

**ABOUT PRINCIPLES OF TRANSBOUNDARY WATER
RESOURCES JOINT USE AND MANAGEMENT IN
SYRDARYA RIVER BASIN UNDER CURRENT POLITICAL-
ECONOMIC CONDITIONS OF CENTRAL ASIAN REGION**

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SyrDarya river is one of two great rivers of Central Asia, along this river 20 mln. people live, which existing development are provided by the river for many centuries. SyrDarya put the beginning of civilization in the region, linked settlements and irrigated fields creating life along its banks. But with a time new cities were constructed, industry grew, irrigation and hydropower engineering developed and water was used for all these needs. That is why necessity of water resources integrated use was gradually understood and mechanism of this was developed. Unique experience was accumulated in this region.

SyrDarya river basin covers area of 484.5 th. sq. km. River flow mostly forms in mountains (upper reaches), middle reaches are located in steppe and lower reaches – in Kyzylkum desert. Since 1991 four sovereign states are located within the basin: Kyrgyzstan, Tadjikistan, Kazakhstan and Uzbekistan.

Climate is sharply continental with high temperature fluctuations within a day and a year and low precipitation insufficient for farming but there are huge thermal resources and fertile lands. All together caused origin and wide development of artificial irrigation.

SyrDarya is created by confluence of Naryn and Karadarya rivers in eastern part of Fergana valley and has length 2 337 km. River water resources account for 40.6 cu. km including 37.12 cu. km surface inflow and 2.18 cu. km groundwater inflow. Precipitation accounts for 1.3 cu. km. It is worth to note that about 37.9 cu. km of water resources are located between the source and Chardara water reservoir. Mostly (more than 60 %) water resources come from mountains.

Number of water consumer and water users growth in the basin caused range of conflict situations. The main reason for these conflict is the fact that upstream where most part of water resources is formed, prevail interests of consumers for power potential when water mostly is spent in winter, but downstream irrigated lands are located, which require water in summer. SyrDarya basin is clearly divided in two parts. The first is mountainous area, where flow is formed (Naryn and Karadarya upstream) and the second (SyrDarya main trunk), where irrigated lands are located and water diversion exceeds lateral inflow. Landscape peculiarities predetermine concentration of potential power resources and hydropowers location in the mountains (for Naryn – within Kyrgyzstan). Irrigated lands, on contrary, are concentrated in plain area, mostly in Uzbekistan and Kazakhstan as well as in Tadjikistan. Because of that inter-sectoral contradictions in requirements to water reservoir operation regime automatically are transformed (with sovereign states creation) into interstate ones. But common water resources use is always linked with correct priorities and compensation of possible losses to sectors, which do not receive water as much as they need. Sufficiently reliable compensation mechanism was developed in the Soviet Union taking into account, that most part of population works in agriculture and upstream was compensated in winter by electric and thermal energy delivery. This mechanism was developed in detail and power delivery was provided by the Union.

Thus, while water structures building it was required to follow main principles of river's water-power resources which were provided by river flow regulation through Naryn-SyrDarya cascade of water reservoirs. Largest of them Toktogul one is main multiyear flow regulator. Water resources use is integrated, most water is spent for irrigation (including water accumulated in reservoirs). Compensation for electric energy lack in winter was compensated by delivery of coal from Kazakhstan, gas from Uzbekistan and other resources from other republics of Soviet Union, including Russia.

It is known that ICWC establishing was caused by necessity to maintain management system of AmuDarya and SyrDarya transboundary waters. In Agreement signed on February 18, 1992 in Almaty, similar transformation was foreseen. Leaders declared that they recognize previous principles of joint transboundary water management, strengthening and development of collaboration in water use and conservation. But realization of these declarations met with big difficulties.

After 1991 due to economic fall, interstate economic links breakage and not very successful attempts to come into the world market system, possibilities of compensation reduced and under absence of other alternatives Kyrgyzstan was forced to cover own needs (first of all in municipal sector) at expense of Naryn cascade and transfer Toktogul reservoir to power engineering regime, when most part of annual reserve of water was released during non-growing period (up to 8 cu. km instead of previous 3 cu. km). In result of that main flow goes along the river in autumn and winter, but SyrDarya channel downstream Chardara reservoir can not provide trespassing of high flow because of structures with capacity 400 cu. m/s, flood plain is urbanized and channel itself is silted. As a result part of water released from Chardara, floods the plain around Kzylorda and does not achieve the Aral Sea. Seasonal channel reservoirs (Kairakkum and Chardara) due to increased releases from Toktogul reservoir are filled up in December-January, then excess water is released to Arnasay sink (since 1993 about 27 cu. km are released or 3.5 cu. km annually; previously water was released into Arnasay only one time – in extremely humid 1969 year). Release to Arnasay is lost water which floods territory of Uzbekistan making damage to ecological situation and infrastructure. Similar regime changes are observed in Kairakkum reservoir's regime – first of all, aspiration to cut down summer releases that threatens to irrigated lands of SyrDarya middle reaches.

