ANALYSIS OF THE WATER-MANAGEMENT SITUATION IN THE SYRDARYA AND AMUDARYA RIVER BASINS OVER THE NON-GROWING SEASON 2014-2015

1. Syrdarya River Basin

The actual inflow to upstream reservoirs in the Syrdarya basin (Toktogul, Andizhan, and Charvak reservoirs) was 5.61 km3 or 118% of the forecast during the non-growing season. The actual release was 11.4 km^3 from the reservoirs.

The total lateral inflow in the reaches from the Toktogul reservoir to the Shardara reservoirs, including releases to the Karadarya and Chirchik rivers, was 10.6 km3. This is 1.9 times more than the total inflow to the upstream reservoirs.

By the end of the non-growing season, 7.95 km^3 were accumulated in the upstream reservoirs, including 6.41 km^3 in Toktogul reservoir or 87 % of BWO Syrdarya's scheduled amount.

The inflow to the Toktogul reservoir was 2.89 km^3. 8.4 km^3, which is by 1.89 km^3 more than scheduled by the BWO Syrdarya, was released from the reservoir. The comparison of the release volumes from the Toktogul reservoir during the non-growing season with accumulated water in the reservoir at the beginning of the growing season over 1992-2015 (Fig. 1) shows sustainable trends of decreased volumes by the beginning of the growing season and increased non-growing releases. The non-growing release increased by 2 km^3 on average over 1991-2015.

During the non-growing season, the total water diversion from the Naryn and Syrdarya rivers in the reaches up to Shardara reservoir was 3.17 km^3, of which: for the Kyrgyz Republic – 0.021 km^3, the Republic of Tajikistan – 0.024 km^3, the Republic of Kazakhstan (along the Dustlik canal) – 0.404 km^3, the Republic of Uzbekistan – 2.7 km^3.

Water availability was uneven for the states, the river reaches and unstable in time (Table 1.1, as well as data on the site www.cawater-info.net/analysis/).

The inflow to the Shardarya reservoir during the non-growing 2014-2015 was 11.43 km^3, which is 1.19 km^3 up than the BWO Syrdarya's scheduled amount. The release to the river from the Shardarya reservoir was 8.32 km^3, the water diversion for the Kzylkum canal – 0.17 km^3, the release to Arnasay – 0.12 km^3.

The actual water supply to the Aral was (according to the data of Uzgidromet as of 1.04.2015) made 3.24 km^3.

Table 1.2 provides the Syrdarya River channel water balance, and Table 1.3 provides the water balance of the reservoirs.

Table 1.1

Water availability in the Syrdarya River basin countries for the non-growing season 2014-2015

#	Water user	Water volume, km^3		Water availability, %	Deficit (-), surplus (+), km^3
		Quota/schedule	Actual	Season	Season
1	Total water diversion	3.308	3.167	96	-0.14
2	Water diversion by the states:				
	Kyrgyz Republic	0.037	0.021	56	-0.02
	Republic of Uzbekistan	2.496	2.718	109	0.22
	Republic of Tajikistan	0.368	0.024	7	-0.34
	Republic of Kazakhstan	0.407	0.404	99	0.00
3	By river reach				
3.1	Toktogul reservoir-Uchkurgan hydroscheme	1.36	1.35	99	-0.02
	of which:				
	Kyrgyz Republic	0.030	0.017	58	-0.013
	Republic of Tajikistan	0.084	0.000	0	-0.084
	Republic of Uzbekistan	1.252	1.297	104	0.045
3.2	Uchkurgan hydroscheme – Kayrakkum hydroscheme	0.25	0.18	72	-0.070
	of which:				
	Kyrgyz Republic	0.0071	0.0033	47	-0.004
	Republic of Tajikistan	0.0686	0.0006	1	-0.068
	Republic of Uzbekistan	0.1710	0.1731	101	0.002
3.3	Kayrakkum hydroscheme – Shardara reservoir	1.67	1.66	99	-0.01
	of which:				
	Republic of Kazakhstan	0.4000	0.4006	100	0.00
	Republic of Tajikistan	0.2124	0.0238	11	-0.19
	Republic of Uzbekistan	1.0605	1.2396	117	0.18
4	Inflow to the Shardara reser-voir	10.24	11.43	112	1.19
	Discharge to Arnasay	0.00	0.12		0.12
5	Water supply to the Aral Sea (Karateren gauging station)	2.49	3.24	130	0.75

Table 1.2

Syrdarya River channel water balance for the non-growing season 2014-2015 гг.

