

ANALYSIS OF WATER MANAGEMENT SITUATION WITHIN THE AMUDARYA AND SYRDARYA RIVER BASINS FOR VEGETATION PERIOD OF 2011

1 Syrdarya River Basin

The actual inflow to the upstream reservoirs of the Syrdarya River Basin (Toktogul, Andijan and Charvak without inflow from the Ugam river) for vegetation period was 16.99 km³ or 114% predicted inflow (the planned schedule of BWO "Syrdarya"). The upstream reservoirs took 3.82 km³ of the flow of Naryn, Karadarya and Chirchik rivers that less than the planned one by 0.14 km³. Owing to the increased inflow to the upstream reservoirs the actual release from them for vegetation period was 12.90 km³ that exceeds the planned one by 19%.

Before the beginning of vegetation period, 19.5 m³ of water was accumulated in the Toktogul reservoir owing to 4.14 m³ water withdrawn from the Naryn river, and the conditions for further over-year regulation have been created.

The total lateral inflow to Naryn and Syrdarya rivers (at the reach of the river before the Shardara reservoir) calculated by the balance method (data of BWO "Syrdarya") amounted 7.86 km³.

At the end of vegetation period 21.40 km³ of water or 99% of the planned one was accumulated in the upstream reservoirs including 1.18 km³ - in the Charvak reservoir and 0.67 km³ - in the Andijan reservoir.

The total water withdrawal from the Naryn and Syrdarya rivers up to the Shardara reservoir amounted 10.67 km³ including: to the Kyrgyz Republic - 0.18 km³; to the Republic of Tajikistan - 1.45 km³; to the Republic of Uzbekistan - 8.43 km³; to the Republic of Kazakhstan (through the Dustlik canal) - 0.61 km³.

The withdrawn water volume for vegetation period 2011 was less by 1.07 km³ (9%) than the planned limit in 2010. Water supply was unequal for the states as well for river sites (see Table 1.1, and also data on the website: www.cawater-info.net/analysis/water/).

Attention is needed to the fact that over the past 5 years (2006-2007 ... 2010-2011) the average annual inflow to the Toktogul reservoir amounted 13.5 km³, including 10.26 km³ for vegetation periods. The water inflow for vegetation period of 2011 amounted 9.9 km³ that less the average inflow over the past 5 years by 0.37 km³.

Over the past 5 years the average volume of releases from the Toktogul reservoir for vegetation period is estimated at 5.34 km³. During vegetation period of 2011 there was 5.71 km³ of released water, which is more than the scheduled release of BWO "Syrdarya" by 0.68 km³ (see Table 1.4).

According to our estimates, the releases from the Toktogul reservoir for vegetation period amounted 5.5...6.0 km³ in line with irrigation needs of the basin in the normal years and should allow (under stable operation of Naryn HPS cascade) to implement the stable water delivery to the canals in the Fergana Valley.

The obligations on water delivery to the Kairakkum reservoir was implemented on 135%; the water inflow to the reservoir amounted 6.78 km³ as compared with 5.0 km³ of the scheduled water inflow of BWO "Syrdarya".

Water availability of the middle stream of Syrdarya river depends on releases from the Kairakkum reservoir, which can limit water delivery into canals in the middle stream during even normal periods if it will operate under the power-producing mode. During vegetation period 2011 the lowest water availability, which was calculated using the limits of 2010, was observed in some ten-day periods in June-July 2011 (in Tajikistan - up to 70%; in Uzbekistan - up to 60%, in Kazakhstan - up to 30%).

The total release from the Kairakkum reservoir for vegetation period 2011 amounted 8.26 km³ including the release into the river amounted 7.87 km³.

Monthly the release from the Kairakkum reservoir was more than the scheduled one of BWO "Syrdarya"; and the total release for vegetation period amounted 3.3 km³! At the end of vegetation period the reservoir's water volume decreased to 1.5 km³. In spite of this, the total water availability of the river site "Kairakkum-Shardara" amounted 84%, what is 14% less than water availability of the Fergana Valley.

