

Analysis of possible scenarios of inflow to the Toktogul and Andijan reservoirs for the vegetation period in 2011

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Analysis of water content of the Naryn and Karadarya rivers by using the inflow into the Toktogul and Andijan reservoirs is implemented for the analog-years (two-year periods) closely similar to the actual situation in the period 01.10.2009 - 01.04.1911, see the layout scheme.

2009			2010												2011								
X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I	II	III	forecast					
																		IV	V	VI	VII	VIII	IX

The analog-years were selected to match with the actual (observed) hydrological and meteorological characteristics. Selection was done from the CAREWIB database using the computer program (analytical tool).

The table below shows the results of calculations of runoff hydrographs of the Naryn and Karadarya rivers and analysis by criteria.

Criterion 1 - the minimum deviation of water volume for the analog period in comparing to the basic one,

Criterion 2 - the minimum deviation of the curve's shape for the analog period in comparing to the basic one.

The basic period: 01.10.2009-01.04.2011

Results of Analysis

Naryn river

The analog-years closest to the actual situation observed during the period 01.10.09-01.04.11 are as follows: 1920 – 1922, 1951 – 1953, 1968 – 1970, 2001 – 2003.

The expected water content of the river for the vegetation period of 2011 by using the selected analog-years, is ranged from 1.10 km³ (106% of the rate) to 12.2 km³ (128% of the rate), with an average of 1.11 km³ (102% of the rate), see Tables 1 and 3).

Karadarya river

The analog-years closest to the actual situation observed during the period 01.10.09-01.04.11 are as follows: 1920 – 1922, 1935 – 1937, 1968 – 1970, 1987 – 1989.

The expected water content of the river for the vegetation period of 2011 by using the selected analog-years, is ranged from 1.80 km³ (59% of the rate) to 3.65 km³ (120% of the rate), with an average of 2.72 km³ (90% of the rate), see Tables 4 and 5).

Table 1

The Naryn river's runoff hydrograph defined by the analog years (per 2 years) and its assessing by criterions

Years	Runoff volume, mln.m ³	criterion 1		criterion 2	
		mln.m ³	%	mln.m ³	%
1920-1922	23781	-719	-3,1	5178	22,5
1951-1953	19517	3545	15,4	4516	19,6
1968-1970	21380	1682	7,3	3884	16,8
2001-2003	20514	2548	11,0	2729	11,8
2009-2011	23062				

Table 2

The analog years defined by precipitation total (M/S Naryn)

Years	Precipitation, mm	criterion 1		criterion 2	
		mm	%	mm	%
1951-1953	477	272	36	491	65
1968-1970	620	128	17	410	55
2009-2011	748				

Table 3

Calculation of runoff hydrograph of the Naryn river at its confluence with the Toktogul reservoir for vegetation period of 2011, using the defined analog years, mln. m³

	IV	V	VI	VII	VIII	IX	Sum	Flow rate	%
1920-1922	578	1417	2501	2488	1995	1128	10107	9494	106
1951-1953	640	2459	3219	2534	1543	938	11333	9494	119
1968-1970	949	2036	2867	2536	1875	1135	11398	9494	120
2001-2003	823	2131	3603	2821	1638	1164	12179	9494	128
Min	578	1417	2501	2488	1995	1128	10107	9494	106
Max	823	2131	3603	2821	1638	1164	12179	9494	128

Table 4**The Karadarya river's runoff hydrograph defined by the analog years and its assessing by criterions**

Years	Runoff volume, mln.m ³	criterion 1		criterion 2	
		mln.m ³	%	mln.m ³	%
1920-1922	9448	-677	-7,7	2646	30,2
1935-1937	7453	1318	15,0	1779	20,3
1968-1970	7627	1144	13,0	1297	14,8
1987-1989	7723	1049	12,0	2353	26,8
2009-2011	8771				

Table 5**Calculation of runoff hydrograph of the Karadarya river at its confluence with the Andijan reservoir for vegetation period of 2011, using the defined analog years, mln. m³**

	IV	V	VI	VII	VIII	IX	Sum	Flow rate	%
1920-1922	337	661	816	753	651	360	3578	3035	118
1935-1937	290	763	967	616	340	216	3192	3035	105
1968-1970	516	846	855	645	490	295	3648	3035	120
1987-1989	171	482	490	378	136	139	1796	3035	59
Min	171	482	490	378	136	139	1796	3035	59
Max	516	846	855	645	490	295	3648	3035	120