Aral Sea Basin Transboundary Water Early Warning Bulletin

March - April 2020

UNRCCA

A need for production and periodic and timely issue of the Bulletin as an information product for timely collection and dissemination of information on water-related, environmental, and climatic situation in the Aral Sea basin with the purpose to prevent problems or disputes arising was addressed during a seminar on "Early Warning on Potential Transboundary Water Problem Situations in Central Asia", which was held in the city of Almaty on 26th of September 2011. The states in the Aral Sea basin have expressed their support for such initiative in discussions with the UN Regional Centre for Preventive Diplomacy for Central Asia. The Central Asian states have repeatedly shown their interest in enhancing the regional capacities for early warning and preparedness to potential hazards.

The Bulletin is a resource, which provides all the Central Asian states and their international partners with improved capacity to monitor regularly the status of transboundary rivers and warn early of potential issues that require attention.

Four early warning bulletins will be issued as part of the Project in 2020. The format and content of the bulletins have been agreed with the client and with all organizations that provided source information. The second bulletin in 2020 contains the actual information on the Syr Darya and Amu Darya basins for March and the forecast for April.

Data sources:

- BWO Amu Darya and BWO Syr Darya – data on water resources, their distribution in time (day) and by river reach, operation regimes of reservoirs, inflow (planned versus actual) to the Aral Sea,
- CDC "Energy" – data on operation regimes of hydroelectric power stations (HEPS), electricity generation (planned, actual),
- Aral-Syrdarya BWA – data on lower reaches of the Syr Darya River (components of the water balance from the tail-water of the Shardara reservoir to the Northern Aral Sea),
- Open Internet sources - climatic information.

Digest of CA news for March

Source: cawater-info.net/news/index.htm

©	EU launches seven grant projects to support green economy in Central Asia uzdaily.uz
©	Serikkali Brekeshev appointed Vice-Minister of Ecology, Geology and Natural Resources of the Republic of Kazakhstan lenta.inform.kz
©	Productivity of Shardara hydropower plant improved lenta.inform.kz
©	Kazakh experts developed new flood forecasting technique lenta.inform.kz
©	Kazakhstan allocates 638 M for climate change caspiannews.com
©	The road bypassing Roghun hydropower plant will cost $380 M for Tajikistan dialog.tj
©	WB requires increasing electricity tariffs in exchange for $134 M rus.ozodi.org
©	Water fluctuations in the Tajik Sea have caused flooding dialog.tj
©	ADB will inspect its projects in Tajikistan kabar.kg
©	A meeting on environment and climate change held at the Foreign Ministry of Turkmenistan turkmenportal.com
©	14th of March – the World Rivers Day calend.ru
©	Implementation of the initiative "Decade of actions to achieve the UN Sustainable Development Goals until 2030" starts in Uzbekistan uzdaily.uz
©	WMO warns about hazardous effects of global warming news.un.org
©	Kazakhstan will enter agreements with its neighbors on shared rivers ritmeurasia.org
©	D. Nazarbaeva discussed the issue of efficient water use between Kazakhstan and Kyrgyzstan caravan.kz
©	Turkmenistan pushes forward the UN's water diplomacy initiative sng.today
©	Historical event: Uzbekistan scraps cotton state-order system – what are the implications uznews.uz
©	"Green Aral Sea" Initiative launched gazeta.uz
©	Leading scholars offered 76 ways to slow down climate change propozitsiya.com
©	Uzbekistan and Tajikistan will build two hydropower plants in the Zaravshan River basin podrobno.uz
©	They laughed at my idea, and they shouldn't! How a Kyrgyz man created the artificial glacier ru.sputnik.kg
©	Tajikistan cuts in half energy supplies to its neighbors kabar.kg
©	Turkmenistan boosts cooperation with the United Nations in sustainable development turkmenistan.gov.tm
©	A glass of water to the desiccating Aral Sea vesti.uz
©	FAO-GEF project continues in the CA region dknews.kz
©	How natural resources can contribute to peace in Afghanistan newsecuritybeat.org
©	Smart meters are to be installed at Toktogul, Kambar-Ata, and At-Bashi hydropower plants and thermal power plants in Bishkek and Osh tazabek.kg
©	Turkmenistan joined a number of international environmental instruments turkmenistan.gov.tm

Amu Darya River Basin

Actual Situation in March and Forecast for April

In March, the available usable river water resources estimated as natural, non-regulated river flow plus lateral inflow into the river and minus losses amounted to 2,959 Mm^3 (36% more than February's flow). The regulated flow of the Amu Darya in the section upstream of intake to Garagumdarya is estimated at 3,276 Mm^3. It is expected that in April the flow of the Amu Darya River in the section upstream of intake to Garagumdarya will be 4,519 Mm^3, i.e. will increase by 38%.

Inflow to the Nurek reservoir was 729 million m^3 in March or 126% of the forecast. Water releases from the reservoir amounted to 1,262 million m^3 (94% of planned releases). The reservoir was drawn down by 635 Mm^3 and reached the volume of 6,129 million m^3 by the end of month. Water losses in the reservoir (estimated as balance discrepancy) amounted to approx. 3% of water volume in the reservoir. It is expected that in April 1,210 million m^3 of water will flow into the Nurek reservoir. The water volume in the reservoir will increase slightly to 6,172 million m^3, and water releases from the reservoir will be 1,166 million m^3.

In March, inflow to Tuyamuyun waterworks facility (TMWF) was 1,195 million m^3 or 87% of expected volume. The water volume in the reservoirs decreased from 4,117 million m^3 at the beginning of month to 2,801 million m^3 at the end of month. Water releases from the reservoirs amounted to 1,530 Mm^3 – 117% of those scheduled by BWO Amu Darya. Water diversion from the reservoirs amounted to 833 million m^3 (97% of the plan). Water losses in the reservoirs of TMWF (calculated as water balance discrepancy) are estimated at 202 Mm^3, i.e. about 7% of water volume in the reservoirs by the end of March. Inflow to TMWF is expected to be 1,776 million m^3 in April. TMWF reservoirs will accumulate water and their volume will be 3,058 Mm^3 by the end of month. Water releases from the reservoirs are planned in the amount of 976 million m^3.

Nurek HEPS generated 597 million kWh of electric energy in March. The discharge through turbines was 471 m^3/s, while the head was 215 m. Sterile spills were not observed. The head at Nurek HEPS decreased from 220 to 211 m in March.

In March, HEPS of the Tuyamuyun waterworks facility generated 21 million kWh; and, the head at HEPS was 20 m.

In March, water along the Amu Darya River was distributed unevenly: in middle reaches at Kelif g/s (section upstream of intake to Garagumdarya) – Birata g/s (inflow to TMWF) the water shortage amounted to 11% of the plan), and in lower reaches at Tuyamuyun g/s – Samanbay g/s no water shortage was observed. Water withdrawal was 1,734 Mm^3 in the first reach and 949 Mm^3 in the second reach. Water balances in the reaches showed negative discrepancies that can be attributed to water losses in March. Water losses amounted to 687 Mm^3 (21% of river flow at Kelif g/s) in the middle reaches and 444 Mm^3 (29% of river flow downstream of TMWF) in the lower reaches.

In March, flow of the Amu Darya River changed as follows by key gauging station: Kelif g/s – 3,276 Mm^3, Birata g/s (inflow to TMWF) – 1,195 Mm^3 (36% of flow at Kelif g/s), Tuyamuyun g/s (downstream of TMWF) – 1,530 Mm^3 (47%), and Samanbay g/s (inflow to the Large Aral Sea) - 137 Mm^3 (4% of flow at Kelif g/s).

In April, water withdrawal will be increased to 2,048 Mm^3 in the first reach and decreased to 596 Mm^3 in the second reach. River flow along the river will change as follows: Kelif g/s – 4,519 Mm^3, Birata g/s – 1,745 Mm^3, Tuyamuyun g/s – 976 Mm^3, and Samanbay g/s - 130 Mm^3.

In March, inflow to the Large Aral Sea from the Amu Darya basin (flow from the river and collecting drains (collectors)) amounted to 227 million m^3. 207 million m^3 were discharged from the Northern Aral Sea, and, thus, the cumulative inflow into the Eastern part of the Large Aral Sea was 434 million m^3.

In March, the water level in the Eastern part of the Large Aral Sea averaged about 28.2 м, the water surface area was 3.7 thousand km^2, and the water volume was 4.7 km^3. In the Western part, the water level was 21.8 m, the water surface area was 2.2 thousand km^2, and the water volume was 32.6 km^3. Evaporation from 1 km^2 of water surface of the Large Aral Sea was 0.041 Mm^3 in March.

It is expected that in April the total inflow to the Large Aral Sea will be 492 Mm^3, including 285 Mm^3 from the Amu Darya River and collectors and 207 Mm^3 as inflow from the Northern Sea. By the end of April, in the Eastern part of the Large Aral Sea the water level will be 28.2 m, the water surface area will be 3.75 thousand km^2, and the water volume will be 4.9 km^3. In the Western part of the Large Aral Sea the water level will be 21.76 m, the water surface area will be 2.23 thousand km^2, and the water volume will be 32.5 km^3. Evaporation from 1 km^2 of water surface of the Large Aral Sea will be 0.081 million m^3 in April.

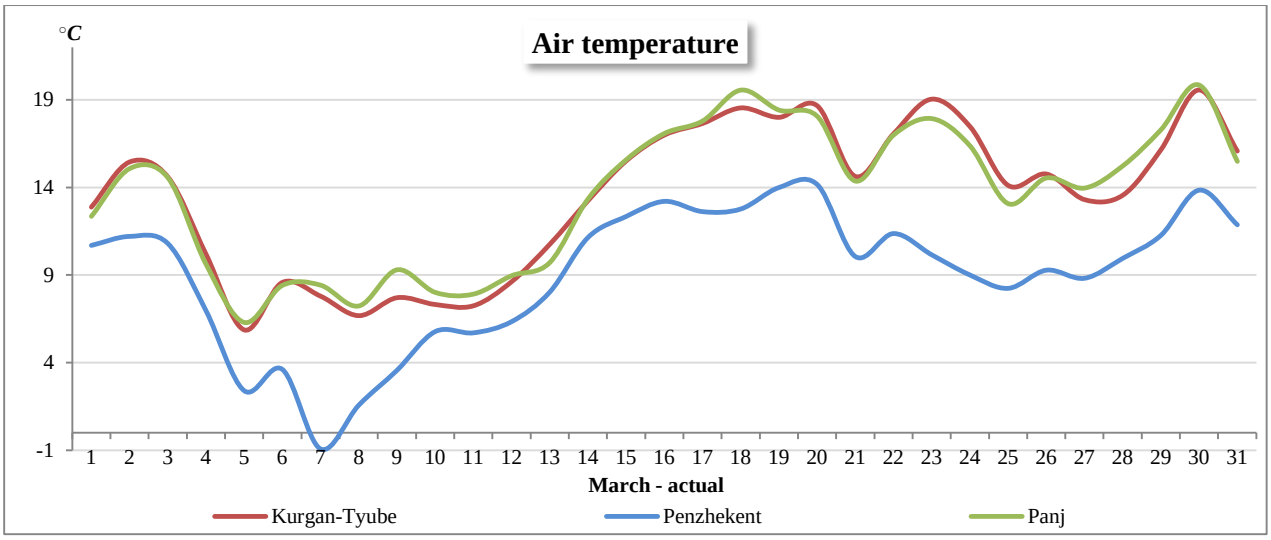
The sections below show daily and ten-day data on climate and water management (reservoirs, HEPS, water distribution).

