

ANALYSIS OF WATER MANAGEMENT SITUATION WITHIN THE AMUDARYA AND SYRDARYA RIVER BASINS FOR VEGETATION PERIOD OF 2010

1 Syrdarya River Basin

The actual inflow to the upstream reservoirs of the Syrdarya River Basin (Toktogul, Andijan and Charvak) for vegetation period was 29.07 km³ or 156% predicted inflow (the planned schedule of BWO "Syrdarya"). The upstream reservoirs took 11.23 km³ of the flow of Naryn, Karadarya and Chirchik rivers that exceeds the planned water intake by 3.59 km³. However owing to the increased inflow to the upstream reservoirs the actual release from them for vegetation period was 17.84 km³ that exceeds the predicted one by 6%.

The total lateral inflow to Naryn, Karadarya, Syrdarya and Chirchik rivers calculated by the balance method (data of BWO "Syrdarya") amounted 13.56 km³ and the available regulated water resource of the basin (including the releases from the upstream reservoirs, and lateral inflow) - 31.4 km³.

At the end of vegetation period 22.79 km³ of water was accumulated in the upstream reservoirs including 19.51 km³ or 120% of the predicted one - in the Toktogul reservoir (calculated according to the schedule of BWO "Syrdarya"). For comparison: at the end of vegetation period 2009 there was 12.67 km³ in the Toktogul reservoir that is 6.84 km³ less than at the beginning of vegetation period 2010.

The total water withdrawal from the Syrdarya river amounted 9.47 km³ including: to the Kyrgyz Republic - 0.17 km³; to the Republic of Tajikistan - 1.258 km³; to the Republic of Uzbekistan - 7.34 km³; to the Republic of Kazakhstan (through the Dustlik canal) - 0.68 km³. Additionally the releases (0.13 km³) were implemented into Arnasay and water delivery to the Aral Sea and Priaralie amounted 4.26 km³.

Water withdrawals from the river channel were being implemented within water limits according to the water users demand on the basis of actual water availability. For this reason despite of high-water year, the calculated water availability for some ten-day periods is less than its average for the season (Table 1.1).

Actually the withdrawn water volume was less than the planned limit by 2.27 km³ (19%). Water supply was unequal for the states, river sites and was unsteady during the times (see Table 2.1, and also data on the website: www.cawater-info.net/analysis/water/).

The obligations on water delivery to the Kairakkum reservoir was implemented on 260%; the water inflow to the reservoir amounted 12.33 km³ with the scheduled water inflow (planned) 4.73 km³. The obligations on water delivery to the Shardara reservoir was implemented on 208%; the water inflow to the reservoir amounted 11.59 km³.

Water releases from the Kairakkum reservoir for vegetation period amounted 12.89 km³ including 12.39 km³ to the river. Water releases from the Shardara reservoir amounted 16.25 km³ including 0.13 km³ - to Arnasay, and 15.34 km³ - to the Syrdarya river. At the same time only 4.26 km³ of water was delivered to the Aral Sea and Priaralie. Sum of water withdrawals and water losses in the lower reach amounted 11.08 km³. The initial water supplying to the Koksaray reservoir with capability of 3.0 km³ is started.

Analysis of reservoirs' water balances (Table 1.3) has revealed the nonregistered inflow to the Toktogul, Kairakkum and Shardara reservoirs within the total volume of 0.73 km³. In the Andijan and Charvak reservoirs the total water losses were 0.19 km³.

Attention is needed to the fact that over the past 5 years (2005-2006 ... 2009-2010) the average annual inflow to the Toktogul reservoir amounted 13.5 km³, including 10.35 km³ for vegetation

periods. The water inflow for vegetation period of 2010 amounted 15.24 km³ that exceeds the average inflow over the past 5 years by 4.89 km³.

Over the past 5 years the average volume of releases from the Toktogul reservoir for vegetation period is estimated at 5.38 km³. During vegetation period of 2010 there was 5.45 km³ of released water, which is near to the average volume of releases (see Table 1.4).

According to our estimates, the releases from the Toktogul reservoir for vegetation period amounted 5...5.5 km³ in line with irrigation needs of the basin in the high-water years and should allow (under stable operation of Naryn HPS cascade) to implement the stable water delivery to the canals in the Fergana Valley.

Water availability in the middle stream of Syrdarya river depends on releases from the Kairakkum reservoir, which is able to limit water delivery into canals in the middle stream even during high-water and normal periods under the power-producing mode.

