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MANAGEMENT OF QUALITY OF RIVER WATERS OF ARAL SEA BASIN

Abstract *The problems of the Aral Sea desiccation and the considerable deterioration of the ecology in the Aral Sea basin and in other regions of Central Asia have now acquired global importance. An estimation of ecological condition of the Aral Sea basin has been made by using the methods of system analysis, budget, statistics, and cartography.*

Keyword: *Quality of river waters, Aral Sea basin, index of water contamination (IWC), hydroecological zoning of territories.*

Introduction the independence of Central Asia Republics and the transition to a market economy, which has been accompanied by a breakage of the links between the CIS countries, and the general background of a regress in the economy of the area, have made the economical use and protection of water resources and introduction of new technologies even more important.

A new approach is required using new technologies. In this, given the limited capacities in the region it is necessary to select priorities that provide a short-term effect and to use the experience, finance and technologies of reputable international organizations and companies to develop an integrated utilization of inter- republican water resources, giving an improvement of river water quality and the provision of good quality drinking water.

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2. Existing knowledge on use and protection of water resources

The main problems of the region are low quality of drinking water and the ineffectiveness of purification facilities in cities, settlements and rural areas. Up to 20-30 years ago there was no serious drinking water supply problem as surface and ground water was not contaminated with toxic substances and ponds, wells, surface water could be utilized using primitive purification devices. A growth in river water mineralization levels and contamination has led to the degradation of near-river and near canal fresh water lenses.

Wells used by the rural population are contaminated by agrochemical-pesticides, nitrates, oil products with those in industrial zones being contaminated by toxic metals and organic components in addition.

Water resource monitoring is carried out by sector:

Uzhydromet (Uzbek Meteorology Agency) monitors regularly water quality in water courses and reservoirs;

Minzdrav (Ministry of Health, Sanitary & Epidemiology Service) monitors quality of drinking water;

Goscomgeologia (State Committee on Geology) monitors quality of underground mineral and fresh drinking water, and Minzelvodhoz (Ministry of Agriculture and Water Management) is responsible for water allocation in river basins and water intake in canals for irrigation purposes. It also monitors quantities of collector-drainage water. Water quality and river discharges monitoring are carried out in the most effective way by Uzgydromet which has a modern analytical and methodological basis [2].

The total Aral Sea basin water resources are estimated by experts to be about 120- 125 km3, whilst the total current annual runoff collected according to calculations is about 33 -35 km3, i.e. about 30% of water resources. Between 21-22 km^3 of collector runoff is included within the Amu Darya basin, including the Karakum canal with its Murgab and Tejen irrigation areas.

A further 13 – 14 km^3 is collected in the Syr Darya basin which has mean mineralization levels varying from 1.7 to 6.0 g/l.(Table1).

Table 1.

Characteristics of collector-drainage water in irrigated regions of the Aral Sea basin in 2016.

Region	Irrigated area (OOOs ha)	Length of collector network (km)	Annual flow (km3)	Salinity (g/L)	Predominant ions (*)	Salt flow (10^x1 tonne)
Amu Dar'ya basin						
Vakhsh	180	1,600	2,67	1,8	Sulfate/chloride Mg,Na,K	4,8
Surkhan-Sherebad	275	73,000	0,95	2,4	Sulfate/chloride Mg,K,Na	2,3
Chardjou	193	5,500	2,31	3,5	Chloride/sulfate K,Mg,Na	8,1
Tuyamuyun	485	13,000	4,71	4,2	Chloride/sulfate K,Mg,Na	19,7
Takhiatash	469	16,746	2,35	4,0	Chloride/sulfate K,Mg,Na	9,4
Karshi	435	5,200	1,22	7,7	Chloride/sulfate Mg,Na	9,4

Bukhara	317	7,190	1,47	4,2	Chloride/sulfate Mg,Na	6,2
Murgab	347	8,300	1,20	10,5	Sulfate/chloride Mg,Na	12,6
Tedzhen	280	4,600	0,44	14.2	Sulfate/chloride Mg,Na	6,3
Syr Dar'ya basin						
Fergana	1,300	24,800	7,47	2,2	Chloride/sulfate K,Mg,Na	16,4
Hungry steppe	480	16,000	2,58	2,7	Chloride/sulfate Mg,K,Na	7,0
Tashkent	375	8,000	1,20	1,7	Chloride/sulfate Mg,K,Na	2,0
Arys-Turkistan	185	1,530	0,05	6,0	Chloride/sulfate K,Mg,Na	0,3
Kzyl-Orda	252	4,300	0,20	4,2	Chloride/sulfate Mg,Na	0,8

(*) Predominant ions are those that exceed 10% equivalent when the sum of all ions iIs assumed to be 100%.

