Aral Sea Basin Transboundary Water Early Warning Bulletin

April – May 2021

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. Moreover, this was reflected in the Aral Sea Basin Programs (ASBP-3 and ASBP-4).

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 are to be issued as part of the Project in 2021. The format and content of the bulletins have been agreed with the client and with all organizations that provided source information. The present bulletin contains the actual information on the Syr Darya and Amu Darya basins for April 2021 and the forecast for May.

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 April

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

UN will provide $363 million of financial assistance to Tajikistan, ***kabar.kg***

FAO and the European Space Agency unite to support countries in achieving the SDGs, ***agroperspectiva.com***

Iran offers Central Asian nations route to access global waters, ***iran.ru***

Uzbekistan and Kazakhstan strengthen bilateral water cooperation, ***kabar.kg***

The UN General Assembly affirmed the important role of the Regional Centre for Preventive Diplomacy in Turkmenistan, ***turkmenportal.com***

UN Race to Zero campaign, ***news.un.org***

Climate change has shifted axis of Earth, ***news.rambler.ru***

World's glaciers melting at a faster pace, ***hightech.plus***

Kazakhstan and Kyrgyzstan have agreed on operation regimes of reservoirs and water supply along the Shu and Talas rivers, ***forbes.kz***

Tajikistan claims for Kyrgyzstan's water resources, ***24.kg***

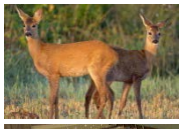
Chinese researchers calculate Central Asia's water waste, agriculture potential, ***eurasianet.org***

FAO holds GIS training at TSAU, ***uzdaily.uz***

Central Asia courts green energy investors, ***beltandroad.news***

How do Kazakhstan and Kyrgyzstan address water security issues? ***lenta.inform.kz***

World’s largest iceberg breaks off of Antarctica, ***asiaplustj.info***



UNEP: 42 percent of world’s protected areas were added in last decade, ***azertag.az***

UN GA unanimously adopts resolution on Aral Sea region, ***sputniknews.ru***

View from IFAS: The UN General Assembly’s resolution affirms the UN’s support to efforts and initiatives launched in Uzbekistan, ***dunyo.info***

European Union supports Kazakhstan’s efforts to restore the Aral Sea Basin ecosystem, ***aral.uz***

NASA released that the industrial revolution has caused climate change, ***hightech.plus***

Over a third of Antarctic ice shelf could collapse due to climate change, ***hightech.fm***

World Bank will increase climate finance, ***russian.rt.com***

Central Asia is considered to be one of the least connected regions in the world, ***ritmeurasia.org***

Kyrgyzstan, Uzbekistan agree on power swap to restore reservoir levels, ***eurasianet.org***

Afghanistan is going to build 44 dams, ***afghanistan.ru***

Kyrgyzstan. CASA-1000 opens a new page in the field of energy development, ***stanradar.com***

OJSC NBO Roghun looking for a suitable international auditor, ***kabar.kg***

Measures taken for safe and efficient operation of Tupolang reservoir, ***norma.uz***

The largest CA’s wind farm will be built in Uzbekistan, ***knews.kg***

Uzbekistan to develop hydrogen energy, ***kabar.kg***

Uzbek team proposed the best idea to restore the Aral Sea, ***ecouz.uz***

Over 2 million hectares of the dried Aral Sea bed digitized and mapped, ***vzglyad.uz***

Water weapon of Ashraf Ghani, ***afghanistan.ru***

Electric power export from Tajikistan increased, ***stanradar.com***

Reforming Uzbekistan's water sector – the way towards sustainable development, ***uzdaily.uz***

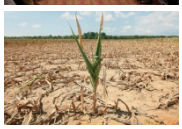
Uzbek delegation took part in the roundtable on climate change, ***uzdaily.uz***

The Kyrgyz Ministry of Energy tells what was proposed to Russian side on Upper Naryn cascade project, ***tazabek.kg***

Tajikistan's Ministry of Finance: "The World Bank's mission is expected to identify Roghun potential, mobilize investments and speed up implementation of this strategically important project", ***khovar.tj***

Development of the Karakum in Turkmenistan – way to solve freshwater problem, ***arzuw.news***

The Afghan Government to launch water and electricity projects across 21 provinces, ***wadsam.com***

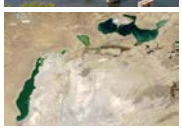


Disaster risk reduction system in agriculture analyzed in Tajikistan, ***east-fruit.com***

