

Security and Water Resources Management Problems and Experience in the Amudarya River Basin

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I. Water resources management

1. Introduction

Until 1987, USSR Ministry for Agriculture and Water Resources (MAWR), Republican MAWRs and Upradik (a water management organization under USSR MAWR, responsible for republican water sharing in river downstream, based on principles of rigid objectivity, and located in Urgench city) played a key role in water resources management and regulation in the Amudarya basin.

A need for the integrated water resources management and protection at basin level was rationalized long before independence of the countries in the region. Although USSR MAWR implemented centralized water sharing system based on consultations with five governments, water shortage consequences analysis in 1974-1975 and especially in 1982 showed that environmentally applicable and quantitatively and strictly controlled water supply was impossible without a single water management organization for the whole basin.

Thus, in October 1987, Basin Water Organization “Amudarya” with headquarters in Urgench was established by USSR MAWR Decree upon recommendation of the Republics in given region in order to improve and increase water resources management effectiveness in the basin, transfer to basin management, as well as assure more operative, well-timed solution of water-related problems. BWO is responsible for operative water resources management and regulation among the republics, well-timed and regular water supply to users within fixed limits (agreed with governments), sanitary and ecological releases to Priaralie area and the Aral sea.

All head waterworks on rivers and main tributaries with discharge of more than 10 m³/s, as well as interstate canals were transferred under BWO’s responsibility, according to the Government Decree № 1110.

BWO also controls some headworks, which are not under its responsibility, and all pumping stations taking water from rivers and main interstate canals, as well as reservoirs, main river gauging stations, return water discharge into the Amudarya river stream.

According to the general agreement with the countries in the region, BWO «Amudarya» is responsible for managing and controlling water diversion structures located in the following transboundary river basins:

1. Pandj river
2. Vakhsh river
3. Kafirnigan river.
4. Amudarya river

Under present conditions, the Amudarya river flow is regulated poorly. This leads to river water stress and complicates the use of this water source for economic purposes. Active Nurek and Tyuyamuyun reservoirs are regulated seasonally. At present, they are the main regulators of the Amudarya river flow.

Besides, there are a number of in-basin and in-system reservoirs distributing and redistributing river flow in the Amudarya river basin.

At present, water is diverted from the river by means of dams or without them and some water is taken by lifting.

Energy, fish industry and water transport are the key water users in the Amudarya river basin.

Industrial and municipal water supply, as well as agricultural irrigation is a group of water consumers.

Leading fields of agriculture are cotton and grain production. Gardening, wine-growing, silkworm breeding, beet and melon growing are developed in the Amudarya river basin, while rice growing is promoted in river downstream.

The large-scale desert pastures are used as forage base for sheep breeding, mainly for caraculs.

Irrigation amelioration is the largest element of water management system.

Taking into account morphological and geographical characteristics, the Amudarya river basin is divided into three sections – upstream (upstream of Kelif – border between Turkmenistan and Uzbekistan), midstream (between Tyuyamuyun and Kelif) and downstream (downstream of Tyuyamuyun). The total irrigated area is within 4,0-4,5 million ha. Upstream is comprised of irrigated lands of Tajikistan, Uzbekistan (Surkhandarya province) and Kyrgyzstan (small irrigated area in the south of the Republic). Thus, upstream irrigated lands are located in the valleys of main components of Amudarya and its tributaries: Pandj, Vakhsh, Kafirnigan, Surkhandarya and Sherabad.

Today, the largest midstream irrigated areas are focused along extended canals. Such canals are Garagum canal, Karshi main canal with the cascade of 6 pumping stations and Amubukhar canal. Off-stream reservoirs are functioning in each canal system. Irrigation systems from Kelif up to Tyuyamuyun take water from tens of canals diverting water without dam.

Large-scale canal systems such as Tashsaka, Pakhta-arna, Klychniyazbai, Urgench-Daryalyk-arna, Kipchakbozsu, Khan-yab (Sovet-yab), Dzhumabaisaka, Kyzketken and Suenli were built in the Amudarya downstream along two river banks.

Canal systems such as Tashsaka, Klychniyazbay and Kipchakbozsu are of interstate importance.

Existing water management system in the Amudarya basin is a complex of structures assuring water resources transportation, flow transformation, water withdrawal and water supply to water users, power generation, water resources controlling, accounting and quality.

The water management system defines largely conditions of economic development in given region.

Water management system is a system of natural and economic objects that form, transport, redistribute and consume water resources.