Climate

Weather station Riverhead	Location		
	Latitude	Longitude	Altitude above sea level, m
Kurgan-Tyube	37.82	68.78	429
Penzhekent	39.48	67.63	1015
Panj	37.23	69.08	363

Air temperature (**T**)

Station	Parameter		March			April		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Panj	*T*, °C	*Forecast*	12.00	14.00	15.00	15.00	17.00	22.00
		Actual	9.93	14.64	15.91			
Kurgan-Tyube	*T*, °C	*Forecast*	12.00	14.00	16.00	15.00	17.00	22.00
		Actual	9.70	14.52	15.97			
Penzhekent	*T*, °C	*Forecast*	8.00	11.00	11.00	10.00	12.00	18.00
		Actual	5.56	11.03	10.35			

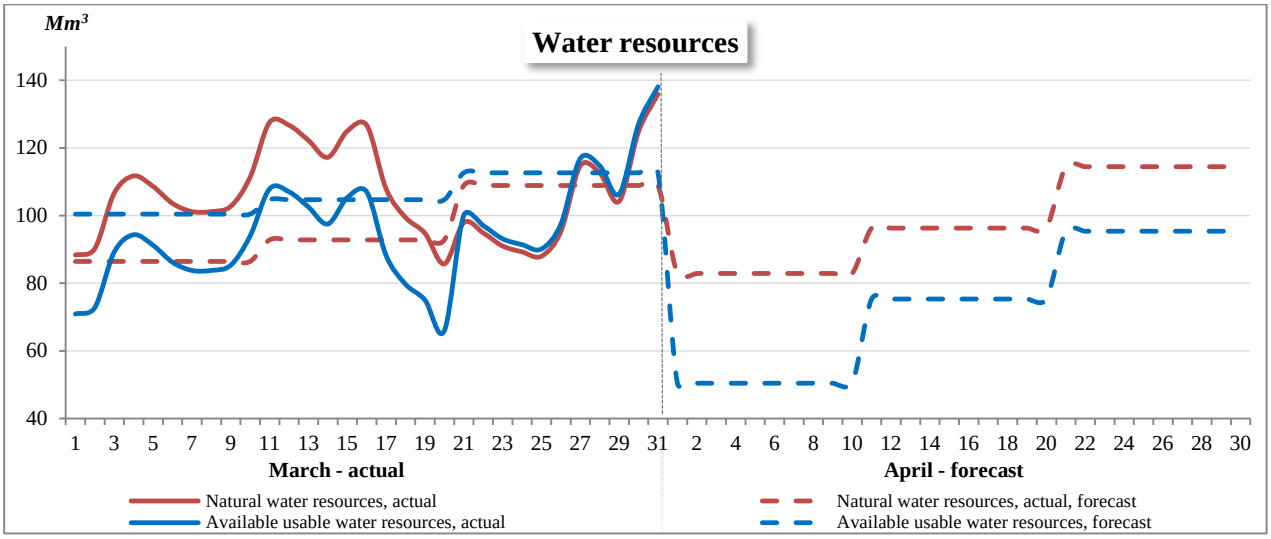


Water resources

Object
Amu Darya
Nurek reservoir
Atamyrat gauging station

Water volume (**W**)

Object	Parameter		March			April		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
River runoff: Atamyrat g/s	*W, Mm³*	*Forecast*	522.7	492.5	589.2	829.4	963.4	1144.8
		Actual	767.1	755.9	547			
Water withdrawal: upstream of Atamyrat g/s	*W, Mm³*	*Forecast*	631.7	708.2	808.5	764.4	837.6	953.3
		Actual	526	583	662			
Nurek reservoir /filling (+) or draw down (-)	*W, Mm³*	*Forecast*	-289	-272	-200	-43	26	60
		Actual	-267	-206	-60			
Natural water resources at Atamyrat g/s	*W, Mm³*	*Forecast*	865	929	1198	1551	1827	2159
		Actual	1025	1133	1148			
Lateral inflow: downstream of Atamyrat g/s	*W, Mm³*	*Forecast*	93	90	96	91	91	91
		Actual	114	111	114			
Open channel losses: downstream of Atamyrat g/s	*W, Mm³*	*Forecast*	-46	-29	55	416	301	282
		Actual	288	308	91			
Available usable water resources	*W, Mm³*	*Forecast*	1004	1047	1239	1226	1617	1968
		Actual	851	936	1172			

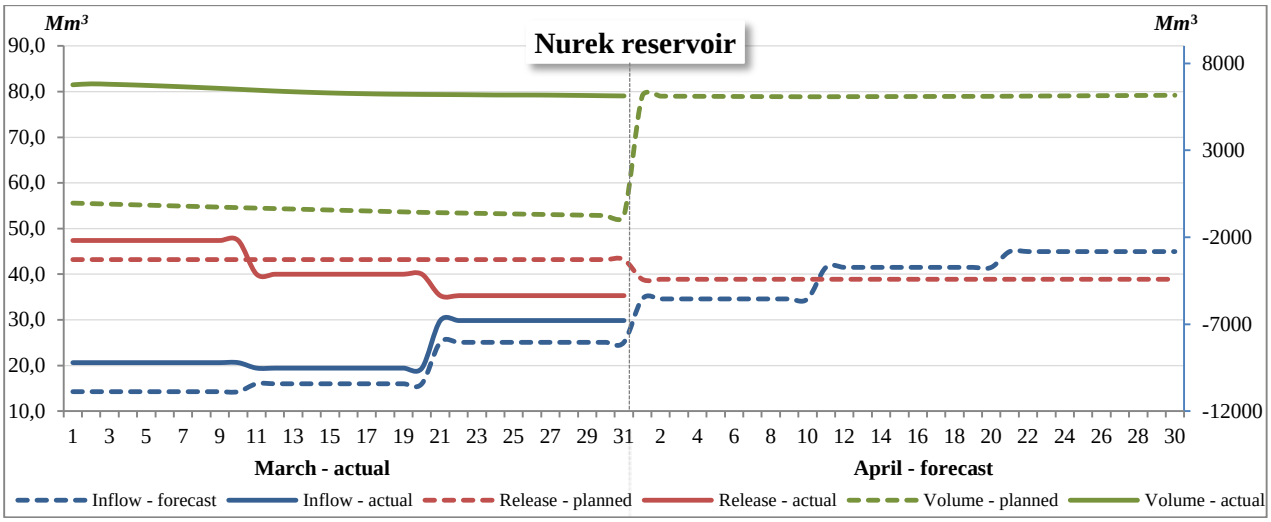


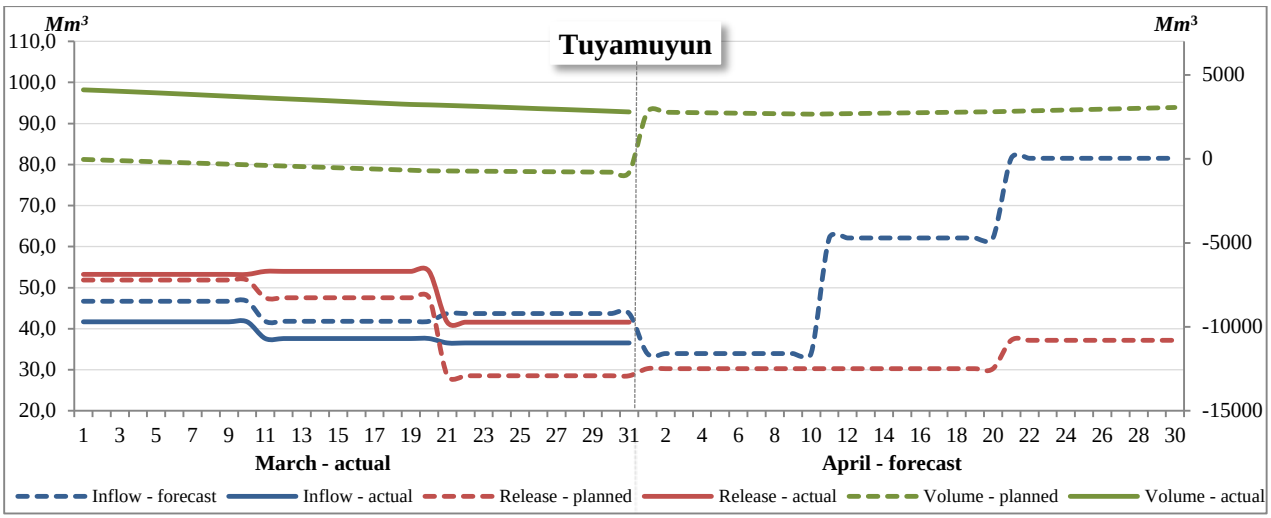
Reservoirs and HEPS

Reservoir	Location			Characteristics				
	Latitude	Longitude	Altitude above sea level, m	Length, km	Width, km	Water-surface area, km²	Full volume, km³	Full reservoir level, m
Nurek	38.40	69.47	864	70	1	98	10.50	910
Tuyamuyun	41.03	61.73	130	55	20	670	6.86	130

Inflow (**I**), Releases (**R**), Volume (**W**)

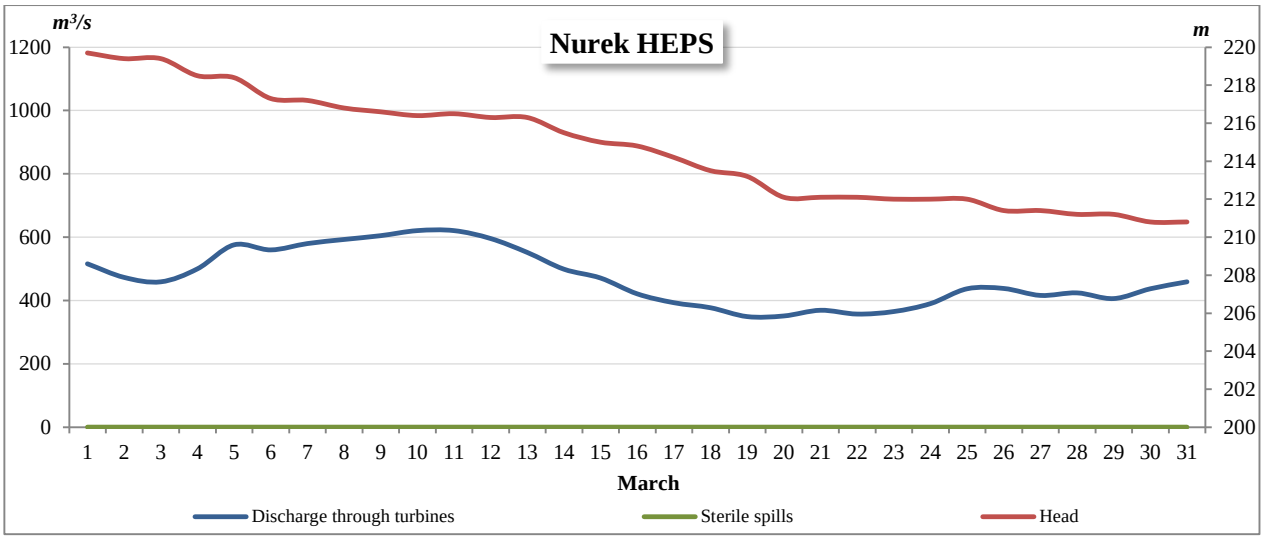
Reservoir	Parameter		March			April		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Nurek reservoir	*I, Mm³*	*Forecast*	142.6	159.8	275.6	345.6	414.7	449.3
		Actual	206.2	194.2	328.6			
	R, Mm³	*Planned*	432.0	432.0	475.2	388.8	388.8	388.8
		Actual	473.7	400.0	388.6			
	W, Mm³	*Planned*	6581	6308	6109	6086	6112	6172
		Actual	6508	6215	6129			
Reservoirs of Tuyamuyun waterworks facility	*I, Mm³*	*Forecast*	467.1	418.3	480.9	339.7	621.2	815.3
		Actual	416.6	376.2	402.1			
	R, Mm³	*Planned*	518.4	475.2	313.6	302.4	302.4	371.5
		Actual	532.6	539.9	457.6			
	W, Mm³	*Planned*	3817	3458	3369	2662	2805	3058
		Actual	3686	3222	2801			