This change in cascade operation schedule has led to full river regime deformation, it can be said, that winter and summer exchange their places: high flow in winter and dry period in summer. Let us note negative consequences of Toktogul reservoir changes:

- strong deficit of water for irrigation;
- damage to lands of Kazakhstan and Uzbekistan under flood plain flooding downstream Chardara reservoir and releases to Arnasay;
- river's water system sustainability is lost – in winter river channel is flooded and can not withdraw return waters and in summer tense sanitary-epidemiological situation occurs because SyrDarya channel in middle and lower reaches sometimes dries up;
- during range of dry years Toktogul reservoir was close to be empty, when it can not regulate river flow in multiyear period; power generation will also fall down.

It is worth to take into account threefold population growth compared with the time of Toktogul reservoir construction that seriously strengthens crisis – minimum summer release from Toktogul reservoir (180 cu. m/s) has been foreseen when basin's population accounted for 7.5 mln, now it is 20 mln. Recognizing objective reasons of Toktogul reservoir regime changes should be recognized as well that current situation leads to crisis, economic losses and threats to population health.

Since 1995 mechanism of compensation deliveries is restored when, in order to overcome contradictions, agreements for next year started to conclude, in which deliveries thermal and electric resources from Uzbekistan and Kazakhstan to Kyrgyzstan were established and releases during growing period from Toktogul reservoir were determined. But autumn-winter

releases remained the same (7-8 cu. km). Agreements of then were concluded with delay and not fulfilled in full volume. Besides, 1993, 1994 and 1998 were years of high humidity and this prevented to Toktogul reservoir release, mitigate situation during growing period but in winter situation aggravated because lateral inflow increased inflow to channel reservoirs that caused their filling and then water losses.

Main disadvantage of the practice after 1995 that deliveries of energy to Kyrgyzstan allowed to provide water supply during growing period but do not relate to Toktogul reservoir regime in autumn-winter period. It is necessary to ground, first of all, releases volume and regime from Toktogul reservoir during non-growing period and compensate to Kyrgyzstan accumulated within this period water. Only in this case Toktogul reservoir role can be restored. Establish control over winter releases from Toktogul reservoir, it would be possible to avoid releases from Chardara on the territory of Uzbekistan. Such regime should be provided by appropriate compensation deliveries.

Thus, because of different objective reasons SyrDarya flow is disregulated and flow rational use level decreased. In connection with above necessity appeared to revise and amplificate principles of joint management and use of transboundary water resources in SyrDarya basin. Because international collaboration is performed through agreements between states of the river basin, similar document should be developed, where above principles should be formulated, main permissible indicators of Naryn-SyrDarya cascade's reservoir operation and other important parameters of water-economic sector functioning agreed between the states – water consumers.

While developing agreement accumulated experience both world and local should be used. As independent states appeared 10 year ago in Central Asia, international water right is very useful for such agreement. In legislation of most countries the priority of interstate regional agreements is recognized, but this approach is not always recognized by new independent states. Own history of each region and its peculiarities do not allow to use existing experience of other countries and regions. For example, agreements between USA and Canada and Mexico reflect situation, which fully differs from Central Asian one. On North American continent tension grew, first of all, due to civilization development in states existing for long time. Uneven industrial and agrarian development increased pressure on transboundary water courses, when countries-neighbours of USA (Canada and Mexico) were subjected to damage due to water amount and quality in transboundary rivers induced by USA with its fastly developing industry and agriculture.

Central Asian region is characterized by different peculiarities: about 125 years SyrDarya was running within one state initially in Russian Empire and then in the Soviet Union. Only after 1991 independent states were established. Water crisis in the region is aggravated by sharply change of political-economic situation. Each republic received from the Soviet Union previously jointly operated hydrostructures and began to use it for own purposes do not taking into account needs of neighbours.

Account of international water right allows to organize international collaboration on transboundary water use basing on the following fundamental provisions:

- transboundary water resources are common properly of all people living in the basin and a base of its future and they are limited;
- transboundary water resources exist regardless to state boundaries;

- main goal of water resources management is common wellbeing of people and states;
- priority of basin interests over private ones including separate states using common water resources; this priority should have clear boundaries beyond which state sovereignty is violated or damage is made to some state;
- obligatory observance of principles of multipurpose water use optimization;
- mutual understanding of common objectives and interests;
- respect of national sovereignty of neighbouring states;
- joint search of ways to maximum effective resources use;
- equality of all participants of agreements;
- rational natural resources use and prevention any negative consequences under joint water resources use;
- account of next generations interests.

