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SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2019 **Issue:** 11 **Volume:** 79

Published: 30.11.2019 **http://T-Science.org**

QR – Issue QR – Article

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WAYS TO INCREASE ALLOWED WATER RESOURCES

Abstract: *The article is of great scientific interest and the practical importance of developing organizational and technical methods that provide an economically feasible degree of use of available and increasing available water resources, including collector-drainage, groundwater, and wastewater, which in the near future will ensure the sustainable development of the national economy. The composition of measures to overcome the consequences and reduce the damage to agricultural production in conditions of water scarcity is determined. Also, the joint use of waters of various origin and quality within individual zones or regions of the republic.*

Key words: *water systems, trans boundary problems, water management system, water scarcity, water consumption policy, irrigation rate, interstate water allocation, use of water and energy resources.*

Language: *English*

Citation: Bazarbaev, B. (2019). Ways to increase allowed water resources. *ISJ Theoretical & Applied Science, 11 (79),* 688-691.

Soi: http://s-o-i.org/1.1/TAS-11-79-141 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2019.11.79.141

Scopus ASCC: *1101.*

Introduction

At the present stage of development of the sectors of the national economy of the republic, water sources, on the basis of which disposable water resources can be increased, consist of three parts:

1. A traditional source of increasing water resources is the abstraction of water from river systems. In conditions of excess river water, this is the easiest way, but in conditions of water scarcity it is almost exhausted.

2. The use of fresh groundwater with the possibility of replenishment during periods of high water availability, the development of methods of artificial replenishment.

3. The use of non-traditional water sources - collector-drainage, brackish groundwater, wastewater of industrial and municipal facilities. In conditions of water scarcity, this is the most real and only way to mitigate its effects.

Literature review

Koshekov R.M, Mirzaev S.Sh, Nasonov V.G, Ramazanov O, operate in simple, simple ways. Literature give us information and fact. And also from literature we inrich our knowledge. Knowledge leads to science, and science leads to the future.

Methods and analysis

Surface water resources. Currently, the available surface water resources in the Syr Darya basin have reached full exhaustion, provided for by the «General Scheme of the use of irrigated lands, water resources and their protection in the Republic of Uzbekistan» («Vodproekt», 1994), the Syr Darya river is fully regulated with a coefficient 0.94.

However, in the last decade in the river basin. The Syr Darya during the vegetation period is often observed the most severe dry periods, causing serious damage to agriculture. This is caused not only by years of low water availability, but also by a radical change in the operating regime of reservoirs, mainly Taktogulsky. The fact is that in the upper part of the Syr Darya basin, reservoirs created to meet the needs of irrigated agriculture in the middle and lower reaches switched to an energy regime, dramatically increasing electricity production in the winter, which radically changed the water management situation and influenced the features of the underlying reservoirs. As a result, the guaranteed volume of water supply in the Syr Darya basin decreased due to irrigation by 4.5-5.0 km3 / year, of which Uzbekistan accounts for up to 2.3 km3 / year.

In the basin of the Amu Darya river, it was assumed that with the commissioning of the Rogun reservoir, the possibilities of multi-year regulation of the Amu Darya river with a regulation coefficient of 0.92 would be exhausted. However, there is currently no reservoir. Therefore, taking into account possible. clarification of water allocation in the Kerky site, the volume of available water resources for river runoff should be accepted at present and in the future in accordance with the "Draft National Water Strategy".

Table 1. Available water resources of Uzbekistan by river runoff, mln.m^3

№ п/п	River basins	The annual volume of flow in mln.m^3		
1		River trunk	Small rivers	Total
2	SyrDarya river	10490	9425	1915
3	AmuDarya river	22080	10413	31493
	Total	32570	19838	52408

It should be borne in mind that the volumes shown in Table 5 are very conditional, since the volumes of river runoff formation by different organizations are estimated with a wide spread and additional studies are needed to refine them, nevertheless they are minimally possible and therefore accepted as the basics.

Collector-drainage water resources. In the Aral Sea basin, collector-drainage waters are diverted to natural depressions or discharged into the river channels, where they are reused for irrigation. Within Uzbekistan, in river basins, from 12 to 16 km3 / year of collector-drainage water is discharged, depending on the year. In addition, about 6 km3 / year is diverted directly to rivers from the irrigated territories of states located upstream. Thus, at present from 18 to 22 km3 / year of collector-drainage water is discharged into rivers on average. There is no actual data on how much each state takes for irrigation of collector-drainage waters and discharges them into rivers. Considering that Uzbekistan uses half of the water resources of the river flow, 50% of the volume of collector-drainage water discharged into the rivers can also be taken by the republic, including their volume discharged into the river from the territories of the Syr Darya and Tashkent regions, which cannot be used in Uzbekistan.

The actual share of the use of collector-drainage water discharged into the rivers and used downstream by Uzbekistan is approximately 8.105 km3 / year. This value can be taken at present and in the near future as part of the disposable secondary water resources. It must be assumed that the collector-drainage water makes certain changes to the hydrograph of the river flow, however, for the republic this phenomenon is not of fundamental importance and does not require the construction of a regulatory capacity.

Another way is the use of collector-drainage water in the places of their formation for irrigation of agricultural crops. The annual volume of their use at the places of their formation in disposable water resources can currently be taken in the amount of 1.24 km3 / year.

