Aral Sea Basin Transboundary Water Early Warning Bulletin

February – March 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 first bulletin in 2020 contains the actual information on the Syr Darya and Amu Darya basins for February and the forecast for March.

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 February

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

©	Uzbekistan and China discussed joint project cooperation in Afghanistan podrobno.uz
©	Satellite monitoring helps solving 50 sectoral tasks in Kazakhstan kazakh-tv.kz
©	Kazakhstan transfers aquifer territories back into the state's hands mk-kz.kz
©	A big wind station under construction in Sarysu district, Zhambyl province lenta.inform.kz
©	Kyrgyzstan proposes a glacier conference to its neighbors kp.kg
©	According to Kyrgyz deputy, 90% of water from the Kirov reservoir flows to Kazakhstan, this means that Kyrgyzstan accumulates water annually for them tazabek.kg
©	$50 million green economy project is to be launched in Kyrgyzstan this year tazabek.kg
©	Tajik authorities look forward to receiving compensation from neighbors for water regnum.ru
©	Tajikistan reduces almost 2.5 times idle discharge from reservoirs regnum.ru
©	Tajikistan and UN discusses implementation of the National development strategy khovar.tj
©	WB allocates $134 million for rehabilitation of Barki Tojik dialog.tj
©	The organizing committee of the International High-Level Conference on International Decade for Action "Water for Sustainable Development", 2018-2028 had a meeting chaired by the Prime-Minister in Dushanbe khovar.tj
©	António Guterres appoints Sezin Sinanoglu of Turkey as UN Resident Coordinator in Tajikistan khovar.tj
©	Turkmen-Afghan business-forum held in Ashkhabad turkmenportal.com
©	Major water users enlisted in Uzbekistan nuz.uz
©	Tashkent's authorities promised to ensure access for drinking water for all residents in 2020 uz.sputniknews.ru
©	Skolkovo's scientists will offer solutions on water treatment in Uzbekistan uz.sputniknews.ru
©	Uzbekistan will build two 200 MW solar stations uz.sputniknews.ru
©	Uzbekistan increased energy generation by 1.2% uzdaily.uz
©	Kazakhstan and Uzbekistan signed half a billion worth agreements orient.tm
©	"My Garden in the Aral Sea" Project on agro- and ecotourism mininnovation.uz
©	Turkmen-Afghan cooperation aspects discussed in Kabul mfa.gov.tm
©	Construction of power transmission line started in Afghanistan as part of CASA1000 afghanistan.ru
©	Zhanat Zhakhmetova assigned as Kazakhstan's Energy Vice-Minister lenta.inform.kz
©	WB will allocate $30 million for drinking water supply in Dushanbe centrasia.org
©	Tajikistan will upgrade monitoring facilities at Lake Sarez kabar.kg
©	New energy grid will couple all regions in Turkmenistan orient.tm
©	Major tasks to be solved by the Agency for Implementation of Water Sector Projects identified uzdaily.uz
©	Joint transboundary water management and use in Central Asia discussed uzdaily.uz
©	Kazakhstan and Uzbekistan compare notes on water supply during the growing season lenta.inform.kz

©	Mirziyoyev holds a meeting on development of agricultural clusters kun.uz
©	European experts come up with suggestions on implementation of the Agricultural Development Strategy in Uzbekistan review.uz
©	Ministry of Energy drafts PSA with British Petroleum and SOCAR for development activities in the Aral area kun.uz
©	World small hydropower development report 2013-2019 issued by UNIDO ekois.net
©	UN calls on countries to address the climate change challenges jointly korrespondent.net
©	The water quality databank developed under UN auspices khovar.tj
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©	Kazakhstan and Kyrgyzstan hold negotiations on water and energy ecogeo.gov.kz
©	Why does USAID strive to control water supply in Central Asia? ritmeurasia.org
©	Uzbek President is named person of the year 2019 review.uz
©	Tajik Prime Minister and company head Salini Impregilo discuss Roghun centralasia.media
©	Meeting of the partnership framework development program between Turkmenistan and the UN arzuw.news
©	On cooperation between the Uzbekistan's Ministry of Housing and Communal Services and the Scientific-Information Center of ICWC
©	Ocean Conference preparatory meeting held at UNHQ turkmenportal.com
©	Central Asian environmental challenges discussed in Brussels lenta.inform.kz
©	Head of Government holds fourth meeting of Dialogue on investment cooperation between Kazakhstan and European Union avesta-news.kz
©	Kyrgyzstan starts fulfilling obligations under the Paris Agreement kabar.kg
©	A new version of the Water Code of Tajikistan adopted khovar.tj
©	Ministry of Finance: Tajikistan will borrow for Roghun tj.sputniknews.ru
©	Tajikistan plans increasing export of electricity to neighbors centralasia.media
©	Russian company will build HEPS on the Chatkal River just outside Tashkent fergana.agency

Amu Darya River Basin

Actual Situation in February and Forecast for March

In February, the regulated flow of the Amu Darya River upstream of water intake to Garagumdarya is estimated at 2,701 Mm^3 (15% higher than the forecast), while the available usable river water resources estimated as natural, non-regulated river flow plus lateral inflow into the river and minus losses amounted to 1,906 Mm^3. The regulated flow in the section upstream of Garagumdarya is higher than the available usable water for two reasons: i) discharge from the Nurek reservoir adds 639 Mm^3 to natural flow, ii) about 800 Mm^3 (30% of river flow upstream of intake to Garagumdarya) is lost along the river.

River flow is expected in the amount of 2,998 Mm^3 upstream of intake to Garagumdarya in March. If we subtract drawdown of the Nurek reservoir (732 Mm^3) in March, then the natural river flow in this section will be 2,266 Mm^3 (89% of the norm – mean long-term flow).

According to UzHydromet's estimates, water content in the Vakhsh River is expected within 90-100% of the norm for the growing season 2020 (April-September). SIC estimates that water content in the Amu Darya River in the section upstream of Garagumdarya will be also within 90 - 100%; however, it can decrease to 70 – 75% of the norm in summer months (June, July).

By the beginning of February, the snow cover depth at Sary Tash weather station (Vakhsh River basin) is only 43% of the norm (on the same date last year snow was accumulated 20% more of the norm). Accumulation of precipitation and seasonal snow in mountains will continue till the beginning of April and this may change the situation for the better. The data on accumulation of precipitation in the Panj River basin is not available at UzHydromet.

Inflow to the Nurek reservoir was 533 million m^3 in February or 122% of the forecast. Water releases from the reservoir amounted to 1,397 million m^3 (115% of planned releases). The reservoir was drawn down to 6,870 million m^3 by the end of month. This is 97% of the volume planned in BWO Amu Darya's schedule. Water losses in the reservoir (estimated as balance discrepancy) amounted to approx. 2% of water volume in the reservoir. It is expected that in March 578 million m^3 of water will flow into the Nurek reservoir. The water volume in the reservoir will decrease down to 6,142 million m^3, and water releases from the reservoir will be 1,339 million m^3.

In February, inflow to Tuyamuyun waterworks facility (TMWF) was 1,016 million m^3 or 78% of the expected volume. The water accumulation plan in reservoirs of TMWF was fulfilled by the beginning of March: the water volume in the reservoirs was 4,171 million m^3 (102% of the plan) by the end of February. At the same time, water volume in the reservoirs decreased by 313 Mm^3. Water releases from the reservoirs amounted to 631 Mm^3 – only 50% of those scheduled by BWO Amu Darya. Water diversion from the reservoirs amounted to 417 million m^3 (96% of the plan). Water losses in the reservoirs of TMWF (calculated as water balance discrepancy) are estimated at 274 Mm^3, i.e. about 7% of water volume in the reservoirs by the end of February.

Inflow to TMWF is expected to be 1,366 million m^3 in March. TMWF reservoirs will be emptied and their volume will be 3,369 Mm^3 by the end of month. Water releases from the reservoirs are planned in the amount of 1,307 million m^3.

Nurek HEPS generated 704 million kWh of electric energy in February. The discharge through turbines was 557 m^3/s, while the head was 229 m. Sterile spills were not observed.

In February, HEPS of the Tuyamuyun waterworks facility generated 23 million kWh; and, the head at HEPS was 20 m.

In February, 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 the water shortage was estimated at 90 Mm^3 (7% of the plan), and in lower reaches at Tuyamuyun g/s – Samanbay g/s the water shortage was 177 Mm^3 (78% of the plan). Water withdrawal was 1,338 Mm^3 in the first reach and 225 Mm^3 in the second reach.

Open channel losses were observed in middle and lower reaches of the Amu Darya River. Water losses amounted to 622 Mm^3 (23% of river flow at Kelif g/s) in the middle reaches and 229 Mm^3 (47% of river flow downstream of TMWF) in the lower reaches. The trend towards an increase in open channel losses was observed in the first reach: 1st ten-day period - 16%, 2nd ten-day period - 25%, 3rd ten-day period - 26%. The second reach showed the following: 1st ten-day period - 59%, 2nd ten-day period - 65%, 3rd ten-day period - 32%.

In February, flow of the Amu Darya River changed as follows by key gauging station: Kelif g/s – 2,701 Mm^3, Birata g/s (inflow to TMWF) – 1,016 Mm^3 (38% of flow at Kelif g/s), Tuyamuyun g/s (downstream of TMWF) - 631 Mm^3 (23%), and Samanbay g/s (inflow to the Large Aral Sea) - 107 Mm^3 (4% of flow at Kelif g/s).

In March, water withdrawal will be increased to 1,953 Mm^3 in the first reach and to 605 Mm^3 in the second reach. River flow along the river will change as follows: Kelif g/s – 2,701 Mm^3, Birata g/s – 1,366 Mm^3, Tuyamuyun g/s – 1,307 Mm^3, and Samanbay g/s - 338 Mm^3.

In February, inflow to the Large Aral Sea from the Amu Darya basin (flow from the river and collecting drains (collectors)) amounted to 158 million m^3. 127 million m^3 were discharged from the Northern Aral Sea, and, thus, the cumulative inflow to the Eastern part of the Large Aral Sea was 285 million m^3.

In February, the water level in the Eastern part of the Large Aral Sea varied within 27.5…27.6 м, the water surface area was 2.5…2.6 thousand km^2, and the water volume was 2.4…2.5 km^3. In the Western part, the water level was 21.74…21.81 m, the water surface area was 2.22…2.24 thousand km^2, and the water volume was 32.41…32.63 km^3. Evaporation from 1 km^2 of water surface of the Large Aral Sea was 0.035 Mm^3 in February.

It is expected that in March the total inflow to the Large Aral Sea will be 552 Mm^3, including 355 million m^3 from the Amu Darya River and collectors and 197 Mm^3 as inflow from the Northern Sea. By the end of March, in the Eastern part of the Large Aral Sea the water level will be 27.7 m, the water surface area will be 2.82 thousand km^2, and the water volume will be 2.79 km^3. In the Western part of the Large Aral Sea the water level will be 21.83 m, the water surface area will be 2.24 thousand km^2, and the water volume will be 32.7 km^3. Evaporation from 1 km^2 of water surface of the Large Aral Sea will be 0.041 million m^3 in March.