3. Objective and scope

To achieve the necessary condition of optimal and harmonious development of the technical and economical level of Central Asian Countries necessary permanent data on the quality of water resources, which can be used for water are required so that future information about natural water quality have main practical significance for economic developing. The acceptable chemical content levels for the different uses of drinking, municipal use, agriculture, technical etc;

Results of the research of the hydrochemical laboratory of Institute of Water Problems at Academy of Science (from 2005 to 2012 yy.) Focused on solving the hydrochemical problems of this region. This included the design of systems for the prevention, limitation and removing of contamination of river waters upon which I want to concentrate in this paper and not the research that is being carried out into the examination of river waters. It is these investigations into solving hydrochemical problems [3]. (table 1)

4. Results

On the basis of an analysis of the “Bank of hydrochemical dates” (which included details of river water quality since 1990) interactive estimating of the modern contamination levels of rive waters were conducted using five classes of quality: good quality, satisfactory quality, bad quality, dangerous quality and highly dangerous quality.

The contamination level of river water quality was calculated using the method of index of water contamination (IWC). At the present time , the level of contamination of surface water is estimated using the IC method (index of contamination) from Institute of Hydrochemistry. This index included six ingredients which exceeded a maximum admitted concentration (MAC), considering oxygen content. But, in this form that index note chaff for practical demands.

From this reason was suggesting considering of all ingredient, which high than MAC, introduce coefficients K1 and K2. When Index of Contamination exchange from 0 to 1 – water in good quality, 1-3 – satisfactory, 3-5 - bad, 5 -10 – dangerous and more than 10 - very dangerous.

Results of investigation permitted to make map of “Distraction of river waters of Uzbekistan on quality of drinking water “. Conducted analyze of dates about area and population with different water quality. 8% of area of country have quality of “good water” , where living 10% of population, “ satisfactory” quality area is 15%, where living 16% of population.

Area with “bad ” quality 41%, and population when living 50% and end cantor “ dangerous” quality of water 35% of area, where living more than 24% of population of Uzbekistan. As this, points solving of drinking water quality very actual for territory of Uzbekistan.

Investigation results showed “ dangerous ” water had not only in territory of low Amudarya, also in low Zeravshan, where situation with water contamination one of hard.

Calculation showed IC in Syrhendarya river - 2,8; Kashkadarya - 4,0; Zeravshan – 5.3; and Amydarya – 5,4 this number proved our conclusions.

For example we can give detal investigation result's Zeravshan. Average year mineralization of river before Samapkand 0,3 g/l, after flow of into the high mineralization drainage water's increased to 0,5 g/l. In the part of river from Khatirchi to Navoi mineralization increased reason is waste waters from industry plants Kattakurgan and Navoi city, mineralization of river after flow of into the river water's from " Navoiazot" - 1,6 g/l.

Quality of water changing essentially line of rive is water composition in exit in the mountain is sulphate-hydrocarbonate – magnezuim - calcium, at lower part is sulphate -magnesium – calcium – natreum composition.

From contamination chemicals pesticides have higher level than MAG. Maximum concentration of alfa hyxochoran (GHCG) had Khatirchi network station (6, 2 MAC).

From higher metals chromium and zinc (ZN) had higher concentration. Higher concentration of these metals had collectors Siab and Chaganak. Also, in water of Zeravshan contented curium, which very dangerous for man's health.

Contamination level of river waters with organic elements estimated by BPK5 (biochemical use of oxygen during five days). This index higher then MAC 1,1 - 1,2 only in three networks. Water of Zeravshan contaminated with phenol also, concentration which higher than 3 - 7 MAC. Maximum concentration was river Amankutansay IC of river water had - 5.3.

Chemical composition of Amudarya water in the flat area is composed under the influence of collector waters coming into the from irrigated areas of Surhandarya, Sherabad, Kashkadarya (through Southern

collector), Zeravshan (through the Main Bukhara collector) river basin areas as well as from irrigated area of Turkmenistan left bank irrigation area (Chardjou oasis) Due to this the Amudarya water mineralization levels in midstream and especially in downstream areas are elevated up to 1,2 – 1,3 g/l. Water contamination is caused by nitrate nitrogen, oil products, phenol, copper, pesticide, etc., the content exceeding MAC.

5. Conclusion

For the conservation and improvement of surface water quality in the Aral Sea basin there is a need to introduce integrate water safe measures:

- the organization of monitoring network responsible for water quality , with the study of charges for negative processes;

- the installation of a water safe zone and shelf line in water objects and the measurement of pollution and exhaustion to support sanitary conditions;

- to decrease the flow of collector-drainage water from rives irrigation fields by the application of progress possible of irrigation with using less volume of irrigation water, and more, full using these waters in place their forming (with estimate method of kvazidesalition and methods of kvazidesalition and methods of hydroelectric);

- to extend in practice water rotation systems of product water – supply, and wider counts ruction for treatment disaffection and render harmless of waste water;

- to introduce precept of payment off using of water resources, this will be stimulation for increase natural capacity of products uses will be try intriduce water save technology, for economy of water;

- necessary introduce methods of economy stimulation for organizations- users, liberation from taxes for treatment installation now shocked live test;

- it is necessary to initiate serious research ad practical work on utilization and purification of these waters as the present time they impact on the

environment causing contamination of river (and drinking) water, saltinization of pastures, creation of salty sewage lakes, etc. The problem is related with solution of problem of preservation of drying of the Aral Sea as well.

For best execute all problems for hydrochemical of basin of Aral Sea and ecology his basin necessary indicate efforts of specialists, hero in republic of Central Asia , and foregone specialists.

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