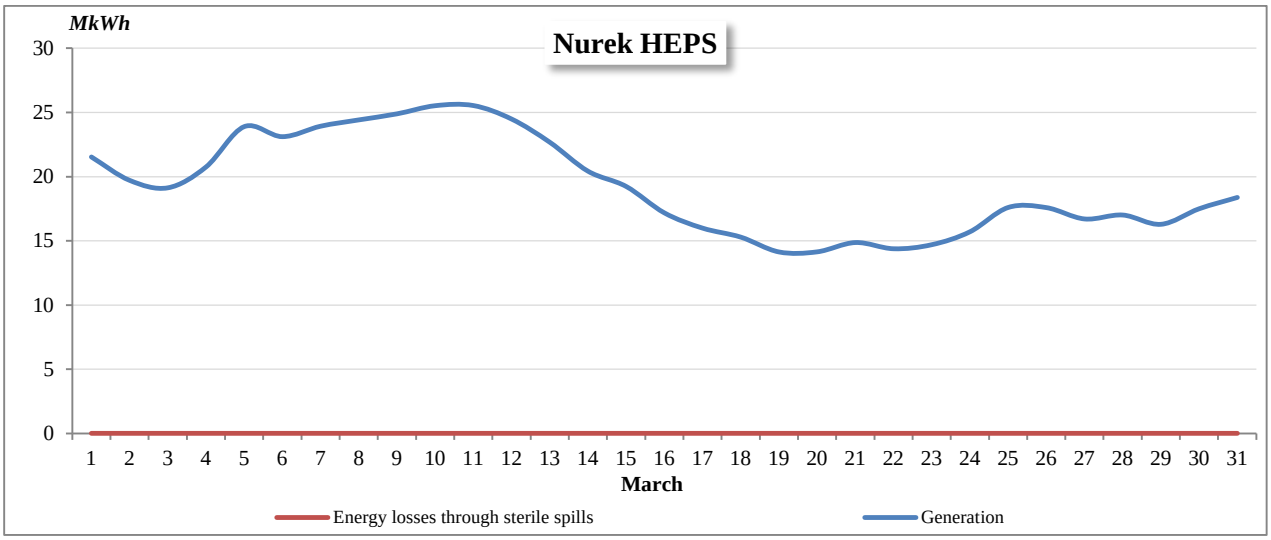


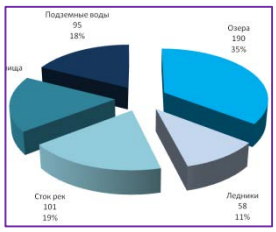


Generation (**G**), Energy losses through sterile spills (**L**), Discharge through turbines (**Q**), Sterile spills (**R**), Head (**H**)

HEPS	Parameter		March		
			I ten-day	*II ten-day*	*III ten-day*
Nurek	*G, M kWh*	*Actual*	226.96	189.15	180.77
	L, M kWh	*Actual*	0.00	0.00	0.00
	Q, m³/s	*Actual*	548.30	463.00	408.90
	R, m³/s	*Actual*	0.00	0.00	0.00
	H, m	*Actual*	217.97	214.74	211.50







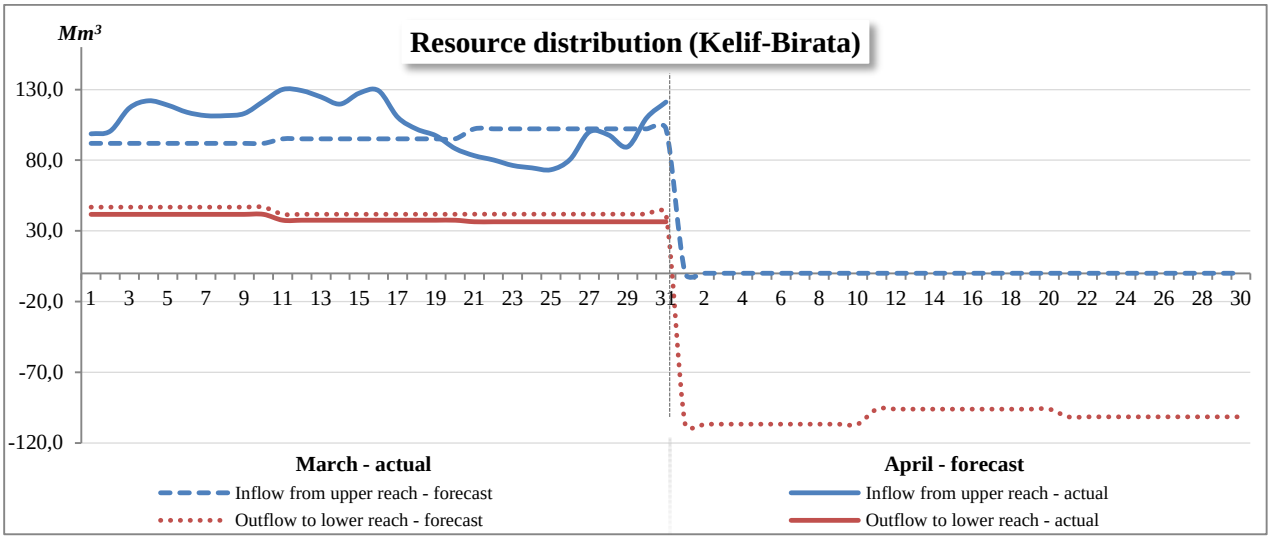
Water distribution

River reaches
Kelif gauging station (upstream of intake to Garagumdarya) – Birata gauging station (Darganata)
Tuyamuyun gauging station (tail water of Tuyamuyun waterworks facility) – Samanbay settlement
Large Aral Sea

Water volume (W)

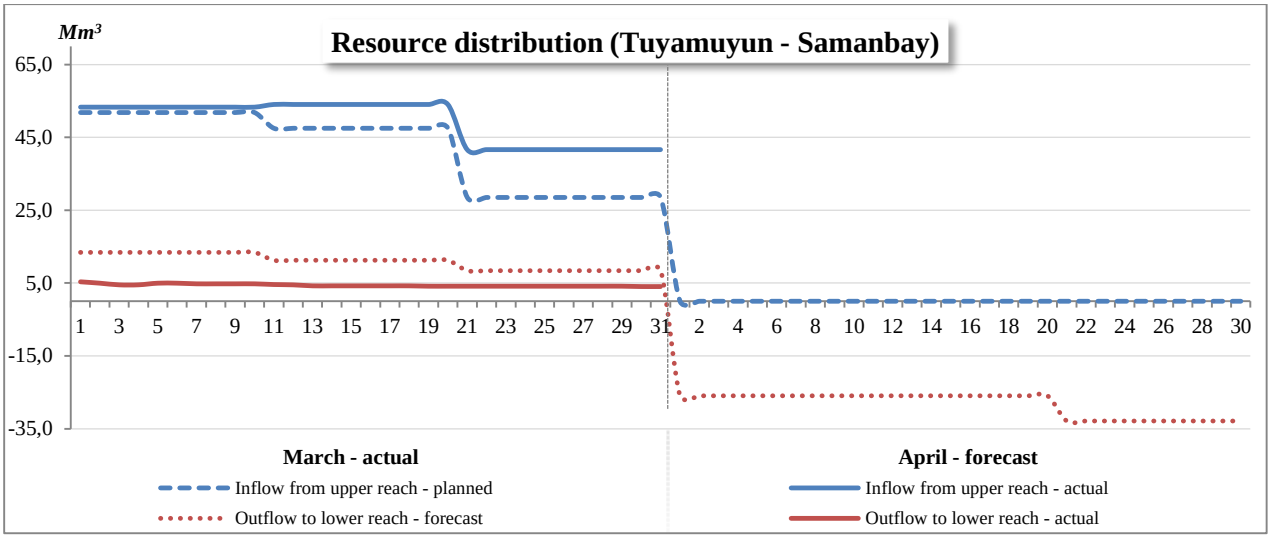
Kelif - Birata	Parameter		March			April		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach	*W, Mm³*	*Forecast*	920	952	1125	1305	1482	1732
		Actual	1130	1159	987			
Lateral inflow	*W, Mm³*	*Forecast*	93	90	96	91	91	91
		Actual	114	111	114			

Water withdrawal	*W, Mm³*	*Planned*	592	654	707	652	661	734
		Actual	539	586	609			
Losses	*W, Mm³*	*Forecast*	-46	-29	55	416	301	282
		Actual	288	308	91			
Outflow to lower reach	*W, Mm³*	*Forecast*	467	417	459	327	611	807
		Actual	416.6	376.2	402.1			



Water volume (W)

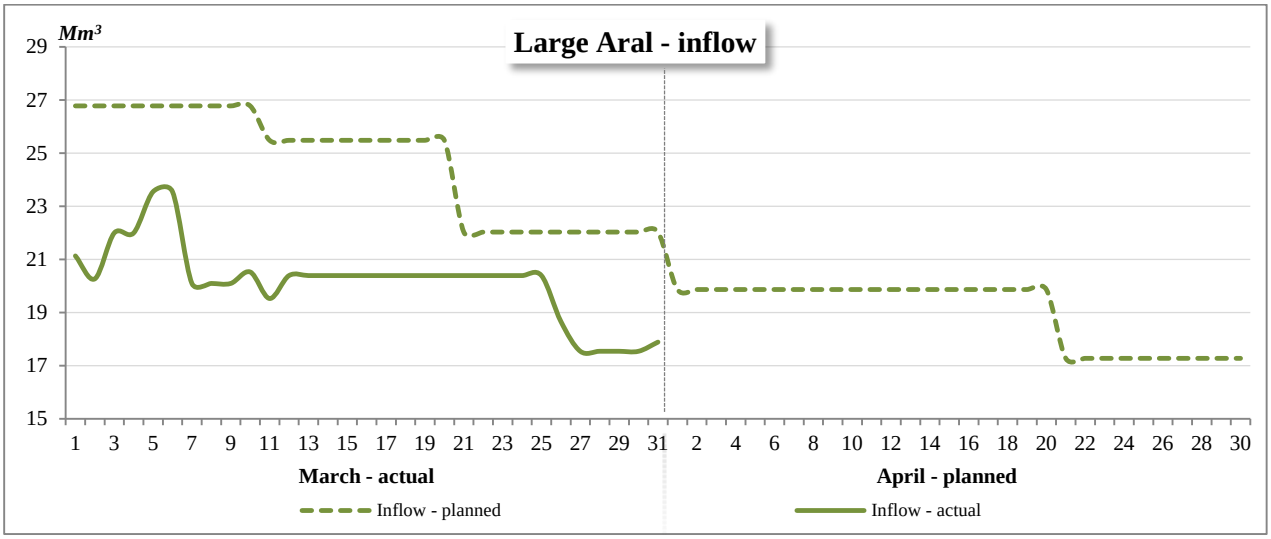
Tuyamuyun - Samanbay	Parameter		March			April		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach	*W, Mm³*	*Forecast*	518	475	314	302	302	372
		Actual	532.6	539.9	458			
Lateral inflow	*W, Mm³*	*Forecast*	0	0	0	0	0	0
		Actual	0	0	0			
Water withdrawal [1]	*W, Mm³*	*Planned*	220	242	143	181	181	233
		Actual	277.6	334.6	337			
Losses	*W, Mm³*	*Forecast*	164.2	121.0	79	78	78	95
		Actual	207	162	75			
Outflow to lower reach	*W, Mm³*	*Forecast*	133.9	112.3	92.2	43	43	43
		Actual	48	43	46			