Complexity of the water management system is caused by the fact that management objects are dispersed within four sovereign Central Asian states. Specificities of the water management system can be formulated as follows:

- huge volume of heterogeneous information characterizing conditions of the water management system,
- abundance and spatial dispersion of management bodies and information sources.
- stochastic nature of hydrological information.
- inconsistency of demands of the system's actors regarding management regimes.
- lack of common economic criteria for water resources use.

First of all, interstate (transboundary) river waters of the basin are included into management.

There should be underlined that large-scale head intakes (36 units) were allocated to BWO Amudarya responsibility, excluding gauging stations such as Dangarin (Tajikistan) and Garagumdarya (Turkmenistan), and Tyuyamuyun waterworks facility (LBK, Turkmendarya, PBK, Pitnyak-Arna) – Uzbekistan, which were planned to be transferred to BWO after completion of their construction.

Four administrations on operation of intake structures, waterworks facilities and interstate canals were established under BWO Amudarya with centers in Kurgan-Tyube city (Tajikistan),

Turkmenabad city (Turkmenistan), Urgench city (Uzbekistan) and Takhiatash city (the Republic of Karakalpakistan) so that BWO could manage transboundary water resources.

Territorial coverage was divided in the following way between the administrations:

- Upstream Administration operates intake structures and controls water withdrawal from Vakhsh, Pandj and Kafirnigan and within the Amudarya river reach of 246 km long, up to gauging station Kelif.

- Midstream Administration controls water withdrawals within the Amudarya river reach of 552 km long, between gauging stations Kelif and Darganata

- Administration for Amudarya inter-republican canals (Upradik) operates river water intakes, maintains and operates interstate canals with their structures, controls water withdrawals within river reach from Tyuyamuyun hydrounit up to gauging station Kipchak (length of river reach is 167 km).

Upradik manages three large-scale irrigation systems:

1. Tashsaka

2. Klychniyazbai

3. Kipchak-Bozsu

- Downstream Administration operates Takhiatash waterworks facility, head intake structures on Khan-yab and Dzhumabaisak and controls all water withdrawals within reach from gauging station Kipchak up to the Aral sea (reach length is 283 km).

According to the Statute, BWO should perform the following functions in order to achieve set goals and objectives:

- Develop water withdrawal plans, operating mode for cascade of reservoirs, correct and agree season water consumption limits for riparian states by ICWC;
- Medium-term planning, joint water resources development and protection that is agreed with water management and power departments of riparian states, and participation in perspective planning;
- Supply water to state – water consumers, the Aral Sea and Priaralie, according to ICWC decisions.
- Provide monthly information on water resources use to ICWC members.
- Develop and implement automated water resources management system in the Amudarya river basin, water accounting and water measuring within head intakes, providing them with automation and telemechanical equipment;
- Jointly with hydrometeorological services, perform control water measurements within boundary sites of territorial administrations in order to make balancing account of river flow;
- Control observation of operating mode of reservoirs' cascade as agreed by ICWC;
- Maintain, reconstruct and operate waterworks facilities, head intakes, interstate canals and collectors, objects of automated water resources management system in the Amudarya river basin and other objects, which are under its responsibility;
- Jointly with water management bodies and other interested enterprises and organizations, develop and implement measures to control floods and protect settlements and agricultural lands from water-logging, flooding and other water-related disasters;

BWO "Amudarya" is guided by BWO Statute agreed by ICWC, acting legislations of ICWC's country-members, ICWC decisions, agreements, protocols and other regulations.

BWO is financed at the expense of allocations of three states (Uzbekistan – in soums, Tajikistan – in somoni and Turkmenistan – in manats).

2. Operation pattern

Water use is planned in the following way under the Amudarya water management system. BWO prepares proposals for water withdrawal limits, according to water availability

forecast for planned period. Such forecast is provided by Uzbekistan Hydrometeorological Service to BWO.

Water withdrawal limits for each ICWC member-state for hydrological year (non-growing and growing seasons) are discussed and agreed during ICWC meetings. BWO prepares proposals for water sharing limits.

After approval of limits, BWO collects water withdrawal requests for transboundary river flows and develops operating modes for cascade of reservoirs (Nurek and Tyuyamuyun reservoirs). Operating mode for Nurek reservoir is prepared jointly with UDC (United Dispatcher Center) «Energy». There should be underlined that UDC has a priority when preparing operating mode.

