Research report

2. Research

2.2 Analysis of national development programs

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Contents

Introduction

The report provides information on Turkmen lake “Altyn Asyr” (or as named Golden Age Lake) and the assessment of future collector-drainage flow resulting from the construction of the lake in Turkmenistan. This report is a part of Section 2.2 “Analysis of national development programs” of the second research stage under the PEER Project.
By constructing Lake Altyn Asyr it is planned to stock water, which could be used for agricultural needs in the future.

1. Turkmen lake Altyn Asyr

The idea to divert collector-drainage water (CDW) from irrigated land in Turkmenistan appeared in the 1960s. Then a proposal was to build a Trans-Caspian collector or collecting drain, which was to collect CDW from the Murghab and Tedzhen irrigated areas and deliver this water to the Caspian Sea. In the 1970s, the Ashgabad Institute “GIPROVODKHOZ” designed a project to transfer CDW from the Murghab and Tedzhen irrigated areas to the Central Karakum’s natural Karashor Depression , a large saline desert, 120 km long and 25 km wide.

The basic aim of the current Altyn Asyr Lake project is a little different, that is collecting CDW flowing now to the Amudarya River and Sarykamysh Lake (along interstate main drains), transferring and accumulating in the Karashror Depression which in the future, as envisioned by the project developers, will become Turkmen Lake of XXI century (Altyn Asyr). The lake is constructed according to the Turkmen President’s Decree # 3172 of August 31, 2000.

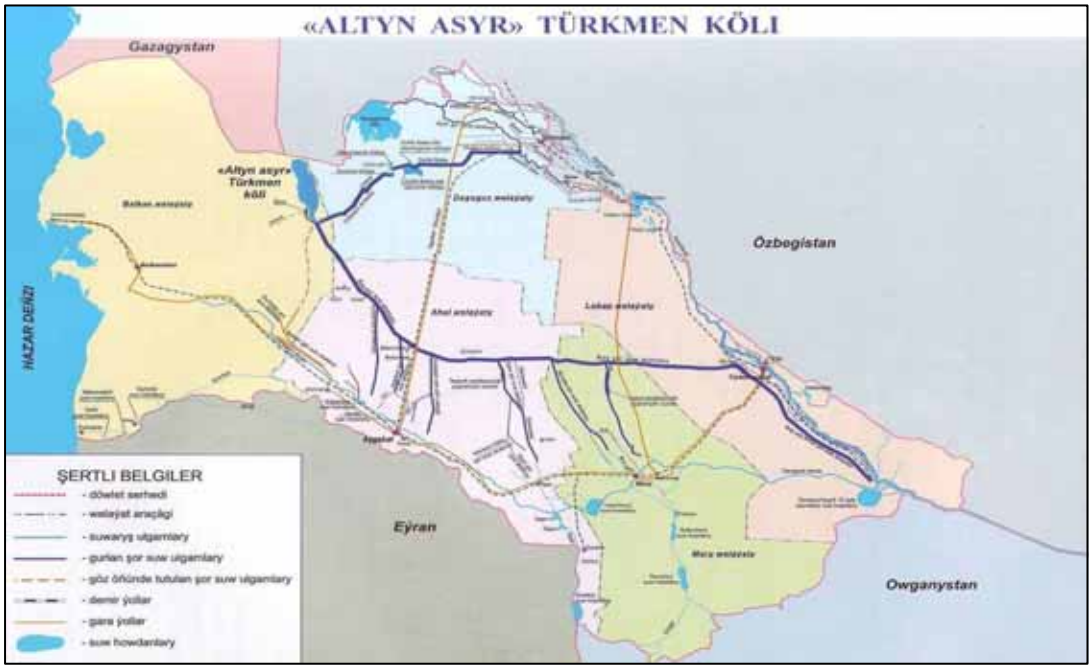

Fig.1. Layout of collectors transporting water to Lake Altyn Asyr

According to the National Program “Strategy of Economic, Political and Cultural Development in Turkmenistan by 2020”, it is planned to expand the area of irrigated lands; it is also planned that the construction of only Main collector delivering water to Lake Altyn Asyr

will allow watering 3 Mha of pasture and raising additional 1.4 million sheep and goats. There are 800,000 ha of desert soils along this collector. Those are planned to be irrigated with drainage water. It is to establish areas of irrigated land near sheep breeding farms. Various crops will be grown there (alfalfa, barley, cucurbits, roots, etc.). In the Karakum desert, it is planned to develop fish breeding farms in Turkmen Lake (Turkmen Lake "Altyn Asyr", Ashgabat, 2009). The length of the lake will be 103 km, width – 18.6 km, average depth – 69 m, area –about 1,900 square km, and volume – 132 km³. It is supposed to annually divert up to 10 km³ of CDW there. The lake is to be filled in 15 years.