Water inflow to the Shardara reservoir amounted 2.73 km³ or 19% less than the scheduled one of BWO "Syrdarya". It is result of decreasing the lateral inflow and release in the Chirchik river as compared to the scheduled one. Water losses at the river section "Kairakkum-Shardara" was discovered on the basis of the water balance method; it amounted 1.2 km³ when the lateral inflow was 1.4 km³.

Water release from the Shardara reservoir amounted 6.35 km³ including 5.62 km³ into the river.

Analysis of reservoirs' water balances (Table 1.3) has revealed the nonregistered inflow to the Andijan reservoir amounted 0.02 km³. The total water losses of the Toktogul, Charvak, Kairakkum and Shardara reservoirs amounted 1.0 km³.

According to Kazhydromet (g/s Karateren) water delivery to the Aral Sea and Priaralie amounted 1.57 km³ what less than the scheduled one of BWO "Syrdarya" by 0.33 km³. Water volume used in the lower reaches (algebraic sum of withdrawal, lateral inflow, losses) amounted 4 km³.

Table 1.1

Water availability in the Syrdarya River basin countries for vegetation period 2011 r.

| 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 | 11,75 | 10,67 | 90,9 | 68,30 | -1,07 | -1,70 |
| 2. By countries: | | | | | | |
| Republic of Kyrgyzstan | 0,25 | 0,18 | 72 | 31,25 | -0,07 | -0,07 |
| Republic of Uzbekistan | 8,80 | 8,43 | 96 | 70,82 | -0,37 | -1,20 |
| Republic of Tajikistan | 1,90 | 1,45 | 76 | 22,67 | -0,45 | -0,47 |
| Republic of Kazakhstan | 0,79 | 0,61 | 77 | 23,00 | -0,19 | -0,24 |
| 3. By river reaches | | | | | | |
| 3.1 Toktogul reservoir – Uchkurgan | 3,95 | 3,95 | 100,0 | 78,74 | 0,00 | -0,30 |

| 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 (***) |
| hydroscheme | | | | | | |
| <i>of which:</i> | | | | | | |
| <i>Republic of Kyrgyzstan</i> | 0,16 | 0,13 | 81 | 38,89 | -0,03 | -0,04 |
| <i>Republic of Tajikistan</i> | 0,24 | 0,10 | 42 | 26,56 | -0,14 | -0,14 |
| <i>Republic of Uzbekistan</i> | 3,55 | 3,72 | 105 | 79,73 | 0,17 | -0,23 |
| 3.2 Uchkurgan hydroscheme – Kayrakkum hydroscheme | 1,08 | 1,06 | 98,7 | 75,51 | -0,01 | -0,08 |
| <i>of which:</i> | | | | | | |
| <i>Republic of Kyrgyzstan</i> | 0,08 | 0,05 | 62 | 13,57 | -0,04 | -0,04 |
| <i>Republic of Tajikistan</i> | 0,45 | 0,52 | 115 | 21,17 | 0,07 | -0,03 |
| <i>Republic of Uzbekistan</i> | 0,54 | 0,50 | 92 | 71,63 | -0,05 | -0,06 |
| 3.3 Kayrakkum hydroscheme – Shardara reservoir | 6,72 | 5,66 | 84,2 | 56,97 | -1,06 | -1,37 |
| <i>of which:</i> | | | | | | |
| <i>Republic of Kazakhstan</i> | 0,79 | 0,61 | 77 | 23,00 | -0,19 | -0,24 |
| <i>Republic of Tajikistan</i> | 1,22 | 0,84 | 67 | 21,62 | -0,38 | -0,39 |
| <i>Republic of Uzbekistan</i> | 4,71 | 4,22 | 89 | 60,56 | -0,49 | -0,95 |
| 4. In addition: | | | | | | |
| Inflow to the Shardara reservoir | 3,36 | 2,73 | 81,3 | 22,6 | -0,63 | -1,69 |
| Discharge to Arnasai | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Water supply to the Aral Sea and Priaralie | 1,802 | 1,57 | 87,3 | 0,00 | -0,23 | 0,00 |

