

ANALYSIS OF WATER MANAGEMENT SITUATION IN THE SYR DARYA AND AMU DARYA RIVER BASINS FOR THE GROWING SEASON 2024

1 Syr Darya River Basin

During the growing season, the actual inflow to the upper reservoirs of the Syr Darya River basin (Toktogul, Andijan, Charvak) was 18.23 km^3 or 110% of the forecast, 98% of the norm (18.5 km^3) and by $2.73\% \text{ km}^3$ more than in the growing season 2023.

Total lateral inflow to the Naryn and Syr Darya Rivers amounted to 10.5 km^3 in the reach up to the Chardara reservoir (by 3.2 km^3 more than in the growing season 2023), including 1.48 km^3 from the Karadarya River (Uchtepa g/s), 1.32 km^3 from the Chirchik River (Chinaz-Chirchik g/s), and 7.7 km^3 from return flow and small rivers.

Water accumulation in the upper reservoirs (Toktogul, Andijan, Charvak) was 8.85 km^3 by the beginning of the growing season. By the end of the growing season, the water volume was 15.83 km^3 in the upper reservoirs, i.e. water accumulation was 6.98 km^3 .

The inflow to the Toktogul reservoir from the Naryn River reached 10.7 km^3 , which is by 1.36 km^3 more than the forecast and 109% of the norm (9.8 km^3). Discharge from the reservoir amounted to 5.0 km^3 , which is by 0.78 km^3 (14%) less than scheduled by BWO Syr Darya. The total water withdrawal from the Naryn River made up 5.7 km^3 (inflow – water releases: $10.7 - 5.0 = 5.7$). This is by 60% more than scheduled by BWO Syr Darya.

In the Bakhri Tojik reservoir the water volume was 3.32 km^3 at the beginning of the growing season and 1.72 km^3 by the end of the growing season. Inflow to the Bakhri Tojik was 6.33 km^3 , and total water releases amounted to 7 km^3 , including 6.42 km^3 of water discharged into the river. Analysis of Bakhri Tojik operation shows that reservoir accumulated by 1.12 km^3 more than planned by BWO and, accordingly, water releases from the reservoir into the river were by 0.26 km^3 more than scheduled.

Total water withdrawal from the Naryn and Syr Darya rivers in reaches up to Shardara reservoir amounted to 9.85 km^3 or 83% of the limit. During the growing season 2024, the water withdrawal was by 2.05 km^3 less than planned by limits approved at the ICWC meeting. Due to heavy rainfall from April to May, no requests for water have been submitted.

The total water withdrawal was 0.73 km³ for Kazakhstan (through the Dustlik canal), 0.24 km³ for the Kyrgyz Republic, 1.31 km³ for Tajikistan, and 7.57 km³ for Uzbekistan.

In the Shardara reservoir the water volume was 4.8 km³ at the beginning of the growing season and 1.12 km³ by the end of the growing season. Inflow to the Shardara reservoir amounted to 5.2 km³ or 141% of the plan. The discharge from the Shardara reservoir amounted to 6.29 km³.

According to the Committee for Water Resources of Kazakhstan, water supply to the Aral Sea and Aral Sea region (Karateren g/s) was 0.97 km³ in the growing season.

Water use in the lower reaches of the Syr Darya (including water withdrawal plus water losses, minus lateral inflow) is estimated at 4.29 km³, this is less by 18% of the plan.

Table 1.1

Indicators of available water supply for the riparian countries of the Syr Darya River Basin in the growing season 2024