CDW will be delivered to the lake through the Dashoguz (Northern route) channel in the amount of 210 m³/s and the Main collector (Southern route). The Northern route is to direct CDW from irrigated lands in Dashoguz province and partly from Khorezm province, Uzbekistan via Ozerniy (150 m³/s) and Daryalyk (60 m³/s) collectors. Dashoguz channel will cross three natural depressions: Zengi Baba Depression with the volume of 2.7 km^3, Uzyn Shor Depression of 0.76 km^3, and Atabay Shor Depression of 0.02 km³.

The Southern route (with the maximum flow rate of 240 m³/s in the mouth) will totally divert CDW from Lebap, Mary and Akhal provinces. Drainage water from the Main Murghab and Tedjen Central collectors will be delivered there. CDW may be transferred from the right bank of Amudarya in Turkmenistan into the system of collectors in the Main (Southern) collector on the left bank through the collector with the flow rate of 60 m³/s; or CDW on the right bank may be delivered to Sudochye Lake. The latter may be implemented if Turkmenistan and Uzbekistan will sign an agreement that would allow delivering CDW of Turkmenistan on the right bank of the Amudarya to the lower reaches of the River for water sharing purposes. On the route of the Main Collector (Southern route), three lakes are to be built, with the total volume of 1.2 km³.

2. Assessment of future collector-drainage flow in Turkmenistan

Collector-drainage waters of Turkmenistan are generated in Lebap, Dashoguz, Mary, Akhal and Balkan planning zones (provinces).

In the diagnostic report by The United Nations Special Program for the Economies of Central Asia (SPECA, 2000) "Integrated and Efficient Use of Water Resources in Central Asia", return waters of Turkmenistan are estimated at 4.05 km³/year on average for 1990-2000, including 3.8 km³ of collector drainage flow from irrigation, 0.25 km³ of wastewater, outflow; into the rivers estimated at 0.91 km³ and that into depressions at 03.1 km³.

Later assessments of collector drainage flow in Turkmenistan provided figures of 6 km³ (Saparov U.B., Golubchenko V.G., 2010; Assessment report "Return Water Management in Turkmenistan", 2011; Kostyanoy A.G. et al., 2012).

The data collected under the PEER project shows that the current volume of return water in Turkmenistan (average for 2010-2015) is 5.8 km^3/year, including 0.5 km^3/year in Akhal PZ, 1.3 km^3/year in Mary PZ, 2.2 km^3/year in Dashoguz PZ, and 1.8 km^3/year in Lebap PZ. In Lebap PZ, 1.4 km^3 (78 %) of the total collector drainage flow is discharged into the Amudarya, whereas the rest is discharged into depressions. In high water years, return water in Mary and Lebap PZ is added with flood water from the Murghab and Tedjen Rivers.

In the future, it is planned to deliver up to 10 bcm of water to Turkmen lake, including: 3…4 km³ from Akhal, Mary and Lebap PZs through the Main (Southern) Collector; and, 6…7 km³ from Daqshoguz PZ through the Northern Collector. The current volume of CDW in Turkmenistan does not exceed 6 bcm. To ensure the planned volume of collector drainage flow for the lake, water supply from Dashoguz needs to be increased by redirecting a share of flow from Sarykamysh Lake to the Northern Collector, including CDW of Uzbekistan generated in Khorezm province.

As the "ALTYN ASYR" project suggests using a share of flow discharged into Sarykamysh Lake, and the total collector drainage flow directed to the former could be increased from the current 6…7 km³ to 8 km³. The PEER project does not consider an increase of CDW up 10 km³ as this would lead to degradation of Sarykamysh Lake. However, this does not mean that the whole volume of this water (8 km³ for the long-term period) will reach Lake Altyn Asyr; a portion would be used up along the collectors, while the rest would be lost.