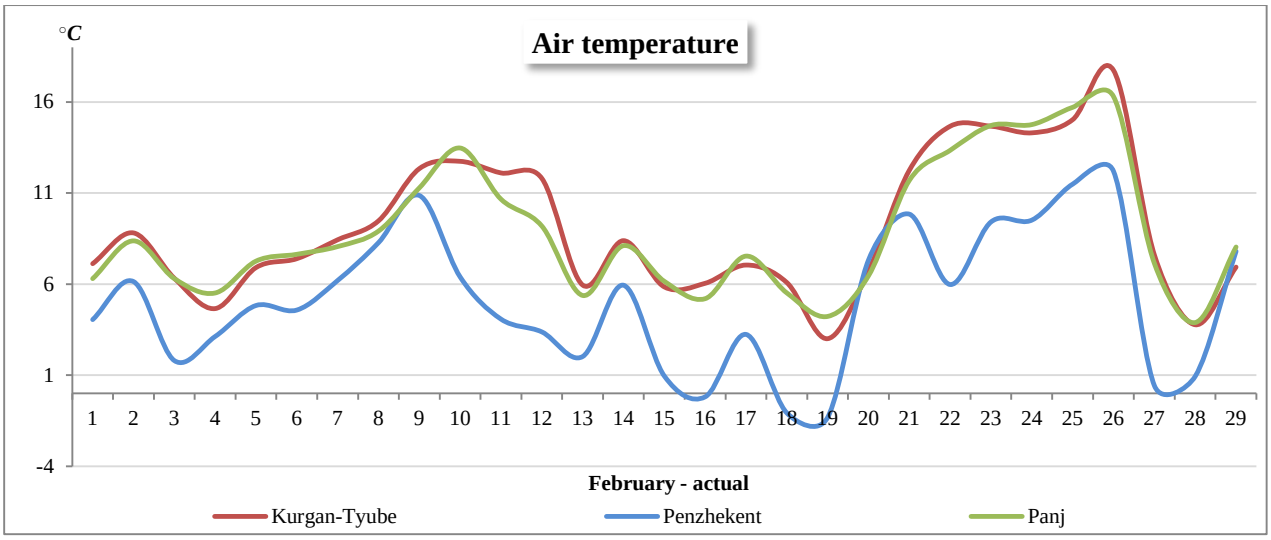
The sections below show daily and ten-day data on climate and water management (reservoirs, HEPS, water distribution).

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		February			March		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Panj	*T*, °C	*Forecast*	7.00	7.00	10.00	12.00	14.00	15.00
		Actual	8.31	6.84	11.73			
Kurgan-Tyube	*T*, °C	*Forecast*	8.00	8.00	11.00	12.00	14.00	16.00
		Actual	8.42	7.30	11.88			
Penzhekent	*T*, °C	*Forecast*	5.00	3.00	7.00	8.00	11.00	11.0
		Actual	5.62	2.44	7.51			

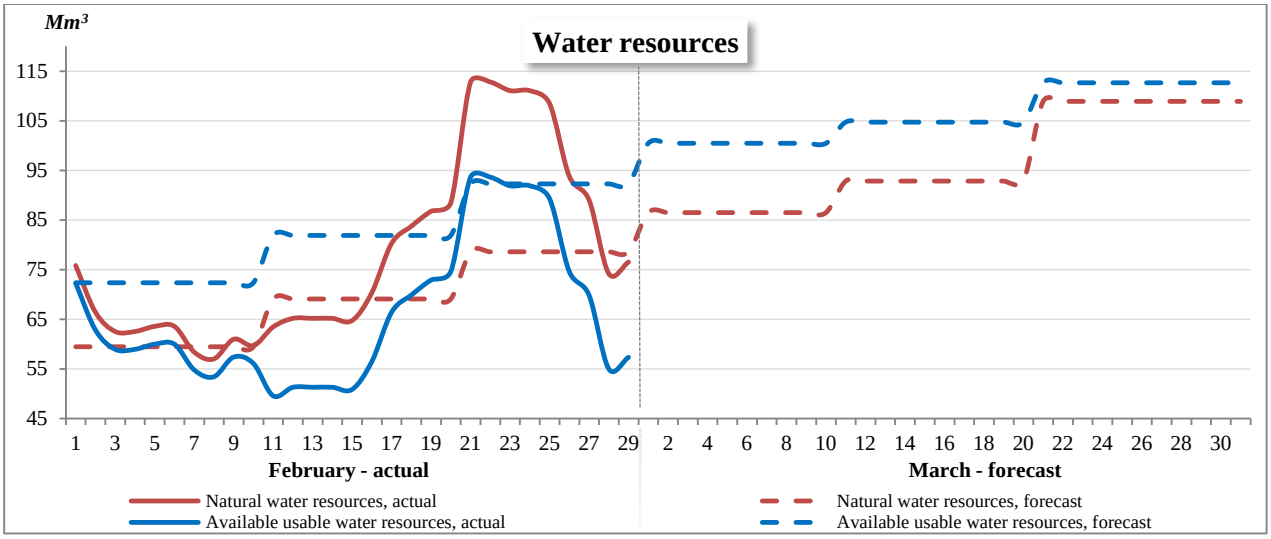


Water resources

Object
Amu Darya
Nurek reservoir
Atamyrat gauging station

Water volume (**W**)

Object	Parameter		February			March		
			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*	475	492	466.6	522.7	492.5	589.2
		Actual	530	609	699			
Water withdrawal: upstream of Atamyrat g/s	*W, Mm³*	*Forecast*	400	479	497.4	631.7	708.2	808.5
		Actual	420	431	428			
Nurek reservoir /filling (+) or draw down (-)	*W, Mm³*	*Forecast*	-281	-281	-257	-289	-272	-200
		Actual	-321	-306	-237			
Natural water resources at Atamyrat g/s	*W, Mm³*	*Forecast*	595	691	707	865	929	1198
		Actual	630	733	890			
Lateral inflow: downstream of Atamyrat g/s	*W, Mm³*	*Forecast*	76	87	84	93	90	96
		Actual	95	95	95			
Open channel losses: downstream of Atamyrat g/s	*W, Mm³*	*Forecast*	-53	-40	-39	-46	-29	55
		Actual	131	233	258			
Available usable water resources	*W, Mm³*	*Forecast*	723	819	830	1004	1047	1239
		Actual	595	595	717			

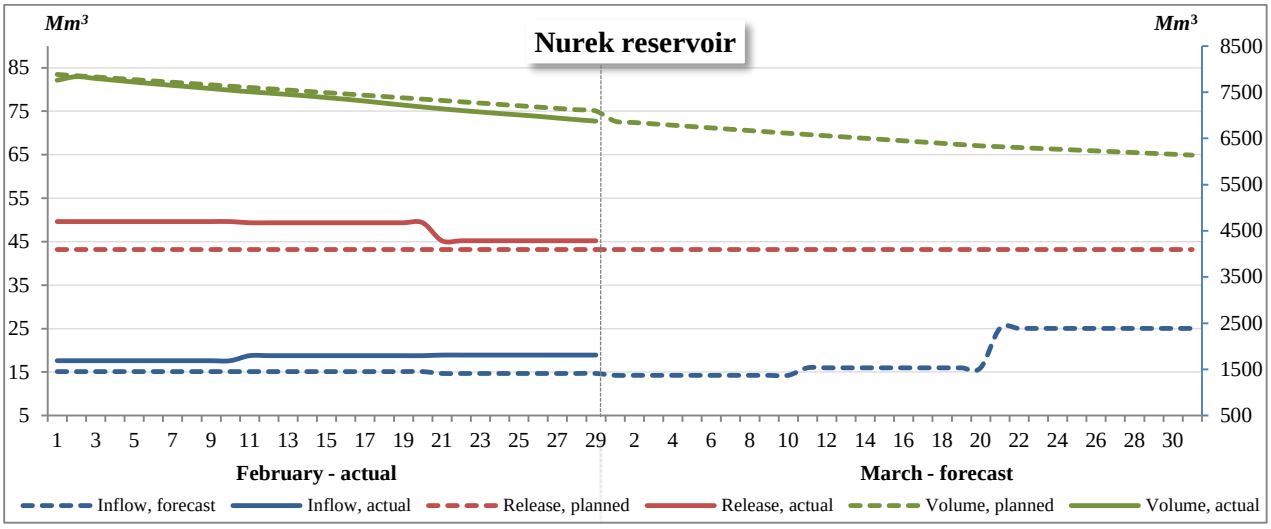


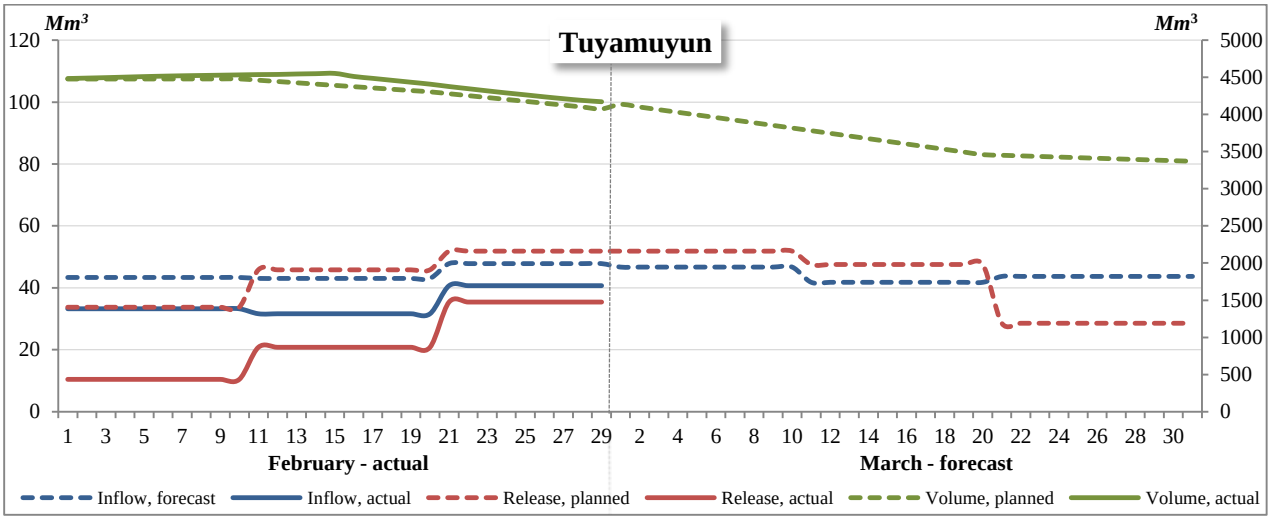
Reservoirs and HEPS

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**)

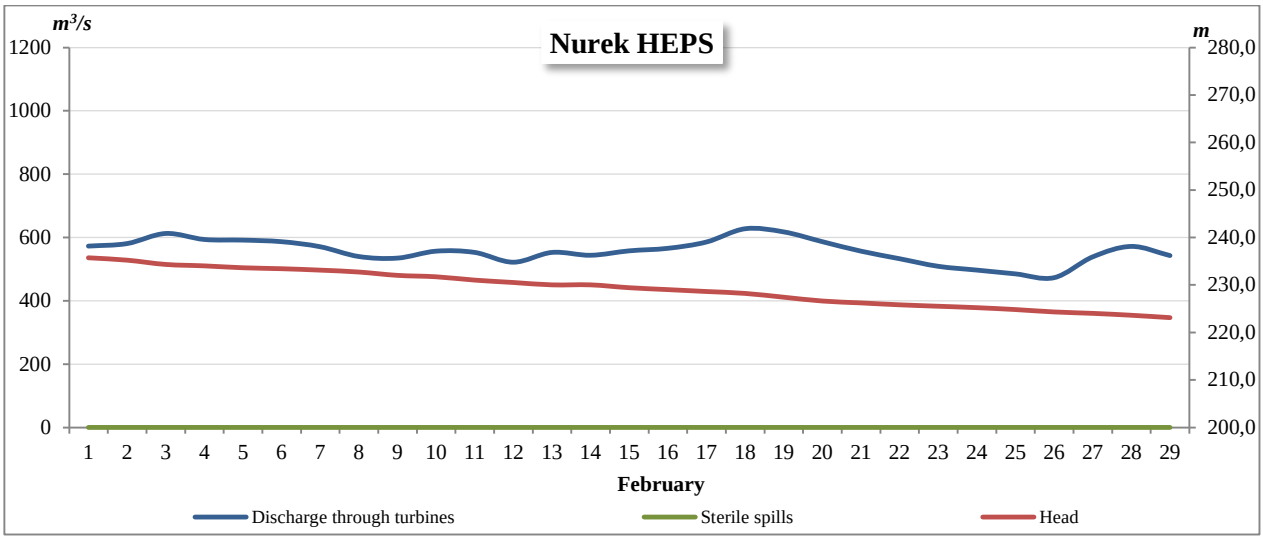
Reservoir	Parameter		February			March		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Nurek reservoir	*I, Mm³*	*Forecast*	151	151	132.2	142.6	159.8	275.62
		Actual	176	187	170			
	R, Mm³	*Planned*	432	432	388.8	432.0	432.0	475.2
		Actual	497	494	407			
	W, Mm³	*Planned*	7631	7351	7094	6614	6341	6142
		Actual	7542	7178	6870			
Reservoirs of Tuyamuyun waterworks facility	*I, Mm³*	*Forecast*	434	431	430.4	467.1	418.3	480.9
		Actual	333	316	367			
	R, Mm³	*Planned*	337	458	466.6	518.4	475.2	313.6
		Actual	105	208	319			
	W, Mm³	*Planned*	4480	4306	4075	3817	3458	3369
		Actual	4533	4408	4171			