Water user	Water volume, km ³	
	BWO schedule /limit	Actual
1 Total water withdrawal (in the reach up to Shardara reservoir)	11.90	9.85
2 By country:		
– <i>Kyrgyz Republic</i>	0.270	0.244
– <i>Republic of Uzbekistan</i>	8.800	7.566
– <i>Republic of Tajikistan</i>	1.905	1.312
– <i>Republic of Kazakhstan</i>	0.921	0.728
3 By river reach		
3.1 Toktogul reservoir – Uchkurgan hydroscheme	3.99	3.52
<i>Including:</i>		
– <i>Kyrgyz Republic</i>	0.21	0.18
– <i>Republic of Tajikistan</i>	0.24	0.09
– <i>Republic of Uzbekistan</i>	3.55	3.24
3.2 Uchkurgan hydroscheme – Bakhri Tojik reservoir	1.05	1.00
<i>Including:</i>		
– <i>Kyrgyz Republic</i>	0.06	0.06
– <i>Republic of Tajikistan</i>	0.45	0.46
– <i>Republic of Uzbekistan</i>	0.54	0.48
3.3 Bakhri Tojik reservoir – Shardara reservoir	6.85	5.33
<i>Including:</i>		
– <i>Republic of Kazakhstan</i>	0.92	0.73
– <i>Republic of Tajikistan</i>	1.22	0.76
– <i>Republic of Uzx</i>	4.71	3.84
4 In addition:		
– Inflow to Shardara reservoir	3.69	5.20
– Discharge into Arnasay	0.00	0.07
– Water supply to the Aral Sea and Aral Sea region ¹	1.00	0.97

¹ Committee for Regulation, Protection and Use of Water Resources at the Ministry of Water Resources and Irrigation of the Republic of Kazakhstan

Table 1.2

Water balance of the Syr Darya River in the growing season 2024

Balance item	Water volume, km ³		Difference (actual-plan)	
	Forecast/ plan	Actual	km ³	%
1 Inflow to Toktogul reservoir	9.34	10.69	1.36	15
2 Lateral inflow in the Toktogul reservoir -Shardara reservoir reach (+)	9.23	10.49	1.26	14
<i>including:</i>				
– <i>Discharge from the Karadarya river (Uchtepa g/s)</i>	1.34	1.48	0.14	10
– <i>Discharge from the Chirchik river (Chinaz-Chirchik g/s)</i>	1.21	1.32	0.11	9
– <i>Lateral inflow from CDN and small rivers</i>	6.68	7.70	1.02	15
3 Flow regulation by reservoirs: recharge (+) or diversion of flow (-)	-2.62	-5.61	-2.99	114
<i>Including:</i>				
– <i>Toktogul reservoir</i>	-3.56	-5.70	-2.14	60
– <i>Bakhri Tojik reservoir</i>	0.95	0.09	-0.86	90
4 Regulated flow (1+2+3)	15.95	15.57	-0.38	2
5 Water diversion in the Toktogul – Shardara reach (-)	-11.90	-9.85	2.05	17
6 Inflow to Shardara reservoir	3.69	5.20	1.50	41
7 Water releases from Shardara reservoir (into the river and water withdrawal)	6.21	5.27	-0.94	15
8 Water use (-) downstream of Shardara reservoir (water withdrawal - lateral inflow + losses)	-5.21	-4.29	0.92	18
9 Water supply to the Aral Sea and Aral Sea region	1.00	0.97	-0.02	2

Table 1.3

Reservoir water balance in the Syr Darya River basin for the growing season 2024

Balance item	Water volume, km ³		Difference (actual-plan)	
	Forecast/ plan	Actual	km ³	%
1. Toktogul reservoir				
1.1 Inflow	9.34	10.69	1.36	15
1.2 Water volume:				
– beginning of the season (1 April 2024)	7.28	7.28	0.00	0
– end of the season (1 October 2024)	10.84	13.04	2.19	20
1.3 Water releases	5.77	4.99	-0.78	14
1.4 Flow regulation: recharge (+) or diversion of flow (-)	-3.56	-5.70	-2.14	60
2. Andijan reservoir				
2.1 Inflow	2.41	2.47	0.05	2
2.2 Water volume :				
– beginning of the season (1 April 2024)	0.96	0.96	0.00	0
– end of the season (1 October 2024)	1.06	0.99	-0.07	7
2.3 Water releases	2.30	2.38	0.07	3
2.4 Flow regulation: recharge (+) or diversion of flow (-)	-0.11	-0.09	0.02	
3. Charvak reservoir				
3.1 Inflow	4.88	5.07	0.19	4
3.2 Water releases				
– beginning of the season (1 April 2024)	0.61	0.61	0.00	0
– end of the season (1 October 2024)	1.71	1.81	0.09	6
3.3 Water releases	3.82	4.83	1.01	26
3.4 Flow regulation: recharge (+) or diversion of flow (-)	-1.06	-0.24	0.82	78
4 Bakhri Tojik reservoir				
4.1 Inflow	5.21	6.33	1.12	22
4.2 Lateral inflow	0.28	0.155	-0.12	45
4.3 Water volume				
– beginning of the season (1 April 2024)	3.32	3.32	0.00	0
– end of the season (1 October 2024)	1.70	1.72	0.02	1
4.4 Water releases	6.73	6.998	0.26	4
including:				
– <i>water releases into the river</i>	6.16	6.42	0.26	4
– <i>water diversion from the reservoir</i>	0.58	0.58	0.00	0
4.5 Flow regulation: recharge (+) or diversion of flow (-)	0.95	0.09	-0.86	90
5 Shardara reservoir				
5.1 Inflow	3.69	5.20	1.50	41
5.2 Lateral inflow	0.00	0.00	0.00	
5.3 Water volume:				