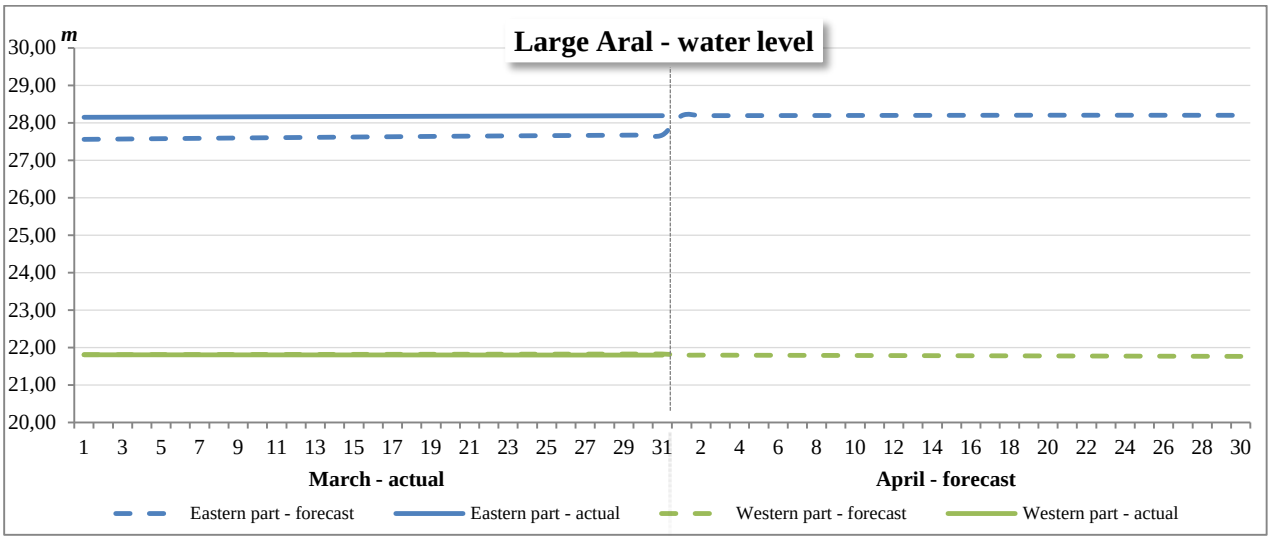


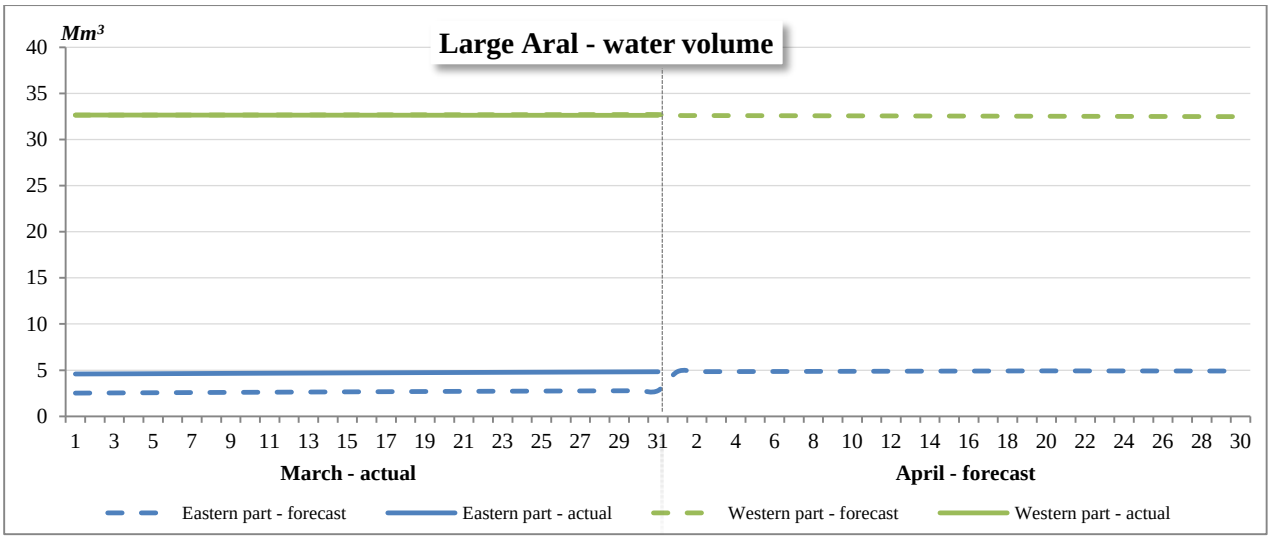
[1] *Note: Including supply to the system of lakes and environmental water releases into canals*

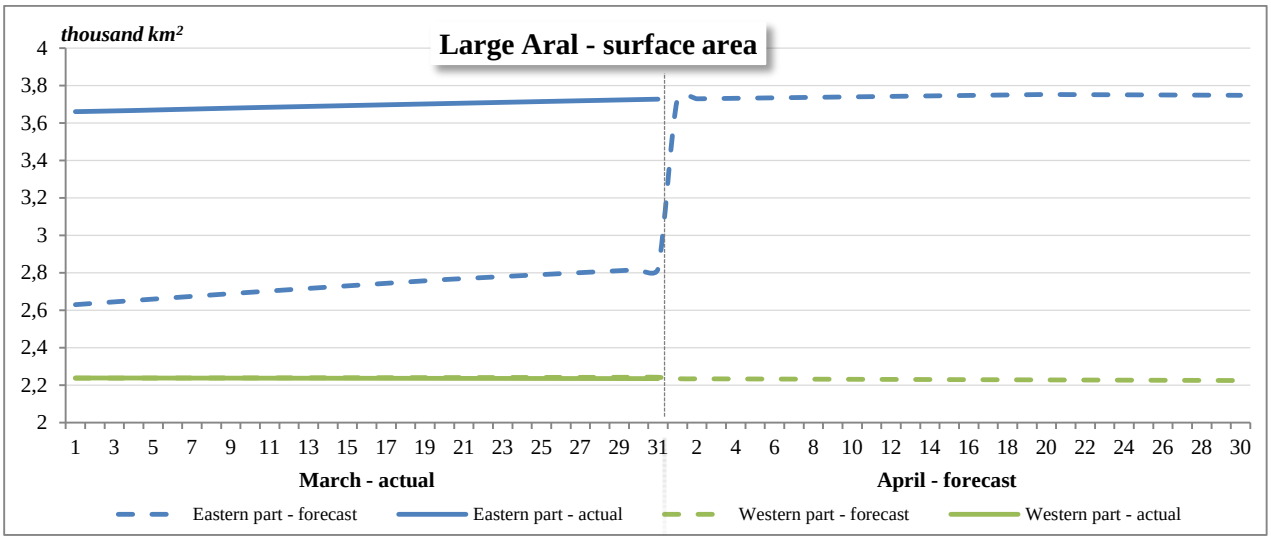
Water volume (**W**), Level (**H**), Surface area (**S**)

Large Aral Sea	Parameter		March			April		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow	*W, Mm³*	*Planned*	267.84	254.88	242.35	198.68	198.68	172.76
		Actual	213.32	203.06	208.67			
Eastern part, water volume	*W, Mm³*	*Forecast*	2.57	2.67	2.75	4.86	4.90	4.92
		Actual	4.63	4.71	4.79			
Eastern part, level	*H, m*	*Forecast*	27.58	27.62	27.66	28.19	28.20	28.20
		Actual	28.16	28.17	28.18			
Eastern part, area	*S, th.km²*	*Forecast*	2.66	2.73	2.80	3.73	3.75	3.75
		Actual	3.67	3.69	3.72			
Western part, water volume	*W, Mm³*	*Forecast*	32.65	32.67	32.69	32.58	32.54	32.50
		Actual	32.63	32.62	32.61			
Western part, level	*H, m*	*Forecast*	21.81	21.82	21.82	21.79	21.78	21.77
		Actual	21.81	21.80	21.80			
Western part, area	*S, th.km²*	*Forecast*	2.24	2.24	2.24	2.23	2.23	2.23
		Actual	2.24	2.24	2.24			






Large Aral - water volume
Mm³
40
35
30
25
20
15
10
5
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
March - actual
April - forecast
Eastern part - forecast
Eastern part - actual
Western part - forecast
Western part - actual


Large Aral - surface area
thousand km²
4
3,8
3,6
3,4
3,2
3
2,8
2,6
2,4
2,2
2
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
March - actual
April - forecast
Eastern part - forecast
Eastern part - actual
Western part - forecast
Western part - actual

Syr Darya River Basin

Actual Situation in March and Forecast for April

In March, the available usable water resources in the Syr Darya that were estimated as the sum of river flows based on inflow to Toktogul, Andizhan, and Charvak reservoirs plus lateral inflow to the rivers and minus losses amounted to 2,319 million m^3, of which the inflow to the three upper reservoirs was 997 million m^3 (116% of forecast and 128% of flow in February). In April, the available usable water resources are expected in the amount of 3,382 Mm^3, including 1,593 Mm^3 of inflow to three upper reservoirs or 160% of the flow in March.

In March, inflow to the Toktogul reservoir was 526 million m^3 or 118% of the expected volume, and water releases from the reservoir amounted to 1,353 million m^3 or 78% of BWO Syr Darya's schedule. The water volume in the reservoir decreased from 12,493 million m^3 at the beginning of month to 11,659 million m^3 by the end of month (104% of the plan). The unrecorded inflow to the reservoir was detected in the amount of 20 Mm^3. It is expected that in April the Toktogul reservoir will continue discharging water and by the end of month the water volume will be 11,221 million m^3; the inflow to the reservoir is expected in the amount of 689 million m^3, and water releases are planned at 1,128 million m^3.

In March, inflow to the Andizhan reservoir was 134 million m^3 (93% of the forecast), and 142 million m^3 of water were released from the reservoir. The water volume virtually has not changed: 826 million m^3 at the beginning of month and 825 million m^3 at the end of month. Water losses amounted to 3 Mm^3. In April, inflow to the Andizhan reservoir is expected to increase to 269 million m^3 and water releases will be 203 million m^3.

Inflow to the Bakhri Tojik reservoir was 1,838 million m^3 (83% of the forecast), while water releases from the reservoir were in the amount of 2,369 million m^3 (124% of the plan) in March. The water volume changed from 3,516 Mm^3 to 3,114 Mm^3. The unrecorded inflow to the reservoir was detected from the balance method in the amount of 130 Mm^3. In April, inflow to the Bakhri Tojik reservoir is expected to be 1,574 million m^3, and 1,186 million m^3 are to be discharged from the reservoir. Water will be accumulated in the reservoir approx. to 3,502 Mm^3.

Water was discharged from the Charvak reservoir from 579 million m^3 to 470 million m^3 in March. Inflow to the reservoir was 336 million m^3, and water releases amounted to 349 million m^3. Water losses in the reservoir were estimated at 84 Mm^3. In April, the Charvak reservoir will accumulate water and its volume will be 708 Mm^3 by the end of month. Inflow to the reservoir is expected in the amount of 635 Mm^3, while 397 Mm^3 of water will be released.

Inflow to the Shardara reservoir was 1,820 million m^3 (80% of the forecast) in March. Water releases from the reservoir amounted to 993 million m^3 (only 51% of BWO Syr Darya's schedule). The reservoir accumulated water from 4,337 Mm^3 to 4,857 Mm^3. Water discharge into Arnasai was 17 Mm^3, and water withdrawal from the reservoir was 89 Mm^3. Balance discrepancy was substantial and amounted to 245 Mm^3 (about 5% of the water volume in the reservoir). The analysis of water losses from the reservoir over the past years shows that the balance discrepancy in March 2020 cannot be fully attributed to water losses in the reservoir; measurement errors are possible in the Syr Darya River flow, namely inflow to the Shardara reservoir. In April, inflow to the Shardara reservoir is expected to decrease to 793 million m^3, while planned water releases will increase to 1,374 million m^3. Consequently, the reservoirs water volume will decrease to 4,129 million m^3 by the end of month. Water discharge into Arnasai is not planned for April.

In March, the Koksarai reservoir was filled with water. Water diversion into the reservoir amounted to 812 million m^3 (85% of the plan and 82% of river flow downstream of the Shardara reservoir). By the end of March, 2,010 Mm^3 of water was accumulated in the reservoir. The reservoir did not discharge water into the river that month. Water losses in the reservoir are estimated at 15 million m^3 (less than 1% of the water volume in the reservoir). In April, accumulation of water in

the Koksarai reservoir will be stopped. It is planned to discharge water from the reservoir into the river in the amount of 432 million m^3. The water volume in the reservoir will be augmented to 1,578 million m^3 by the end of April.

