

SOURCES OF THE AIDAR-ARNASOY LAKE SYSTEM IN THE PERIOD OF 2004-2025, THEIR MONITORING , ANALYSIS OF WATER MINERALIZATION AND SOIL SALINATION AND SOLUTIONS***Ravshanova Adolat Ravshan kizi****JDPU, senior lecturer of the Department of Biology, PhD****Kalandar Abdullaevich Saparov****TDPU, professor of zoology department, b.f.d (DcS)****Abdug'aniyeva Guljahon Sayfiddin kizi****JDPU, biology department student*

Abstract: Analysis and solutions of the main water sources of Aydar-Arnasoy lake system, their monitoring, water mineralization and their salinity.

Key words: hydrobiological analysis, hydrochemical analysis, degree of mineralization , salt deflation , visual observation , reconstruction , bathymetric measurement , water-salt balance model .

Аннотация. Анализ и решения их мониторинга основных источников вод Айдар-Арнасоевской системы озер, их мониторинга, минерализации вод и засоления почв.

Ключевые слова: гидробиологический анализ, гидрохимический анализ, степень минерализации, дефляция солей, визуальное наблюдение, реконструкция, батиметрические измерения, модель водно-солевого баланса.

Annotatsiya . Aydar-Arnasoy ko'llar tizimi asosidagi suv manbalarini ta'minlash va yechimlari, monitoringi, suvlarning menerallanishi va issiqlik o'rni.

Kalit so'zlar: gidrobiologik himoya, gidrokimyoviy yo'l, minerallashuv darajasi , tuz deflyatsiyasi , vizual kuzatuv , rekonstruksiya , botiometrik o'lchov, suv-tuz balans modeli.

INTRODUCTION. Decree of the President of the Republic of Uzbekistan No. PP-141 dated 22.02.2022 Paragraph 2 of the resolution "**On measures to improve the management of the Aydar-Arnasoy lake system** " provides for the organization of a hydrobiological and hydrochemical analysis of the state of water bodies, the implementation of measures to ensure the implementation of legal documents on the use of water in the Aydar-Arnasoy lake system, and the effective use of water resources .

In order to maintain the water level of the Aidar-Arnasay lake system, according to the letter No. 04/32-190 of the Ministry of Water Resources of the Republic of Uzbekistan (formerly the Ministry of Agriculture and Water Resources) to the Cabinet of Ministers dated February 29, 2016, the water volume of the Aidar-Arnasay lake system from 1994 to 2000 was 44.1 billion cubic meters (km³). reached.

ANALYSIS. Uzgidromet and by the West Arnasoy hydrological station in the area of the lake system has been established and monitoring of water level, mineralization and rainfall in the lake system is being carried out.

In 1969, 21 billion cubic meters of water was poured into the Aydar-Arnasoy lake system through the Chordara reservoir in order to mitigate the negative impact of the flood event on the Sirdarya River .

According to Uzhydromet, as a result of the large amount of water released from the Chordara reservoir over many years, in 2005 the water level in the lake system reaches a maximum height of 247.42 m (from the level of the Baltic Sea) rose to an absolute mark. In this case, the surface of the lake system in terms of water level was 370.6 thousand hectares, and its volume was 44.26 billion cubic meters.

Since 2005, a sharp reduction in the discharge of water from the Chordara reservoir through the Arnasoy reservoir into the lake system as a result, the ecological condition of the water system and adjacent areas began to deteriorate.

The distribution of water level changes throughout the year due to the redistribution of water balance elements in the lake system has also been observed. For example, during the period 2005-2021, the water level in the lake system fluctuated between 0.56-1.17 meters.

2.4 billion cubic meters of water annually from collector-drainage networks, including a minimum of 1.85 billion cubic meters in 2008 and a maximum of 1.85 billion cubic meters in 2011. **2.8 billion cubic meters** in 2010 **If water has fallen, an average of** 2.5 billion cubic meters of water will be discharged from collector and drainage networks annually in 2019-2020. It rained.