The actual releases from the Kairakkum reservoir during practically the whole vegetation period 2010 exceed (except July) the planned ones. The maximal releases were on April-May (1.8-2.7 times as much) and on September (2.4 times as much). At the same time the release deficit was observed in 2nd and 3d ten-day periods of July.

The estimates show that water status of the year gave possibility to make a reservoir's drawdown about 0.8-1.0 km³ on July and to fill in the reservoir with needed water on September.

The dynamics of inflow to the Kairakkum reservoir during vegetation period of 2010 looks like the water management situation in 2003-2004 when inflow to the waterworks facility amounted 9-8.7 km³ during vegetation period. The dynamics of inflow to the Kairakkum reservoir during vegetation period of 2010 looks like the water management situation in 2003-2004 when inflow to the waterworks facility amounted 9-8.7 km³ during vegetation period. However the vegetation period 2010 is an exclusive phenomenon because during the whole period the reservoir did not drawdown more than 3 km³ water when operating under the power-producing mode.

The total channel losses of the Naryn river and of the Syrdarya section before the Chardara reservoir calculated by the balance method (using the CAREWIB channel model) amounted 2.1 km³ for vegetation period 2010. These

These losses - specific for the high-water years - are compensated by much lateral inflow including the collector-drainage flow (CDF), small rivers' flow and filtration inflow to the river channel from the upstream area (generally down from reservoirs - the Naryn HES cascade, Kairakkum and Farkhad waterworks facilities).

Difference between lateral inflows and water losses amounts 8.2-2.1=6.1 km³, that practically coincides with the planned water volume for allocation within the basin (see Table 1.2).

Table 1.1

Water availability in the Syrdarya River basin countries for vegetation period 2010

Water user	Water volume, km ³		Water availability, %		Deficit (-), surplus (+) km ³	
	limit/schedule	actual	season	min value for the ten-day interval *)	season	total per ten-day interval **)
1. Total water withdrawal	11.74	9.47	81	53	-2.27	-2.55
2. By countries:						
Republic of Kyrgyzstan	0.25	0.17	71	36	-0.08	-0.08
Republic of Uzbekistan	8.80	7.34	84	52	-1.46	-1.7
Republic of Tajikistan	1.90	1.28	67	27	-0.62	-0.64
Republic of Kazakhstan	0.79	0.68	85	53	-0.11	-0.21
3. By river reaches						

Water user	Water volume, km ³		Water availability, %		Deficit (-), surplus (+) km ³	
	limit/schedule	actual	season	min value for the ten-day interval *)	season	total per ten-day interval **)
3.1 Toktogul reservoir – Uchkurgan hydroscheme	3.95	3.01	76	55	-0.94	-0.97
<i>of which:</i>						
<i>Republic of Kyrgyzstan</i>	0.16	0.13	78	41	-0.03	-0.04
<i>Republic of Tajikistan</i>	0.24	0.13	53	27	-0.11	-0.11
<i>Republic of Uzbekistan</i>	3.55	2.75	78	55	-0.8	-0.84
3.2 Uchkurgan hydroscheme – Kayrakkum hydroscheme	1.07	0.98	91	65	-0.09	-0.15
<i>of which:</i>						
<i>Republic of Kyrgyzstan</i>	0.08	0.05	57	21	-0.03	-0.04
<i>Republic of Tajikistan</i>	0.45	0.36	81	21	-0.09	-0.11
<i>Republic of Uzbekistan</i>	0.54	0.57	105	78	0.03	-0.03
3.3 Kayrakkum hydroscheme – Shardara reservoir	6.72	5.48	82	44	-1.24	-1.48
<i>of which:</i>						
<i>Republic of Kyrgyzstan</i>	0.79	0.68	85	53	-0.11	-0.21
<i>Republic of Tajikistan</i>	1.22	0.78	64	27	-0.44	-0.44
<i>Republic of Uzbekistan</i>	4.71	4.02	86	40	-0.69	-0.92
4. In addition:						
Inflow to the Shardara reservoir	5.58	11.59	208	93	6.01	-0.01
Discharge to Arnasai	0	0.129	-	-	0.129	-
Water supply to the Aral Sea and Priaralie	2.44	4.26	175	-	1.82	-