*) Limits for vegetation period 2010

**) 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 2011

| Items | Water volume, km ³ | | Deviation (actual-plan) |
|---|-------------------------------|--------|-------------------------|
| | expected/plan | actual | |
| 1 Inflow to the Toktogul reservoir | 9,2 | 9,9 | 0,7 |
| 2 Lateral inflow to the river reach Toktogul reservoir – Shardara reservoir (+) | 8,25 | 7,86 | -0,39 |
| <i>of which:</i> | | | |
| <i>Discharge along the Karadarya river</i> | 0,79 | 2,02 | 1,23 |
| <i>Discharge along the Chirchik river</i> | 0,58 | 0,38 | -0,20 |
| <i>Lateral inflow by CDF¹ and small rivers</i> | 6,88 | 5,46 | -1,42 |

¹ CDF-collector-drainage flow

| Items | Water volume, km ³ | | Deviation (actual- plan) |
|---|-------------------------------|--------|--------------------------------|
| | expected/plan | actual | |
| 3 Runoff regulation by reservoirs addition to runoff (+) or withdrawal (-) | -4,49 | -3,26 | 1,24 |
| <i>of which:</i> | | | |
| <i>Toktogul reservoir</i> | -4,16 | -4,17 | -0,02 |
| <i>Kayrakkum reservoir</i> | -0,34 | 0,92 | 1,25 |
| 4 Regulated runoff (1+2+3) | 12,94 | 14,49 | 1,54 |
| 5 Water withdrawal at the Toktogul – Shardara (-) site | -11,75 | -10,67 | 1,07 |
| 6 Runoff losses (-) or unaccounted inflow to the channel (+) at the Toktogul – Shardara site | -2,16 | 1,08 | 3,25 |
| <i>Including % of regulated runoff</i> | -16,7 | 7,5 | 24,18 |
| 7 Inflow to the Shardara reservoir | 3,36 | 2,73 | -0,63 |
| 8 Runoff regulation by the Shardara reservoir addition to runoff (+) or withdrawal (-) | 3,36 | 3,62 | 0,259 |
| 9 Water release from the Shardara reservoir to the river | 5,52 | 5,62 | 0,105 |
| 10 Diversion to Kyzylkum canal (-) | -1,21 | -0,73 | 0,473 |
| 11 Discharge to Arnasai (-) | 0,00 | 0,00 | 0,000 |
| 12 Amount of water used in the lower reaches: algebraic sum of withdrawal (-), lateral inflow (+), losses (-) | 3,71 | 4,05 | 0,334 |
| 13 Water supply to the Aral Sea and Priaralie | 1,80 | 1,57 | -0,229 |

Table 1.3

Water balance of the Surdarya River basin's reservoirs for vegetation period 2011

| Items | Water volume, km ³ | | Deviation (actual- plan) |
|--|-------------------------------|--------|--------------------------------|
| | expected/plan | actual | |
| 1. Toktogul reservoir | | | |
| 1.1 Inflow to the reservoir | 9,2 | 9,9 | 0,70 |
| 1.2 Water volume in the reservoir: | | | |
| - at the beginning of the season (April 1, 2010) | 15,398 | 15,398 | 0,00 |
| - at the end of the season (October 1, 2010) | 19,500 | 19,541 | 0,04 |
| 1.3 Release from the reservoir | 5,035 | 5,714 | 0,68 |
| 1.4 Unaccounted inflow (+) or water losses (-) | -0,05 | -0,03 | 0,02 |
| <i>% of inflow to the reservoir</i> | -0,01 | 0,00 | 0,00 |
| 1.5 Runoff regulation: addition to runoff (+) or withdrawal (-) | -4,102 | -4,143 | -0,04 |
| 2. Andijan reservoir | | | |
| 2.1 Inflow to the reservoir | 1,582 | 2,988 | 1,41 |
| 2.2 Water volume in the reservoir: | | | |
| - at the beginning of the season (April 1, 2010) | 1,427 | 1,427 | 0,00 |
| - at the end of the season (October 1, 2010) | 1,016 | 0,672 | -0,34 |
| 2.3 Release from the reservoir | 1,982 | 3,763 | 1,78 |