No water was released from the Chordara reservoir into the lake system during the years 2013, 2014, 2015, 2016, 2020, and 2021.

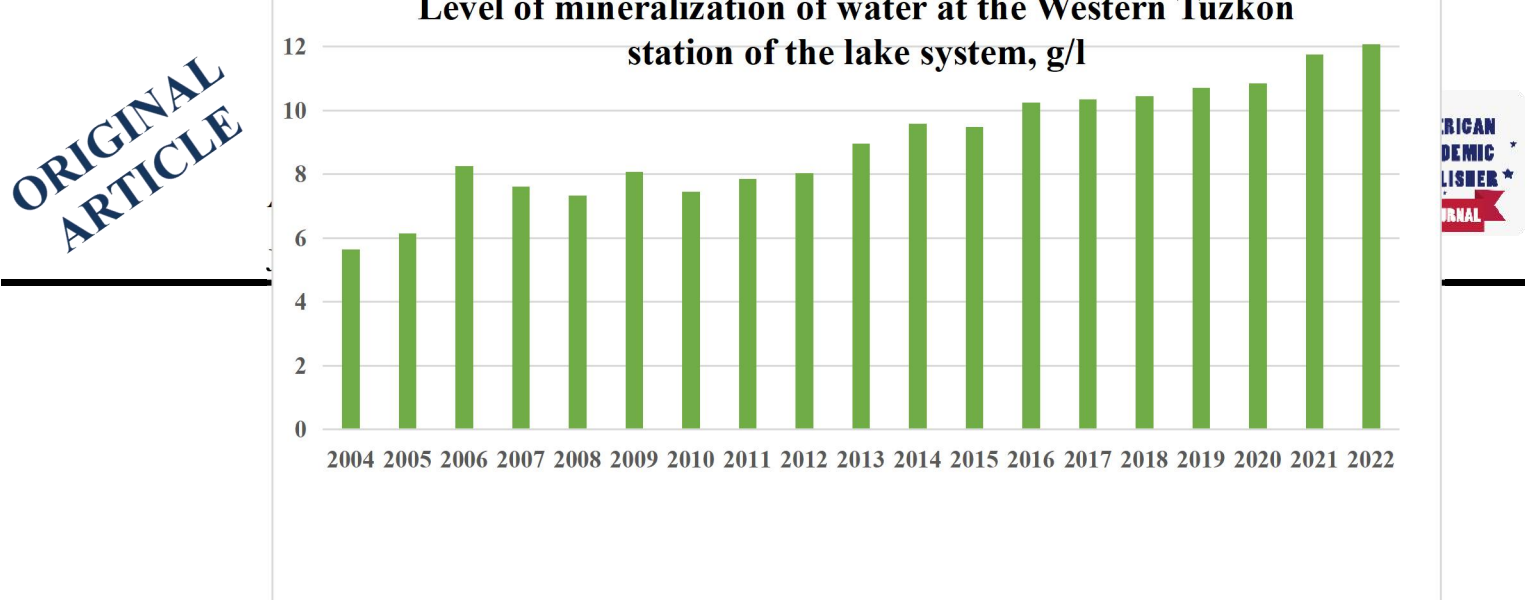
In 2015, 100 mln. cubic meters, 35 million in 2017. cubic meters, 17.9 million in 2018. cubic meters and 532 million in 2019. only one cubic meter of water was thrown.

To date, it has decreased to approximately 37.7 billion cubic meters (km.cube).

Another 1.9 billion cubic meters of water is needed every year to maintain the water level in the lake system at 245 degrees.

The Ministry of Water Resources' land reclamation expeditions in the Jizzakh and Syrdarya regions, as well as the Jizzakh Reservoirs Department, are monitoring the amount of water discharged into the lake system and its mineralization.

Uzhydromet at the West Arnasoy hydrological station of the lake system when the level of mineralization of water was observed and analyzed, it was found that the level of mineralization is increasing.