*) Minimum value recorded in the ten-day period

***) Total water deficit by ten-day periods; covered by surplus water during the season

Table 1.2

Syrdarya River channel water balance for vegetation period 2010

Items	Water volume, km ³		Deviation (actual-plan)
	expected/plan	actual	
1 Inflow to the Toktogul reservoir	10.303	15.244	4.941
2 Lateral inflow to the river reach Toktogul reservoir – Shardara reservoir (+)	11.458	17.425	5.967
<i>of which:</i>			
<i>Discharge along the Karadarya river</i>	2.21	5.515	3.305
<i>Discharge along the Chirchik river</i>	3.05	3.740	0.69
<i>Lateral inflow by CDF¹ and small rivers</i>	6.198	8.17	1.972
3 Runoff regulation by reservoirs addition to runoff (+) or withdrawal (-)	-4.433	-9.527	-5.094
<i>of which:</i>			
<i>Toktogul reservoir</i>	-6.683	-9.799	-3.116
<i>Kayrakkum reservoir</i>	2.25	0.272	-1.978
4 Regulated runoff (1+2+3)	17.328	23.142	5.814
5 Water withdrawal at the Toktogul – Shardara (-) site	-11.745	-9.470	2.275
6 Runoff losses (-) or unaccounted inflow to the channel (+) at the Toktogul – Shardara site	0	-2.085	-2.085

¹ CDF-collector-drainage flow

Items	Water volume, km ³		Deviation (actual-plan)
	expected/plan	actual	
<i>Including % of regulated runoff</i>	0	9	
7 Inflow to the Shardara reservoir	5.583	11.587	6.004
8 Runoff regulation by the Shardara reservoir addition to runoff (+) or withdrawal (-)	3.592	4.663	1.071
9 Water release from the Shardara reservoir to the river	7.97	15.34	7.37
10 Diversion to Kyzylkum canal (-)	-1.205	-0.780	0.425
11 Discharge to Arnasai (-)	0	-0.13	-0.13
12 Amount of water used in the lower reaches: algebraic sum of withdrawal (-), lateral inflow (+), losses (-)	-5.53	-11.08	-5.55
13 Water supply to the Aral Sea and Priaralie	2.44	4.26	1.82

Table 1.3

Water balance of the Surdarya River basin's reservoirs for vegetation period 2010

Items	Water volume, km ³		Deviation (actual-plan)
	expected/plan	actual	
1. Toktogul reservoir			
1.1 Inflow to the reservoir	10.303	15.244	4.94
1.2 Water volume in the reservoir:			
- at the beginning of the season (April 1, 2010)	9.617	9.698	0.08
- at the end of the season (October 1, 2010)	16.245	19.509	3.26
1.3 Release from the reservoir	3.62	5.445	1.83
1.4 Unaccounted inflow (+) or water losses (-)	-0.055	0.012	0.067
<i>% of inflow to the reservoir</i>	0.5	0.1	
1.5 Runoff regulation: addition to runoff (+) or withdrawal (-)	-6.683	-9.799	-3.116
2. Andijan reservoir			
2.1 Inflow to the reservoir	3,004	6,386	3,38
2.2 Water volume in the reservoir:			
- at the beginning of the season (April 1, 2010)	1.147	1.238	0.09
- at the end of the season (October 1, 2010)	1.15	1.419	0.27
2.3 Release from the reservoir	2.989	6.171	3.18
2.4 Unaccounted inflow (+) or water losses (-)	-0.012	-0.034	-0.022
<i>% of inflow to the reservoir</i>	0.4	0.5	
2.5 Runoff regulation: addition to runoff (+) or withdrawal (-)	-0.015	-0.215	-0.2
3. Charvak reservoir			
3.1 Inflow to the reservoir	5.386	7.441	2.06
3.2 Water volume in the reservoir:			
- at the beginning of the season (April 1, 2010)	0.82	0.8	-0.02
- at the end of the season (October 1, 2010)	1.741	1.858	0.12
3.3 Release from the reservoir	4.45	6.23	1.78
3.4 Unaccounted inflow (+) or water losses (-)	-0.015	-0.153	-0.138
<i>% of inflow to the reservoir</i>	0.3	2	
3.5 Runoff regulation: addition to runoff (+) or withdrawal (-)	-0.936	-1.211	-0.275
4. Kayrakkum reservoir			
4.1 Inflow to the reservoir	4.73	12.33	7.6
4.2 Lateral inflow	0.27	0.285	0.01
4.3 Water volume in the reservoir:			
- at the beginning of the season (April 1, 2010)	3.42	3.52	0.1
- at the end of the season (October 1, 2010)	1.01	3.38	2.37
4.4 Release from the reservoir	6.98	12.89	5.91
of which:			
- release to the river	6.5	12.39	5.89
-water withdrawal from the reservoir	0.48	0.49	0.01
4.5 Unaccounted inflow (+) or water losses (-)	-0.16	0.13	0.29
<i>% of inflow to the reservoir</i>	3	1	