Balance item	Water volume, km ³		Difference (actual-plan)	
	Forecast/ plan	Actual	km ³	%
– beginning of the season (1 April 2024)	4.82	4.82	0.00	0
– end of the season (1 October 2024)	1.03	1.12	0.09	9
5.4 Water releases	7.04	6.29	-0.75	11
<i>Including:</i>				
– <i>discharge into Arnasay</i>	0.00	0.07	0.07	
– <i>water releases into the river</i>	6.21	5.27	-0.94	15
– <i>water diversion from the reservoir</i>	0.83	0.95	0.12	15
5.5 Flow regulation: discharge (+) or diversion of flow (-)	2.52	0.07	-2.45	97
TOTAL flow regulation by reservoirs: recharge (+) or diversion of flow (-)	-1.27	-5.87	-4.60	362

2 Amu Darya River Basin

The actual flow in the Amu Darya River at “nominal Kerki” g/s (upstream of water intake to Garagumdarya) was 44.11 km³ (94% of the norm), which is by 3.48 km³ more than expected by BWO Amu Darya (Table 2.2). For comparison, the actual river flow was 43.46 km³ in the growing season 2023.

Inflow to Nurek dam amounted to 16.39 km³ and was more than the projected flow by 1.36 km³. Water releases from the reservoir were 12.63 km³, which is by 1.64 km³ more than scheduled by BWO Amu Darya. Diversion of river flow through accumulation of water in the Nurek reservoir amounted to 3.75 km³ (Table 2.3).

Based on data from Darganata g/s, inflow to the Tuyamuyun hydroscheme (TMHS) was 18.07 km³, which exceeded the expected inflow by 1.86 km³. As a result, 0.75 km³ more water was accumulated in the reservoirs of TMHS during the growing season and reached a total of 4.0 km³. Water releases from TMHS exceeded the planned amount by 0.63 km³, totaling 14.83 km³.

In the current water management situation, the established water withdrawal limit for the Amu Darya River basin was covered by 85% (Table 2.1). The total water withdrawal was 33.83 km³, including 26.72 km³ downstream of Kerki g/s (starting from water intake to Garagumdarya). The average water availability was 91% for Tajikistan, 90% for Turkmenistan, and 79% Uzbekistan in the growing season.

In the growing season, water supply to the Aral Sea region and the Aral Sea amounted to 1.24 km³ (from the Amu Darya River at Samanbay g/s plus discharge from CDN) or 59% of BWO's forecast schedule.