If the mineralization of water in 2004 is **5.65 g/l** , this indicator was **8.25 g/l** in 2006 , **10.53 g/l** in 2020 , In 2021, it was **11.75 g/l** .

The working group organized a study of water mineralization throughout the lake system as of **February 20, 2022** .

The level of mineralization of water in the lake system was analyzed by the Scientific-Research Institute of Environment and Nature Protection Technologies under the State Ecology Committee.

According to research, the lake system has dried up part average **5-7 t/km²** presence of salt, their main pollutant component consists of sulfate, chloride, sodium and magnesium salts.

The Working Group on February 20, 2022 soil sample was taken from the dry area of the lake system near the water level in the area.

The soil sample was analyzed by the Research Institute of Environment and Nature Protection Technologies.

According to the analysis, the dry residual amount of salts in the soil was **3.04 percent** and it was found to be very saline .

The salinity belongs to the type of chloride-sulfate salinity. Among the anions, the sulfate ion dominates in the soil, and among the cations, the sodium cation dominates.

The soil contains a high concentration of **NaCl** and **Na₂SO₄** salts, and the soil has an alkalinity index of **pH 8.58** , which indicates a strongly alkaline environment.

RESULTS

WATER BALANCE of the Aydar-Arnasay lake system in 2008-2020 (million cubic meters)

Components of the balance sheet	By years:													Medium - medium
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
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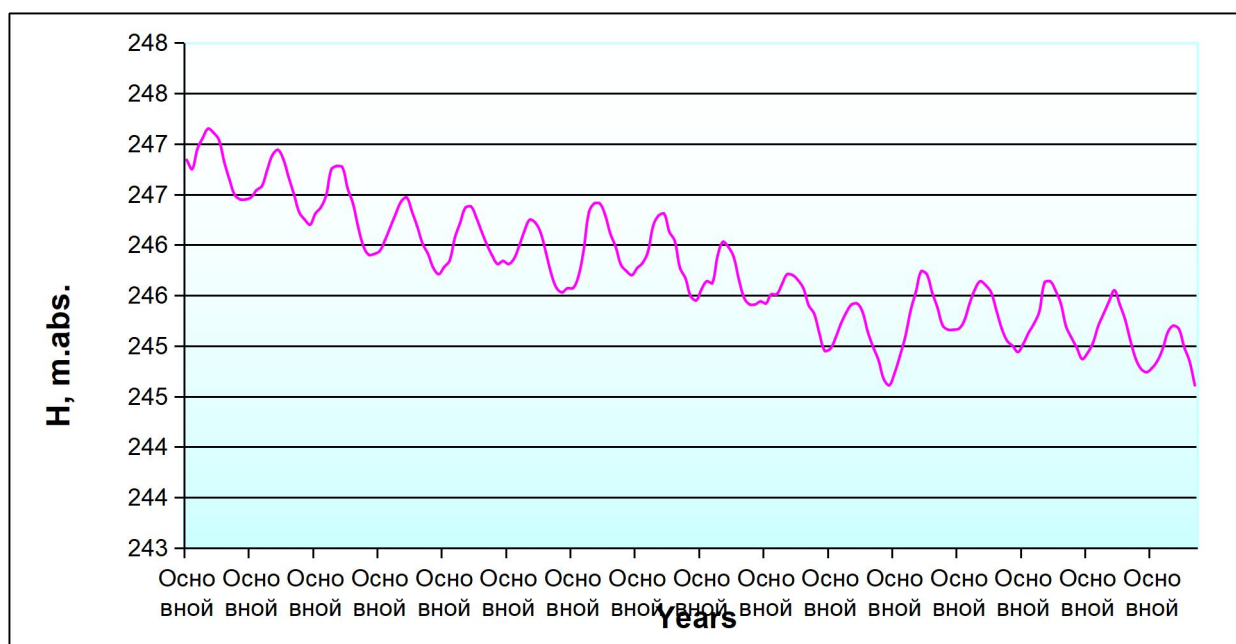
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Components of the balance sheet	By years:													Medium - medium
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Difference														
Changes in water balance	-1275	-520	132	-754	580	-614	-504	-1513	-776	1431	-547	-293	-485	-395
Change in water volume coordinate	-1301	-563	106	-844	703	-738	-492	-1569	-737	1427	-527	-285	-461	-406
Difference	26.27	43.01	-26.3	89.48	123.1	124.3	-11.8	84.08	-39.4	-4.83	35.12	-8.07	-24.7	32