Sultan Sanjar dam of Düýeboýun reservoir to be strengthened for better water supply in Turkmenistan, ***hronikatm.com***

Factors leading to dam breakthrough in Sardoba named, ***stanradar.com***

Kazakhstan and China undertake water assessment for the whole transboundary river basin, ***kaztag.kz***



Drought in Turkmenistan may be worse than in 2018, ***hronikatm.com***

Modernization of Nurek HEPS discussed in Dushanbe, ***avesta.tj***

Amu Darya River Basin

Actual Situation in April and Forecast for May

The available usable river water resources estimated as natural, non-regulated river flow plus lateral inflow into the river and minus losses amounted to 3,860 million m^3 in April. The regulated flow of the Amu Darya at the Atamyrat (Kerki) section was 1,740 million m^3. In May, the available usable river water resources are expected to be 9,570 million m^3, i.e. will increase 2.5 times.

Inflow to the Nurek reservoir from the Vakhsh River was 1,080 million m^3 in April. Water releases from the reservoir amounted to 1,060 million m^3. The reservoir was filled with water by 90 million m^3 and reached the volume of 6,310 million m^3 by the end of month. Water losses in the reservoir as water balance discrepancy were estimated at 90 million m^3 (1.4% of water volume in the reservoir). It is expected that in May 2,110 million m^3 of water will flow into the Nurek reservoir. The water volume will increase slightly to 6,540 million m^3, and water releases from the reservoir will increase to 1,880 million m^3.

Inflow to Tuyamuyun waterworks facility (TMWF) was 1,430 million m^3 in April. Water releases from TMWF into the Amu Darya River amounted to 1,010 million m^3, while water diversion from the reservoir into canals was 430 million m^3. In April, the water volume in the reservoirs of TMWF decreased from 2,650 million m^3 at the beginning of month to 2,450 million m^3 at the end of month. Water losses in the reservoirs of TMWF (calculated as water balance discrepancy) are estimated at 190 million m^3; this is about 13% of inflow to TMWF and 8% of water volume in the reservoirs by the end of April. Inflow to TMWF is expected to be 3,370 million m^3 in May. TMWF reservoirs will not accumulate water and their volume will be about 3,400 million m^3 by the end of month. Water releases from TMWF are planned in the amount of 1,780 million m^3. Water diversion is planned at 650 million m^3.

Nurek HEPS generated 505 million kWh of electrical energy (94% of generation in April 2020) in April. The discharge through turbines was 408 m^3/s (432 m^3/s in 2020), while the head was 217 m. Sterile spills at HEPS were not observed. In April, TMWF HEPS generated 11 million kWh only.

In April, water along the Amu Darya River was distributed unevenly: in the middle reaches at Kelif g/s (section upstream of intake to Garagumdarya) – Birata g/s (inflow to TMWF) the water shortage was 2% only of the plan, and in the lower reaches at Tuyamuyun g/s – Samanbay g/s no water shortage was observed. Water withdrawal was 1,690 million m^3 in the first reach and 610 million m^3 in the second reach. Water balance in the reaches showed negative discrepancies that can be attributed to water losses: 74 million m^3 (3% of river flow at Kelif g/s) in the middle reaches and 340 million m^3 (33% of Amu Darya river flow downstream of TMWF - Tuyamuyun g/s) in the lower reaches.

In April, flow of the Amu Darya River changed by key gauging station as follows: Kelif g/s – 2,890 million m^3 only (c.f., April 2020 – 4,303 million m^3, i.e. 1.5 times more), Birata g/s (inflow to TMWF) – 1,430 Mm^3 (1,798 million m^3 in 2020), Tuyamuyun g/s (downstream of TMWF) – 1,010 million m^3, and Samanbay g/s (inflow to the Large Aral Sea) - only 63 million m^3 (104 million m^3 in 2020).

In May, water withdrawal will be increased to 2,780 million m^3 in the first reach and to 1,200 million m^3 in the second reach. Flow along the Amu Darya River is expected to change as follows: Kelif g/s – 6,430 million m^3, Birata g/s – 3,370 million m^3, Tuyamuyun g/s – 1,780 million m^3, and Samanbay g/s - 125 million m^3.

