OPEN ACCESS
INTERNATIONAL JOURNAL
EIJMRMS
Next Scientists
European International Journal of Multidisciplinary Research and Management Studies
SJIF 5.954 2022

EUROPEAN INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND MANAGEMENT STUDIES
ISSN: 2750-8587
DOI: https://doi.org/10.55640/eijmrms-02-04-24

https://eipublication.com/index.php/eijmrms
Volume: 02 Issue: 04 April 2022
Published Date:- 20-04-2022

Page No.-131-137

RE-USE OF COLLECTOR-TRENCH WATERS IN CONDITIONS OF CLIMATE CHANGE (ON THE EXAMPLE OF JIZZAKH MAIN COLLECTOR-TRENCH IN JIZZAKH REGION)

J.A.Mirzaev

National University of Uzbekistan f.f.d., Senior Teacher, Uzbekistan

S.Komilova

National University of Uzbekistan student, Uzbekistan

S.Samig`jonov

National University of Uzbekistan student, Uzbekistan

J.M.Muxammadiev

National University of Uzbekistan master`s degree, Uzbekistan

ABSTRACT: - To make proposals for rational use of irrigated lands by studying the characteristics of the Collector-trench waters of the region using Physico-Chemical and statistical methods.

KEYWORDS: mineralization, irrigation, collector-trench, m3/s, mln. m3, mg/l, nitrogen nitrite, nitrogen nitrate, nitrogen ammonium, iron, phosphate, chromium, oil, phenol, fluorine.

INTRODUCTION

Due to highly irrigated farming activities, irrigated lands from the countries of the Aral Sea basin, particularly Turkmenistan, Uzbekistan, and South-East Asia, are places with a high degree of natural inclination for secondary salinity in climatic change [1, 5]. The use of extensively irrigated land, irrigation, and the proper functioning of Collector-trench networks have resulted in an increase in groundwater mineralization, resulting in a severe worsening in the irrigated land reclamation condition over the last 20-25 years [2, 3].

In Uzbekistan, salty lands account for 50.7% of irrigated land, with weak saline lands accounting for 21.4%, moderately saline lands for 15.5%, and strongly saline areas accounting for 3.8% [4]. Mineral fertilizers are commonly used in large quantities, resulting in increased productivity (for example, 10-15% for cotton). However, the widespread use of mineral fertilizers (mostly nitrogen-based) resulted in soil salinization, necessitating greater water resources for Salt washing, which raised the level and mineralization of groundwater, hastening the salinization of irrigated soils [5].

Jizzakh region has a total land area of 21.2 thousand square kilometers, a population of 1,301 thousand people, a temperate temperature, and is dominated by desert, low plains, hills, and mountains.

The region is one of the regions that sharply manifests itself such problems as a decrease in the amount and quality of surface and underground water resources, a deterioration in the melioration of irrigated lands.

The purpose of the work is to make proposals for rational use of irrigated lands by studying the characteristics of the Collector-trench waters of the region using physico-chemical and statistical methods.

The water supply of the region has a cross-border character, in many respects depends on the amount of water coming from the Kyrgyz and Tajik Republics. In the region, on average, 1890 million m3 of water is used from the Sirdarya River, 1050 million m3 from the Zarafshan River and 100 million m3 from the Sangzor River. The amount of water used for irrigation purposes for 2000-2020 years ranged from 2644 million m3 to 2854 million m3. The mineralization of Syrdarya Water averaged 1166.6 mg/l and Zarafshan River 347.5 mg / l[5].

Cotton, grain products, fruits, vegetables, melons, and grapes are grown on the region's total irrigated area, which is 300547 hectares. The amount of humus in irrigated soils is less than 1-2 percent in desert soil, sand, and gray-brown soils.