Table 2.1

Indicators of available water supply for the countries of the Amu Darya River Basin in the growing season 2024

Water user	Water volume, km ³		Water availability, %	Shortage (-), surplus (+), km ³
	Limit/schedule	Actual	Season	Season
1. Total water withdrawal	39.70	33.83	85	-5.9
2. Breakdown by states:				
Kyrgyz Republic	-	-	-	-
Republic of Tajikistan	7.0	6.3	91	-0.7
Turkmenistan	15.5	14.0	90	-1.5
Republic of Uzbekistan	17.2	13.5	79	-3.7
3. Downstream of nominal Kerki g/s	31.520	26.72	85	-4.8
<i>including:</i>				
<i>Turkmenistan</i>	15.5	14.0	90	-1.5
<i>Republic of Uzbekistan</i>	16.0	12.8	80	-3.3
4. By river reach:				
Upper reaches	8.182	7.11	87	-1.1
<i>including:</i>				
<i>Kyrgyz Republic</i>	-	-	-	-
<i>Republic of Tajikistan</i>	6.98	6.33	91	-0.7
<i>Syrkhandarya province, Uzbekistan</i>	1.20	0.78	65	-0.4
Middle reaches	16.207	15.70	97	-0.5
<i>including:</i>				
<i>Turkmenistan</i>	10.47	10.24	98	-0.2
<i>Republic of Uzbekistan</i>	5.73	5.45	95	-0.3
Lower reaches	15.313	11.02	72	-4.3
<i>including:</i>				
<i>Turkmenistan</i>	5.03	3.72	74	-1.3
<i>Republic of Uzbekistan</i>	10.285	7.31	71	-3.0
5. Additionally:				
Emergency-environmental flow to canals in the lower reaches	0	0		
<i>including:</i>				
<i>Turkmenistan</i>	0	0		
<i>Republic of Uzbekistan</i>	0	0		
Water supply to the Aral Sea region and the Aral Sea **	2.10	1.24	59	-0.9

*) nominal Kerki g/s (upstream of water intake to Garagumdarya)

***) including discharge from CDN

Table 2.2**Water balance of the Amu Darya River in the growing season 2024**

Balance item	Water volume, km ³		Difference (actual-plan)	
	Forecast /plan	actual	km ³	%
1. Flow in the Amu Darya River – non-regulated flow at nominal Kerki station*	40.63	44.11	3.48	9
2. Flow regulation by Nurek reservoir: recharge (+) or diversion of flow (-)	-4.03	-3.75	0.28	7
3. Water intake in middle reaches (-)	-16.21	-15.70	0.51	3
4. Return flow in middle reaches (+)	0.95	0.94	-0.01	1
5. River flow at Darganata g/s	16.21	18.07	1.86	11
6. Water releases from TMHS (including water intake from the reservoir)	14.20	14.83	0.63	4
7. Water intake in lower reaches, including water intake from TMHS (-)	-15.31	-11.02	4.29	28
8. Return flow in lower reaches (+)	0.00	0.00	0.00	
9. Emergency-environmental flow to canals (-)	0.00	-0.01	-0.01	
10. Supply to the Aral Sea region and the Aral Sea (Samanbay g/s)	0.58	0.45	-0.13	22

* Amu Darya River flow (upstream of water intake to Garagumdarya) at the non-regulated flow rate at Nurek dam (excluding regulation of flow of the Vakhsh River).

Table 2.3

**Reservoir water balance in the Amu Darya River basin
in the growing season 2024**

Balance item	Water volume, km ³		Difference (actual-plan)	
	Forecast /plan	Actual	km ³	%
1 Nurek reservoir				
1.1. Inflow	15.03	16.39	1.36	9
1.2. Water volume:				
– beginning of the season (1 April 2024)	6.02	6.02	0.00	0
– end of the season (1 October 2024)	10.52	10.57	0.05	0
1.3. Water releases	11.00	12.63	1.64	15
1.4. Flow regulation: recharge (+) or diversion (-) of flow	-4.03	-3.75	0.28	7
2 Reservoir of TMHS				
2.1 River flow at Darganata g/s	16.21	18.07	1.86	11
2.2 Water volume:				
– beginning of the season (1 April 2024)	2.97	2.97	0.00	0
– end of the season (1 October 2024)	3.25	4.00	0.75	23
2.3 Water releases	14.20	14.83	0.63	4
including:				
– water releases into the river	10.21	10.22	0.01	0
– water intake	3.99	4.62	0.63	16
2.4 Flow regulation: recharge (+) or diversion (-) of flow	-6.00	-7.85	-1.85	31
TOTAL flow regulation by reservoirs: recharge (+), diversion (-) of flow	-10.03	-11.60	-1.57	16