In April, inflow to the Large Aral Sea from the Amu Darya River and collecting drains (collectors) amounted to 150 million m^3 and, if we add water discharged from the Northern Aral Sea to eastern part of the Large Sea, 216 million m^3. In April, the water level in the eastern part of the Large Aral Sea varied within 26.4…26.5 m on average, the water surface area was 1.08…1.21 thousand km^2, and the water volume was 0.9…1.02 km^3. In the western part, the water level varied within 22.18…22.15 m, the water surface area was 2.34...2.33 thousand km^2, and the water volume was 33.9…34.7 km^3. Evaporation from 1 km^2 of water surface of the Large Aral Sea was 0.081 Mm^3 in April.

It is expected that the inflow to the Large Aral Sea will be 210 Mm^3 in May. By the end of May, in the eastern part of the Large Aral Sea the water level will be 26.6 m, the water surface area will be 1.3 thousand km^2, and the water volume will be 1.1 km^3. In the western part of the Large Aral Sea the water level will be 22.2 m, the water surface area will be 2.3 thousand km^2, and the water volume will be 33.9 km^3. Evaporation from 1 km^2 of water surface of the Large Aral Sea will be 0,105 million m^3 in May.

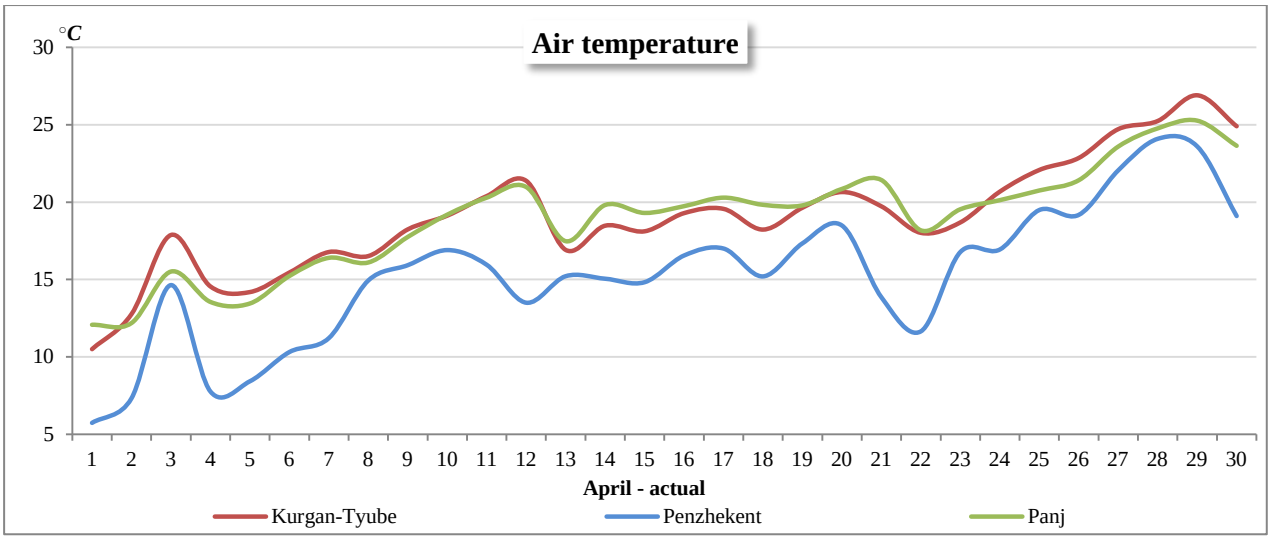
The sections below show daily and ten-day data on climate and water management (reservoirs, HEPS, water distribution).

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		April			May		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Panj	*T*, °*C*	*Forecast*	15.0	20.0	22.0	23.0	24.0	24.0
		Actual	15.14	19.83	21.87			
Kurgan-Tyube	*T*, °*C*	*Forecast*	16.0	20.0	23.0	24.0	24.0	26.0
		Actual	15.6	19.26	22.38			
Penzhekent	*T*, °*C*	*Forecast*	12.0	16.0	19.0	19.0	21.0	23.0
		Actual	11.32	15.91	18.67			