Surface and subterranean waters, as well as irrigated soil samples collected as part of regional geology and melioration expeditions and field expeditions led by the authors of the article, were studied and statistically processed in this study. Groundwater levels, soil salinity, and mineralization are all under control thanks to these trips [5]. A tube (inner diameter 90-110 mm, length 3-6 m) packed with sand-gravel filters is installed in underground leakage water monitoring stations. Priklonsky technique [9] was used to determine the degree of mineralization of groundwater.

Droughts are frequently repeated droughts that demand more water resources for irrigation purposes [9]. The climate changes observed in the following years (rising temperature and the "greenhouse" effect), the decrease in the amount of river water flow coming from the Central Asian glaciers, are often repeated droughts that demand more water resources for irrigation purposes.

If irrigation water is used in excess rather than on the basis of actual need, excess water collects in irrigated soils, making it difficult for surplus water to flow naturally out of the irrigated areas, resulting in a deterioration in soil fertility and waterlogging [10].

Although irrigated areas account for 15% of agricultural land in Uzbekistan, they account for 90% of agricultural outputs [11].

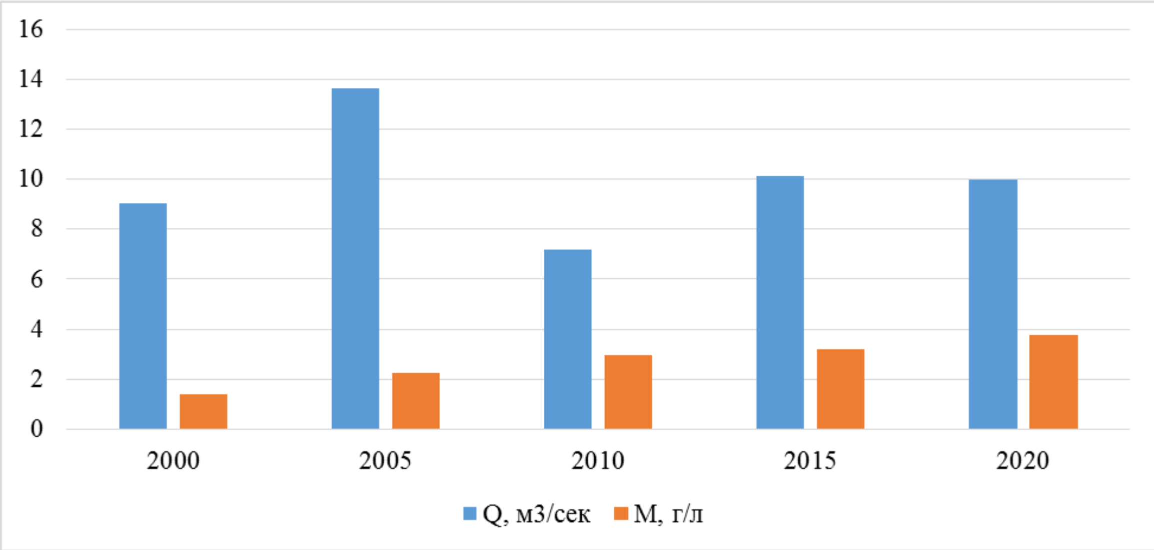
The source of groundwater drainage saturation Water infiltration is the movement of irrigation water into the bottom layers of soil in irrigated agricultural regions through infiltration (absorption). This represents 90-95 percent of the seawater water's saturation sources[12].

The Jizzakh main branch (JBC) is 77.96 kilometers long and begins in the Mirzabad District of the Sirdarya region. The overall irrigation area of JBC is 8,021 thousand hectares, with 8460 ha in Mirzabad and Khovos districts in the Sirdarya region. From the Jizzakh region's Zamin district to 17720 hectares, from the Zarbdar district to 28900 hectares, from the Zafarabad district to 12008 hectares, and from the Rashidov district to 12933 hectares. To examine and evaluate the head, middle, and lower regions of the body, samples were obtained from the head, middle, and lower parts.