| Items | Water volume, km ³ | | Deviation (actual- plan) |
|---|-------------------------------|--------|--------------------------------|
| | expected/plan | actual | |
| 2.4 Unaccounted inflow (+) or water losses (-) | -0,01 | 0,02 | 0,03 |
| <i>% of inflow to the reservoir</i> | -0,01 | 0,01 | 0,01 |
| 2.5 Runoff regulation: addition to runoff (+) or withdrawal (-) | 0,411 | 0,755 | 0,34 |
| 3. Charvak reservoir | | | |
| 3.1 Inflow to the reservoir | 4,117 | 4,108 | -0,01 |
| 3.2 Water volume in the reservoir: | | | |
| - at the beginning of the season (April 1, 2010) | 0,747 | 0,747 | 0,00 |
| - at the end of the season (October 1, 2010) | 1,014 | 1,182 | 0,17 |
| 3.3 Release from the reservoir | 3,83 | 3,42 | -0,41 |
| 3.4 Unaccounted inflow (+) or water losses (-) | -0,02 | -0,25 | -0,23 |
| <i>% of inflow to the reservoir</i> | 0,00 | -0,06 | -0,06 |
| 3.5 Runoff regulation: addition to runoff (+) or withdrawal (-) | -0,267 | -0,435 | -0,17 |
| 4. Kayrakkum reservoir | | | |
| 4.1 Inflow to the reservoir | 5,005 | 6,782 | 1,78 |
| 4.2 Lateral inflow | 0,295 | 0,173 | -0,12 |
| 4.3 Water volume in the reservoir: | | | |
| - at the beginning of the season (April 1, 2010) | 3,33 | 3,33 | 0,00 |
| - at the end of the season (October 1, 2010) | 3,08 | 1,53 | -1,55 |
| 4.4 Release from the reservoir | 5,00 | 8,26 | 3,27 |
| of which: | | | |
| - release to the river | 4,51 | 7,87 | 3,36 |
| -water withdrawal from the reservoir | 0,48 | 0,39 | -0,09 |
| 4.5 Unaccounted inflow (+) or water losses (-) | -0,56 | -0,50 | 0,06 |
| <i>% of inflow to the reservoir</i> | -0,11 | -0,07 | 0,04 |
| 4.6 Runoff regulation: addition to runoff (+) or withdrawal (-) | 0,256 | 1,802 | 1,55 |
| 5. Shardara reservoir | | | |
| 5.1 Inflow to the reservoir | 3,361 | 2,734 | -0,63 |
| 5.2 Lateral inflow | - | - | - |
| 5.3 Water volume in the reservoir: | | | |
| - at the beginning of the season (April 1, 2010) | 4,973 | 4,973 | 0,00 |
| - at the end of the season (October 1, 2010) | 1,071 | 1,118 | 0,05 |
| 5.4 Release from the reservoir | 6,72 | 6,35 | -0,37 |
| of which: | | | |
| -discharge to Arnasai | 0,00 | 0,00 | 0,00 |
| - release to the river | 5,52 | 5,62 | 0,10 |
| - water withdrawal from the reservoir | 1,205 | 0,732 | -0,47 |
| 5.5 Unaccounted inflow (+) or water losses (-) | -0,54 | -0,24 | 0,31 |
| <i>% of inflow to the reservoir</i> | -0,16 | -0,09 | 0,08 |
| 5.6 Runoff regulation: addition to runoff (+) or withdrawal (-) | 3,902 | 3,855 | -0,05 |
| TOTAL runoff regulation: addition to runoff (+) or withdrawal (-) | 0,20 | 1,83 | 1,63 |
| TOTAL losses (-), unaccounted inflow (+) | 9,2 | 9,9 | 0,70 |