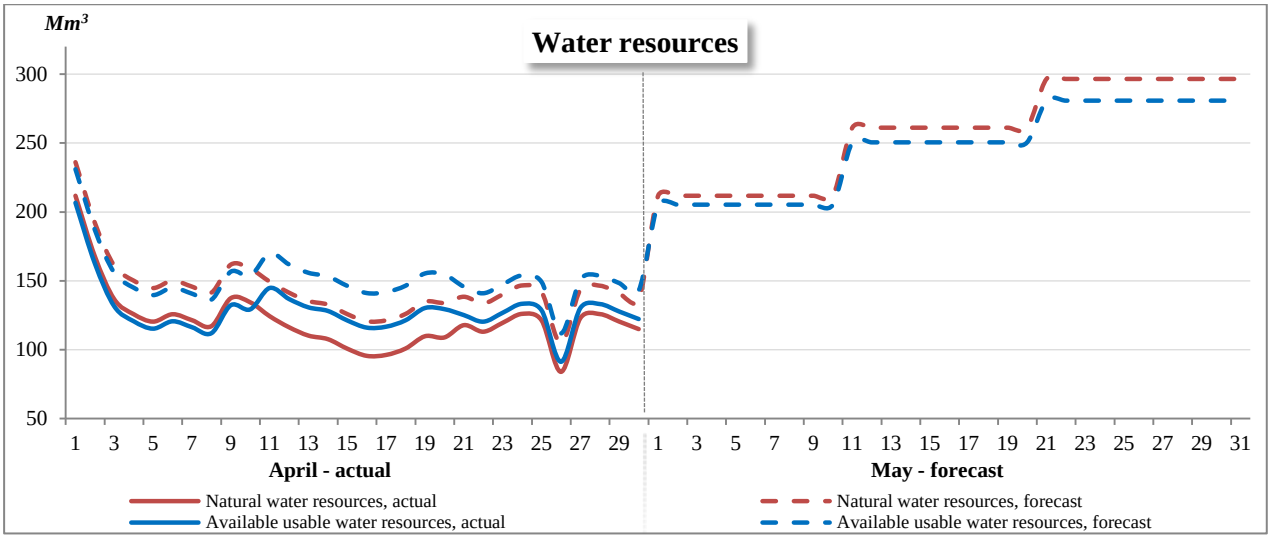


Water resources

Object
Amu Darya
Nurek reservoir
Atamyrat gauging station

Water volume (**W**)

Object	Parameter		April			May		
			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*	914	461	364	1106	1469	1728.0
		Actual	914	461	364			
Water withdrawal: upstream of Atamyrat g/s	*W, Mm³*	*Forecast*	771.3	848.0	961.1	1012	1056	1107
		Actual	528	597	755			
Nurek reservoir /filling (+) or draw down (-)	*W, Mm³*	*Forecast*	-43	13	48	0	86	130
		Actual	-43	13	48			
Natural water resources at Atamyrat g/s	*W, Mm³*	*Forecast*	1642	1322	1372	2117.5	2611.4	2965.1
		Actual	1398	1071	1166			
Lateral inflow: downstream of Atamyrat g/s	*W, Mm³*	*Forecast*	103	101	99	101.1	97.4	74
		Actual	103	101	99			
Open channel losses: downstream of Atamyrat g/s	*W, Mm³*	*Forecast*	154	-104	26	165.7	203.7	231
		Actual	154	-104	26			
Available usable water resources	*W, Mm³*	*Forecast*	1591	1527	1445	2053	2505	2808
		Actual	1347	1276	1239			