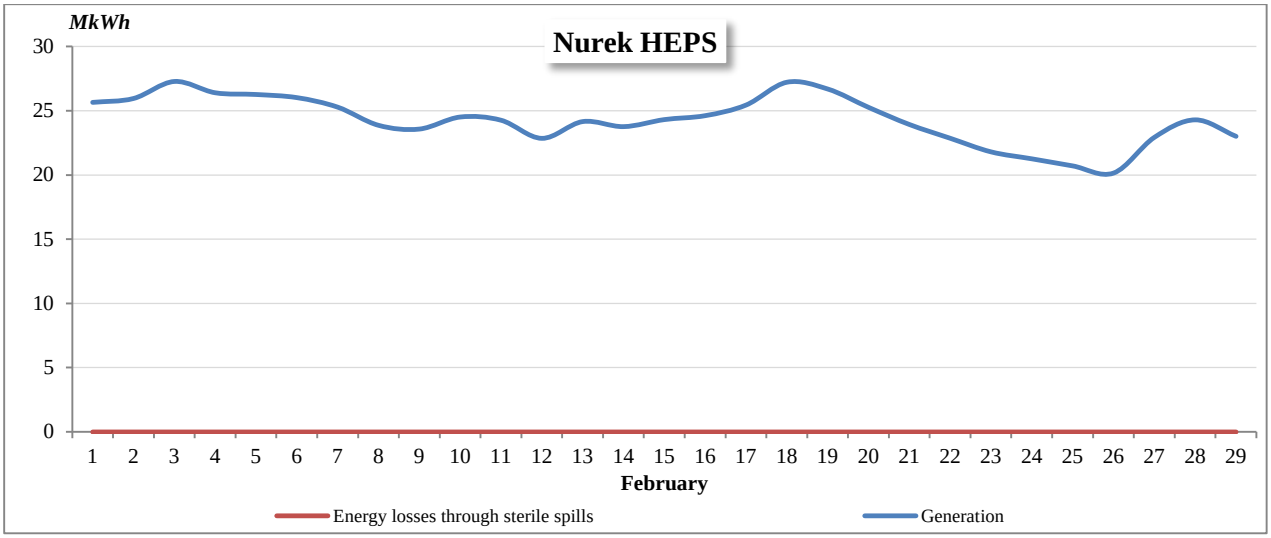


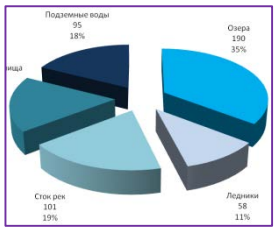


Generation (**G**), Energy losses through sterile spills (**L**), Discharge through turbines (**Q**), Sterile spills (**R**), Head (**H**)

HEPS	Parameter		February		
			I ten-day	*II ten-day*	*III ten-day*
Nurek	*G, M kWh*	*Actual*	254.9	248.7	201.0
	L, M kWh	*Actual*	0.0	0.0	0.0
	Q, m^3/s	*Actual*	574.3	571.5	523.1
	R, m^3/s	*Actual*	0.0	0.0	0.0
	H, m	*Actual*	233.6	229.1	224.7





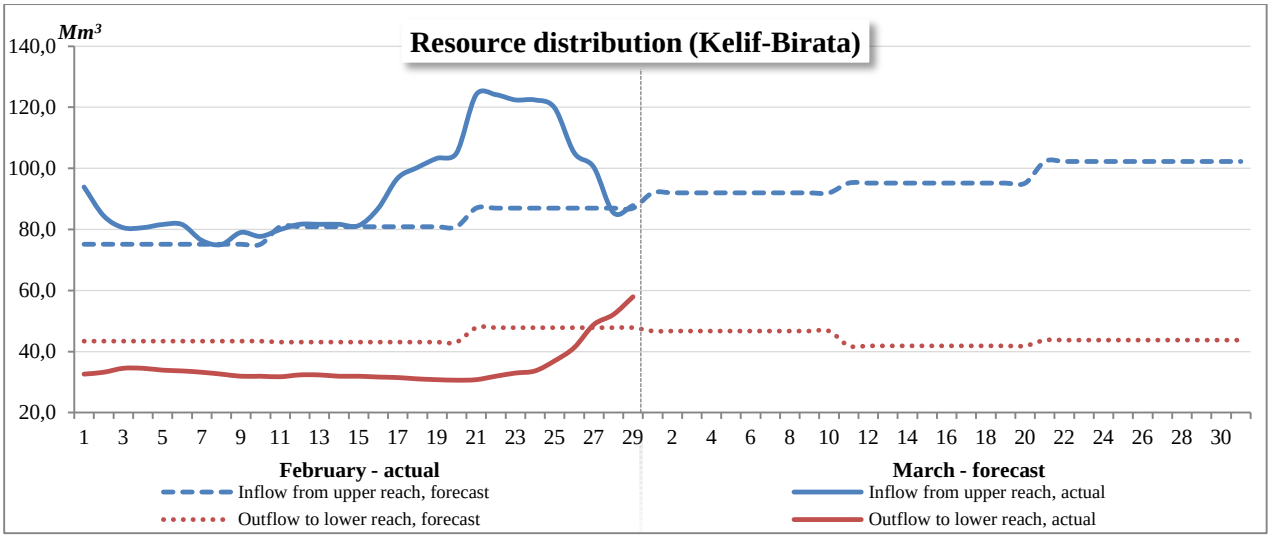


Water distribution

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)

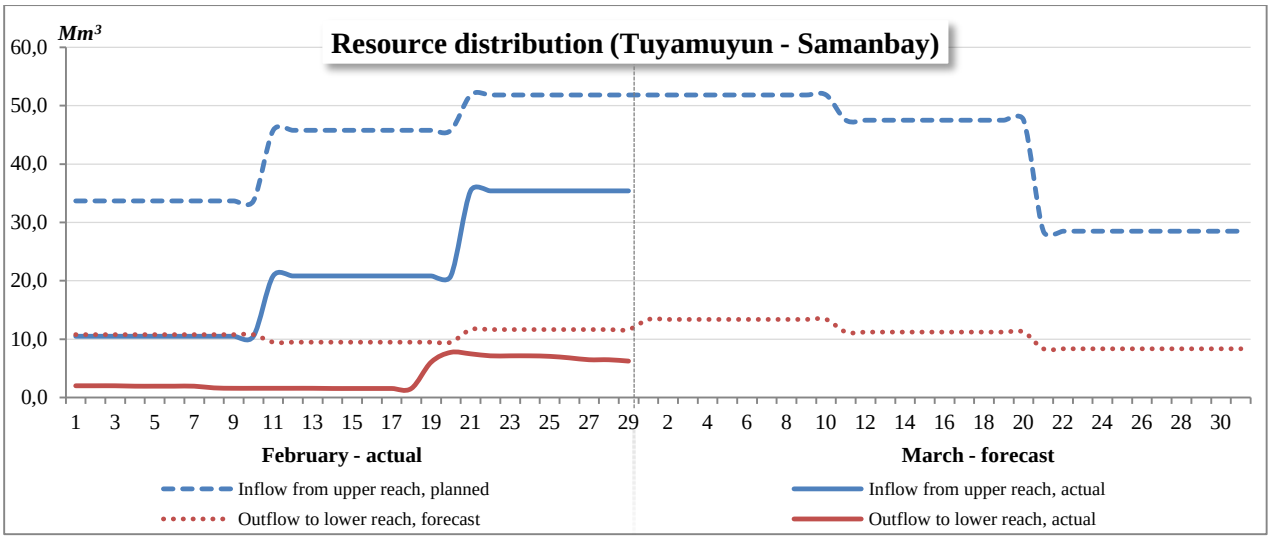
Kelif - Birata	Parameter		February			March		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach	*W, Mm³*	*Forecast*	752	809	783	920	952	1125
		Actual	811	898	991			
Lateral inflow	*W, Mm³*	*Forecast*	76	87	84	93	90	96
		Actual	95	95	85			
Water withdrawal	*W, Mm³*	*Planned*	447	506	475	592	654	707
		Actual	443	443	452			
Losses	*W, Mm³*	*Forecast*	-53	-40	-39	-46	-29	55
		Actual	131	233	258			
Outflow to lower reach	*W, Mm³*	*Forecast*	434	431	430	467	418	481
		Actual	333	316	367			



Water volume (W)

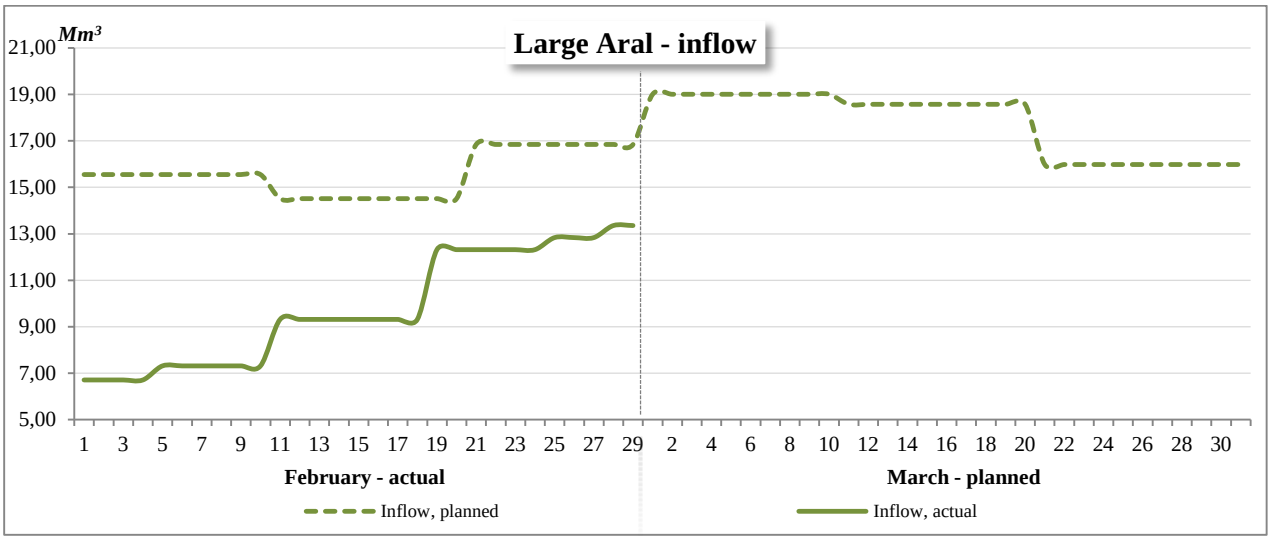
Tuyamuyun - Samanbay	Parameter		February			March		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach	*W, Mm³*	*Forecast*	337	458	467	518	475	314
		Actual	105	208	319			
Lateral inflow	*W, Mm³*	*Forecast*	0	0	0	0	0	0
		Actual	0	0	0			
Water withdrawal [1]	*W, Mm³*	*Planned*	117	130	156	220	242	143
		Actual	27	46	152			
Losses	*W, Mm³*	*Forecast*	112	233	206	164.2	121	79
		Actual	59.0	136	104			
Outflow to lower reach	*W, Mm³*	*Forecast*	108	95	105	133.9	112.3	92.2
		Actual	19	26	62			