Figure 1 depicts the trends of CBK's average annual water consumption and mineralization for the years 2000, 2005, 2010, 2015, and 2020. In 2000, the total water volume was 9,02 m3 per check; in 2005, 13,6 m3/ sec; in 2010, 6,7 m/sec; and in the years 2015-2020, the total water volume was about 10-11 m3/ sec. Because of the rainwater coming from the Zomin mountain slopes (524,5 mm) in the spring of 2005, the average yearly water usage at CBK is 13,6 m3/sec, which is relatively high. The dry and spring season of the year in 2010 is 7,2 m3/ sec, with comparatively low water use due to low precipitation. The fact that the mineralization of JBK water increased by 2000-2020 years means that this collector-trench was increased without regard to water consumption (figure 1).

On the land of Pistalitog village in Zafarabad district, JBC's water would be attached to the QLI trench.

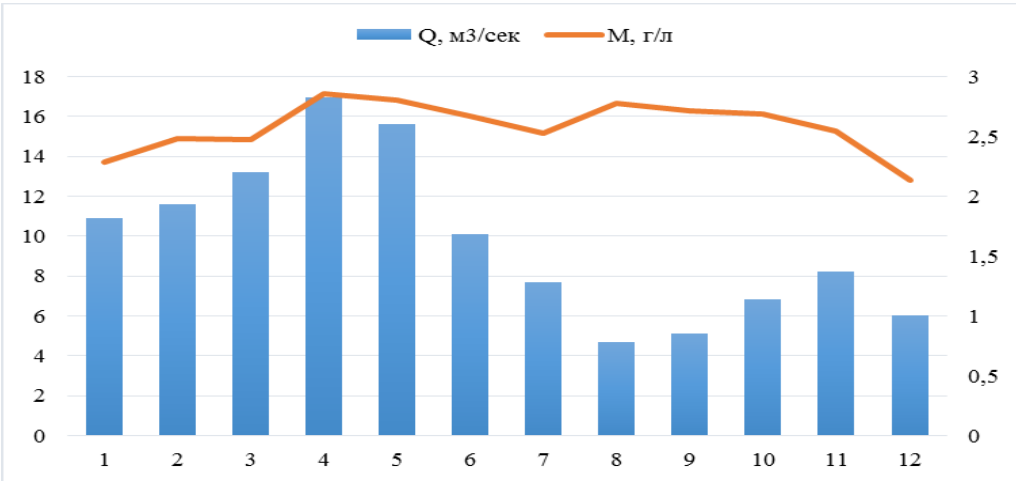
The following are some of the findings from the CBK trench. Because it is understandable that the soil conditions in arid (arid) locations are closely related to soil salinity, the correlation relationship was discovered in mineralization. The mineralization of the trench Waters is connected to the water consumption of the trench $R2 = 0,0109$ correlation, which indicates that the mineralization of the trench Waters has deteriorated and that the mineralization has altered regardless of the water consumption of the trench (Figure 1).



1-picture. The dynamics of the Jizzakh main reservoir's average annual water consumption and mineralization changes.

Figure 2 illustrates the monthly average water consumption and mineralization of the JBK trench. The graph shows that water consumption begins to grow in March, with the main cause being that the majority of the yearly precipitation occurs during the winter and spring seasons.

Water consumption increased from January (10,9 m3/c) to May (15,6 m3/c) due to winter and spring precipitation, decreased from June (10,11 m3/c) to August (4,7 m3/c) due to irrigation, and increased from September (5,1 m3/c) to December due to the performance of washing operations (December, January).



2-picture. Dynamics of changes in the monthly average water consumption and mineralization of the CBK trench 2000-2020 years.

The mineral water of the CBK trench averaged 2,6 gr/l from 2000 to 2020, with the best months being April-May at 2,8 gr/l and the lowest month being January at 2,3 gr/l.