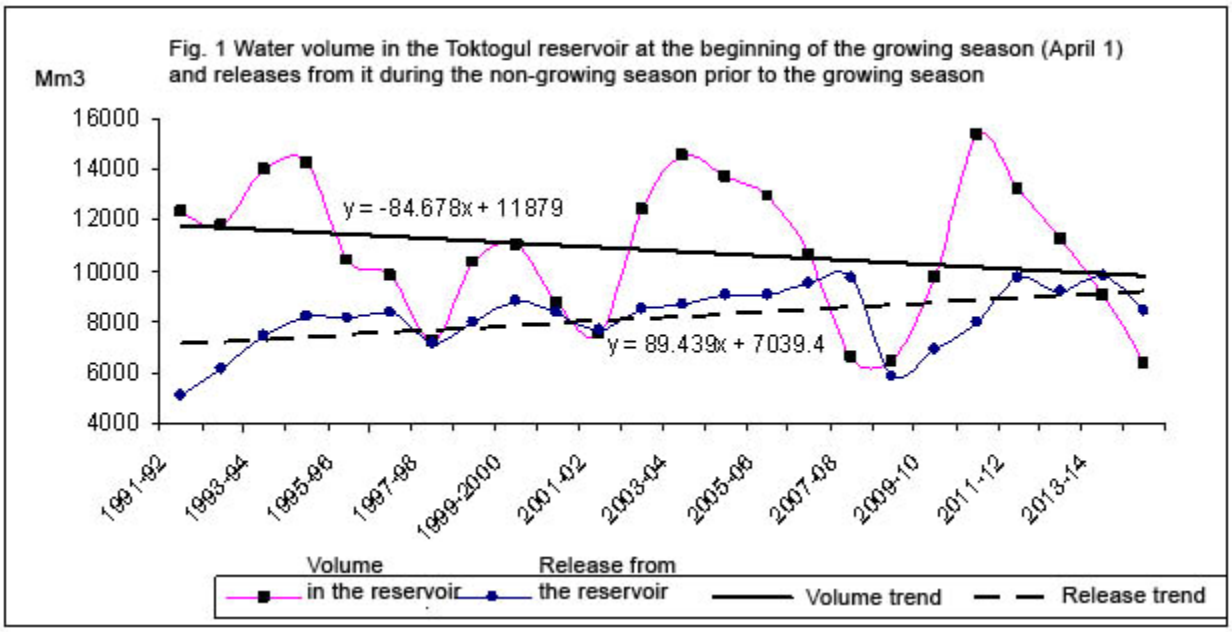
#	Balance item	Water volume, km3		Deviation (actual - plan)
		Forecast/Plan	Actual	
1	Inflow to the Toktogul reservoir	2.62	2.89	0.27
2	Lateral inflow at the river reach of Toktogul reservoir - Shardara reservoir (+)	3.32	10.59	7.28
	of which:			
2.1	Release to the Karadarya river	1.61	1.65	0.03
2.2	Release to the Chirchik river	1.71	1.28	-0.42
2.3	Lateral inflow from CDF and small rivers		7.66	7.66
3	Flow regulation in the reservoirs: inflow (+) or diversion (-)	6.64	2.62	-4.02
	of which:			
3.1	Toktogul reservoir	8.55	5.51	-3.03
3.2	Kairakkum reservoir	-1.91	-2.90	-0.99
4	Regulated flow (1+2+3)	12.57	16.10	3.53
5	Water diversion at the reach of Toktogul-Shardara	3.29	3.16	-0.13
6	Water losses (-) or unrecorded inflow to the channel (+) at the reach of Toктogul-Shardara	0.96	-1.51	-2.47
6.1	Including % of the regulated flow	-8	9	
7	Inflow to the Shardara reservoir	10.24	11.43	1.19
8	Flow regulation in the Shardara reservoir: inflow (+) or diversion (-)	-3.62	-2.82	0.81
9	Water release from the Shardara reservoir	6.53	8.32	1.79
10	Water release to the Kzylkum canal (-)	0.08	0.17	0.09
11	Discharge to Arnasay (-)	0.00	0.12	0.12
12	Expenditure of flow in the lower reaches: algebraic sum of water diversion (-), lateral inflow (+), losses (-)	-4.57	-5.84	-1.27
13	Water supply to the Aral Sea (Karateren gauging station)	1.96	2.48	0.52