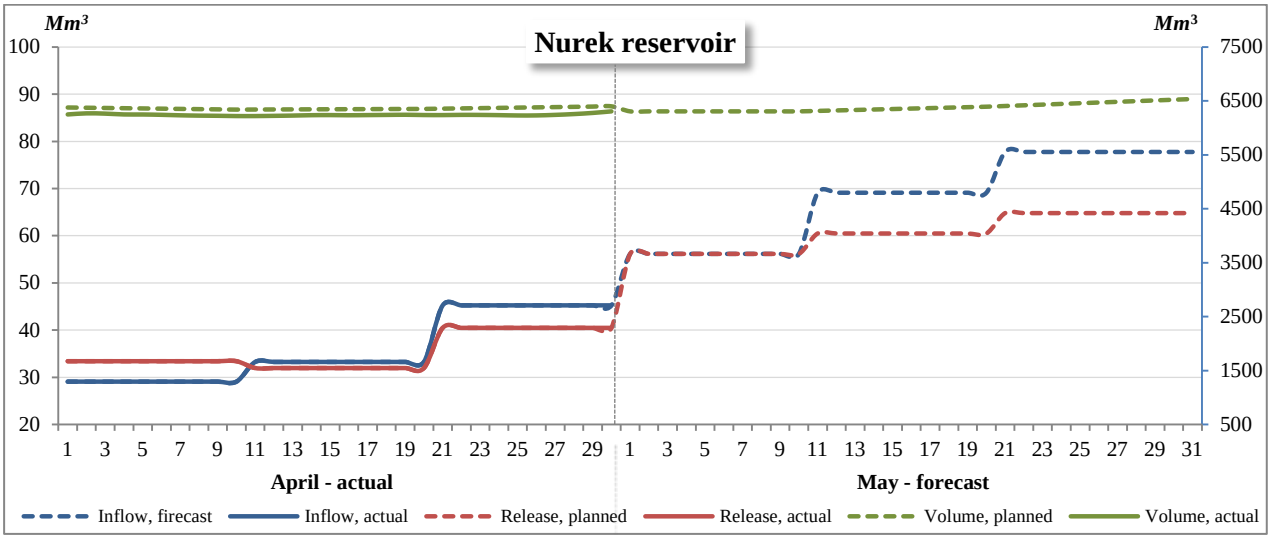


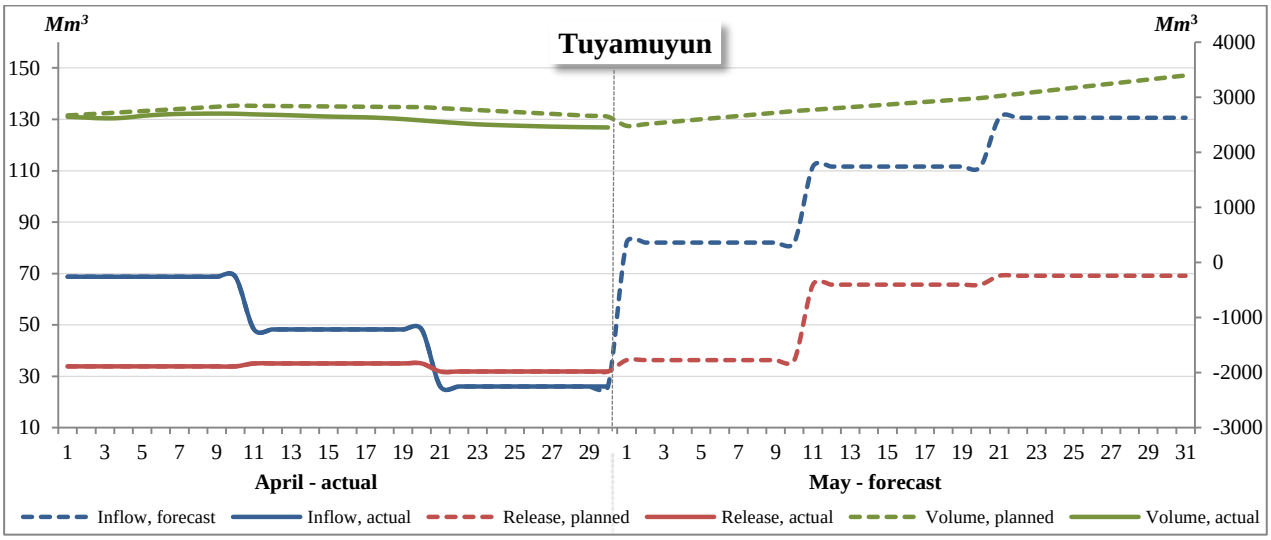
Reservoirs and HEPS

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**)