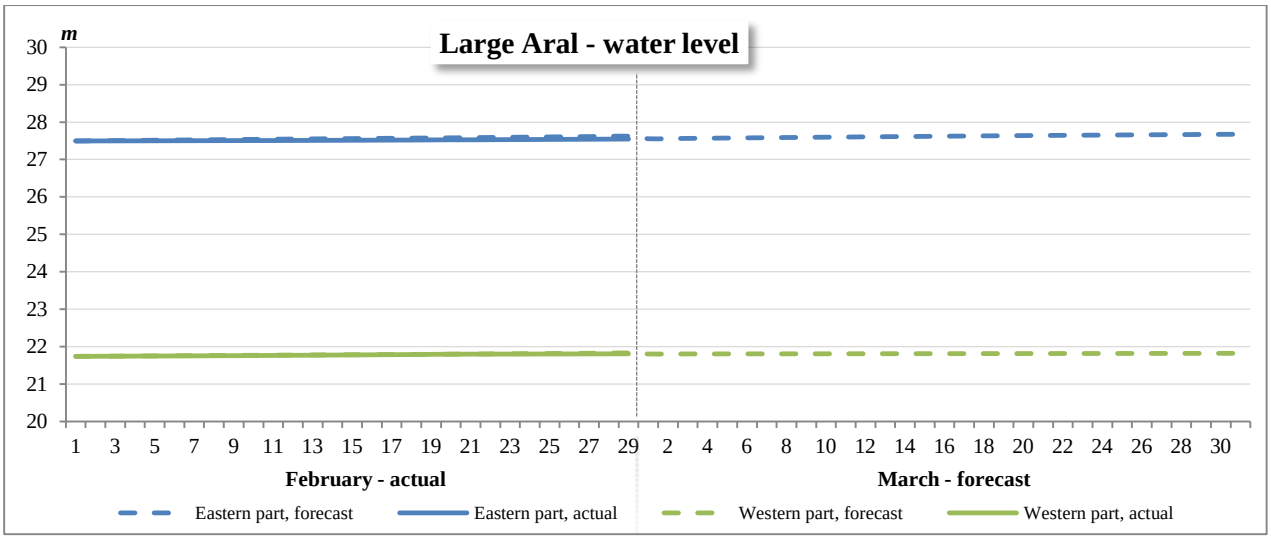
[1] *Note: Including supply to the system of lakes and environmental water releases into canals*

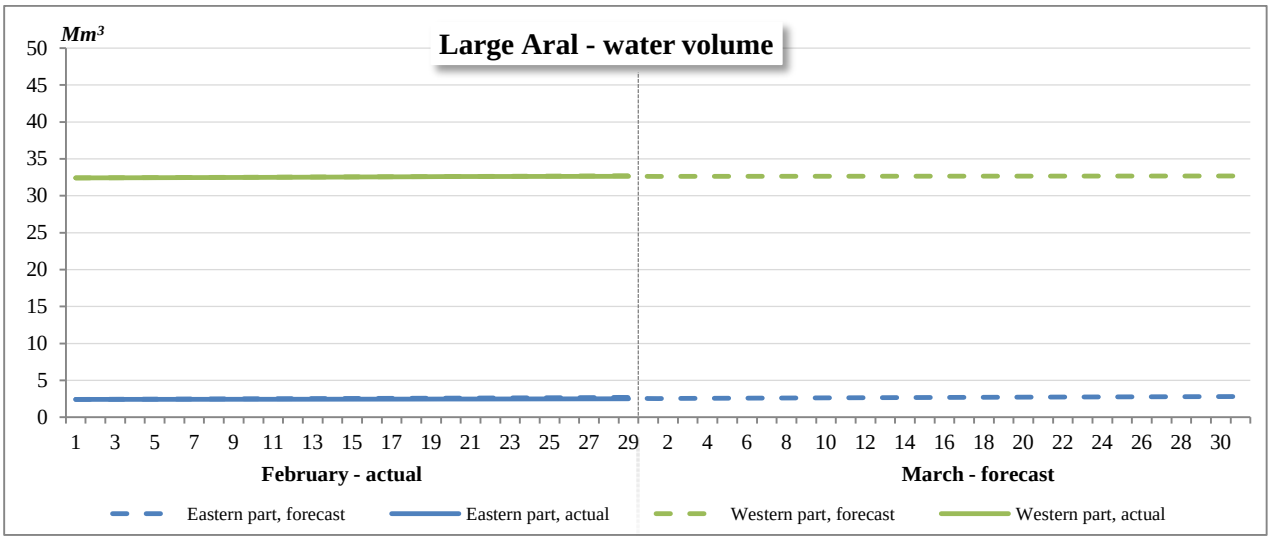


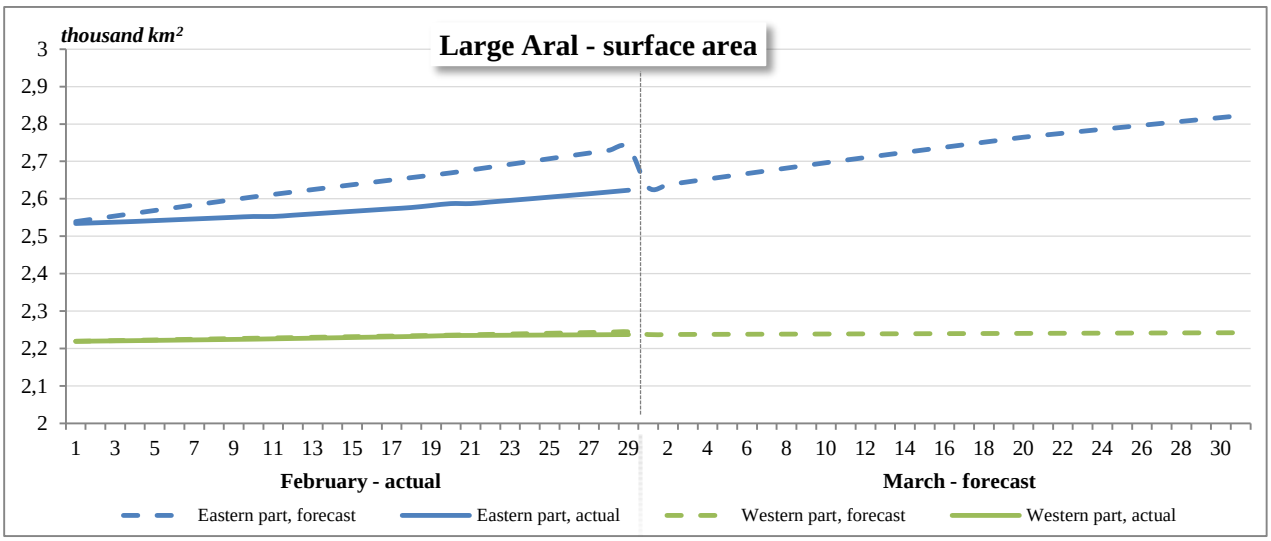
Water volume (**W**), Level (**H**), Surface area (**S**)

Large Aral Sea	Parameter		February			March		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow	*W, Mm³*	*Planned*	155.52	145.15	151.63	190.08	185.76	175.82
		Actual	70.78	99.20	114.51			
Eastern part, water volume	*W, Mm³*	*Forecast*	2.45	2.54	2.63	2.57	2.67	2.75
		Actual	2.41	2.45	2.49			
Eastern part, level	*H, m*	*Forecast*	27.52	27.56	27.60	27.58	27.62	27.66
		Actual	27.50	27.52	27.54			
Eastern part, area	*S, th.km²*	*Forecast*	2.57	2.64	2.71	2.66	2.73	2.80
		Actual	2.54	2.57	2.60			
Western part, water volume	*W, Mm³*	*Forecast*	32.46	32.57	32.68	32.65	32.67	32.69
		Actual	32.44	32.54	32.62			
Western part, level	*H, m*	*Forecast*	21.76	21.79	21.82	21.81	21.82	21.82
		Actual	21.75	21.78	21.80			
Western part, area	*S, th.km²*	*Forecast*	2.22	2.23	2.24	2.24	2.24	2.24
		Actual	2.22	2.23	2.24			




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


Large Aral - water volume
Mm³
50
45
40
35
30
25
20
15
10
5
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
February - actual
March - forecast
Eastern part, forecast
Eastern part, actual
Western part, forecast
Western part, actual


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

Syr Darya River Basin

Actual Situation in February and Forecast for March

In February, 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 1,767 million m^3, of which the inflow to the three upper reservoirs was 766 million m^3 (124% of the norm and 112% of forecast). In March, the available usable water resources are expected in the amount of 2,752 Mm^3, including 869 Mm^3 of inflow to three upper reservoirs or 106% of the norm. According to UzHydromet's estimates, water content in the Syr Darya basin is expected within the following limits during the growing season (April-September): Naryn and Chirchik rivers - 90-100%, Karadarya River - 80-90%. SIC ICWC estimates (by averaging plausible scenarios) water content in the main rivers of the Syr Darya basin for the growing season as follows: Naryn River (inflow to Toktogul reservoir) - 94% of the norm, Karadarya River (inflow to Andizhan reservoir) - 66%, Chirchik River (inflow to Charvak reservoir) - 86%. The snow cover depth at weather stations in the Chirchik River basin was 50 - 92% of the norm by the beginning of February.

In February, inflow to the Toktogul reservoir was 396 million m^3 or 91% of the expected volume, and water releases from the reservoir amounted to 1,549 million m^3 or 91% of BWO Syr Darya's schedule. The water volume in the reservoir decreased from 13,578 million m^3 at the beginning of month to 12,493 million m^3 by the end of month (101% of the plan). The unrecorded inflow to the reservoir was detected in the amount of 30 Mm^3. It is expected that in March the Toktogul reservoir will continue discharging water and by the end of month the water volume will be 11,199 million m^3; the inflow to the reservoir would be 445 million m^3, and water releases are planned at 1,738 million m^3. In February, inflow to the Andizhan reservoir was 132 million m^3 (121% of the forecast), and only 15 million m^3 of water were released from the reservoir. The water volume changed from 714 million m^3 at the beginning of month to 826 million m^3 at the end of month. The reservoir accumulated water for the growing season by 112 Mm^3. Water losses amounted to 5 Mm^3. In March, inflow to the Andizhan reservoir is expected to be 144 million m^3 and water releases will be also 144 million m^3. Thus, the reservoir will be operated in transit regime, without changes in its volume. Inflow to the Bakhri Tojik reservoir was 2,137 million m^3 (96% of the forecast), while water releases from the reservoir were in the amount of 2,253 million m^3 (99% of the plan) in February. The water volume was 3,516 Mm^3. The unrecorded inflow to the reservoir was detected from the balance method in the amount of 116 Mm^3. In March, inflow to the Bakhri Tojik reservoir is expected to be 2,224 million m^3, and 1,916 million m^3 are to be discharged from the reservoir. Water will be accumulated in the reservoir approx. to 3,825 Mm^3. Water was discharged from the Charvak reservoir from 784 million m^3 to 579 million m^3 in February. Inflow to the reservoir was 200 million m^3, and water releases amounted to 364 million m^3. Water losses in the reservoir amounted to 7% of water volume by the end of month. In March, the Charvak reservoir will be emptied and its volume will drop to 539 million m^3 by the end of month. Inflow to the reservoir is expected in the amount of 281 million m^3, while 321 Mm^3 of water will be released. Inflow to the Shardara reservoir was 2,031 million m^3 (76% of the forecast) in February. Water releases from the reservoir amounted to 1,100 million m^3 (only 75% of BWO Syr Darya's schedule). The reservoir was emptied from 3,486 Mm^3 to 4,337 Mm^3. Water was not discharged from the reservoir into Arnasai. Water losses were estimated at 79 Mm^3 (less than 2% of the water volume). In March, inflow to the Shardara reservoir is expected to increase to 2,267 million m^3, while water releases will be planned at 1,941 million m^3. The water volume will be 4,650 million m^3 by the end of month. Water discharge into Arnasai is not planned for March. In February, the Koksarai reservoir was filled with water. Water diversion into the reservoir amounted to 816 million m^3 (89%

of the plan and 74% of river flow downstream of the Shardara reservoir). By the beginning of March, 1,183 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 27 million m^3 (3% of the water volume). In March, it is planned to continue accumulating water in the Koksarai reservoir. The expected water diversion from the river is 957 million m^3. No discharge is planned. The water volume in the reservoir will be augmented to 2,140 million m^3 by the end of March.