Items	Water volume, km ³		Deviation (actual-plan)
	expected/plan	actual	
4.6 Runoff regulation: addition to runoff (+) or withdrawal (-)	2.25	0.272	-1.978
5. Shardara reservoir			
5.1 Inflow to the reservoir	5.583	11.587	6.004
5.2 Lateral inflow	-	-	-
5.3 Water volume in the reservoir:			
- at the beginning of the season (April 1, 2010)	5.277	5.132	-0.145
- at the end of the season (October 1, 2010)	1.117	1.043	-0.074
5.4 Release from the reservoir	9.175	16.25	7.075
<i>of which:</i>			
-discharge to Arnasai	0	0.13	0.13
- release to the river	7.97	15.34	7.37
- water withdrawal from the reservoir	1.205	0.78	0.425
5.5 Unaccounted inflow (+) or water losses (-)	-0.568	0.58	1.148
% of inflow to the reservoir	10	5	
5.6 Runoff regulation: addition to runoff (+) or withdrawal (-)	3.592	4.663	1.071
TOTAL runoff regulation: addition to runoff (+) or withdrawal (-)	-1.79	-6.29	-4.5
TOTAL losses (-), unaccounted inflow (+)	-0.81	0.54	1.35

Table 1.4

Inflow to and release from the Toktogul reservoir for 2005-2010

n	Hydrologic year	Inflow, million m3			Release, million m3		
		Nonvegetati on period	Vegetation period			Nonvegetati on period	Vegetation period
1	2005-2006	3496	10362	13858	9082	5418	14500
2	2006-2007	3157	8911	12068	9538	5857	15395
3	2007-2008	2505	7371	9876	9726	4408	14134
4	2008-2009	2672	9876	12548	5884	5748	11632
5	2009-2010	3898	15244	19142	6965	5445	12410
	Average for 5 years	3146	10353	13498	8239	5375	13614

2 Amudarya River Basin

The actual water content of the Amudarya river at the Atamyrat gauging station (GS) conditional (upstream to the water intake into Garagumdarya), which was calculated on the basis of natural discharges of the Vaksh river (without runoff regulation by the Nurek reservoir), amounted 58.31 km³ or more than the expected one by 11.91 km³. Water delivery to the Nurek reservoir amounted 3.79 km³; the actual flow at the GS Atamyrat (upstream of water intake to Garagumdarya) amounted 54.52 km³ that is more than expected one by 30% (calculated according to the schedule of BWO"Syrdarya").

In the existing water management situation (the high-water year) the defined water withdrawal limit for the canals in the Amu Darya River Basin was used only by 88%; the total water withdrawal amounted 34.9 km³, including 28.72 km³ down the Atamyrat GS (starting from the water intake into Garagumdarya). Water supplying was unequal for the states, river sites and was unsteady during the time (see Table 2.1, and also data on the website: www.cawater-info.net/analysis/water/). Low water availability during some periods is justified by actual needs of water withdrawals from river in the high-water year, which are lower than the planned ones for normal year.

The emergency-environmental water releases into the Amudarya downstream canals amounted 1.57 km³ which decreased the actual inflow to Priaralie and the Aral Sea; the flow at the Samanbay GS amounted 14.59 km³ and with releases of the collector-drainage network the inflow to the Priaralie and to the Aral Sea amounted 17.15 km³.

At the end of season the Nurek reservoir accumulated 10.51 km³ of water and the TMHS reservoirs - up to 5.63 km³ (see Table 2.3). The total river water withdrawal for filling in the Nurek and Tuyamuyun reservoirs amounted 6.35 km³.

The water losses of the Amudarya river at the Atamyrat-Darganata section, which were calculated by the balance method (using the CAREWIB river channel balance model) amounted 3.79 km³ or 7% of water flow at the Atamyrat GS. The water losses in the TMHS reservoirs amounted 1.4 km³ (16% of water inflow to waterworks facility) and in the Tuyamuyun-Samanbay section - 5.02 km³ or 17% of water flow at the Tuyamuyun GS (TMHS tail-water).

For comparison: the recommended calculated limits of Amudarya river channel losses at the Atamyrat-Darganata section (according to the ADB RETA 6163 project) amounted 5%, and at the Tuyamuyun-Samanbay section - 20%. Thereby the actual losses exceeded the recommended (calculated) ones for the middle Amudarya by 2%, and for lower Amudarya they less than the recommended ones by 3%.