To use them in such volumes does not require the creation of infrastructure, it already exists. In the near future, the volume of available water resources should include the volumes of collector-drainage water use at the places of their formation in the amount of 3.33 km3 / year.

Wastewater in Uzbekistan is 2.4 km3 / year.

Despite the positive results of previously completed work, currently in the republic there are no pilot production studies on the use of wastewater for irrigation. Therefore, first of all, it is necessary to provide for the use of wastewater only on pilot production systems in order to obtain the initial data for the creation of standards and design documentation or to seek foreign sponsors. Based on previous experiments on the use of wastewater for irrigation and international data, in the available water resources for the near future it is envisaged to use them for irrigation in the amount of 0.1 km3 / year, and in the long term up to 1 km3 / year.

Disposable groundwater resources. Groundwater exploitation experience in the period 1980-1990 showed that when about 6.5 km3 / year was pumped out, a decrease in surface water runoff was not observed. Moreover, at that time, a certain stabilization of the reclamation state of irrigated lands and a decrease in the rate of flooding of settlements were observed. However, to achieve this level of pumping volumes, certain financial, organizational and technical measures are required. Therefore, at the present stage, accept the existing average annual volume of groundwater pumping of 4.6 km3 / year used for irrigation of crops. At the 2015 level, the pumping volume achieved in the period 1980-1990 was adopted. - 7.1 km3 / year. It should be noted that this is significantly less than the currently approved groundwater reserves. This is due to the fact that the restoration of the previous volumes of groundwater pumping will require certain repair and restoration works of existing water intakes.

The available water resources in the country for river flow in the amount of 52408 million m3 / year, although somewhat arbitrary, are nevertheless the most appropriate, since the surface water resources in

the Aral Sea basin are practically exhausted, and according to other estimates (SANIGMI - 132, 7 km3 / year, GEF WEMP - 123.8 km3 / year, NITsMKVK - 116.6 km3 / year) available surface water resources in Uzbekistan will be different.

In addition, it must be borne in mind that the proposed construction of the Kambarata hydroelectric station, the Rogun hydroelectric station, and the planning of further expansion of irrigation for the future in Tajikistan, Kyrgyzstan and other states will entail serious changes in the distribution of river flow over time. This determines not only a shortage of water resources, but also the need to find new non-traditional sources, a radical revision of existing views and the procedure for using underground and collector-drainage waters, which the republic has in a sufficiently large volume.

Calculations made using materials from research institutes, design and survey organizations, and operational organizations indicate that in the short term, the amount of groundwater used can be increased by 1.5 times, collector-drainage by 2.8 times, and wastewater can be increased to 100 million m3 per year, due to which real prerequisites will be created for the stable development of agricultural production in the irrigated zone of the republic.

Table 2. Disposable water resources of Uzbekistan, mln.m^3

River basin	River waters, mln.m^3	The groundwater, mln.m^3	Recycled water resources in mln.m^3			Available water resources, mln.m^3
			Collector-drainage water		Waste water	Available water resources, mln.m^3
			In a river	In paces formation	In paces formation	
Currently						
SyrDarya	19915	3010	4005	580		27510
AmuDarya	32493	1590	4100	660		38843
Total	52408	4600	8105	1240		66353
Currently						
SyrDarya	19915	4636	4005	1620	70	30246
AmuDarya	32493	2475	4100	1840	30	40930
Total	52408	7111	8105	3460	100	71184
In future						
Total	52408	10100	6100	6000	1000	75608

In the article are given the analysis the state and volume of the water resources of the Republic of Uzbekistan. The necessity and possible volumes of non-traditional sources are justified: collector-drainage, groundwater and wastewater when used in the near future, sustainable development of the sectors is ensured of the national economy.

Conclusion

I would like to note that since the period of the shortage of water resources in various soil and climatic conditions, experimental and pilot production studies have been carried out to establish the possibility of using underground, collector-drainage and waste water for irrigation of crops (cotton, rice, corn, etc.) flushing saline soils. On the whole, positive results were obtained, limit values for the salinity of groundwater, collector-drainage waters were established, the procedure and technology for their use in dry years as an additional source of irrigation were developed.

In order to organize and maintain sustainable agricultural production in irrigated areas, it is necessary in the near future to develop and systematically implement the following measures:

- for each province, fog and farms to determine the volume of use of non-traditional water resources and the composition of measures for their implementation;
- improvement and improvement of the technical level of existing irrigation and drainage systems and water supply systems that ensure efficient water use and increase the productivity of water use;
- the introduction of organizational, technical, socio-economic fundamentals and methods for the delivery of water and water distribution between consumers, contributing to the efficient use of water in the production of agricultural products;
- development and implementation of economic, social and environmental criteria for assessing water as a commodity;
- development and implementation of irrigation technologies that provide a higher level of water use in agricultural sectors, prevention of irretrievable water losses in the irrigation canals-field system;
- development and implementation of organizational and legal principles for the

participation of water users in the management of water resources and irrigation and drainage systems;

- the creation of permanent, short-term courses for training water users in assessing the impact of water scarcity and methods for reducing its damage to agricultural production, and the impact on the ecological and reclamation state of irrigated lands.

The scientific study was led by Koshekov R.M., DS doctor of technical science Nukus branch of TashSAU.

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