7 years, namely in 2013-2019.

RESULTS AND DISCUSSIONS

Problems related to the hydrochemical regime of the Lower Amudarya and the negative consequences of water supply shortages in the Aral Sea region were studied by Ch.A.Abdirov, L.G.Konstantinova, E.I.Chembarisov, F.E.Rubanova, R.T.Khojamuratova and others. However, in the studies listed, each researcher studied the problem in a specific direction and came to appropriate conclusions within that study. It should be noted that the characteristics of changes in the hydrochemical regime of the lower reaches of the Amudarya River are not well studied. This research paper differs from the above in this respect. Problems related to the hydrochemical regime of the Lower Amudarya and the negative consequences of water supply shortages in the Aral Sea region were studied by Ch.A.Abdirov, L.G.Konstantinova, E.I.Chembarisov, F.E.Rubanova, R.T.Khojamuratova and others. However, in the studies listed, each researcher studied the problem in a specific direction and came to appropriate conclusions within that study. It should be noted that the characteristics of changes in the

hydrochemical regime of the lower reaches of the Amudarya River are not well studied. This research paper differs from the above in this respect. It is known that the Amudarya River supplies water to all districts of the Republic of Karakalpakstan. It is also the only source of drinking water for the population living in these areas. In carrying out the tasks set out in the study, we first began by analyzing the annual changes in the level of river water erosion. The analysis of the collected data shows that in the period under study, ie in 2013-2019, the average level of mineralization of river water increased from 827.9 mg / l (2017) to 933.2 mg. / l (2018 y). Its mean perennial dose was 891.2 mg / l (Table 1).

Time/chemical com.	Mineralizatsion mg/l	Calcium mg/l	Magnesium mg/l	Chlorine mg/l	Sulfate mg/l	Ph
2013	894	87,1	43,5	189,5	266,5	7,7
2014	907,6	91,7	42,1	191,3	279	7
2015	873	88,7	39,8	209,4	317	7
2016	889,7	102,4	43,1	288,6	303,2	7,1
2017	827,9	91,5	39,6	195,1	341,5	7,4
2018	933,2	92,9	43	210,9	324	7,2
2019	912,8	92,7	42,3	207,5	319	7,1
Average	891,2	92,4	41,9	213,2	307,2	7,2

Table 1. Results of hydrochemical analysis of river water

The degree of mineralization of river water is characterized by changes in the amount of dissolved basic ions HCO_3^- , CO_3 , SO_4^{2-} , Cl^- , anions and Ca^{2+} , Mg^{2+} , Na^+ , K^+ cations. Given this situation, the next stage of the research was to analyze the change in the chemical composition of river water over time. The analysis shows that the amount of sulfate (SO_4^{2-}) and chlorine (Cl^-) ions from the anions in the river water has the highest value than the others. The maximum value of sulfate ion in the observed years was 341.5 mg/l, which was observed in 2017. The lowest value was observed in 2013, its value was 266.5 mg/l, the highest value of chloride ion was 288.6 mg/l, the lowest value was 191.3 mg/l, and it Observed in 2014. The average perennial value of hydrogen (pH) in water was 7.2. Below we describe the results of the hydrochemical analysis of the waters of the lower reaches of the Amudarya River on the basis of a complex graph (Figure 1).

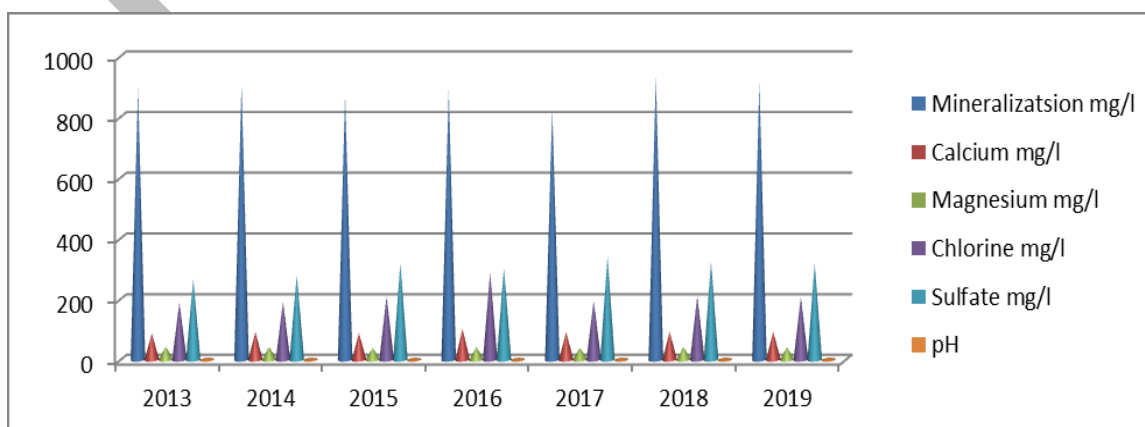


Figure 1. Complex graph of hydrochemical analysis of river water

CONCLUSION

In summary, the mean long-term sulfate ion content for the study period was 302 mg/l and the chlorine ion value was 198 mg/l. According to the classification of O.A. Alyokin, the chemical composition of river water corresponds to the sulfate class, sodium group.

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