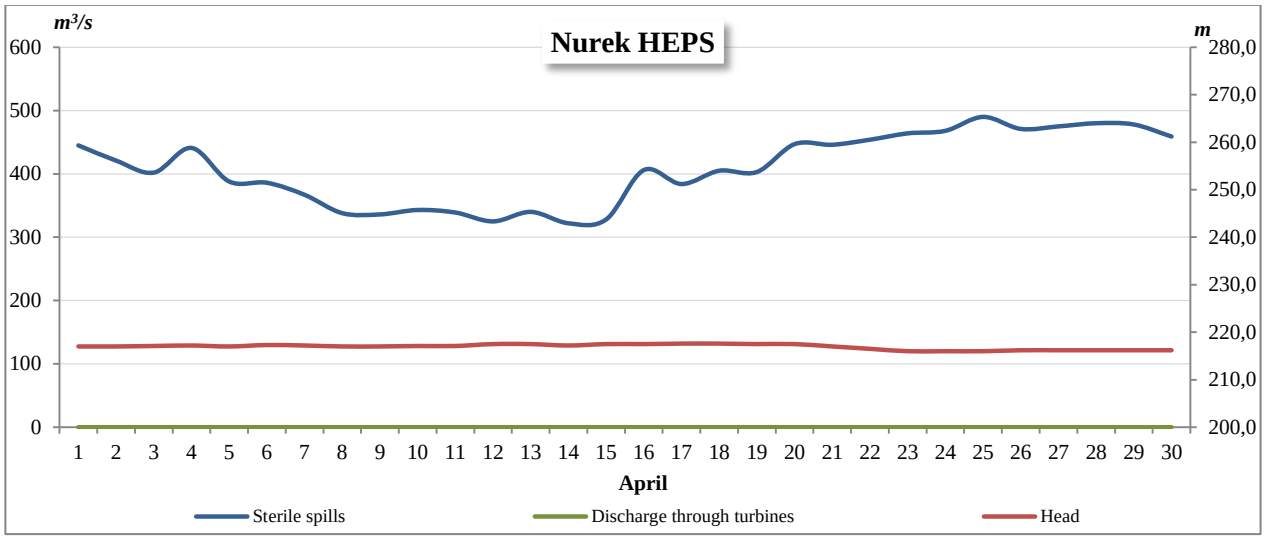
Reservoir	Parameter		April			May		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Nurek reservoir	*I, Mm³*	*Forecast*	290.8	332.6	452.5	562	691	855
		Actual	290.8	332.6	452.5			
	R, Mm³	*Planned*	334.1	319.6	404.8	562	605	713
		Actual	334.1	319.6	404.8			
	W, Mm³	*Planned*	6340	6353	6400	6307.0	6393.4	6536.0
		Actual	6220	6239	6307			
Reservoirs of Tuyamuyun waterworks facility	*I, Mm³*	*Forecast*	687.5	482.3	260.2	820.4	1116.3	1436.8
		Actual	687.5	482.3	260.2			
	R, Mm³	*Planned*	338.5	349.9	318.6	362.9	656.6	760.3
		Actual	338.5	349.9	318.6			
	W, Mm³	*Planned*	2849	2821	2647	2751	2987	3398
		Actual	2702	2580	2453			

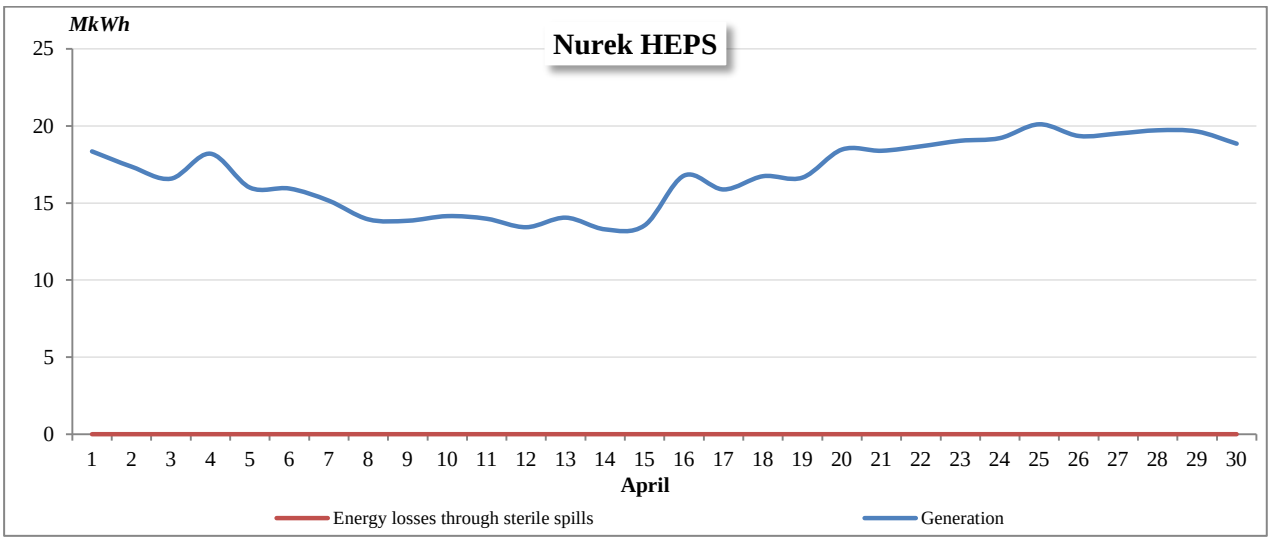


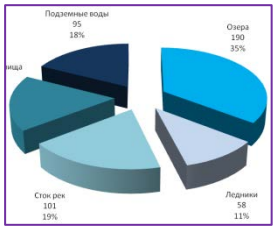


Generation (**G**), Energy losses through sterile spills (**L**), Discharge through turbines (**Q**), Sterile spills (**R**), Head (**H**)