Main principles of water right (“reasonable and equitable use”, “do not harm”, etc.) under different states collaboration could be considered in wide diapason and should be refined in a special document, for instance, in above-mentioned agreement.

Thus, Agreement goal is preparation of proposals which implementation will allow providing optimal and sustainable process of transboundary water resources rational joint use under modern conditions.

The major principles of joint transboundary water resources use are the following:

- each state-agreement’s participant has a right on reasonable and equitable participation in maximum possible profitable transboundary water use within its territory;
- states of the basin undertake all necessary joint actions (technical, legal, administrative and economic) on prevention, limitation and reduction of any transboundary impact;
- in process of SyrDarya transboundary water management states of the basin aspire for river conservation as a natural objects and linked with it limitation of river regime, water intake limits, water quality and other ecological requirements;
- states of the basin recognize requirements of Aral Sea (Small Sea) and coastal zone as independent water consumer in SyrDarya basin.

In Agreement obligations should be included to provide sanitary releases along the river trunk and water supply to the Aral Sea and SyrDarya delta.

Critical point of Agreement is preparation of proposals on releases regime from Naryn-SyrDarya water reservoirs’ cascade which should be provided by the states of the basin because there is no possibility to make seasonal regulation of SyrDarya flow in designed regime. Optimal option is possible under re-approachment of upstream and downstream interests. It is known that hydropower engineering is interested in maximum releases in winter-time, but irrigation, on contrary, during growing period. Previous system of compensation can be realized by new independent states. Because of that return to previous or natural river regime is impossible, particularly without economic assessment of water as natural resource. But formed last time Toktogul reservoir regime does not promise positive results in the future, because during series of dry years the reservoir will be emptied.

Therefore, different approach is needed, which would allow to preserve priorities of all countries and smooth existing natural contradictions. For that two requirements should be satisfied – needs satisfaction and prevention of crisis situations.

Often above two requirements are united – if needs of major consumers and users are not satisfied, crisis is possible. If regime will be built coming from own interests, crisis will arise firstly in Uzbekistan and Kazakhstan and then it will touch others as well.

Regarding hydropower engineering and upstream the task is to ground maximum flow in autumn-winter period, which would provide upstream with electric energy. For countries with irrigated lands crisis situation means, first of all, losses of water and ecological impact. Lack of water for irrigation arises when summer releases from Toktogul reservoir are less than 200 cu. m/s. One more consequence of this is dried up channel when absence of sanitary releases water systems' ecological sustainability can be lost. Besides, it means minimum water supply to the Aral Sea.

Having determined search direction, it is worth to mention, that conjunction of upstream and downstream interests means optimal combination of historical rights of people for water and sovereign rights of states to use natural resources within own territory do not making damage to neighbouring states and environment.

Let us come to proposals paing special attention to Toktogul reservoir regime.

For non-growing period:

Analysis of Naryn-SyrDarya cascade operation after Toktogul reservoir transition to new regime shows that if from reservoir not more than 5.5-6.0 cu. km would be released within non-growing period, releases to Arnasay depression and irreversible water losses can be avoid. That was taken into account in 1997 when reservoir was close to became empty and when under preparation of “Agreement between Governments of Kyrgyzstan and Uzbekistan about joint and integrated use of water-power resources of Naryn-SyrDarya cascade in 1998” at first time release volume from reservoir was accepted as 6 cu. km (Agreement has been signed by Prime Ministers in January 1998). Thus, based on previous experience above indicators of Toktogul reservoir's regime during autumn-winter period, agreed with power-engineers from Kyrgyzstan, are proposed to be included in the document about principles of joint trans-boundary water resources use. Under this volume of release Kyrgyzstan needs in electricity will be provided (under condition of refusal from its selling to other states in autumn and winter). Only under observance of this indicator is possible to avoid channel seasonal reservoirs (Chardara and Kairakkum) filling in December-January and irreversible losses.

Regarding other upper reservoirs of Naryn-SyrDarya cascade, winter releases are proposed to be less than maximum average monthly inflows to hydrounits. For Chardara and Kairakkum reservoirs releases should not exceed maximum discharges recorded before beginning of river flow regulation.

For growing period:

Saying about historical right of people for water attention should be paid to the fact that rivers became necessary for people first of all they supported life, were main transport artery uniting and linking people. Because of that in all known legislation running river water always was

common or public property. If lands and lakes and other water bodies were everywhere proclaimed as somebody's property, rivers remained common. Such approach made easier river resources use and disputes had place only in dry regions, where water was always deficit.

Above said means that man before he has earned to manage river, had indisputable right on its waters, at least within the limits, which were determined by its natural properties, i. e. its water availability during given period and possibilities of its diversion. These possibilities grew with hydrotechnique development, especially during last century, but right for water was kept for all.