In February, energy generation by the cascade of Naryn HEPS amounted to 1,366 million kWh, against planned 1,415 million kWh, including: Toktogul HEPS - 576 million kWh, when the plan was 624 million kWh. The average discharge through turbines of Toktogul HEPS was 618 m^3/s, while the average head was 150 m. No sterile spills were observed. The plan of energy generation for March for the cascade of Naryn HEPS is set at 1,342 million kWh, including 605 million kWh for Toktogul HEPS. In February, the total generation at large HEPS of Uzbekistan amounted to 137 million kWh, of which: 89 million kWh at Charvak HEPS, 48 million kWh at Farkhad HEPS. The discharge at Charvak HEPS is 139 m^3/s, and the head is 107 m; the discharge at Farkhad HEPS is 279 m^3/s, and the head is 30 m. No energy was generated by Andizhan HEPS in February; discharge at this station was absent. During this period of time, the reservoir accumulated water for the growing season to cover possible water shortage that may take place because of expected low water content in the Karadarya River. Energy generation by HEPS of the Bakhri Tojik reservoir amounted to about 80 million kWh, and that by Shardara HEPS was 55 million kWh in February. Water discharge at HEPS of Bakhri Tojik was 832 m^3/s, while the head was 19 m. Discharge at Shardara HEPS was 409 m^3/s, and the head was 19 m.

In February, water was distributed unevenly along the Syr Darya River and its tributaries. In the reach of Toktogul HEPS – Uchkurgan (tail-water) the water shortage amounted to 34 million m^3 or 21 % of the water withdrawal limit. Open channel losses were estimated at 188 million m^3 (12% of river flow at the head of the reach). In the reach of Uchkurgan (tail-water) – Akjar g/s virtually no water shortage (1%) was recorded and open channel losses were not observed (unrecorded inflow of 1% of river flow at the head of the reach was detected). In the reach of Bakhri Tojik reservoir – Shardara reservoir water shortage was estimated at 24 million m^3 (7%). In the lower reaches unrecorded inflow of 80 million m^3 (7% of flow of the Syr Darya River downstream of the Shardara reservoir) was detected and no water shortage was observed. In February, flow along the Naryn – Syr Darya rivers changed as follows: discharge from the Toktogul reservoir – 1,549 million m^3, discharge from Uchkurgan waterworks facility – 1,253 million m^3, Akjar g/s (inflow to the Bakhri Tojik reservoir) – 2,137 million m^3, Kyzylkishlak g/s – 2,251 million m^3, inflow to the Shardara reservoir – 2,031 million m^3, tail-water of the Shardara reservoir – 1,100 million m^3, Samanbay g/s (inflow to the Northern Aral Sea) - 403 million m^3. In March, water withdrawal from the river will be increased: to 489 million m^3 in the first reach, to 36 million m^3 in the second reach, and to 409 million m^3 in the third reach. Inflow to the Northern Aral Sea is expected in the amount of 213 million m^3.

In February, inflow to the Northern Aral Sea was 403 million m^3. The water level in the sea varied within 41.97…42.10 m. The water surface area was 3.13…3.17 thousand km^2 and the water volume was 24.19…24.45 km^3. The discharge from the Northern Aral Sea into the Large Aral Sea (Amu Darya Basin) was recorded in the amount of 127 million m^3 in February. It is expected that in March inflow to the Northern Aral Sea will be 213 million m^3, while discharge into the Large Aral Sea will be 197 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 24.7 km^3 by the end of month.

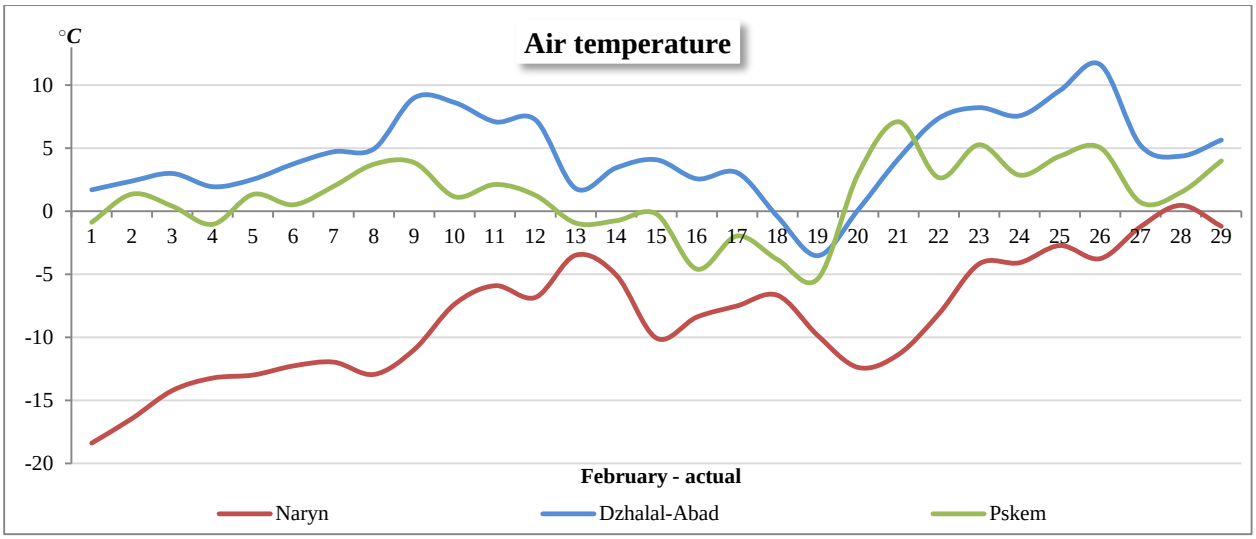
The sections below show daily and ten-day data on climate and water management (reservoirs, HEPS, water distribution).

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		February			March		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Naryn	*T*. °C	*Forecast*	- 14.00	- 8.00	- 5.00	- 4.00	- 1.00	2.00
		Actual	- 13.08	- 7.62	- 4.02			
Dzhalal-Abad	*T*. °C	*Forecast*	4.00	3.00	6.00	8.00	11.00	14.00
		Actual	4.26	2.54	7.08			
Pskem	*T*. °C	*Forecast*	- 1.00	- 1.00	2.00	4.00	6.00	7.00
		Actual	1.23	- 1.14	3.71			

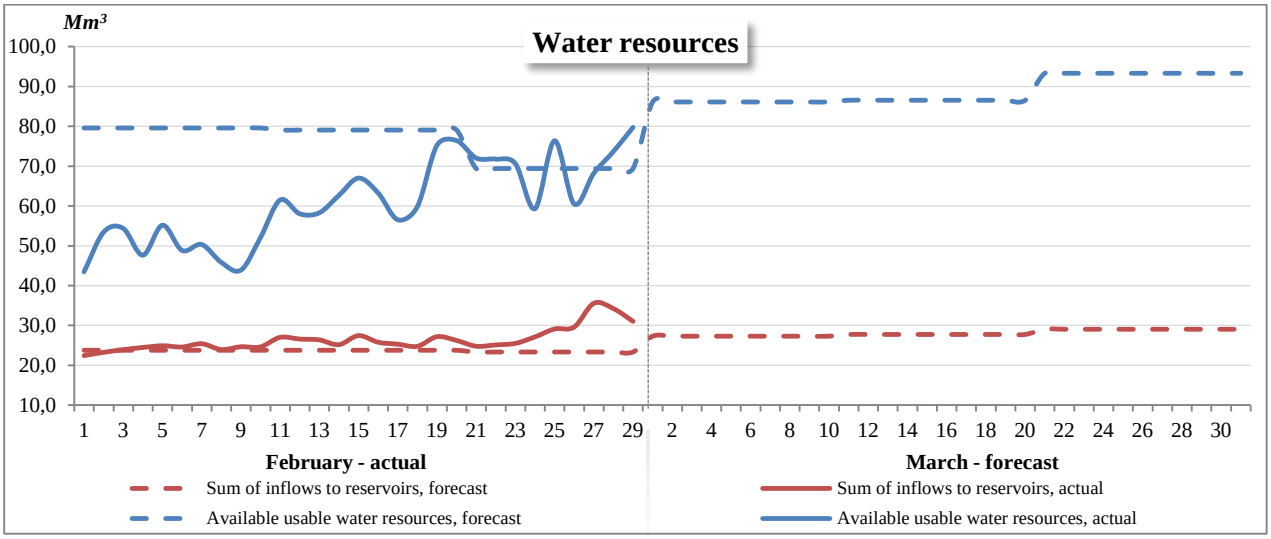


Water resources

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		February			March		
			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*	137	137	122.9	143	143	157.8
		Actual	135	148	151.0			
Inflow to Andizhan reservoir	*W, Mm³*	*Forecast*	39	39	31.1	39	43	61.8
		Actual	44	47	42.1			
Inflow to Charvak reservoir	*W, Mm³*	*Forecast*	63	63	56.3	91	91	99.7
		Actual	63	67	69.0			
Sum of inflows to reservoirs	*W, Mm³*	*Forecast*	238	238	210.3	273	277	319.3
		Actual	242	262	262.1			
Lateral inflow up to Shardara	*W, Mm³*	*Forecast*	567	562	424.1	600	600	719.1
		Actual	263	387	380.2			
Losses	*W, Mm³*	*Forecast*	10	10	9.7	12	12	12.2
		Actual	10	10	9.7			
Available usable water resources	*W, Mm³*	*Forecast*	796	791	624.6	861	865	1026.1
		Actual	495	639	632.6			