HEPS	Parameter		April		
			I ten-day	*II ten-day*	*III ten-day*
Nurek	*G, M kWh*	*Actual*	159.50	152.83	192.49
	L, M kWh	*Actual*	0.0	0.0	0.0
	Q, m^3/s	*Actual*	386.7	369.9	468.5
	R, m^3/s	*Actual*	0.0	0.0	0.0
	H, m	*Actual*	217.1	217.5	216.3





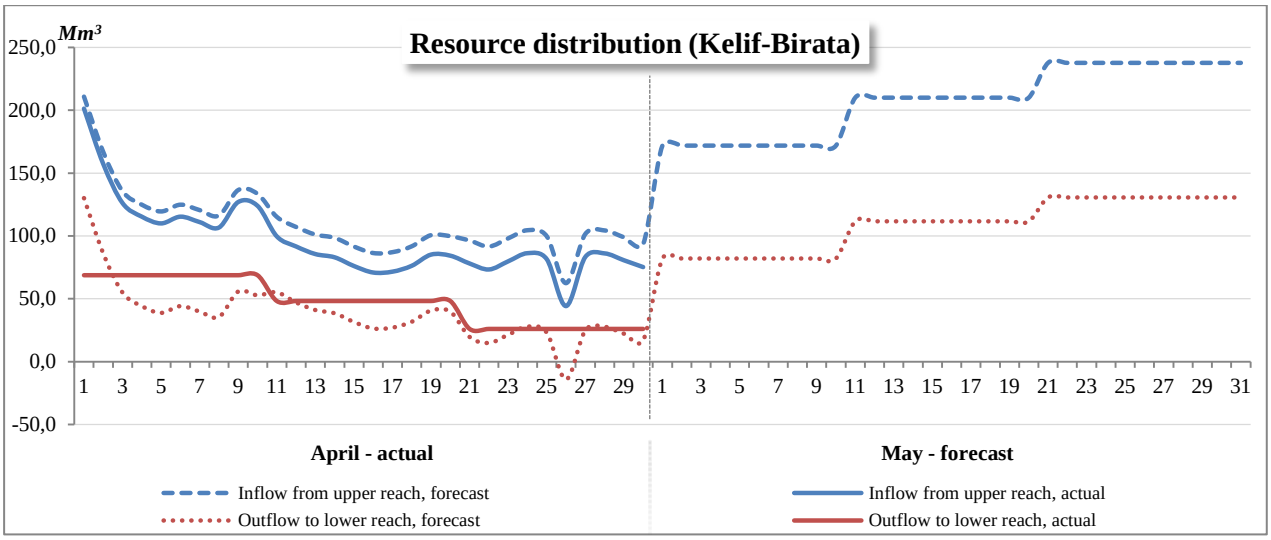


Water distribution

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)

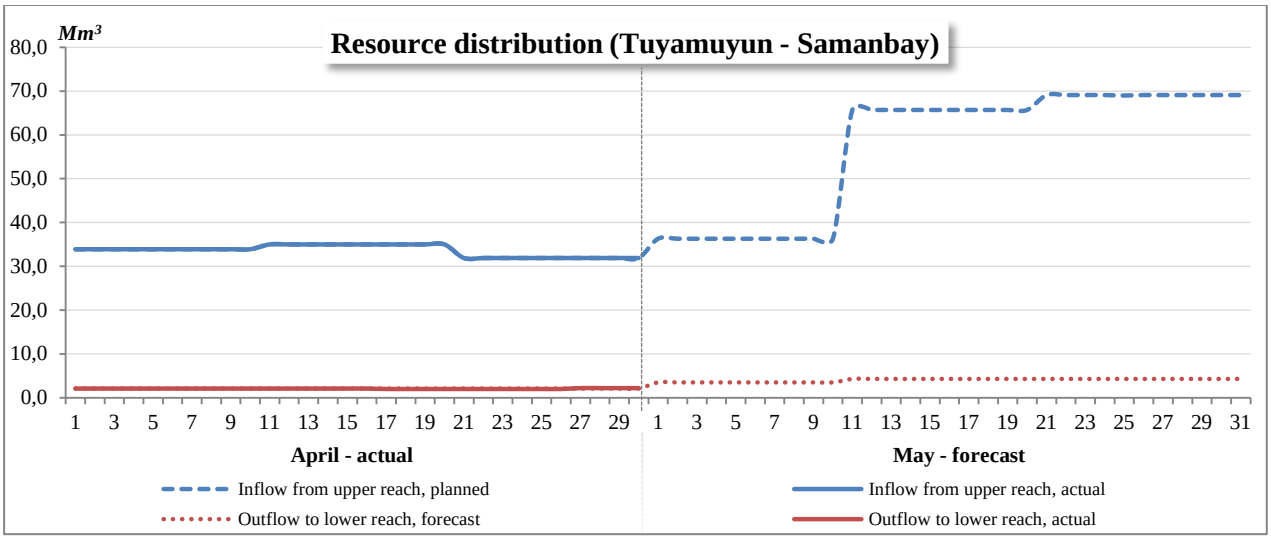
Kelif - Birata	Parameter		April			May		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach	*W, Mm³*	*Forecast*	1389	979	951	1718	2100	2615
		Actual	1294	824	768			
Lateral inflow	*W, Mm³*	*Forecast*	103	101	99	101	97	81
		Actual	103	101	99			
Water withdrawal	*W, Mm³*	*Planned*	756	805	840	855	902	1024
		Actual	556	547.9	581			
Losses	*W, Mm³*	*Forecast*	154	-104	26	143.9	179.0	235
		Actual	153	-105	26			
Outflow to lower reach	*W, Mm³*	*Forecast*	582	379	184	820.4	1116.3	1437
		Actual	687.5	482.3	260			