The difference in the change in the water reserves of the Aydar-Arnasay lake system in terms of the balance of water consumption in 2008-2020 on average -395 million m^3 , the change of water volume according to the coordinate the difference in change on average -406 million m^3 , the difference between the two is 32 million m^3 on average.

from the Chordara reservoir through the Arnasay reservoir into the lake system in

2009 , 2011 , 2013-2016 , and 2020. As a result, the water level in the lake system has decreased by 3.12 meters over the past 15 years.



Water level changes in the Aydar-Arnasoy lake system

the moment Chordara through the reservoir Arnasoy Reservoir due to low water discharge water enters the system of lakes only from collector-drainage networks .

Uzhydromet according to As of February 20, 2022, the volume of water in the lake system will be **34.03 billion cubic meters (10.23 billion cubic meters compared to 2005 billion cubic meters less)**, and the surface of the water level is **317.2 thousand hectares (53.4 less than a thousand hectares)**.

The long-term average loss of water from the Aydar-Arnasoy lake system is 3.9 billion cubic meters .

As a result of the decrease in water discharge into the lake system, the mineralization of the water in it is increasing year by year.

Uzhydromet according to information, the annual average of water in the lower part of the Arnasoy reservoir of the lake system **mineralization** was 8.25 g/l in 2006 , In 2020, this indicator increased to 10.53 g/l, and on February 20, 2022, it will be 12.08 g/l. organized.

the analysis of the soil sample by the Research Institute of Environment and Nature Protection Technologies, the following were determined:

Indicators	Quantity
General alkalinity	0.020%
By chlorine	0.336%
Sulfate	1.536%
Calcium	0.224%
Magnesium	0.109%
Sodium	0.497%
Total salt content	3.036%
The environment of water is pH	8.58

According to the analysis, the level of mineralization of water in the lower part of the lake system from **the Tuzkon area to the Boymurad settlement of the Konimekh district** has slightly increased, and the total salt content is **12.08 g/l** from **14.12** made g/l .

Indicators	Trapper territory	Nurota region	Konimeh region
General alkalinity	3.32g/l	3.12g/l	3.28g/l
Chlorine	2.088 g/l	2.196 g/l	2.556 g/l
Sulfate	5.160 g/l	5.760 g/l	6,200 g/l
Calcium	0.552 g/l	0.628 g/l	0.612 g/l
Magnesium	0.514 g/l	0.590 g/l	0.638 g/l
Sodium	2.298 g/l	2.419 g/l	2.794 g/l
Total salt content	12.084 g/l	13.664 g/l	14.116 g/l
The environment of water is pH	7.65	7.95	7.80

Uzhydromet in 2010 showed that **19.5 %** of the lake system is dry in satellite images. **percent**

area was found to have **extreme salinity** spots.

Due to the strong salinity of the soil in the dewatered areas of the lake system, during salt deflation, magnesium sulfate and sodium chloride salts can fall into the irrigated lands and have a negative effect on their productivity.

Salts may contaminate the western regions of Jizzakh region in accordance with the direction of the wind.

Further decline in water levels in the lake system could exacerbate this negative situation.

by the working group in conjunction with local specialists in the lake system **on February 20, 2022 showed that** the upper parts of the dried areas of the lake system, i.e., relatively less saline areas, are mainly covered with **juniper** bushes, the water surface is covered with **reeds** , and the areas with very high salinity (salt marshes) are **open** .