Operating mode for cascade of reservoirs is discussed and agreed during ICWC meetings. Operating modes for reservoirs are developed for planned period.

Then, correspondence between actual water withdrawals and approved limits and requests of each ICWC member-state is checked. Line services provide information on actual water withdrawals to Control office of BWO territorial administration.

Information is submitted to BWO's central control centers after checking of information on reliability.

BWO "Amudarya" prepares materials related to the establishment of water withdrawal limits for the Amudarya river for each country and water consumer in order to discuss such materials at ICWC meeting:

- A country submits its proposal for decade water withdrawal limits in province dimension for one or another period to BWO "Amudarya" 10-15 days before beginning of respective period.

- BWO «Amudarya» agrees water withdrawal limits for each state – consumer on-site jointly with provincial water management organizations based on applications provided by countries and within allocated limits.

- Generalized materials on water withdrawals in country dimension are reviewed and agreed at regular ICWC meeting.

- BWO "Amudarya" revises and agrees respectively decade water withdrawal limits for the Amudarya river in the light of water consumers for one or another period and submits them to its territorial administrations for implementation after water withdrawal limits for each state are approved at ICWC meeting.

It should be noted that based on forecast and given water-related situation in the region, the following water distribution options are discussed at ICWC meetings:

1. Water is shared according to approved water withdrawal limits without reduction during normal year and available storage in reservoirs.

2. Provision in Article 4 under Almata Agreement on Central Asian countries of 18.02.92 is used during low-water periods. The following criteria are established for interstate use of fixed water withdrawal limits:

- when water availability is lower than design one, water withdrawals for countries should be reduced proportionally within the whole river basin according to ICWC decision;

- there should be no more than 10 % of excess withdrawal above the established limit for certain periods of time;

- BWO "Amudarya" puts percentage water sharing between water consumers under conditions of water deficit in the river basin for certain period of time.

At the same time, we are based on the following principles of percentage water sharing between the states in the Amudarya river basin:

- when establishing a share of water withdrawal under percentage water sharing, a basis is water withdrawal limits approved by ICWC for key water consumers for the whole period.

There are no problems in surface water resources management and distribution under sufficient water availability in the basin. BWO and ICWC address emerging problems immediately during one or another irrigation period.

Water resources management is complicated during low-water periods in extreme events, when ICWC makes respective decisions on water withdrawal limitations, which are obligatory for all water consumers, and in spite of strengthened joint control by BWO and ICWC, actually they are not always fulfilled due to imperfect legal and regulatory frameworks for ICWC executive bodies, different national interests in water use and poor equipping of BWO structures with water accounting and monitoring facilities.

One of the main principles for the Amudarya river water resources management and regulation at BWO level is settlement of flow delivery and receiving within border stations, introduction of in-system and streamflow balance in waterworks management. Border stations are Kelif, Darganata, Tyuyamuyun, Kipchak and Samanbai. At present, BWO makes regular balance calculations within river reach between gauging stations Kelif and Samanbai with four balancing sites (Kelif – Darganata, Darganata - Tyuyamuyun, Tyuyamuyun - Kipchak, Kipchak – Samanbai).

3. Drawbacks in Regional Cooperation on Water Resources Management in the Amudarya River Basin

The following organizations are involved into regional cooperation on water resources management in the Amudarya basin:

1. From IFAS:
 - ICWC
 - BWO «Amudarya»
 - SIC ICWC
 - ICWC Metrological Center
2. UDC «Energy»
3. From states
 - Hydrometeorological services.

The accepted form of water resources management in the Amudarya basin is fully applicable, but it has a number of serious remarks and requests regarding its functionality:

1. It should be noted that there are still no conditions for successful and effective implementation of management and cooperation mechanism in the region:
 - while recognizing ICWC and BWO as the key units in water management and allocation at the regional level, their current status is obviously undervalued and does not facilitate the successful implementation of set objectives.
 - ICWC and BWO capacities are not used fully. In particular, ICWC recommendations to assure agreed conditions for water distribution and releases to the Aral Sea are not always observed.
 - One of the key drawbacks in ICWC activity is the fact that its decisions do not always reach superior bodies in CAR countries.
2. BWO powers as an executive body on interstate water distribution are limited due to the following reasons:

- Some transboundary water diversion structures, as well as the most significant hydro-power systems with reservoirs are managed by national bodies, and not by BWO;
- BWO does not control volumes and schedules of ground water withdrawal and return water disposal, as well as water resources quality;
- Protection zones of interstate rivers are still not defined;
- Respective reaches of Amudarya and other rivers are under jurisdiction of national bodies and BWO does not practically control situation within such reaches;
- Interaction between BWO and national hydrometeorological services is not coordinated. This impacts negatively on accuracy of available water accounting and forecasting;
- BWO and its subordinate bodies do not have sufficient technical base for information acquisition, processing and communication.
- River channel and protection zone are not monitored and controlled.