In March, energy generation by the cascade of Naryn HEPS amounted to 1,176 million kWh (under energy-generation regime) against planned 1,342 million kWh, including: Toktogul HEPS - 484 million kWh (85% of the plan). The average discharge through turbines of Toktogul HEPS was 504 m^3/s, while the average head was 146 m. No sterile spills were observed. The plan of energy generation for April for the cascade of Naryn HEPS is set at 990 million kWh, including 396 million kWh for Toktogul HEPS. In March, the total generation at large HEPS of Uzbekistan amounted to 137 million kWh, of which: 72 million kWh at Charvak HEPS, 43 million kWh at Farkhad HEPS, and 22 million kWh at Andizhan HEPS. The discharge at Charvak HEPS is 117 m^3/s, and the head is 97 m; the discharge at Farkhad HEPS is 234 m^3/s, and the head is 31 m. The discharge at Andizhan HEPS was not observed till 10th of March. That time and in February, the reservoir accumulated water for the growing season to cover potential water shortage that might take place because of expected low water content in the Karadarya River. The average discharge at Andizhan HEPS was 39 m^3/s, while the head was 95 m. Energy generation by HEPS of the Bakhri Tojik reservoir amounted to 85 million kWh, and that by Shardara HEPS was 57 million kWh in March. Water discharge at HEPS of Bakhri Tojik was 830 m^3/s, while the head was 19 m. Discharge at Shardara HEPS was 234 m^3/s, and the head was 31 m.

In March, water was distributed unevenly along the Naryn River and the Syr Darya River. In the reach of Toktogul HEPS – Uchkurgan waterworks facility (tail-water) the water shortage amounted to 29 million m^3 or 6 % of planned water withdrawal. Open channel losses were 94 million m^3 (7% of river flow at the head of the reach). In the reach of Uchkurgan waterworks facility (tail-water) – Akjar g/s no water shortage and open channel losses were observed; unrecorded inflow of 13 Mm^3 or 1.5% of river flow at the head of the reach was detected. In the reach of Bakhri Tojik reservoir – Shardara reservoir water shortage was not observed also, but balance discrepancy (possible water losses) in the amount of 709 Mm^3 (30% of discharge from Bakhri Tojik reservoir) was detected. The balance discrepancy can be partially attributed to unreliable data on river flow of the Syr Darya River at the end of the reach – underestimated inflow to the Shardara reservoir. In the lower reaches (downstream of Shardara reservoir) unrecorded inflow of 97 million m^3 (10% of flow of the Syr Darya River downstream of the Shardara reservoir) was detected and no water shortage was observed.

In March, flow along the Naryn – Syr Darya rivers changed as follows: discharge from the Toktogul reservoir – 1,353 million m^3, discharge from Uchkurgan waterworks facility – 876 million m^3, Akjar g/s (inflow to the Bakhri Tojik reservoir) – 1,838 million m^3, inflow to the Shardara reservoir – 993 million m^3, Samanbay g/s (inflow to the Northern Aral Sea) - 191 million m^3. 207 million m^3 were discharged into the Large Aral Sea.

In April, water withdrawal from the river will be increased: to 531 million m^3 in the first reach, to 66 million m^3 in the second reach, and to 877 million m^3 in the third reach. Inflow to the Northern Aral Sea is expected in the amount of 207 million m^3. In March, inflow to the Northern Aral Sea was 191 million m^3. The water level in the sea varied within 42.1…42.2 m. The water surface area was 3.17…3.19 thousand km^2 and the water volume was 24.4 km^3. The discharge from the Northern Aral Sea into the Large Aral Sea (Amu Darya Basin) was recorded in the amount of 207 million m^3 in March. It is expected that in April inflow to the Northern Aral Sea will be 104 million m^3, while discharge to the Large Aral Sea will be 207 million m^3. The water level will be 42.2 m, the water surface area will be 3.19 thousand km^2, and the water volume will be 24.3 km^3 by the end of month.

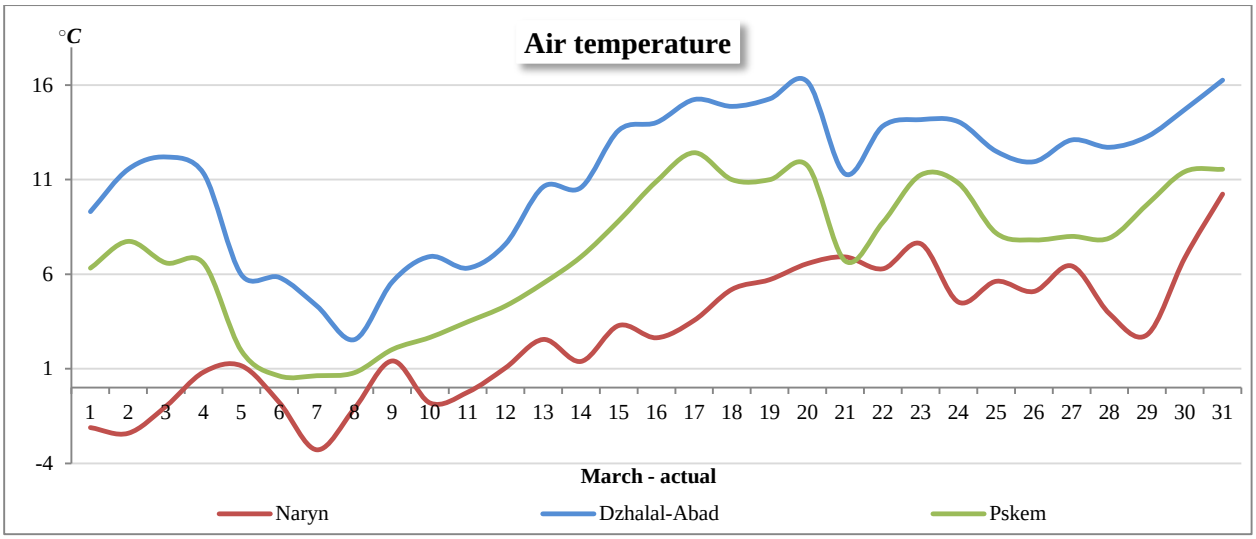
The sections below show daily and ten-day data on climate and water management (reservoirs, HEPS, water distribution).

Climate

Weather station Riverhead	Location		
	Latitude	Longitude	Altitude above sea level, m
Naryn	41.43	76.00	2041
Dzhalal-Abad	40.92	72.95	765
Pskem	41.90	70.37	1258

Air temperature (**T**)

Station	Parameter		March			April		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Naryn	*T*. °C	*Forecast*	- 4.00	- 1.00	2.00	7.00	9.00	15.00
		Actual	-0.81	3.17	6.03			
Dzhalal-Abad	*T*. °C	*Forecast*	8.00	11.00	14.00	13.00	15.00	21.00
		Actual	7.56	12.43	13.44			
Pskem	*T*. °C	*Forecast*	4.00	6.00	7.00	8.00	11.00	15.00
		Actual	3.59	8.62	9.28			

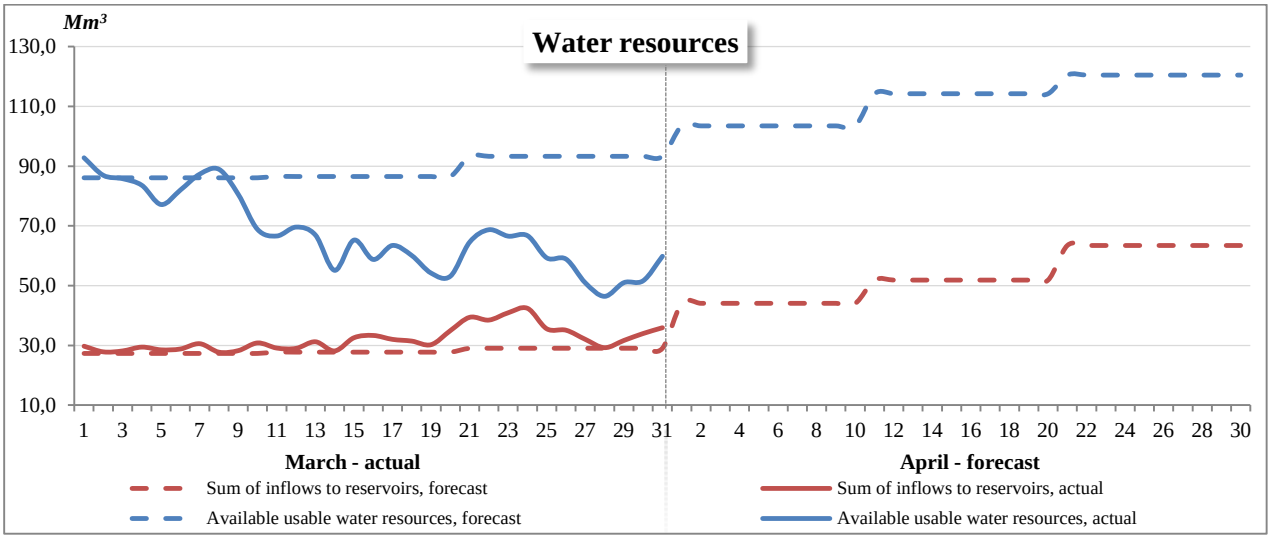


Water resources

Object
Naryn River (inflow to Toktogul)
Karadarya River (inflow to Andizhan)
Chirchik River (inflow to Charvak)
Syr Darya River (up to Shardara)

Water volume (**W**)

Object	Parameter		March			April		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow to Toktogul reservoir	*W, Mm³*	*Forecast*	143	143	157.8	230	230	229.8
		Actual	150	163	212.8			
Inflow to Andizhan reservoir	*W, Mm³*	*Forecast*	39	43	61.8	69	79	121.0
		Actual	48	46	40.4			
Inflow to Charvak reservoir	*W, Mm³*	*Forecast*	91	91	99.7	142	210	283.4
		Actual	92	103	141.8			
Sum of inflows to reservoirs	*W, Mm³*	*Forecast*	273	277	319.3	441	518	634.2
		Actual	290	312	395.0			
Lateral inflow up to Shardara	*W, Mm³*	*Forecast*	600	600	719.1	606	636	581.8
		Actual	556	313	261.9			
Losses	*W, Mm³*	*Forecast*	12	12	12.2	12	12	11.1
		Actual	12	12	12.2			
Available usable water resources	*W, Mm³*	*Forecast*	861	865	1026.1	1035	1142	1204.8
		Actual	834	613	644.7			