Table 1.4**Inflow to and release from the Toktogul reservoir for 2006-2011**

| n | Hydrologic year | Inflow, million m3 | | | Release, million m3 | | |
|---|------------------------|-----------------------------|-----------------------|-------|-----------------------------|-----------------------|-------|
| | | Nonveget ation period | Vegetatio n period | Year | Nonveget ation period | Vegetatio n period | Year |
| 1 | 2006-2007 | 3157 | 8911 | 12068 | 9538 | 5857 | 15395 |
| 2 | 2007-2008 | 2505 | 7371 | 9876 | 9726 | 4408 | 14134 |
| 3 | 2008-2009 | 2672 | 9876 | 12548 | 5884 | 5748 | 11632 |
| 4 | 2009-2010 | 3898 | 15244 | 19142 | 6965 | 5445 | 12410 |
| 5 | 2010-2011 | 3896 | 9888 | 13783 | 8000 | 5714 | 13714 |
| | Average for 5 years | 3226 | 10258 | 13483 | 8023 | 5434 | 13457 |

2 Amudarya River Basin

The actual water content of the Amudarya river at the Atamyrat conditional G/S (upstream to the water intake into Garagumdarya) amounted 32.3 km³ or less the expected one (according to the BWO "Amudarya" schedule) by 2.3 km³ and less the normal one by 30% (Table 2.2). At the same time water inflow to the Nurek HPS was more by 4.3 km³ than the predicted one! Therefore the release from the reservoir amounted 12.4 km³ or more than the planned one by 3.6 km³.

In the existing water management situation only 7.06% of water withdrawal limit for the canals in the Amu Darya River Basin was used; the total water withdrawal amounted 27.9 km³, including 28.72 km³ down the Atamyrat GS (starting from the water intake into Garagumdarya). Water supplying was unequal for the states and river sites (see Table 2.1, and also data on the website: www.cawater-info.net/analysis/water/).

At the end of season the Nurek reservoir accumulated 10.54 km³ of water, but the TMHS reservoir's water volume was decreased up to 2.36 km³ (Table 2.3). The total river water withdrawal for filling in the Nurek and Tuyamuyun reservoirs amounted 6.57 km³.

Water losses assessed by water balance method (by using the CAREWIB river channel balance model) for the river section "G/S Atamyrat (conditional) – TMHS" amounted 4.2 km³ or 13% of flow at G/S Atamyrat (conditional). Water losses for the river section "TMHS - up to boundary of water delivery to the Aral Sea and Priaralie" amounted 4.3 km³ or 35% of inflow to TMHS.

There are no water losses in the Nurek reservoir; but they amounted 2.84 km³ in the Tyuyamuyun reservoirs.

As a whole the water losses in the Amudarya river basin amounted 8.5 km³ or 26% of water content (Atamyrat G/S) or less by 3.1 km³ (10%) than the calculated (planned by the BWO "Amudarya") ones. At the beginning of nonvegetation period 2011-2012 the water situation is very complex: only the Nurek reservoir has the optimal water volume, the usable storage of the TMHS reservoirs is very low and amounted 0.1-0.2 km³. The usable storage of the intersystem reservoirs (Talimardjan, Tudakul, Kuyumazar) amounted 0.53 km³ at the beginning of nonvegetation period; the usable storage of these reservoirs could be increased by 0.7-1.5 km³ during the high-water years.

The needed water volume wasn't delivered to the lakes in the Priaralie because of low water content and water losses (water availability 20-25%).

The flow at the Samanbay G/S amounted 0.207 km³; if considering water release of the collector and drainage network, the Aral Sea and Priaralie received 0.523 km³ of water.