Table 1.3

Water balance of the Syrdarya River basin reservoirs for the non-growing season 2014-2015

#	Balance item	Water volume, km^3		Deviation (actual-plan)
		Forecast/Plan	Actual	
1	**Toktogul reservoir**			
1.1	Inflow to the reservoir	2.615	2.890	0.27
1.2	Water volume in the reservoir:			
	- beginning of the season (October 1, 2013)	15.916	11.921	-4.00
	- end of the season (April 1, 2014)	7.369	6.405	-0.96
1.3	Release from the reservoir	6.510	8.404	1.89
1.4	Unrecorded inflow (+) or losses (-)	-4.652	-0.002	4.650
	% of inflow to the reservoir	-177.9	-0.1	177.80
1.5	Flow regulation: inflow (+) or diversion (-)	8.547	5.514	-3.03
2	**Andizhan reservoir**			
2.1	Inflow to the reservoir	0.803	1.101	0.30
2.2	Water volume in the reservoir:			
	- beginning of the season (October 1, 2013)	0.564	0.392	-0.17
	- end of the season (April 1, 2014)	0.767	0.953	0.19
2.3	Release from the reservoir	0.517	0.523	0.01
2.4	Unrecorded inflow (+) or losses (-)	-0.083	-0.017	0.07
	% of inflow to the reservoir	-10.4	-1.6	8.78
2.5	Flow regulation: inflow (+) or diversion(-)	-0.203	-0.578	-0.38
3	**Charvak reservoir**			
3.1	Inflow to the reservoir	1.327	1.619	0.29
3.2	Water volume in the reservoir:			
	- beginning of the season (October 1, 2013)	1.507	1.504	0.00
	- end of the season (April 1, 2014)	0.687	0.588	-0.10
3.3	Release from the reservoir	2.12	2.48	0.36
	Unrecorded inflow (+) or losses (-)	-0.03	-0.06	-0.03
	% of inflow to the reservoir	-1.93	-3.53	-1.60
3.5	Flow regulation: inflow (+) or diversion(-)	0.820	0.859	0.04
4	**Kairakkum reservoir**			
4.1	Inflow to the reservoir	10.22	12.42	2.20
4.2	Lateral inflow	0.300	0.231	-0.07
4.3	Water volume in the reservoir:			
	- beginning of the season (October 1, 2013)	1.51	1.12	-0.39
	- end of the season (April 1, 2014)	3.42	3.48	0.06
4.4	Release from the reservoir	8.62	9.75	1.14
	of which:			
	- release to the river попуск в реку	8.55	9.75	1.20
	- water diversion from the reservoir	0.069	0.001	-0.068
4.5	Unrecorded inflow (+) or losses (-)	0.01	-0.54	-0.54
	% of inflow to the reservoir	0.1	-4.3	-4.40
4.6	Flow regulation: inflow (+) or diversion (-)	-1.909	-2.90	-0.99
5	**Shardara reservoir**			
5.1	Inflow to the reservoir	10.24	11.43	1.19