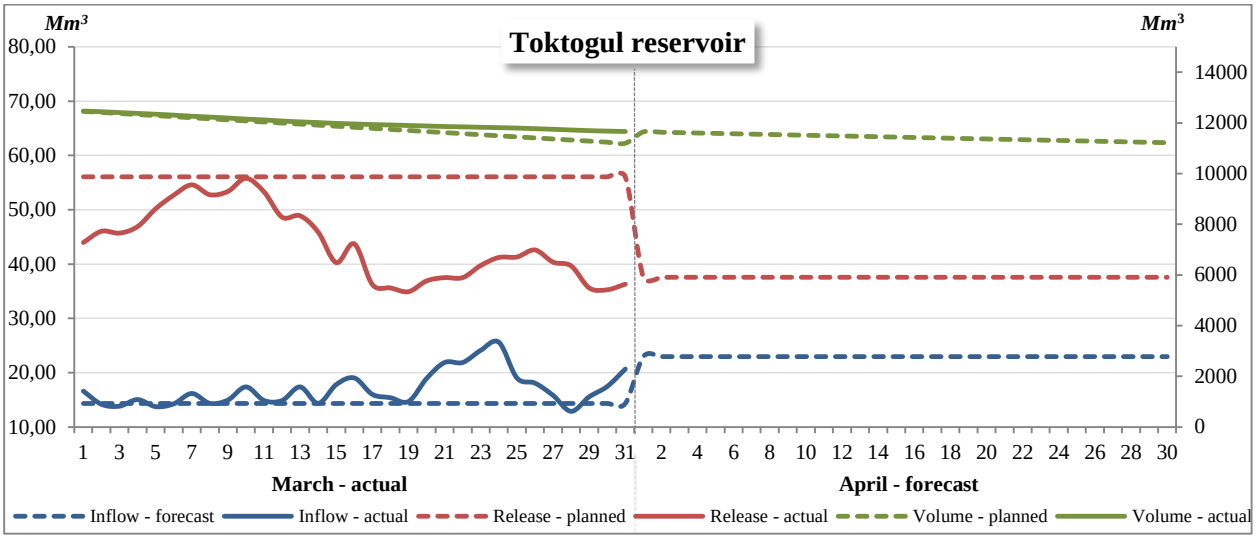


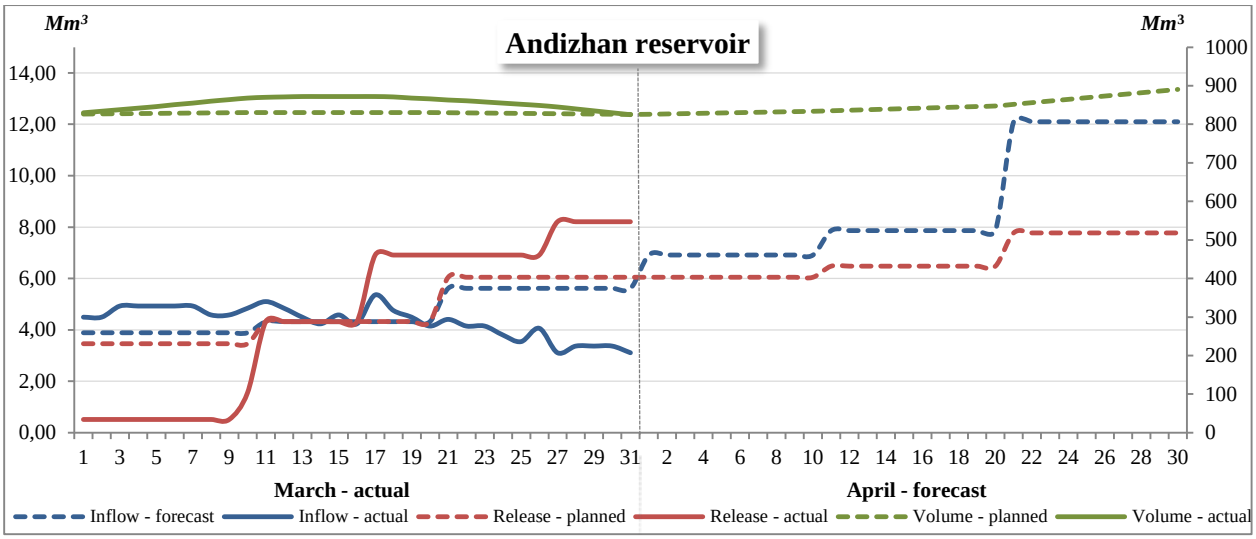
Reservoirs and HEPS

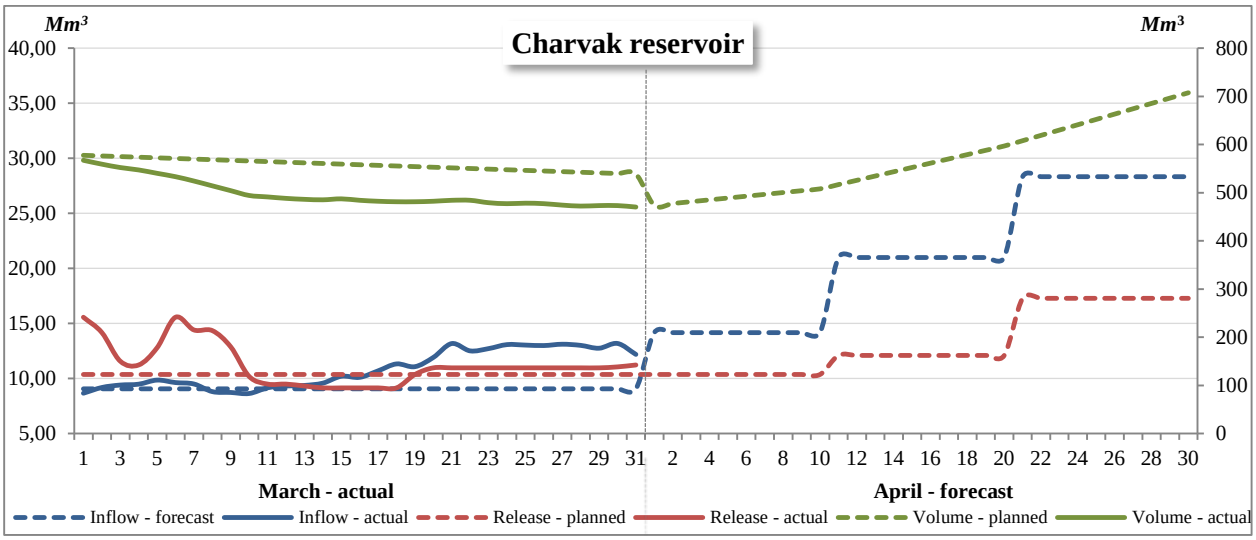
Reservoir	Location			Characteristics				
	Latitude	Longitude	Altitude above sea level, m	Length, km	Width, km	Water-surface area, km²	Full volume, km³	Full reservoir level, m
Toktogul	41.80	72.87	880	65	12	284	19.50	215
Andizhan	40.77	73.11	900	36	1.5-12	56	0.19	905
Bakhri Tojik	40.29	70.07	344	75	20	520	4.16	348
Charvak	41.63	70.03	869	15	3	37	1.90	906
Shardara	41.20	67.99	250	80	25	783	5.70	252

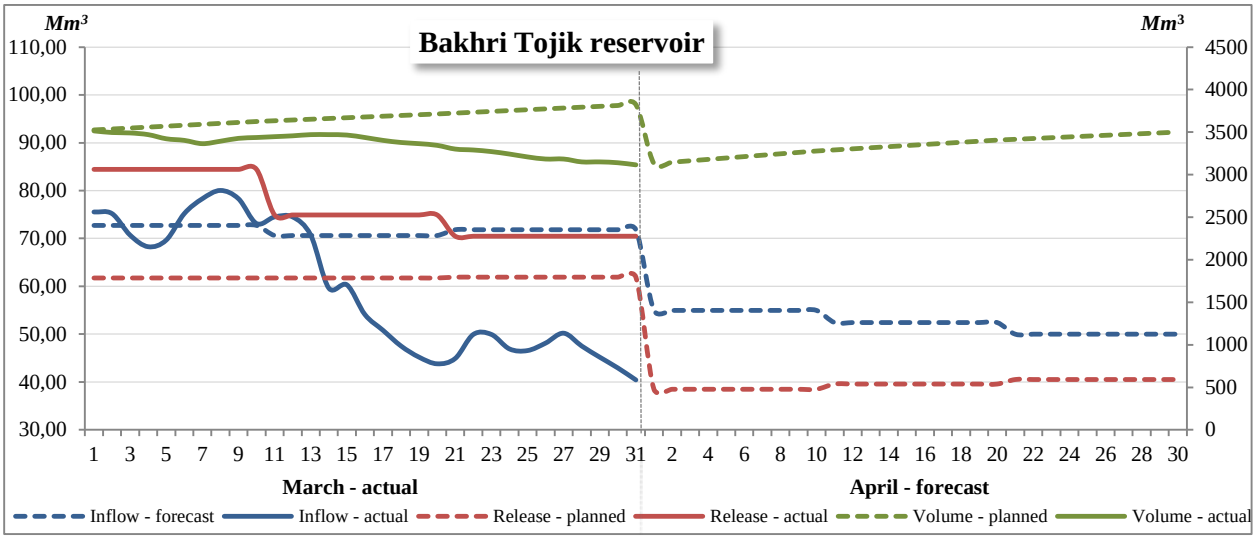
Inflow (**I**), Releases (**R**), Volume (**W**)

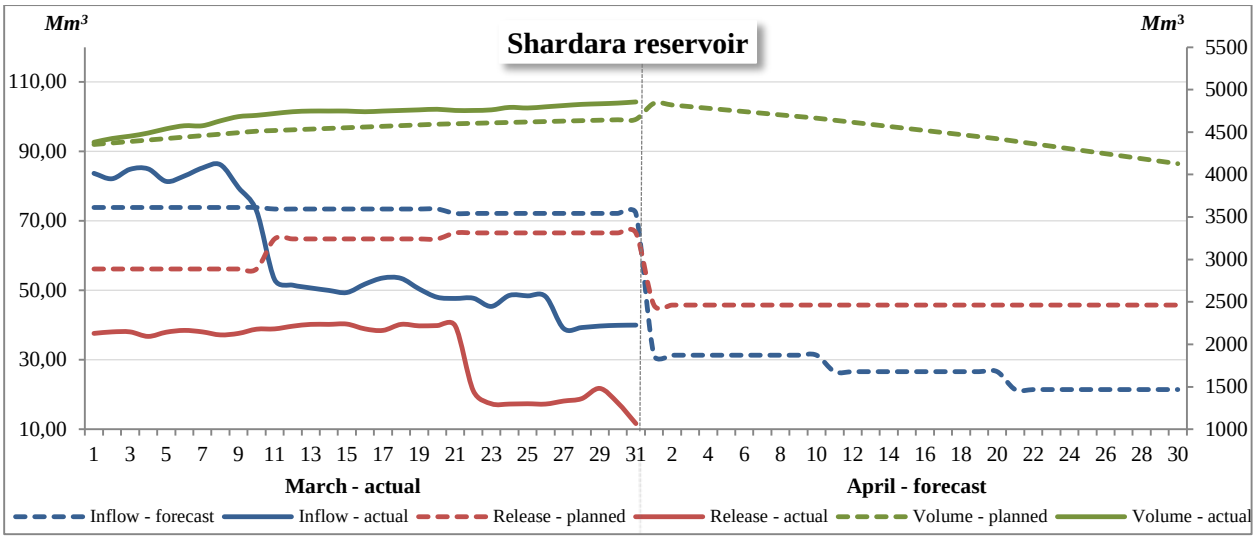
Reservoir	Parameter		March			April		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Toktogul reservoir	*I, Mm³*	*Forecast*	143.42	143.42	157.77	229.82	229.82	229.82
		Actual	150.42	163.21	212.80			
	R, Mm³	*Planned*	560.74	560.74	616.80	375.84	375.84	375.84
		Actual	502.16	424.31	426.99			
	W, Mm³	*Planned*	12076	11658	11199	11513	11367	11221
		Actual	12148	11876	11659			
Andizhan reservoir	*I, Mm³*	*Forecast*	38.88	43.20	61.78	69.12	78.62	120.96
		Actual	47.61	46.22	40.44			
	R, Mm³	*Planned*	34.56	43.20	66.53	60.48	64.80	77.76
		Actual	6.22	53.57	82.51			
	W, Mm³	*Planned*	830	830	826	834	847	891
		Actual	868	866	825			
Charvak reservoir	*I, Mm³*	*Forecast*	90.65	90.65	99.72	141.70	209.95	283.39
		Actual	91.93	102.76	141.77			
	R, Mm³	*Planned*	103.68	103.68	114.05	103.68	120.96	172.80
		Actual	132.68	95.47	121.05			
	W, Mm³	*Planned*	566	553	539	508	597	708
		Actual	494	482	470			
Bakhri Tojik reservoir	*I, Mm³*	*Forecast*	727.53	706.37	790.36	549.68	524.26	499.98
		Actual	744.08	580.95	512.70			
	R, Mm³	*Planned*	617.33	617.33	680.96	385.02	395.92	405.35
		Actual	844.67	749.33	775.44			
	W, Mm³	*Planned*	3626	3715	3825	3279	3407	3502
		Actual	3438	3345	3114			
Shardara reservoir	*I, Mm³*	*Forecast*	738.91	734.47	794.04	313.20	265.79	214.20
		Actual	824.11	512.13	484.18			
	R, Mm³	*Planned*	561.60	648.00	731.81	457.92	457.92	457.92
		Actual	378.26	396.23	218.16			
	W, Mm³	*Planned*	4510	4593	4650	4663	4422	4129
		Actual	4698	4770	4857			