Table 4 shows the chemical composition of the REChU and Sirdarya Rivers individually so that the results of the CBK water analysis can be compared. Sulfate concentration from REChU was 16 times higher in CBK water samples, calcium was 1.5 times higher, magnesium was 5.5 times higher, and sodium was 2.5 times higher. Chromium (+6) is 14 times more abundant, copper is 16 times more abundant, and zinc is 1,1 times more abundant among heavy metals. CBK water mineralization is 2831 mg/l in the head; in the middle part it is 2967 mg/l; in the lower part it is 2932 mg/l and in the middle 2910 mg/l. The amount of mineralization is almost 3 times higher than REChU. The amount of some chemical components contained in the broth increased depending on the lower part of the head (table 1).

The data of the chemical analysis of CBK water are given in Table 1.

Table 1

CBK water chemical analysis data

Components	The main part	The middle part	The lowest part	In the middle	REC hU	Water content of the river sirdarya
Nitrogen nitrite (NO2), mg/l	0,007	0,006	0,008	0,007	0,02	0,012
Nitrogen ammonium (NH4), mg/l	0,25	0,29	0,29	0,27	0,39	0,03
Nitrogen nitrate (NO3), mg/l	0,29	0,27	0,29	0,28	9,1	1,8
Chlorine, mg/l	221,4	226,8	238,3	228,8	300	62,7
Sulfate, mg/l	1575	1684	1618	1625,6	100	324,1
Gidrocarbonate, mg/l	254	241	268	254,3	-	135,7
Calcium, mg/l	276,1	281,3	280,5	279,3	180	722,2
Magnesium, mg/l	223,4	218,5	218,9	220,2	40	53.9
Sodium, mg/l	297,9	312,1	307	305,6	120	89,7
Potassium, mg/l	2,8	3,2	3,0	3	50	-
Iron (Fe) mg/l	0,02	0,02	0,04	0,03	0,5	0,09
Petroleum products, mg/l	0,012	0,021	0,03	0,021	0,05	0,02
Fluorine, mg/l	0,61	0,72	0,69	0,67	0,75	0,54

Chromium (+6), mcg/l	0,8	1,6	1,8	1,4	0,1	0,75
Copper, mcg/l	1,57	1,42	1,92	1,63	0,1	2,1
Zinc, mcg/l	12,8	10,7	11,3	11,6	10,1	9,7
Hardness, mg-ekv/l	31	29	32	30,6		9,0
Minerals, mg/l	2831	2967	2932	2910	1000	1167

We can see that over the years, mineralization has increased due to the fact that the Collector-trench water was used both for the purpose of blocking irrigation during the irrigation period and for the purpose of irrigation in the years when annual rainfall was low.

CONCLUSION

Groundwater mineralization and irrigated soil salinity have improved slightly in Jizzakh's irrigated areas over the previous 21 years.

The findings revealed that, despite the fact that the irrigation and collector-trench systems are outdated, their low efficiency does not work well in preventing soil salinity, and the level of salinity in soil and underground seawater water has improved as a result of the region's agricultural system's systematic land reclamation work.

Further efforts targeted at repairing the Collector-trench system have revealed the need for greater stimulation, as well as regular monitoring of the characteristics of the relevant irrigated lands and groundwater leakages, as well as the necessity for more efficient use of groundwater.

Heavy metals in CBK water: Iron, fluorine, chromium, copper, and zinc were several times the permissible norm, cations nitrogen nitrite, nitrogen ammonium, nitrogen nitrate, chlorine, and sulfate were 2-3 times higher, anions calcium, magnesium, sodium, and potassium were 5-6 times higher, and anions calcium, magnesium, sodium, and potassium were 5-6 times higher. In years when there is a water deficit from the Collector-plant, low mineralized CBK is advised for irrigation, salt-resistant plant cultivation, and other masquerades. The use of collector-water from the ditches for livestock and drinking is not recommended.

Mineral has been presented as an indicator for river water utilized for irrigation in the region as a consequence of the investigation.

Groundwater levels and mineralization as an indicator for irrigated areas. The results of the 21-year observations and analysis of the cause are the main factors in the salinity of irrigated lands due to the level and mineralization of the seawater.