There are no losses in the Nurek reservoir, the nonregistered inflow of 0.57 km³ is discovered by means of the balance method (3% of the inflow to the reservoir through the Vaksh river).

In whole the water losses in the Amudarya river basin amounted 10.21 km³ or 17% of river water content (at the Atamyrat GS).

Table 2.1

Water availability in the Amudarya River basin countries for vegetation period 2010

Water user	Water volume, km ³		Water availability, %		Deficit (-), surplus (+) km ³	
	limit/schedule	actual	season	limit/schedule	actual	season
1. Total water withdrawal	39,5	34,9	88	71	-4,59	-4,92
2. By countries:						
Republic of Kyrgyzstan	-	-	-	-	-	-
Republic of Tajikistan	6,78	5,2	77	57	-1,58	-1,59
Turkmenistan	15,5	13,52	87	72	-1,98	-2,13
Republic of Uzbekistan	17,22	16,18	94	72	-1,04	-1,53
3. Downstream from g/s Atamyrat ***)	31,52	28,72	91	75	-2,8	-3,32
<i>of which:</i>						
Turkmenistan	15,50	13,52	87	72	-1,98	-2,13
Republic of Uzbekistan	16,02	15,2	95	74	-0,82	-1,36
4. By river reaches:						
Upstream	7,98	6,19	78	57	-1,79	-1,81
<i>of which:</i>						
Republic of Kyrgyzstan	-	-	-	-	-	-
Republic of Tajikistan	6,78	5,2	77	57	-1,58	-1,59
Surkhandarya, Uzbekistan	1,2	0,99	82	44	-0,21	-0,24
Middle reach	16,2	14,55	90	80	-1,65	-1,68
<i>of which:</i>						
Turkmenistan	10,46	9,25	89	75	-1,21	-1,24
Republic of Uzbekistan	5,73	5,3	92	79	-0,44	-0,47
Downstream	15,32	14,17	93	61	-1,15	-1,78
<i>of which:</i>						

Water user	Water volume, km ³		Water availability, %		Deficit (-), surplus (+) km ³	
	limit/schedule	actual	season	limit/schedule	actual	season
<i>Turkmenistan</i>	5,04	4,27	85	53	-0,77	-0,89
<i>Republic of Uzbekistan</i>	10,28	9,90	96	60	-0,38	-1,04
5. In addition:						
Emergency-environmental releases to downstream canals	0	1.57	-	-	1.57	-
<i>of which:</i>						
<i>Turkmenistan</i>	-	-	-	-	-	-
<i>Republic of Uzbekistan</i>	0	1.57	-	-	1.57	-
Water supply to the Aral Sea and Priaralie (without CDF)	2.1	14.59	911	-	12.49	-

*) Minimum value recorded in the ten-day period

**) Total water deficit by ten-day period \s; covered by surplus water during the season

**) gauging station Atamyrat (conditional) – Amudarya river section upstream of Garagumdarya

Table 2.2

The Amudarya River channel water balance for vegetation period 2010

Items	Water volume, km ³		Deviation (actual-plan)
	expected/plan	actual	
1 Water content of the Amudarya River – natural runoff in the section of g/s Atamyrat (tentative)	46.4	58.31	11.91
2 Runoff regulation by the Nurek reservoir: addition to runoff (+) or withdrawal (-)	-4.4	-3.84	0.56
3 Water withdrawal in the middle reach (-)	-16.2	-14.55	1.65
4 Return CDF in the middle reach (+)	1.10	1.73	0.63
5 Runoff losses (-) or unaccounted inflow to the channel (+)	0	-3.79	-3.79
<i>% of runoff in the section of g/s Atamyrat (tentative)</i>	-	7	
6 Inflow to the Tuyamuyun hydroscheme (TMHS)	26.9	37.86	10.96
7 Runoff regulation by TMHS reservoirs: addition to runoff (+) or withdrawal (-)	-4.26	-2.51	1.75
8 Losses in TMHS reservoirs (-), lateral inflow (+)	-4.04	-1.4	2.64
<i>% of inflow</i>	15	4	
9 Downstream water withdrawal, including withdrawal from the TMHS (-)	-15.32	-14.17	1.15
10 Return CDF in the lower reach (+)	-	-	-
11. Sanitary-environmental water releases into downstream canals (-)	0	-1.57	-1.57
12 Runoff losses (-) or unaccounted inflow to the channel (+)	-5.22	-5.02	0.2
<i>% of runoff in the section of g/s Tuyamuyun</i>	30	16	
13 Water supply to the Aral Sea and Priaralie (without CDF)	2.1	14.59	12.49
TOTAL losses:	-9.76	-10.21	-0.45
<i>% of water content of the river</i>	20	17	