Andizhan reservoir
Mm³
Mm³
14,00
12,00
10,00
8,00
6,00
4,00
2,00
0,00
1000
900
800
700
600
500
400
300
200
100
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
March - actual
April - forecast
Inflow - forecast
Inflow - actual
Release - planned
Release - actual
Volume - planned
Volume - actual

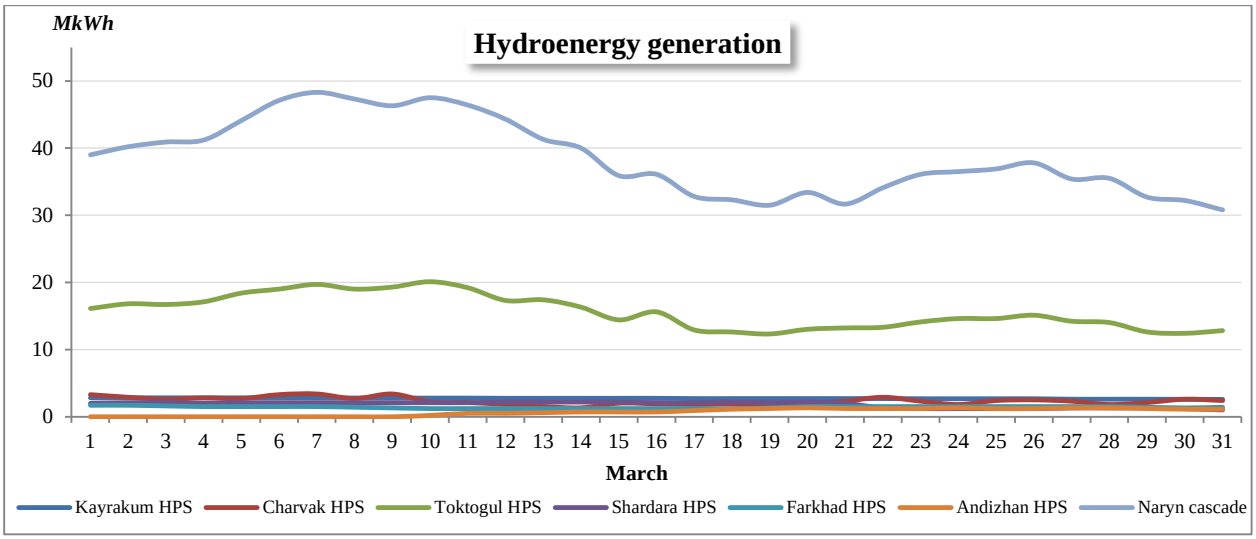

Charvak reservoir
Mm³
Mm³
40,00
35,00
30,00
25,00
20,00
15,00
10,00
5,00
800
700
600
500
400
300
200
100
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
March - actual
April - forecast
Inflow - forecast
Inflow - actual
Release - planned
Release - actual
Volume - planned
Volume - actual

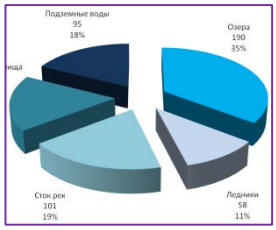

Bakhri Tojik reservoir
Mm³
Mm³
110,00
100,00
90,00
80,00
70,00
60,00
50,00
40,00
30,00
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
March - actual
April - forecast
Inflow - forecast
Inflow - actual
Release - planned
Release - actual
Volume - planned
Volume - actual



Generation (**G**), Energy losses through sterile spills (**L**), Discharge through turbines (**Q**), Sterile spills (**R**), Head (**H**)

HEPS	Parameter		March		
			I ten-day	*II ten-day*	*III ten-day*
Naryn cascade	*G, M kWh*	*Actual*	441.9	374.0	379.7
Toktogul	*G, M kWh*	*Actual*	182.2	151.0	150.9
	Q, m³/s	*Actual*	581.0	490.2	445.9
	H, m	*Actual*	147.4	146.1	145.2
Andizhan	*G, M kWh*	*Actual*	0.2	8.2	13.3
	Q, m³/s	*Actual*	3.0	54.2	58.4
	H, m	*Actual*	95.0	95.0	95.0
Bakhri Tojik	*G, M kWh*	*Actual*	28.1	27.4	29.2
	Q, m³/s	*Actual*	830.0	830.0	830.0
	H, m	*Actual*	19.9	19.4	18.8
Farkhad	*G, M kWh*	*Actual*	14.9	12.4	16.1
	Q, m³/s	*Actual*	248.8	206.8	244.4
	H, m	*Actual*	30.6	30.6	30.6
Charvak	*G, M kWh*	*Actual*	29.3	17.7	25.4
	Q, m³/s	*Actual*	143.0	89.1	118.3
	H, m	*Actual*	98.8	96.8	96.0
Shardara	*G, M kWh*	*Actual*	20.8	21.6	14.2
	Q, m³/s	*Actual*	401.0	445.0	200
	G, M kWh	*Actual*	20.0	20.2	21.4



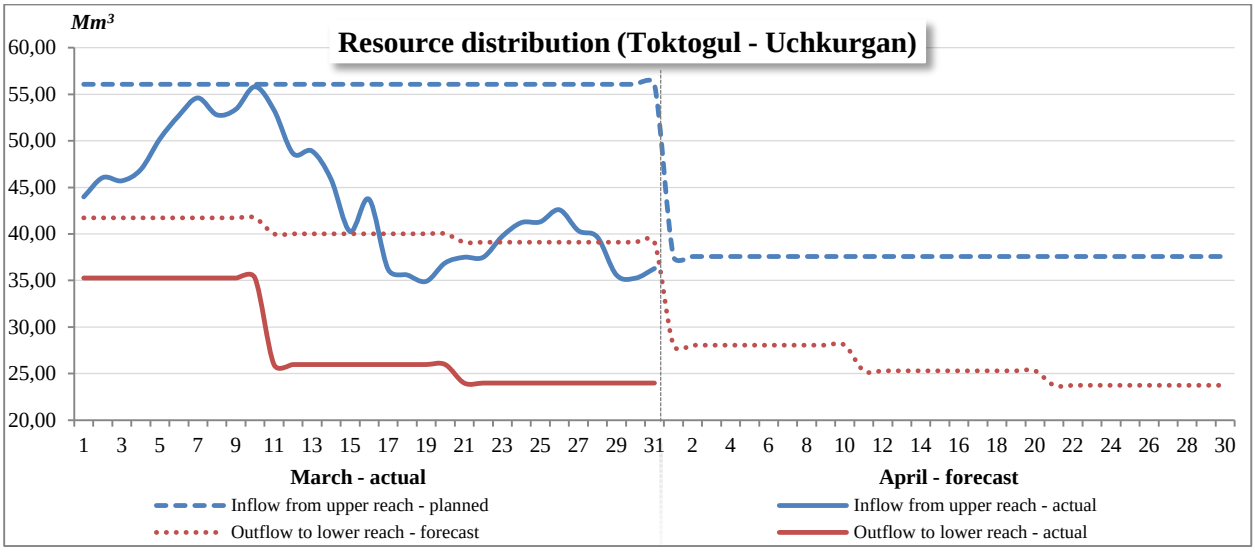


Water distribution

River reach
Naryn River: tail water of Toktogul reservoir– Uchkurgan waterworks facility
Naryn River: Uchkurgan waterworks facility - Syr Darya River: inflow to Bakhri Tojik reservoir
Syr Darya River: tail water of Bakhri Tojik reservoir – inflow to Shardara reservoir
Syr Darya River: tail water of Shardara reservoir – inflow to Northern Aral Sea (Karateren settlement)
Northern Aral Sea

Water volume (**W**)

Toktogul - Uchkurgan	**Parameter**		**March**			**April**		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach	*W, Mm³*	*Planned*	560.74	560.74	616.80	375.84	375.84	375.84
		Actual	502.16	424.31	426.99			
Lateral inflow[2]	*W, Mm³*	*Forecast*	25.38	25.38	27.90	66.86	66.86	66.86
		Actual	12.70	20.39	44.33			
Water withdrawals	*W, Mm³*	*Planned*	143.08	160.17	186.09	153.45	180.92	196.47
		Actual	128.43	151.57	180.62			
Losses	*W, Mm³*	*Forecast*	25.92	25.92	28.51	8.64	8.64	8.64
		Actual	33.92	33.50	26.96			
Outflow to lower reach[3]	*W, Mm³*	*Forecast*	417.12	400.03	430.10	280.61	253.14	237.59
		Actual	352.51	259.63	263.74			

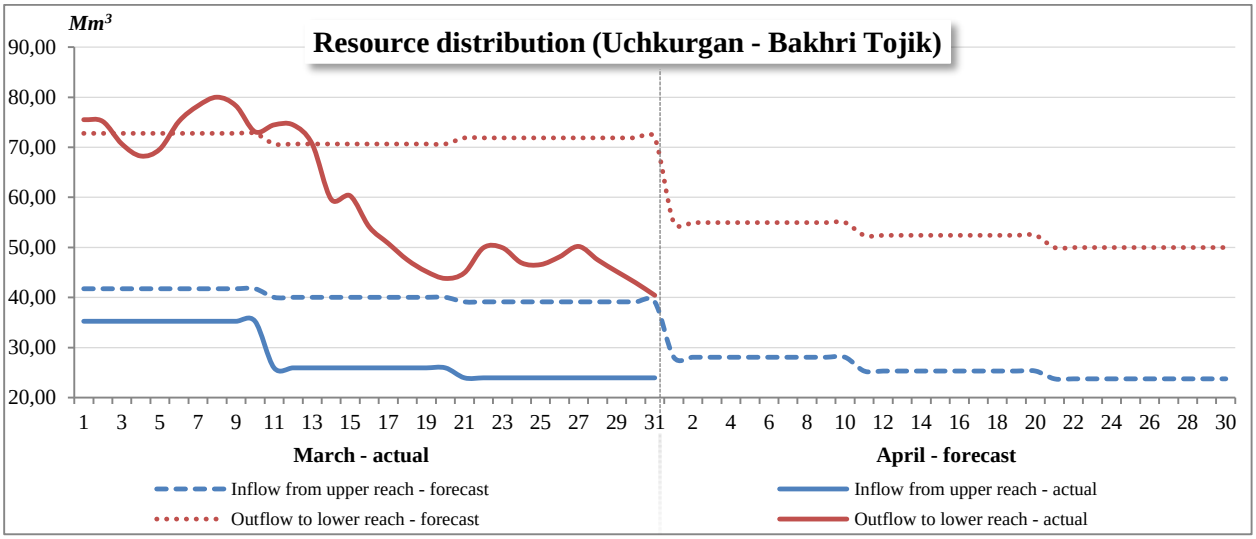


Water volume (**W**)

Uchkurgan – Bakhri Tojik	**Parameter**		**March**			**April**		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach	*W, Mm³*	*Forecast*	417.12	400.03	430.10	280.61	253.14	237.59
		Actual	352.51	259.63	263.74			
Lateral inflow	*W, Mm³*	*Forecast*	352.07	348.00	406.09	320.74	323.20	314.63
		Actual	388.11	310.78	287.28			