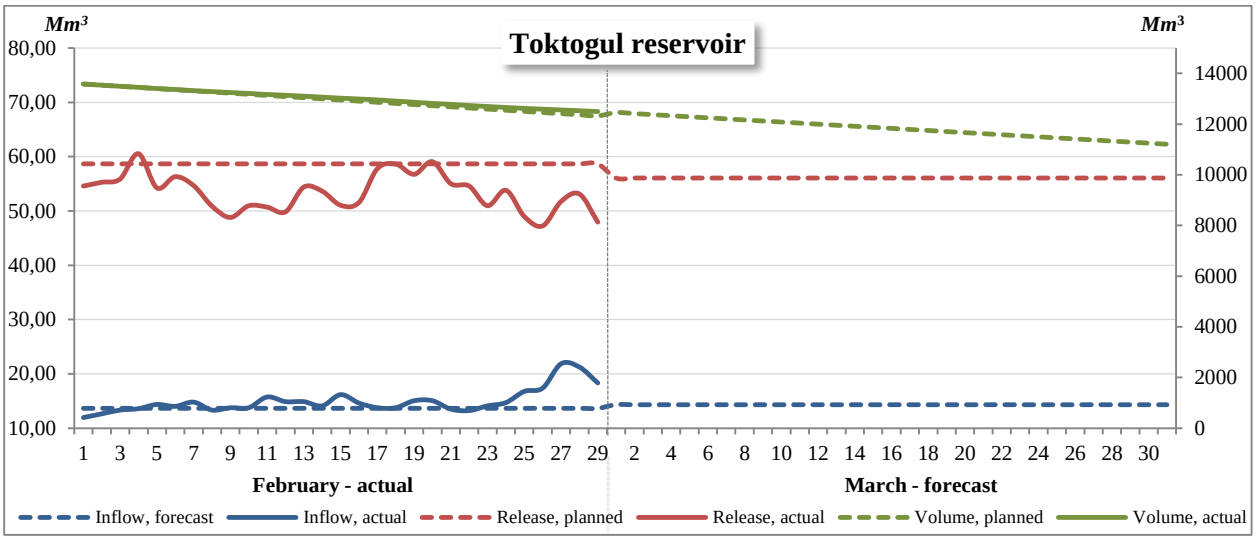


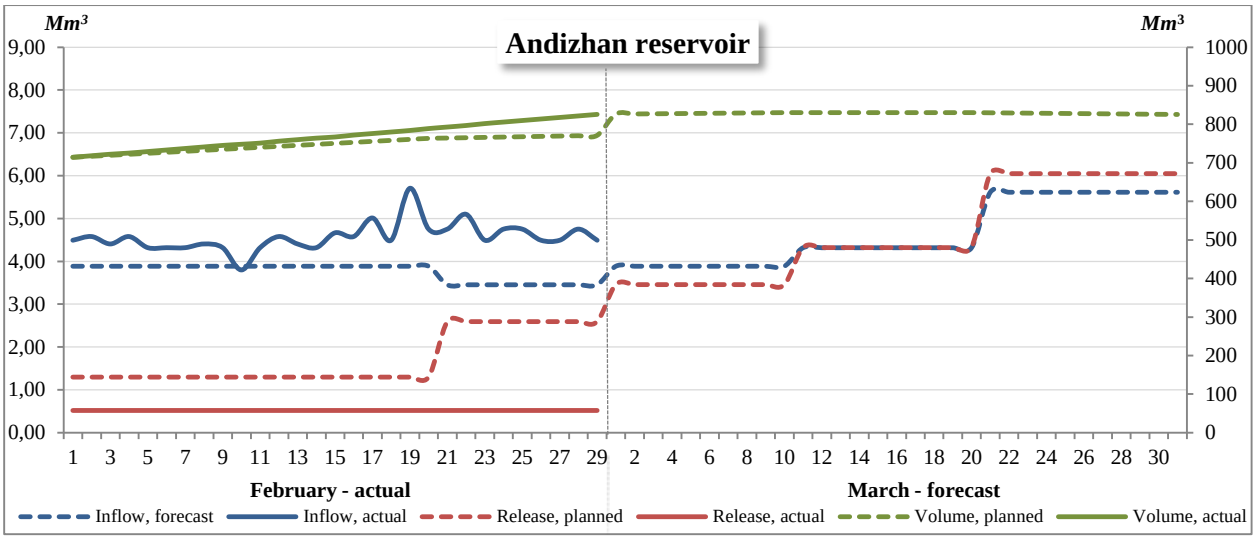
Reservoirs and HEPS

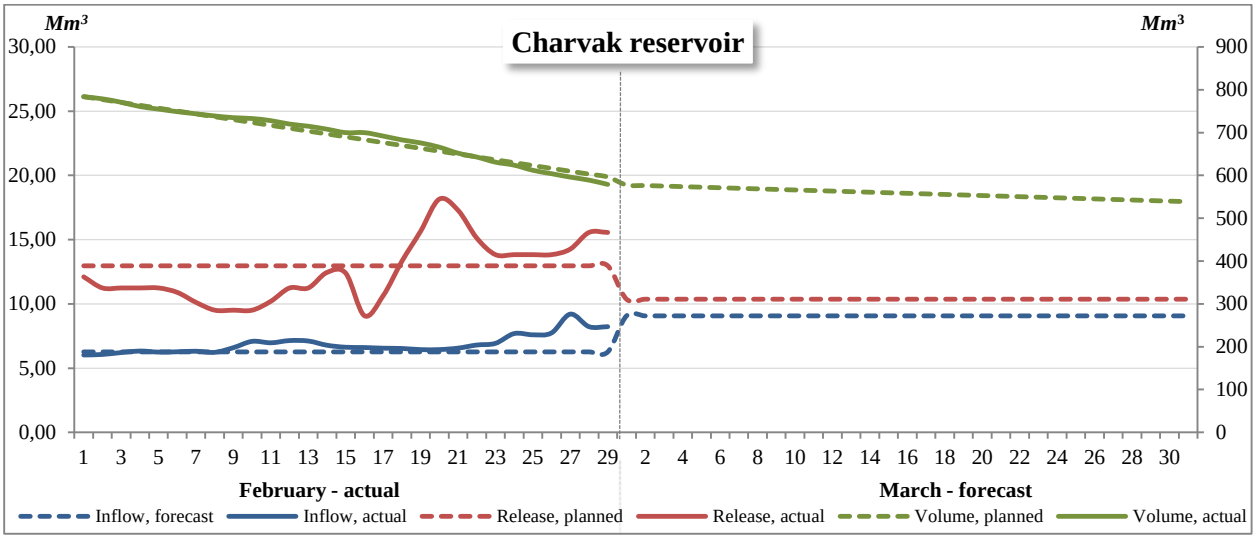
Reservoir	Location			Characteristics				
	Latitude	Longitude	Altitude above sea level, m	Length, km	Width, km	Water-surface area, km²	Full volume, km³	Full reservoir level, m
Toktogul	41.80	72.87	880	65	12	284	19.50	215
Andizhan	40.77	73.11	900	36	1.5-12	56	0.19	905
Bakhri Tojik	40.29	70.07	344	75	20	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

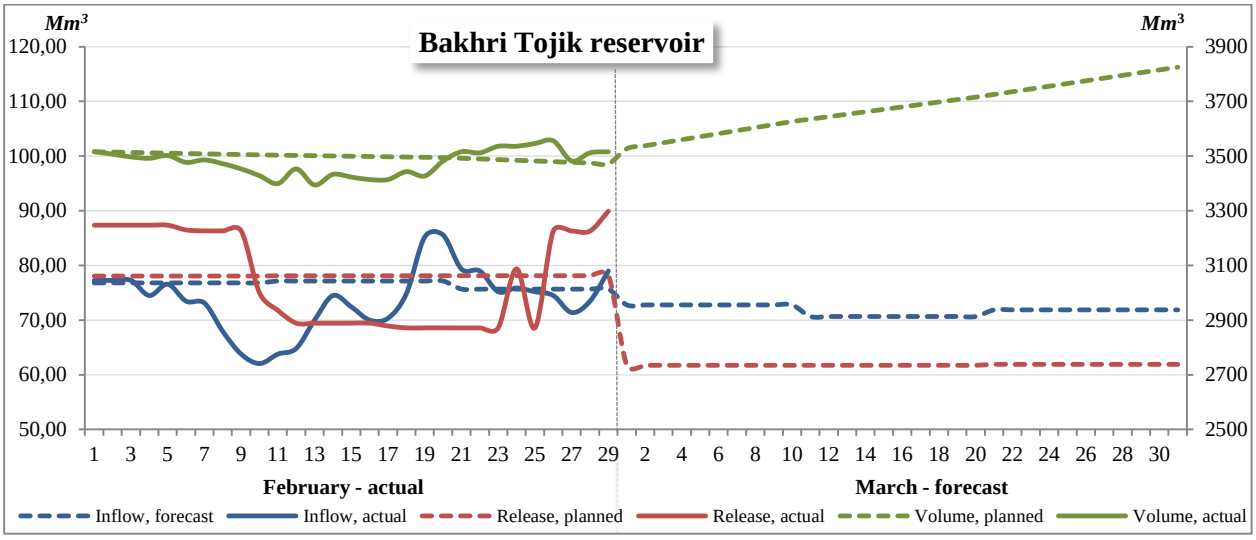
Inflow (**I**), Releases (**R**), Volume (**W**)

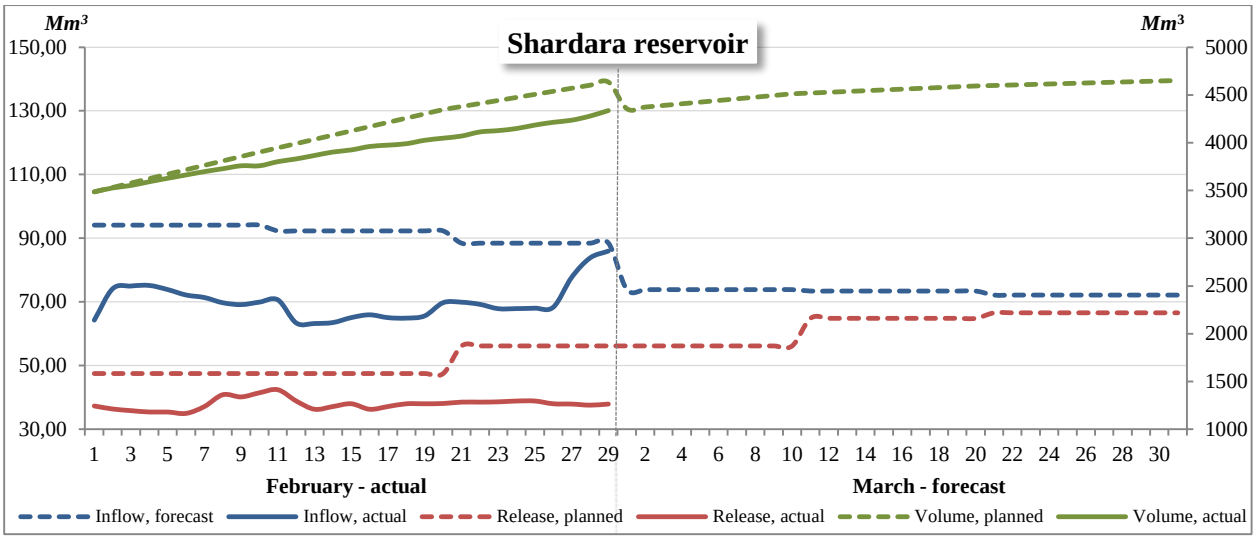
Reservoir	Parameter		February			March		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Toktogul reservoir	*I, Mm³*	*Forecast*	136.51	136.51	122.86	143.42	143.42	157.77
		Actual	135.30	147.83	151.03			
	R, Mm³	*Planned*	586.66	586.66	527.99	560.74	560.74	616.80
		Actual	542.33	543.63	463.54			
	W, Mm³	*Planned*	13173	12723	12318	12076	11658	11199
		Actual	13208	12815	12493			
Andizhan reservoir	*I, Mm³*	*Forecast*	38.88	38.88	31.10	38.88	43.20	61.78
		Actual	43.55	46.83	42.08			
	R, Mm³	*Planned*	12.96	12.96	23.33	34.56	43.20	66.53
		Actual	5.18	5.18	4.67			
	W, Mm³	*Planned*	737	763	771	830	830	826
		Actual	748	789	826			
Charvak reservoir	*I, Mm³*	*Forecast*	62.56	62.56	56.31	90.65	90.65	99.72
		Actual	63.39	67.22	68.96			
	R, Mm³	*Planned*	129.60	129.60	116.64	103.68	103.68	114.05
		Actual	106.53	124.27	133.06			
	W, Mm³	*Planned*	724	657	596	566	553	539
		Actual	733	666	579			
Bakhri Tojik reservoir	*I, Mm³*	*Forecast*	767.87	771.25	680.85	727.53	706.37	790.36
		Actual	723.00	731.29	682.73			
	R, Mm³	*Planned*	780.62	781.14	703.11	617.33	617.33	680.96
		Actual	857.17	693.61	702.41			
	W, Mm³	*Planned*	3505	3495	3472	3626	3715	3825
		Actual	3428	3482	3516			
Shardara reservoir	*I, Mm³*	*Forecast*	941.50	923.38	796.37	738.91	734.47	794.04
		Actual	714.83	657.15	658.77			
	R, Mm³	*Planned*	475.20	475.20	505.44	561.60	648.00	731.81
		Actual	375.06	380.33	344.91			
	W, Mm³	*Planned*	3902	4346	4633	4510	4593	4650
		Actual	3759	4048	4337			