Table 2.3

Water balance of the Amudarya River basin's reservoirs for vegetation period 2010

Items	Water volume, km ³		Deviation (actual-plan)
	expected/plan	actual	
1. Nurek reservoir			
1.1 Inflow to the reservoir	16,77	20,84	4,07
1.2 Water volume in the reservoir:			
- at the beginning of the season (April 1, 2010)	6,10	6,10	0
- at the end of the season (October 1, 2010)	10,50	10,51	0,01
1.3 Release from the reservoir	12,37	17,0	4,63
1.4 Lateral inflow (+) or water losses (-)	0	0,57	0,57
<i>% of inflow to the reservoir</i>	0	3	
1.5 Runoff regulation: addition to runoff (+) or withdrawal (-)	-4,40	-3,84	0,56
2. TMHS reservoirs			
2.1 Inflow to the hydroscheme	26,9	37,86	10,96
2.2 Water volume in the reservoirs:			
- at the beginning of the season (April 1, 2010)	4,52	4,52	0
- at the end of the season (October 1, 2010)	4,74	5,63	0,89
2.3 Release from the hydroscheme	22,64	35,35	12,71
of which:			
- release to the river	17,08	30,70	13,62
- water withdrawal	5,56	4,65	0,91
2.4 Lateral inflow (+) or water losses (-)	-4,04	-1,4	2,64
<i>% of inflow to the reservoir</i>	15	4	
2.5 Runoff regulation: addition to runoff (+) or withdrawal (-)	-4,26	-2,51	1,75
TOTAL runoff regulation by reservoirs: addition to runoff (+) or withdrawal (-)	-8,66	-6,35	2,31
TOTAL losses (-), unaccounted inflow (+)	-4,04	-0,83	3,21

Conclusions

Syrdarya river basin

1. The Toktogul waterworks facility performance in the vegetation period 2010 under decreased irrigation requirements provided maximal filling of the reservoir to the beginning of non-vegetation period 2010-2011. However, the rational use of the accumulated volume can be guaranteed only by the regime of longterm regulation of the Naryn River runoff by the Toktogul Reservoir, that supposes a certain release limitations in the vegetation period and coordinated action of power specialists on electricity generation by the Naryn cascade hydropower stations and electricity supplies to Kazakhstan in the winter.

2. Obligations to supply water to the Kayrakkum and Chardara reservoirs have been met At the same time during some ten-day periods on July the energy releases from Kairakum HPS were lower than the planned ones. This energy mode should not be repeated in the vegetation period 2011, which is expected to be lower than the normal one. To do this the coordination of work of energy specialists of Tajikistan, Uzbekistan and Kazakhstan regarding this HPP is needed in advance.

3. Despite the high-water year the excessive withdrawals from the Syr Darya River and its major tributaries has not been observed. At the same time in some periods the water

withdrawal at some sections was less than the limit. This fact can be explained mainly by lowered water requirements during the high-water season and, to a lesser extent, by the management problems, what allows to identify a specific reserve of saved transboundary flow in the high-water periods, and take it into account when the high-water years will be in the future.

Amudarya river basin

1. The vegetation period 2010 revealed a significant loss of calculated runoff of the Amu Darya River and TWF's reservoirs. They can be taken for a conditional limit above which the losses aren't physically exist. At the same time, the losses are calculated and therefore should be corrected when having a reliable data regarding the boundaries of river sections, what requires the implementation of inter-state monitoring in the Amu-Darya river basin, the basis of which can be new gauging stations on the borders of states and implementation of SCADA.

2. The vegetation period 2010 has demonstrated that it is necessary to improve the control system for inflow of the river and drainage water to the Southern Priaralie and the Aral Sea, and to use more data - not only data of Samanbay section. The reporting system should include data on the Pravoberejny collector, as well as of other collectors on the left and right riversides of the Amu Darya river and data on river water inflow to the East Sea. Processing of satellite images of the Aral Sea water area for 2009-2010 showed a significant water influx to the eastern part and the water level raising in the eastern and western parts. The water inflow from the North Sea is being observed. The total volume of the Big Aral Sea replenishment exceeds the Amu Darya river flow in the Samanbay section.