Table 2.1

Water availability in the Amudarya River basin countries for vegetation period 2011

| Water user | Water volume, km ³ | | Water availability, % | | Deficit (-), surplus (+) km ³ | |
|--|-------------------------------|--------|-----------------------|-----------------------------|--|--------------------------------|
| | limit/ schedule **** | actual | season | Min ten-day period *) | season | Total ten-day period **) |
| 1. Total water withdrawal | 39,54 | 27,90 | 70,6 | 59,0 | -11,64 | -11,75 |
| 2. By countries: | | | | | | |
| Republic of Kyrgyzstan | - | - | - | - | - | - |
| Republic of Tajikistan | 6,82 | 6,08 | 89,2 | 55,7 | -0,74 | -0,80 |
| Turkmenistan | 15,50 | 10,55 | 68,1 | 52,7 | -4,95 | -4,95 |
| Republic of Uzbekistan | 17,22 | 11,27 | 65,4 | 47,3 | -5,95 | -6,16 |
| 3. Downstream from g/s Atamyrat ***) | 31,52 | 20,96 | 66,5 | 53,3 | -10,56 | -10,66 |
| <i>of which:</i> | | | | | | |
| <i>Turkmenistan</i> | 15,50 | 10,55 | 68,1 | 71,9 | -4,95 | -4,95 |
| <i>Republic of Uzbekistan</i> | 16,02 | 10,41 | 65,0 | 46,0 | -5,61 | -5,80 |
| 4. By river reaches: | | | | | | |
| Upstream | 8,02 | 6,94 | 86,5 | 60,9 | -1,08 | -1,11 |
| <i>of which:</i> | | | | | | |
| <i>Republic of Kyrgyzstan</i> | - | - | - | - | - | - |
| <i>Republic of Tajikistan</i> | 6,82 | 6,08 | 89,2 | 55,7 | -0,74 | -0,80 |
| <i>Surkhandarya, Uzbekistan</i> | 1,20 | 0,86 | 71,7 | 60,0 | -0,34 | -0,36 |
| Middle reach | 16,21 | 12,94 | 79,9 | 60,3 | -3,26 | -3,26 |
| <i>of which:</i> | | | | | | |
| <i>Turkmenistan</i> | 10,47 | 7,81 | 74,6 | 55,0 | -2,66 | -2,66 |
| <i>Republic of Uzbekistan</i> | 5,74 | 5,13 | 89,4 | 67,9 | -0,61 | -0,73 |
| Downstream | 15,31 | 8,02 | 52,4 | 27,4 | -7,30 | -7,52 |
| <i>of which:</i> | | | | | | |
| <i>Turkmenistan</i> | 5,03 | 2,74 | 54,5 | 32,2 | -2,29 | -2,33 |
| <i>Republic of Uzbekistan</i> | 10,29 | 5,28 | 51,3 | 22,6 | -5,01 | -5,20 |
| 5. In addition: | | | | | | |
| Emergency-environmental releases to downstream canals | 0,0 | 0,0 | | | | |
| <i>of which:</i> | | | | | | |
| <i>Turkmenistan</i> | 0,0 | 0,0 | | | | |
| <i>Republic of Uzbekistan</i> | 0,0 | 0,0 | | | | |
| Water supply to the Aral Sea and Priaralie (without CDF) | 2,10 | 0,52 | 24,9 | | | |