Andizhan reservoir
Mm³
Mm³
9,00
8,00
7,00
6,00
5,00
4,00
3,00
2,00
1,00
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 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
February - actual
March - forecast
Inflow, forecast
Inflow, actual
Release, planned
Release, actual
Volume, planned
Volume, actual

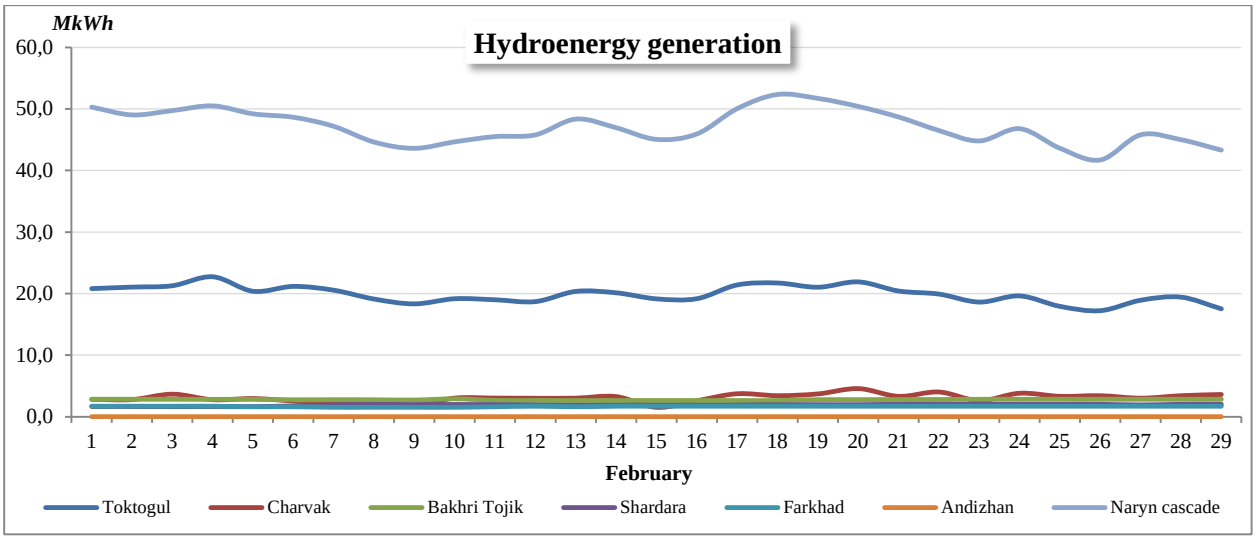

Charvak reservoir
Mm³
Mm³
30,00
25,00
20,00
15,00
10,00
5,00
0,00
900
800
700
600
500
400
300
200
100
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
February - actual
March - forecast
Inflow, forecast
Inflow, actual
Release, planned
Release, actual
Volume, planned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

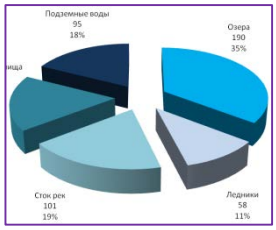

Bakhri Tojik reservoir
Mm³
Mm³
120,00
110,00
100,00
90,00
80,00
70,00
60,00
50,00
3900
3700
3500
3300
3100
2900
2700
2500
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
February - actual
March - forecast
Inflow, forecast
Inflow, actual
Release, planned
Release, actual
Volume, planned
Volume, actual



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

HEPS	Parameter		February		
			I ten-day	*II ten-day*	*III ten-day*
Naryn cascade	*G, M kWh*	*Actual*	477.5	482.2	406.2
Toktogul	*G, M kWh*	*Actual*	204.4	202.4	169.4
	Q, m³/s	*Actual*	628.0	629.2	594.6
	H, m	*Actual*	152.0	150.4	148.8
Andizhan	*G, M kWh*	*Actual*	0.0	0.0	0.0
	Q, m³/s	*Actual*	0.0	0.0	0.0
	H, m	*Actual*	95.0	95.0	95.0
Bakhri Tojik	*G, M kWh*	*Actual*	27.9	26.4	25.3
	Q, m³/s	*Actual*	834.9	830.0	830.0
	H, m	*Actual*	19.7	18.7	19.9
Farkhad	*G, M kWh*	*Actual*	16.0	16.8	15.3
	Q, m³/s	*Actual*	266.0	282.8	288.0
	H, m	*Actual*	30.6	30.6	30.6
Charvak	*G, M kWh*	*Actual*	26.7	31.7	30.4
	Q, m³/s	*Actual*	116.7	143.6	157.9
	H, m	*Actual*	109.9	106.9	102.7
Shardara	*G, M kWh*	*Actual*	17.8	19.0	17.9
	Q, m³/s	*Actual*	410.0	415.0	400.0
	G, M kWh	*Actual*	18.9	19.1	19.5



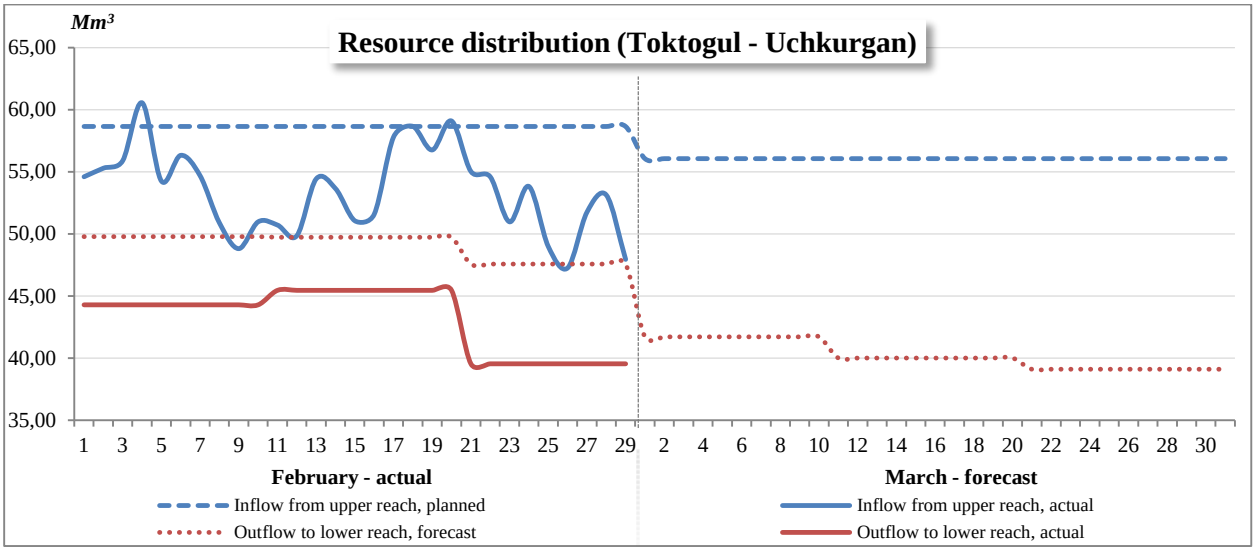


Water distribution

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**		**February**			**March**		
			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*	586.66	586.66	527.99	560.74	560.74	616.80
		Actual	542.33	543.63	463.54			
Lateral inflow[2]	*W, Mm³*	*Forecast*	17.90	17.90	16.11	25.38	25.38	27.90
		Actual	13.82	23.76	12.27			
Water withdrawals	*W, Mm³*	*Planned*	59.10	59.62	73.08	143.08	160.17	186.09
		Actual	48.17	44.29	65.50			
Losses	*W, Mm³*	*Forecast*	47.52	47.52	42.77	25.92	25.92	28.51
		Actual	65.18	68.64	54.50			
Outflow to lower reach[3]	*W, Mm³*	*Forecast*	497.94	497.42	428.25	417.12	400.03	430.10
		Actual	442.80	454.46	355.80			

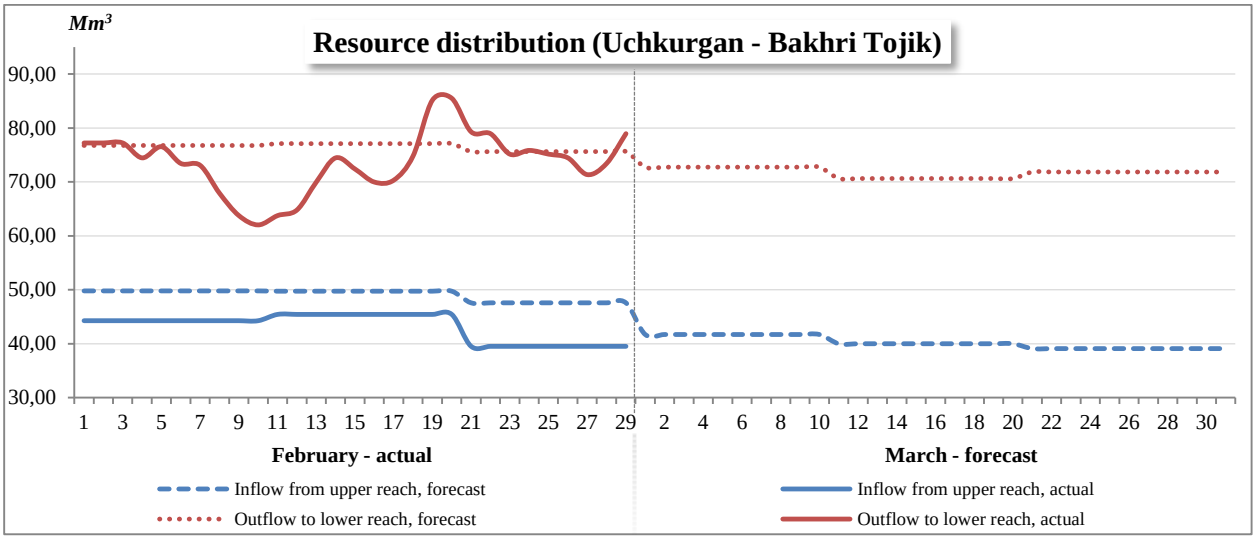


Water volume (**W**)

Uchkurgan – Bakhri Tojik	**Parameter**		**February**			**March**		
			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*	497.94	497.42	428.25	417.12	400.03	430.10
		Actual	442.80	454.46	355.80			
Lateral inflow	*W, Mm³*	*Forecast*	313.32	315.99	281.35	352.07	348.00	406.09
		Actual	316.58	300.84	270.82			