CONCLUSION

This, in turn, can have a serious negative impact on the ecological situation of the lake system and its surroundings.

Therefore, in order to stabilize the water level and water mineralization in the lake system , an average of 1.5 billion cubic meters per year is required , of which 1.0 billion cubic meters are poured into Aydarkol and 0.5 billion cubic meters into the Arnasoy reservoir .

Measures taken to release water into the lake system and maintain its water level.

The project of reconstruction of the canals feeding the Arnasoy reservoir through the Southern Mirzachol canal was implemented by the Ministry of Water Management.

Within the framework of the project, a total of 24 billion 793 million soums of capital funds were appropriated from the state budget in 2018-2020 to reconstruct 34.9 km of canals and 27 hydraulic structures that feed the Arnasay reservoir .

43 cubic meters per second was poured into the Arnasoy reservoir , of which 37 cubic meters per second through the left channel and 6 cubic meters per second through the right channel . or in the autumn-winter months, an additional 350-400 million cubic meters of water can be collected in the reservoir. This makes it possible to supply water to irrigated lands connected to the Arnasay reservoir.

Also, the project of direct injection of additional water to Aydarkol is being implemented.

The total cost of the project is 65.8 billion soums , and a total of 30.3 billion soums of capital funds were disbursed in 2018-2020 .

After the project is fully launched, 450-500 million cubic meters will be supplied to Aydarkol every year in November-February. it is possible to provide additional water in the amount

In order to reduce the mineralization of water in the system of lakes, the following measures are defined:

Completion of the project of additional water discharge into the lake system by the Ministry of Water Management in the prescribed manner;

In high-water years, the Chordara reservoir releases an average of 1.5 billion cubic meters per year , of which 0.5 billion cubic meters goes to the Arnasay reservoir , 1.0 billion cubic meters

to Aydarkol To agree with the Kazakh side in accordance with the established procedure on the issues of water discharge, as well as the implementation of the additional water discharge project. To this end, to establish an intergovernmental working group with the Republic of Kazakhstan;

taking measures to annually release additional water into the lake system through the channels of the irrigation system;

conducting bathymetric measurements to determine the exact volume of water in the lake system. Digitization of water accounting in water management facilities discharging water into the lake system;

organization of additional hydrological and other observation points in the lake system.

efficient use of water resources in the lake system, cleaning of collector-drainage networks flowing into it;

to study the experience of Israel and Arab countries in reducing the harmful effects of collector-drainage waters and to prepare a scientifically based proposal; creating a water-salt balance model of the lake system.

Issues of preventing the formation of salt deposits on the shores, eliminating ecological hazards, and creating enclosures of trees and shrubs suitable for soil and climatic conditions in the lake system .

In order to improve the ecological environment in the Aral region of our republic, systematic measures are being taken against salt migration in the dry part of the Aral Sea.

During the spring planting season of 2022, **200 saxaul** seedlings will be planted in the sandy-barren areas of the forest fund lands around the Aidar-Arnasay lakes in the Forish district of the Jizzakh region.

protection forests were established on **the hectare area.**

Based on these practical experiences, the following tasks are defined in order to eliminate ecological risk in the lake system:

- allocation of land in the state reserve located in the areas adjacent to the lake system to forestry enterprises in the prescribed manner;
- Based on the experience of afforestation in the Aral Sea regions, it is planned to create **500 thousand hectares of protective forests from desert vegetation by the end of 2022. hectare , and** take measures to increase it sharply in the coming years ;
- To take steps to establish a nursery on 10 hectares, to collect 15 tons of seeds of desert plants to create a reserve of seedlings;
- preparing a scientifically based proposal on alternative tree and shrub species for afforestation in coastal regions;
- Development of project-estimate documents for the establishment of protected forest zones by the "Forest Project" design institute;

Provision in local budgets based on the developed project-estimate documents and allocation within the specified periods.

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