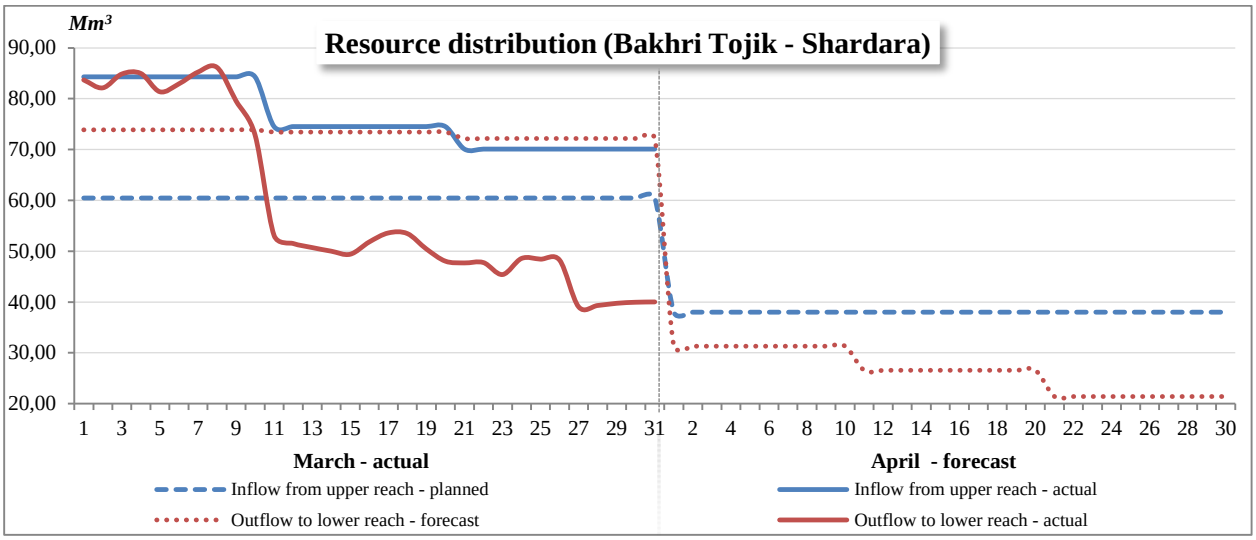
[2] *Incl. Karasu left and right*
[3] *Uchkurgan waterworks facility*

Water withdrawals	*W, Mm³*	*Planned*	11.66	11.66	12.83	21.67	22.08	22.24
		Actual	8.73	12.86	16.09			
Losses	*W, Mm³*	*Forecast*	30.00	30.00	33.00	30.00	30.00	30.00
		Actual	-12.19	-23.40	22.22			
Outflow to lower reach[4]	*W, Mm³*	*Forecast*	727.53	706.37	790.36	549.68	524.26	499.98
		Actual	744.08	580.95	512.70			



Water volume (**W**)

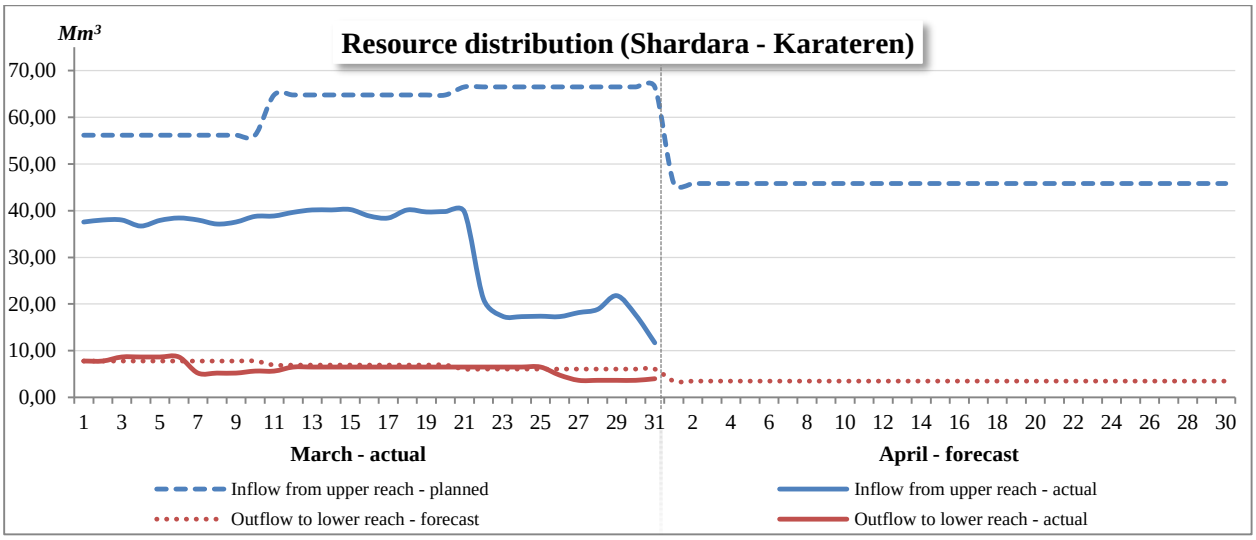
Bakhri Tojik - Shardara	**Parameter**		**March**			**April**		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach[5]	*W, Mm³*	*Planned*	604.80	604.80	665.28	380.16	380.16	380.16
		Actual	843.00	745.03	770.77			
Lateral inflow	*W, Mm³*	*Forecast*	320.97	305.90	329.26	271.69	252.14	269.54
		Actual	274.62	165.41	139.66			
Water withdrawals	*W, Mm³*	*Planned*	136.86	126.23	145.51	248.79	306.67	321.11
		Actual	134.26	138.15	135.82			
Losses	*W, Mm³*	*Forecast*	50.00	50.00	55.00	89.86	59.84	114.39
		Actual	159.25	260.16	290.43			
Outflow to lower reach	*W, Mm³*	*Forecast*	738.91	734.47	794.04	313.20	265.79	214.20
		Actual	824.11	512.13	484.18			



[4] *Akdzhar g/s*
[5] *Kyzylkishlak g/s*

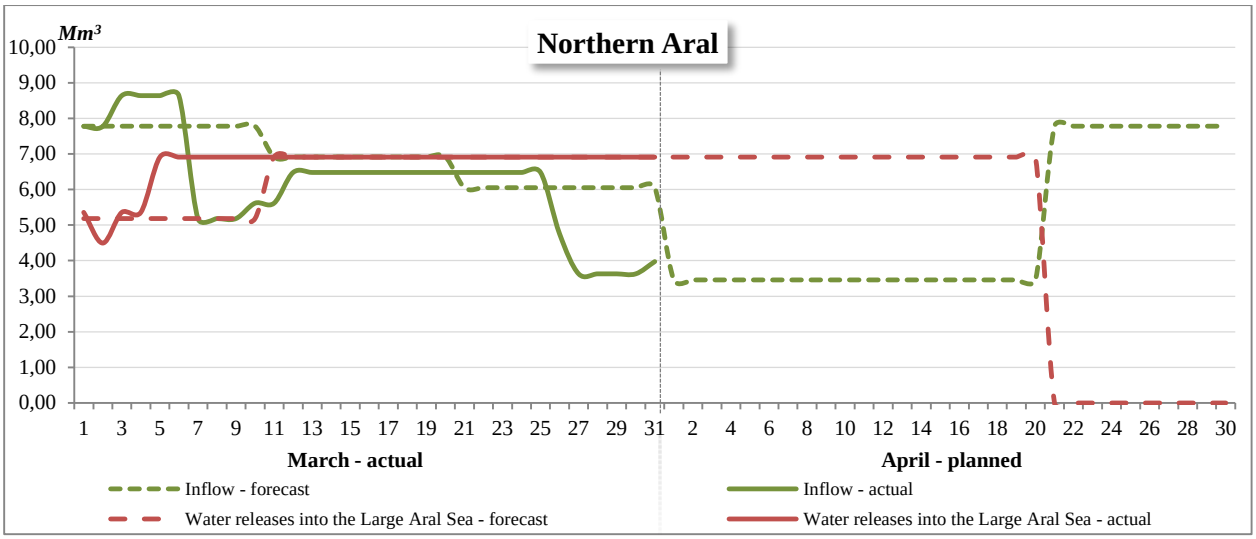
Water volume (**W**)

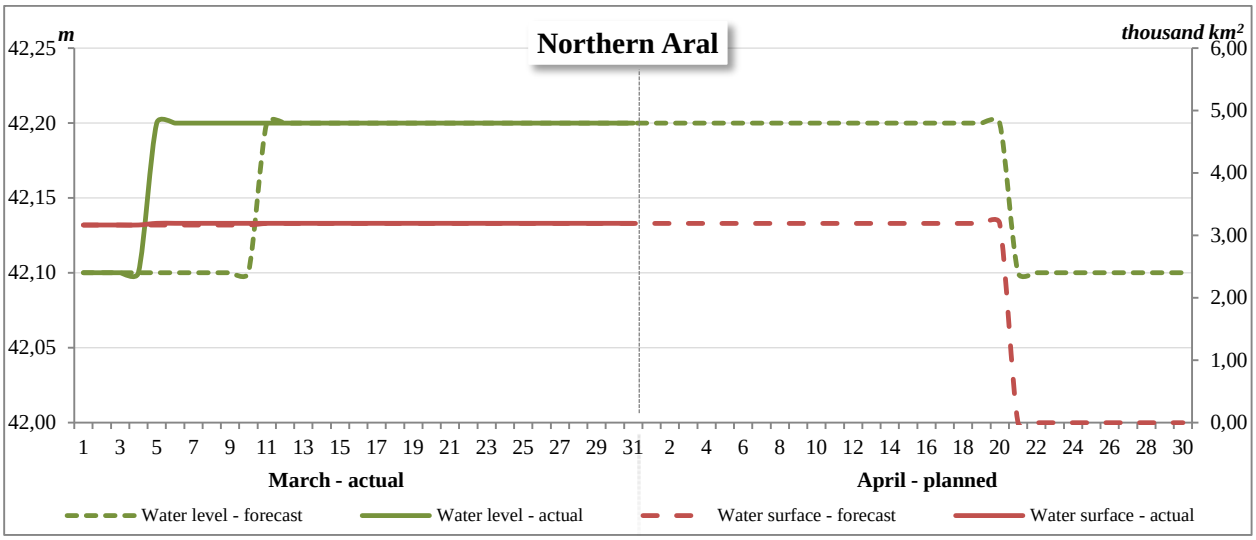
Shardara - Karateren	Parameter		March			April		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach	*W, Mm³*	*Planned*	561.60	648.00	732	457.92	457.92	457.92
		Actual	378.26	396.23	218			
Lateral inflow	*W, Mm³*	*Forecast*	11.76	16.72	19	6.05	6.05	6.05
		Actual	20.27	19.07	35			
Filling (+), draw down (-) of Koksarai reservoir	*W, Mm³*	*Planned*	-345.6	-345.6	-266	0.00	172.80	259.20
		Actual	-302.4	-337.0	-173			
Water withdrawals	*W, Mm³*	*Planned*	0.0	0.0	0	80.35	247.97	362.88
		Actual	51.8	51.8	57			
Losses	*W, Mm³*	*Forecast*	150.0	250.0	418	349.06	354.24	325.73
		Actual	-26.9	-37.4	-33			
Outflow to lower reach	*W, Mm³*	*Forecast*	77.8	69.1	67	34.56	34.56	34.56
		Actual	71.3	63.9	56			



Water volume (**W**), Level (**H**), Surface area (**S**)

Northern Aral	Parameter		March			April		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow	*W, Mm³*	*Forecast*	77.76	69.12	66.53	34.56	34.56	77.76
		Actual	71.28	63.94	55.64			
Water volume	*W, Mm³*	*Forecast*	24.48	24.56	24.63	24.42	24.40	24.48
		Actual	24.46	24.45	24.44			
Water level	*H, m*	*Forecast*	42.10	42.20	42.20	42.20	42.20	42.10
		Actual	42.16	42.20	42.20			
Water surface area	*S, th.km²*	*Forecast*	3.17	3.19	3.19	3.19	3.19	0.00
		Actual	3.18	3.19	3.19			
Water releases into the Large Aral Sea	*W, Mm³*	*Forecast*	51.84	69.12	76.03	69.12	69.12	0.00
		Actual	62.04	69.12	76.03			





Information sources

Basin Water Organization “Amu Darya”
Basin Water Organization “Syr Darya”

Aral–Syrdarya Basin Water Authority
Coordination Dispatch Center “Energy”

Website of the Center of Hydrometeorological Service (Uzbekistan) meteo.uz
Central Asia Water and Ecological Knowledge Portal cawater-info.net
Website “Weather and Climate” pogodaiklimat.ru

For detailed analysis of water-related situation by SIC ICWC, please, visit the CAWATER-info portal cawater-info.net/analysis/index.htm