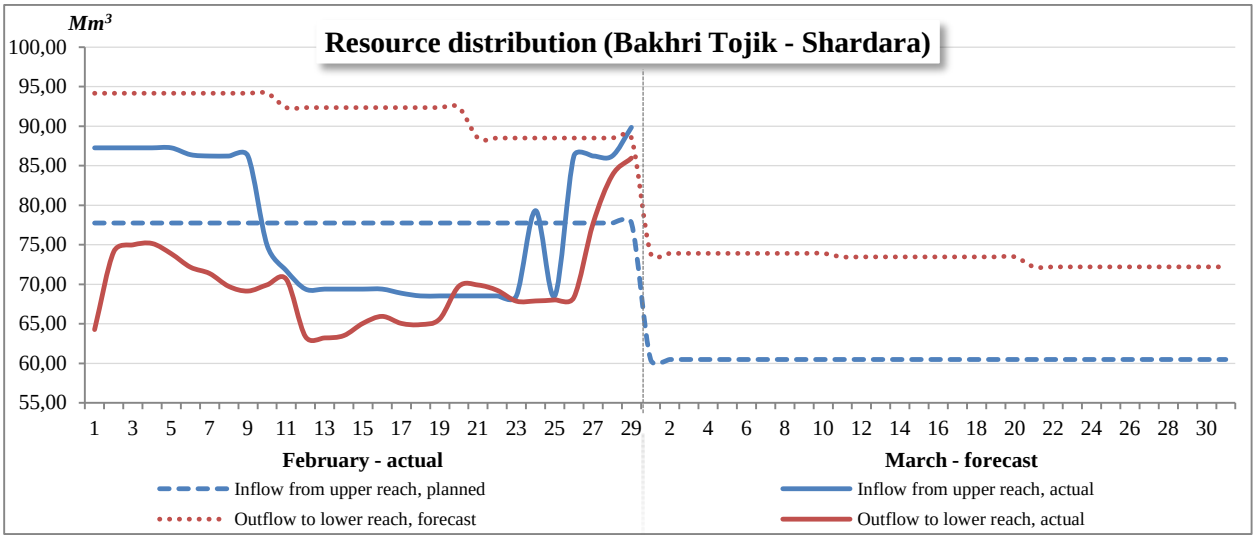
[2] *Incl. Karasu left and right*
[3] *Uchkurgan waterworks facility*

Water withdrawals	*W, Mm³*	*Planned*	13.39	2.16	1.75	11.66	11.66	12.83
		Actual	11.06	4.60	2.72			
Losses	*W, Mm³*	*Forecast*	30.00	40.00	27.00	30.00	30.00	33.00
		Actual	25.32	19.41	-58.83			
Outflow to lower reach[4]	*W, Mm³*	*Forecast*	767.87	771.25	680.85	727.53	706.37	790.36
		Actual	723.00	731.29	682.73			



Water volume (**W**)

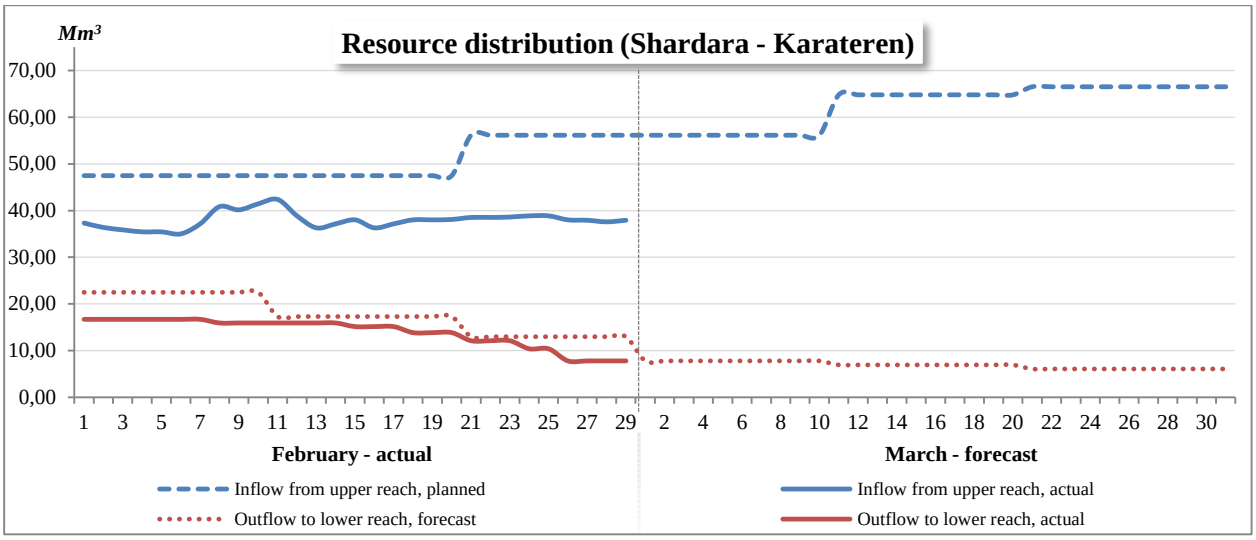
Bakhri Tojik - Shardara	Parameter		February			March		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach[5]	*W, Mm³*	*Planned*	777.60	777.60	699.84	604.80	604.80	665.28
		Actual	856.31	693.01	701.91			
Lateral inflow	*W, Mm³*	*Forecast*	325.87	327.71	268.05	320.97	305.90	329.26
		Actual	184.72	208.20	236.91			
Water withdrawals	*W, Mm³*	*Planned*	111.97	131.93	126.52	136.86	126.23	145.51
		Actual	112.06	121.83	112.42			
Losses	*W, Mm³*	*Forecast*	50.00	50.00	45.00	50.00	50.00	55.00
		Actual	214.14	122.23	167.64			
Outflow to lower reach	*W, Mm³*	*Forecast*	941.50	923.38	796.37	738.91	734.47	794.04
		Actual	714.83	657.15	658.77			



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

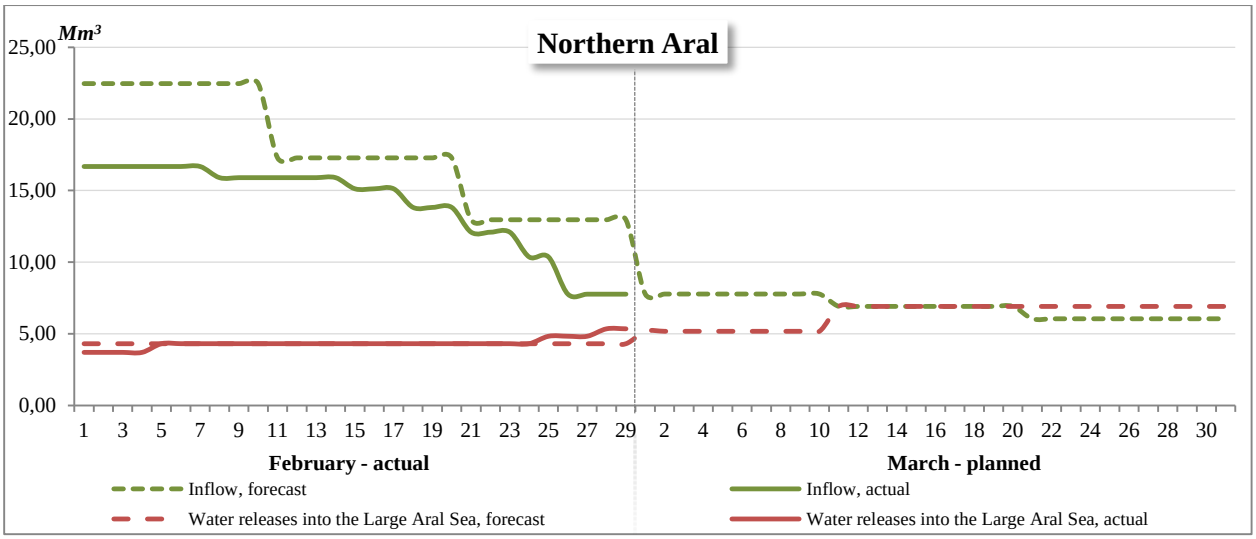
Water volume (**W**)

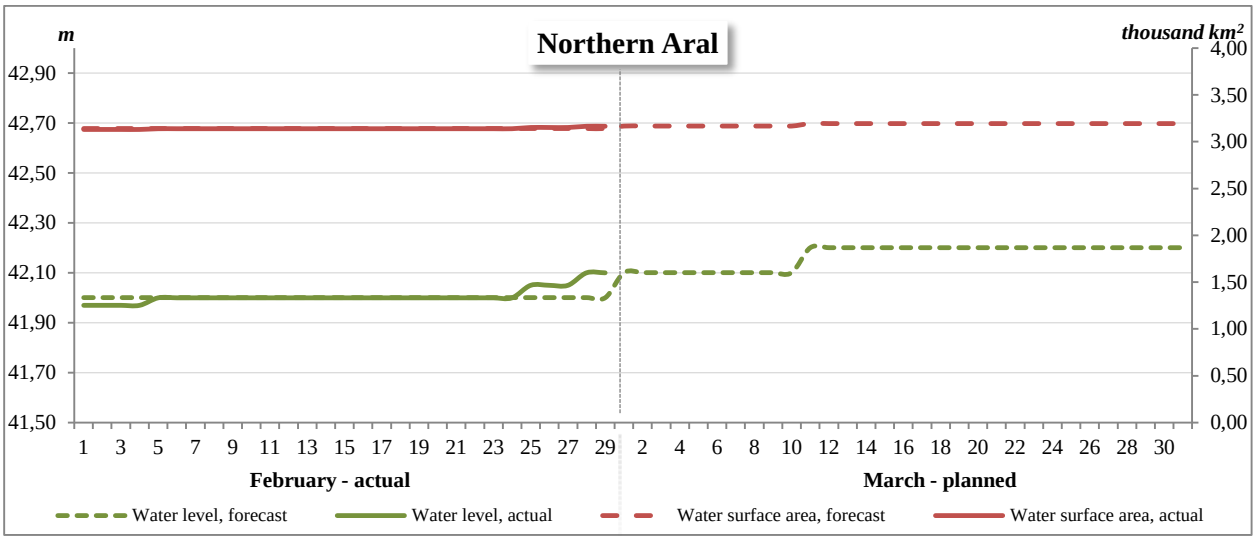
Shardara - Karateren	Parameter		February			March		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach	*W, Mm³*	*Planned*	475.20	475.2	505.4	561.60	648.00	732
		Actual	375.06	380.3	344.9			
Lateral inflow	*W, Mm³*	*Forecast*	38.64	73.2	3	11.76	16.72	19
		Actual	8.01	16.4	15			
Filling (+), draw down (-) of Koksarai reservoir	*W, Mm³*	*Planned*	-259.2	-345.6	-311	-345.6	-345.6	-266
		Actual	-263.5	-285.1	-268			
Water withdrawals	*W, Mm³*	*Planned*	0.0	0.0	0	0.0	0.0	0
		Actual	0.0	0.0	0			
Losses	*W, Mm³*	*Forecast*	30.0	30.0	81	150.0	250.0	418
		Actual	-44.9	-38.8	4			
Outflow to lower reach	*W, Mm³*	*Forecast*	224.6	172.8	117	77.8	69.1	67
		Actual	164.4	150.4	88			



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

Northern Aral	Parameter		February			March		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow	*W, Mm³*	*Forecast*	224.64	172.80	116.64	77.76	69.12	66.53
		Actual	164.42	150.42	88.13			
Water volume	*W, Mm³*	*Forecast*	24.29	24.48	24.62	24.48	24.56	24.63
		Actual	24.24	24.36	24.43			
Water level	*H, m*	*Forecast*	42.00	42.00	42.00	42.10	42.20	42.20
		Actual	41.99	42.00	42.04			
Water surface area	*S, th.km²*	*Forecast*	3.14	3.14	3.14	3.17	3.19	3.19
		Actual	3.14	3.14	3.15			
Water releases into the Large Aral Sea	*W, Mm³*	*Forecast*	43.20	43.20	38.88	51.84	69.12	76.03
		Actual	40.78	43.20	42.51			





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) http://meteo.uz
Central Asia Water and Ecological Knowledge Portal http://cawater-info.net
Website “Weather and Climate” http://www.pogodaiklimat.ru

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