REFERENCES

1. Mirzaev J.A., Kulmatov R.A. Sug‘oriladigan maydonlardan hosil bo‘lgan kollektor drenaj suvlarining miqdor va sifatini hamda ulardan foydalanish imkoniyatlarini baholash (Jizzax viloyati misolida). O‘zMU xabarlari.- Toshkent, 2019 №3/2-B-101-108.
2. Mirzaev J.A., Kulmatov R.A., Tayloqov A.A. Iqlim o‘zgarishi sharoitida Jizzax viloyati suv va sug‘oriladigan yer resurslaridan barqaror foydalanish //

"Ekologiya xabarnomasi – Ekologicheskiy vestnik"-Toshkent, 2018 №9(209)-son 26-30 betlar.

3. Kulmatov R.A., Mirzaev J.A., Abuduwaili J.J., Karimov B.K. Challenges for the sustainable use of water and land resources in the Djizakh irrigation zone (Uzbekistan) under changing climate and salinization // Journal of Arid Land (2020) 12(1): rr. 90-103 (IF-3,3). https://doi.org/10.1007/s40333-020-0092-8.
4. Groll M., Kulmatov R., Mullabaev N, Opp, C., Kulmatova, D. Rise and Decline of the fishery industry in the Aydarkul-Arnasay lake system (Uzbekistan)–Effects of reservoir management, irrigation farming and climate change on an unstable ecosystem. Environmental Earth Sciences. (2016) 75:921. DOI 10.1007/s12665-016-5691-5.
5. Groll, M., Opp, Ch., Kulmatov, R., Ikramova, M. & Normatov, I., Water quality, potential conflicts and solutions – an upstream-downstream analysis of the transnational Zarafshan River (Tajikistan, Uzbekistan). WIT Transactions on Ecology and The Environment, Vol 196, 2015. Environmental Earth Sciences (2015) 73, pp. 743-763, DOI: 10.1007/s12665-013-2988-5.
6. Mirzaev J.A. Sangzor daryosi suvidan sug'orish maqsadida miqdor va sifatini aniqlash (Jizzax viloyati) // O'zMU xabarlari.- Toshkent, 2020 №3/1-B-65-69.
7. R.Kulmatov, J.A.Mirzaev, A.Taylakov, J.Abuduwaili, B.Karimov Quantitative and qualitative assessment of collector-drainage waters in Aral Sea Basin: trends in Jizzakh region, Republic of Uzbekistan. Environmental Earth Sciences (2021) 80:122 https://doi.org/10.1007/s12665-021-09406-y
8. R Kulmatov, J Mirzaev, D Kulmatova, R Allaberdiev The modern agroecological (rivers water, irrigated lands) problems of Uzbekistan under the climate change with focus of the Navoi region. Rivojlantirish yutuqlari, muammolari va istiqbollari", mavzuidagi xalqaro ilmiy-amaliy anjumani. Navoi-2019. B-732-741.
9. SA Odilov, RA Kulmatov, JA Mirzaev Assessment and determination of the dynamics of changes in salinization of irrigated lands under the influence of climate change (in the case of Syrdarya province) Bulletin of Gulistan State University, 2021. Rr- 43-59
10. R Kulmatov, J Mirzaev, A Taylakov, R Allaberdiev. Agroecological (rivers water, irrigated lands) problems of the Uzbekistan under climate change. Bukhara–Samarkand–Tashkent. Rr-159-165.
11. J.Mirzaev, R.A.Kulmatov, A.Tayloqov, S.Odilov, N.Jumaeva Iqlim o'zgarishi sharoitida Jizzax viloyati sug'oriladigan maydonlardan hosil bo'lgan kollektor drenaj suvlarining miqdor va sifatini hamda ulardan foydalanish imkoniyatlarini baholash // "Ekologiya xabarnomasi-Ekologeskiy vestnik" axborot-tahliliy va ilmiy-amaliy jurnalining 2019 yil 9(211)-son. 22-25 betlar.