*) 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

****) Limits are agreed but not adopted by ICWC

Table 2.2

The Amudarya River channel water balance for vegetation period 2011

| 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) | 34,68 | 32,33 | -2,35 |
| 2 Runoff regulation by the Nurek reservoir: addition to runoff (+) or withdrawal (-) | -3,85 | -4,54 | -0,69 |
| 3 Water withdrawal in the middle reach (-) | -13,7 | -12,94 | 0,76 |
| 4 Return CDF in the middle reach (+) | 1,37 | 1,44 | 0,07 |
| 5 Runoff losses (-) or unaccounted inflow to the channel (+) | -1.14 | -4,20 | -3,06 |
| <i>% of runoff in the section of g/s Atamyrat (tentative)</i> | -3 | -13,0 | -10,0 |
| 6 Inflow to the Tuyamuyun hydroscheme (TMHS) | 17,36 | 12,09 | -5,27 |
| 7 Runoff regulation by TMHS reservoirs: addition to runoff (+) or withdrawal (-) | -0,15 | -0,80 | -0,65 |
| 8 Losses in TMHS reservoirs (-), lateral inflow (+) | -2,98 | -2,84 | 0,14 |
| <i>% of inflow</i> | -17 | -23 | -6,0 |
| 9 Releases from TMHS (including water withdrawal from reservoir) | 14.53 | 10.02 | 4,51 |
| 10 Downstream water withdrawal, including withdrawal from the TMHS (-) | -13,02 | -8,02 | -5,0 |
| 11 Return CDF in the lower reach (+) | 0,00 | 0,00 | 0,00 |
| 12. Sanitary-environmental water releases into downstream canals (-) | 0,00 | 0,00 | 0,00 |
| 13 Runoff losses (-) or unaccounted inflow to the channel (+) | -1,31 | -1,48 | -0,17 |
| <i>% of runoff in the section of g/s Tuyamuyun</i> | -13 | -21 | -8,0 |
| 14 Water supply to the Aral Sea and Priaralie (without CDF) | 0.2 | 0,52 | +0,32 |
| TOTAL losses: | -5.43 | -8,52 | -3,09 |
| <i>% of water content of the river</i> | -16 | -26 | -10,0 |

* after deduction of the upstream water withdrawal (Tajikistan, Surkhandarya province)

Table 2.3

Water balance of the Amudarya River basin's reservoirs for vegetation period 2011

| Items | Water volume, km ³ | | Deviation (actual-plan) |
|---|-------------------------------|--------|----------------------------|
| | expected/plan | actual | |
| 1. Nurek reservoir | | | |
| 1.1 Inflow to the reservoir | 12,65 | 16,97 | 4,32 |
| 1.2 Water volume in the reservoir: | | | |
| - at the beginning of the season (April 1, 2011) | 6,00 | 6,00 | 0,00 |
| - at the end of the season (October 1, 2011) | 9,85 | 10,54 | 0,69 |
| 1.3 Release from the reservoir | 8,80 | 12,44 | 3,64 |
| 1.4 Lateral inflow (+) or water losses (-) | 0,00 | 0,00 | 0,00 |
| <i>% of inflow to the reservoir</i> | 0,00 | 0,00 | 0,00 |
| 1.5 Runoff regulation: addition to runoff (+) or withdrawal (-) | -3,85 | -4,53 | -0,68 |
| 2. TMHS reservoirs | | | |
| 2.1 Inflow to the hydroscheme | 17,36 | 12,09 | 5,27 |
| 2.2 Water volume in the reservoirs: | | | |
| - at the beginning of the season (April 1, 2011) | 3,16 | 3,16 | 0,00 |
| - at the end of the season (October 1, 2011) | 3,01 | 2,36 | 0,65 |
| 2.3 Release from the hydroscheme | 14,53 | 10,05 | -4,48 |
| of which: | | | |
| - release to the river | 9,86 | 6,97 | -2,89 |
| - water withdrawal | 4,67 | 3,08 | 1,59 |
| 2.4 Lateral inflow (+) or water losses (-) | -2,98 | -2,84 | 0,14 |
| <i>% of inflow to the reservoir</i> | -17 | -23 | -6 |
| 2.5 Runoff regulation: addition to runoff (+) or withdrawal (-) | -2,83 | -2,04 | 0,79 |
| TOTAL runoff regulation by reservoirs: addition to runoff (+) or withdrawal (-) | -6,68 | -6,57 | -0,11 |
| TOTAL losses (-), unaccounted inflow (+) | -2,9 | -2,84 | -0,06 |