After 1992 when Toktogul reservoir regime was shifted to power one main efforts were spent for grounding rights of sovereign states to develop own water resources though transboundary water resources sometimes were considered as natural resources (earth depths, etc.) do not taking into account their peculiarities. Much efforts were spent to link this right with states transition to the market. Finally, this question has been solved by signing of interstate "Agreement on water-power resources of SyrDarya basin" on March 17, 1998 between Kazakhstan, Kyrgyzstan and Uzbekistan to which later Tadjikistan joined.

In this agreement common approach was formulated: "In order to provide agreed regime of hydropower units and Naryn-SyrDarya cascade operation Sides consider necessary to coordinate and make annual decision on water release energy generation and losses compensation on equivalent basis'. Agreement foreseen transfer of additionally generated by Naryn-SyrDarya cascade electric energy, over needs of Kyrgyzstan, to Kazakhstan and Uzbekistan. This framework agreement described general order of water use regime, water consumption and energy resources delivery coordination; reservoirs' operation regime, electric energy over flow and energy resources delivery were supposed to approve in annual intergovernmental agreements in connection with current natural-economic conditions in the basis.

But realization of this document without taking into account all achievements of precedent practice, most important rules of river structures operation could lead to unforeseen consequences, particularly in dry years, how it has happened in 1995 and especially during last growing period. For example, in May 1995 releases were less than 200 cu. m/s (50-150 cu. m/s), similar picture was observed in 1997 and 2000. Similar situation occurred downstream Kairakkum reservoir. Consequences of this situation are negative: lands drying up, yield losses, epidemiological conditions aggravation. Before flow regulation even in dry years river discharge at Toktogul and Kairakkum reservoirs was higher. Thus, release reduction without taking into account needs of population living downstream came to contradiction with experience of precedent centuries and violated natural right of man for water.

Because of that in order to provide historical and natural right it is necessary to compare natural river regime with current one, subordinated to needs of power engineering and choose optimal variant of releases from reservoir allowing combine and smooth contradictions of main water consumers and water users. As during growing period irrigation is major consumer and SyrDarya flow seasonal regulation under current political-economic conditions is impossible, is proposed for upper reservoirs of Naryn-SyrDarya cascade (first of all, for Toktogul reservoir) during growing period to provide minimum average monthly discharge recorded at the hydrounit during all period of observations.

For Toktogul reservoir observations are carried out since 1911; data are presented on fig. 1. Proposed releases from reservoir for each month of vegetation also are shown on fig. 1. From

fig. 1 is apparent that proposed monthly releases from Toktogul reservoir are monthly minimum discharges for all 90 years of observation.

Thus, proposed Toktogul reservoir regime for water-economic year is presented in the table below:

	mln cu. m						
Non-growing period	496	1 023	1 233	1 327	1 186	804	6 069
Growing period	259	831	971	1 206	965	518	4 750
Total							10 819

Average multiyear norm of inflow to Toktogul reservoir is 11 538 mln cu. m, i. e. on 700 mln cu. m more annually. Similar comparison is necessary because current regime on volume of annual releases often exceeds annual inflow to reservoir than can lead to situation, when both irrigation and power engineering will come to crisis. Similar approach is kept for selection of recommended vegetation monthly releases from other reservoirs of cascade; difference is that for upper reservoirs releases should be not less than average monthly discharges of inflows to hydrounits recorded for all period of observation and for channel reservoirs of seasonal regulation – for all period precedent to beginning of river flow regulation.

In agreement should be separately mentioned cases when necessity arises in certain deviations from proposed regimes of releases from cascade reservoirs:

- releases increase during growing period is provided by electric energy overflows regulations and technical resources delivery according to agreement of Sides of March 17, 1998;
- discharges increase during non-growing period should be agreed with other Sides to prevent transboundary impact or to compensate damage to the Side suffered from this impact if it had place.

Besides, in this document is proposed to foresee possibilities of multiyear regulation through water volume accumulation in reservoirs according to agreement between states. In agreement order of Naryn-SyrDarya cascade operation regime approval should be described over periods of a year and water intake limits for the states according to the Agreement. In this document should be described obligations of the basin's states and their responsibility for actions leading to violation of the most important provisions of agreement as well as procedures of disputes resolution.

In conclusion it is worth to mention those questions and objectives which special attention should be paid:

- creation of optimal conditions to population living in lower and middle reaches of SyrDarya including provision of ecological sustainability of water systems and sanitary releases in river channel; aspiration should be directed to maximum possible return to SyrDarya natural regime;
- obligatory involvement of all states-water consumers in SyrDarya resources management problems;
- integrated character of river water resources use;
- strong discipline and fulfillment of all interstate agreements;
- maintenance of stability in interstate relations and reduction of international tension in the region.