In the future (2030, 2050), CDW of Turkmenistan discharged into the lake will not exceed (average for long-term period) 8 km³ as: i) minimum environmental water releases into Sarykamysh Lake will be maintained (at about 3 km³ as we estimate), ii) water withdrawal from the Amudarya along the Garagumdarya (Karakum Canal) will not be increased and local river (Tedjen, Murghab)runoff will be totally used, and iii) there is a trend for the increased share of CDW re-use in places of its generation.

In the PEER Project, the required water supply for Lake Altyn Asyr (in the volume of 8 km³ for the long-term period) is organized as follows:

- Total CDW from Lebap, Mary and Akhal planning zones (including the right bank of the Amudarya), calculated from water balancea of these zones, will be transported to Lake Altyn Asyr through the Southern collector,
- Total collector drainage flow from Khorezm and Dashoguz provinces, minus minimum environmental water releases into Sarykamysh Lake, will be transported through the Northern collector.

The estimated dependences of CDW generated in the planning zones of Turkmenistan, on water withdrawal are given in the report by BWO Amudarya (A.Nazariy).

3. Analysis of risks associated with the "ALTYN ASYR" Project

1. If CDW generated in Khorezm province, Uzbekistan and currently flown to Sarykamysh Lake is transported to Lake Altyn Asyr, Sarykamysh Lake will annually lose up to 3 bcm. This will definitely affect the water balance of the latter. At present, the water surface of Sarykamysh Lake is about 3.7 ths sq.km, its length is 120 km, the width is 40 km, and CDW supply is 4…5 bcm a year, while annual water losses are estimated as about 3 bcm.

If discharge of CDW into Sarykamysh Lake is stopped, this will lead to degradation of the latter, including shrinkage of the lake's area, in the territory of Uzbekistan as well (at present, 20% of the lake is located in Uzbekistan), increase of water salinity, salinization of riparian lands, and the loss of fish capacity (this is preserved only at points where collectors flow into the lake).

To preserve Sarykamysh Lake as an aquatic ecosystem in the Aral Sea basin, minimum environmental water releases (not less than 3 bcm a year) must be ensured.

2. Diversion of CDW from Lebap province will stop discharge of CDW into the Amudarya River and reduce annual river runoff in the amount of 1.0…1.6 bcm, which is on average about 6% of water withdrawal limit allocated for Turkmenistan from the Amudarya. Consequently, the inflow to Prearalie will decrease by 0.8…1.3 bcm.

However, ceasing CDW discharge into the Amudarya from the territory of Turkmenistan (given CDW salinity of 2.5 g/l) will improve water quality in the Amudarya River.

3. The system of collectors of Lake Altyn Asyr will be integrated with the irrigation system of Garagumdarya (Karakum Canal) and will allow discharging irrigation wastewater and perhaps

above-limit water withdrawals from the Amudarya into Lake Altyn Asyr for economic purposes in Turkmenistan.

The scenario of above the limit water withdrawals must be legally avoided in the future (e.g. through a special agreement) . At present, available information sources (Assessment report "Return Water Management in Turkmenistan", 2011) highlight that the lake will be filled up with CDW only and in no way through additional water withdrawal from the Amudarya.

Conclusion

A new agreement between Turkmenistan and Uzbekistan is required for the successful implementation of the "Lake Altyn Asyr" project. This agreement should contain the assessment of risks for Uzbekistan associated with the reduction of flow in the lower reaches of the Amudarya River and stipulate conditions for risk minimization. It is proposed to give the status of interstate structures to the main channels of the "Lake Altyn Asyr" project as they will use CDW generated from the flow of the transboundary Amudarya River.

The new agreement should specify minimum environmental water releases to Sarykamysh Lake that would ensure its preservation as an interstate aquatic ecosystem, with the Turkmenistan's share of 80% and the Uzbekistan's share of 20%. The agreement should reinforce measures on additional monitoring of water withdrawals from the Amudarya River (including water withdrawal for Garagumdarya), as well as monitoring of discharge from collectors, including collectors of Northern and Southern routes. The riparian countries are required to agree on timely exchange of data on CDW use.

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