Thus, existing water resources management structure for the Amudarya river basin should be strengthened and improved.

5. Conclusions

In order to achieve sustainable environmental situation, rational use of water resources and their protection from depletion and pollution become of exceptional importance in economic, social and cultural development of nations living in the Aral Sea basin.

Existing problems related to hydrology of arid zones in the region are typical for the whole world. They can be of five dimensions:

- 1) problems related to scientific rationale of optimal water resources use under water deficit;
- 2) hydrological education and training;
- 3) creation of information systems;
- 4) re-equipment;
- 5) regional cooperation.

Taking into account that water is a natural resource, product of nature and the public, source of impact on ecological and social environment, the scientific field of the problem should be focused on aspects, which allow developing successful water resources strategy, i.e. set of principal regulations, norms and guidelines. Such will be implemented in the form of interstate agreements, contracts and other documents, as well as organizational and economical arrangements and can be tools for sustainable water development in the region, taking into account a particular importance of water resources under arid zone conditions, deficit of water and risk of conflicts as a result of deep water impact on life in the whole region.

The legal mechanism to be developed with account of international experience and joint water management in the Aral Sea basin will serve as a basis to settle many water-related contradictions in Central Asia at the regional and national levels. Sustainable economic development in the region depends on effective interstate cooperation and requires improvement of the legal framework in area of water relations.

It should be pointed out that when studying issues related to regional cooperation, one should consider that practically all international conventions and agreements on water resources use recognize the following:

- water resources are common property and the basis for future development, and water resources volume is very limited;
- water resources do not depend on state boundaries;

- the key goal of water resources management is common weal of nations and countries;
- priority of basin-wide interests over private ones, including water using countries;
- obligatory observation of equitable and rational water use principle and “do not harm” rule.

It is a principal provision in the International Waterways Law and any government should use the international waterway in rational and equitable way in respect of other states using this waterway.

The developed institutional framework for IFAS and its important real capacities can assure sustainable shared interstate water resources management and effective and rational use in the region.

To make IFAS management structure effective, the countries should make necessary efforts and take joint agreed actions to attain priority objectives directed at strengthening of interstate cooperation in water resources management in the region. Such priority objectives are:

1. Adopting a number of interstate Agreements on institutional framework for shared water resources management and use under current conditions, on information exchange in the region, and on water supply limits to the Aral Sea and Priaralie.
2. Strengthening ICWC powers.
3. Enhancing BWO «Amudarya» role.
4. Adopting a special Agreement on key principles for transboundary water sharing in the Amudarya river basin.

II. Security Issues in the Amudarya Basin at Regional Level

Based on twenty-year experience of BWO «Amudarya», the following important security-related issued should be pointed out in the Amudarya basin at regional level:

1. Technical conditions of river water diversion structures, interstate canals with their structures, supply canals managed by BWO. As well as technical state of reservoirs, river pumping and gauging stations, water diversion structures managed by riparian states and controlled by BWO.

BWO «Amudarya» emphasizes this issue. Based on financing availabilities from country-founders, BWO maintains regularly structures and canals with waterworks transmitted for temporary use.

But it should be underlined that allocated funds are sufficient only to maintain, and there are no finances to reconstruct and build new water diversion structures instead of old outdated and depreciated structures.

2. Reliability of forecasts provided by Hydrometeorological services. There are practically no forecasts for the Amudarya basin for the last years, since hydrometeorological services lack required data. Such situation makes some difficulties when planning and making effective decisions.

3. Floods. They contribute to security issues in the Amudarya basin. Safe pass of flood discharge is a very difficult water-related task. BWO «Amudarya» jointly with riparian states have experience in this respect.

4. Ice phenomena in the river channel and interstate canals.
5. Water shortages in the basin.

Conclusions

During the last year, the world community and Central Asian states pay more attention to security and water productivity improvement.

As economies grow and stability is improved in riparian states, issues related to cooperation both in economic and water aspects and food and water security in Central Asia will be addressed gradually.