#	Balance item	Water volume, km^3		Deviation (actual-plan)
		Forecast/Plan	Actual	
5.2	Lateral inflow	0.0	0.0	0.00
5.3	Water volume in the reservoir:			
	- beginning of the season (October 1, 2013)	0.999	0.933	-0.07
	- end of the season (April 1, 2014)	4.698	3.910	-0.79
5.4	Release from the reservoir	6.62	8.62	2.00
	of which:			
	- Discharge to Arnasay	0.00	0.12	0.122
	- Release to the river	6.53	8.32	1.79
	- water diversion from the reservoir	0.08	0.17	0.09
5.5	Unrecorded inflow (+) or losses (-)	0.07	0.16	0.08
	% of inflow to the reservoir	0.7	1.4	0.66
5.6	Flow regulation: inflow (+) or diversion(-)	-3.62	-2.82	0.81
	Total flow regulation by reservoirs: inflow (+) or diversion (-)	3.63	0.08	-3.55
	Total unrecorded inflow (-), or losses (+)	-4.68	-0.46	4.22



2. Amudarya River basin

The actual water availability in the Amudarya River in the Atamyrat gauging station (upstream of the intake to Garagumdarya) was 14.07 km^3, which is 33% more than expected by BWO Amudarya schedule.

The established quotas of water diversions in the Amudarya River basin were 94.3% used; including 12.4 km^3 downstream of the Atamyrat gauging station (starting from the intake to Garagumdarya).

The water availability was unequal for the states, river reaches (see Table 2.1, as well as data on the site www.cawater-info.net/analysis/).

The total water deficit was 5.6 %, of which in the Republic of Tajikistan - 26.8 %, in the Republic of Uzbekistan – 1.6 %, in Turkmenistan – 0.2 %.

By the end of the season, 6.78 km^3 were managed to be kept in the Nurek reservoir, and in the TMHS reservoirs – 3.1 km^3. The inflow to the Nurek reservoir was 3.82 km^3, the release – 7.59 km^3.

The accumulation to the river flow due to the drawdown of the Nurek reservoir was 3.77 km^3. The losses in the Atamyrat-Birata reach were 3.24 km^3 or 18 % of the regulated flow in the Atamyrat gauging station.

The water losses in the river reach from the Tyuyamuyun gauging station up to the Samanbay gauging station were 1.7 km^3 or 31 % of the river flow in the section of the Tyuyamuyun gauging station.

The established quotas for emergency and environmental releases to canals of the Amudarya downstream was 108 % used, the water supply was 0.86 km3.

0.99 km3 or 47% of the scheduled amount were supplied to the Priaralie and the Aral Sea.

Table 2.2 provides data on the river channel balance, and Table 2.3 – the water balance of the reservoirs.

Table 2.1

Water availability in the Amudarya River Basin countries for the non-growing season 2014-2015

#	Water user	Water volume, km^3		Water availability, %	Deficit (-), surplus (+) km^3
		Quota/ Schedule	Actual	Season	Season
1	Total water diversion	15.701	14.82	94.4	-0.88
2	Diversion by states:				
	Kyrgyz Republic	-	-	-	-
	Republic of Tajikistan	2.85	2.09	73.2	-0.76
	Turkmenistan	6.50	6.48	99.8	-0.02
	Republic of Uzbekistan	6.35	6.25	98.4	-0.10
3	Downstream of Atamyrat GS *)	12.48	12.40	99.3	-0.08
	of which				
	Turkmenistan	6.50	6.48	99.8	-0.02
	Republic of Uzbekistan	5.98	5.91	98.9	-0.07
4	By river reaches:				
	Upstream	3.22	2.43	75.3	-0.79
	of which:				
	Kyrgyz Republic	-	-	-	-
	Republic of Tajikistan	2.851	2.09	73.2	-0.76
	Republic of Uzbekistan Surk-handarya province	0.37	0.34	91.4	-0.03
	Midstream	8.34	8.28	99.3	-0.06
	of which:				
	Turkmenistan	5.10	5.05	99.1	-0.05
	Republic of Uzbekistan	3.24	3.23	99.5	-0.02
	Downstream	4.13	4.12	99.5	-0.02
	of which:B				
	Turkmenistan	1.40	1.43	102.1	0.03
	Republic of Uzbekistan	2.74	2.69	98.2	-0.05
5	Emergency and environmental releases to canals within lower reaches	0.80	0.86	108	0.06
	of which:				
	Turkmenistan	0.150	0.191	127	0.04
	Republic of Uzbekistan	0.650	0.671	103.2	0.02
6	Water supply to the Aral Sea and the Priaralie	2.1	0.99	46.9	-1.12

Table 2.2

The Amudarya River channel water balance for the non-growing season 2014-215

#	Balance item	Water volume, km^3		Deviation (actual-plan)
		Forecast/Plan	Actual	
1	Water content of the Amudarya river - non-regulated flow at the Atamyrat GS *	10.58	14.07	3.49
2	Flow regulation in the Nurek reservoir: accumulation (+) or diversion (-)	4.44	3.77	-0.67
3	Water diversion in the midstream (-)	-8.34	-8.28	0.06
4	Midstream return CDF (+)	1.03	1.22	0.19
5	Water losses (-) or unrecorded inflow to the channel (+)	-0.85	-3.24	-2.39
	% of the regulated flow	6	18	12.51
6	Inflow to the TMHS (Bir-Ata GS)	6.85	7.53	0.68
7	Flow regulation in the TMHS reservoirs: accumulation (+) or diversion (-)	0.06	0.17	0.11
8	Losses (-) in the TMHS reservoirs, lateral inflow (+)	-0.8	0.0	0.84
	% of inflow	12	0	-12.3
9	Releases from TMHS (including water diversion from the reservoir)	6.9	7.70	0.79
10	Downstream water diversion, including diversion from TMHS (-)	-4.13	-4.12	0.02
11	Downstream return CDF (+)	0.00	0.00	0.00
12	Emergency and environmental water releases to canals (-)	-0.80	-0.86	-0.06
13	Runoff losses (-) or unrecorded inflow to the channel (+)	-9.7	-1.73	8.01
	% of the flow at the section of the Tuyamuyun gauging station	206	31	-174.47
14	Water supply to the Priaralie and the Aral Sea	2.10	0.99	-1.12
	TOTAL losses:	-11.44	-4.97	6.46
	% of the regulated flow	76	28	-48.26

* Minus upstream water diversions (Tajikistan and Surkhandarya province)

Table 2.3

Water balance of the Amudarya River Basin's reservoirs for the non-growing season 2014-2015

#	Balance item	Water volume, km^3		Deviation (actual-plan)
		Forecast/Plan	Actual	
1	**Nurek reservoir**			
1.1	Inflow to the reservoir	3.85	3.82	-0.03
1.2	Water volume in the reservoir:			
	- beginning of the season (October 1, 2013)	10.56	10.54	-0.02
	- end of the season (April 1, 2014)	6.12	6.78	0.65
1.3	Release from the reservoir	8.28	7.59	-0.70
1.4	Lateral inflow (+) or water losses (-)	0.00	0.00	0.00
	% of the inflow to the reservoir	0.00	0.09	0.09
1.5	Flow regulation: accumulation (+) or diversion (-)	4.44	3.77	-0.67
2.0	**TMHS reservoirs**			
2.1	Inflow to the TMHS	6.85	7.53	0.68
2.2	Water volume in the reservoirs:			
	- beginning of the season (October 1, 2013)	4.03	3.27	-0.77
	- end of the season (April 1, 2014)	3.13	3.10	-0.03
2.3	Release from the TMHS	6.91	7.70	0.79
	of which:			
	- release to the river	4.74	5.56	0.82
	- water diversion	2.17	2.14	-0.03
2.4	Unrecorded inflow (+) or water losses (-)	-0.84	0.00	0.84
	% of the inflow to the reservoir	12	0	-12.31
2.5	Flow regulation: accumulation (+) or diversion (-)	0.06	0.17	0.11
	Total flow regulation by the reservoirs: accumulation (+) or diversion (-)	4.50	3.94	-0.56
	Total losses (-), unrecorded inflow (+)	-0.84	0.00	0.85