Water volume (W)

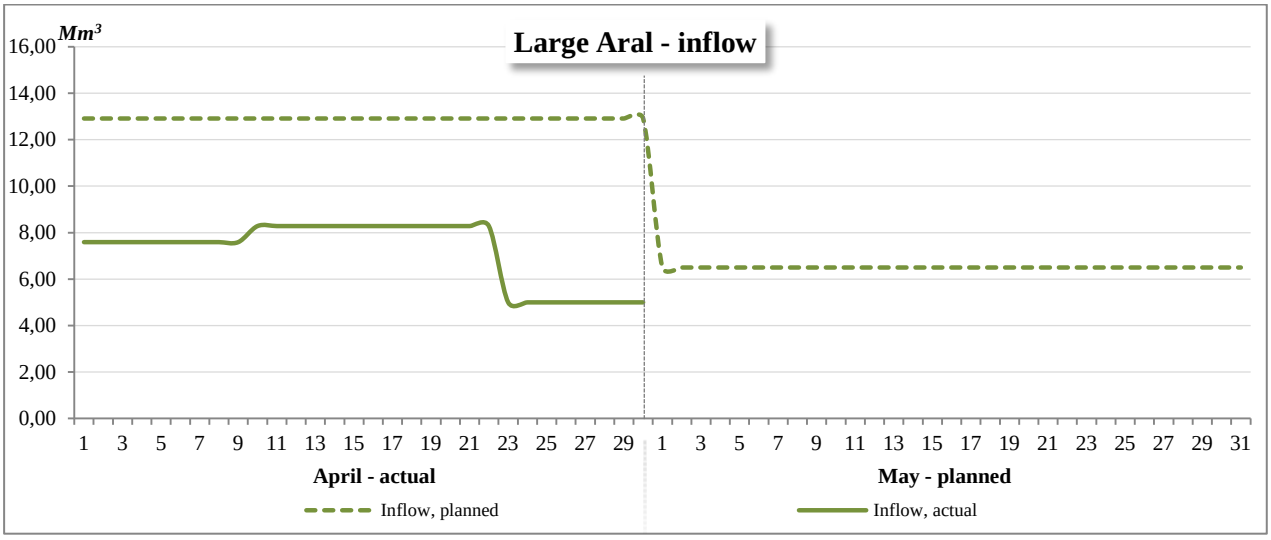
Tuyamuyun - Samanbay	Parameter		April			May		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach	*W, Mm³*	*Forecast*	339	350	319	362.9	656.6	760
		Actual	339	350	319			
Lateral inflow	*W, Mm³*	*Forecast*	0	0	0	0	0	0
		Actual	0	0	0			
Water withdrawal [1]	*W, Mm³*	*Planned*	172	224	209	225	449	523
		Actual	172	224	209			
Losses	*W, Mm³*	*Forecast*	146	105	89	104	164	190
		Actual	146	105	89			
Outflow to lower reach	*W, Mm³*	*Forecast*	21	21	21	34.56	43.20	47.52
		Actual	21	21	21			

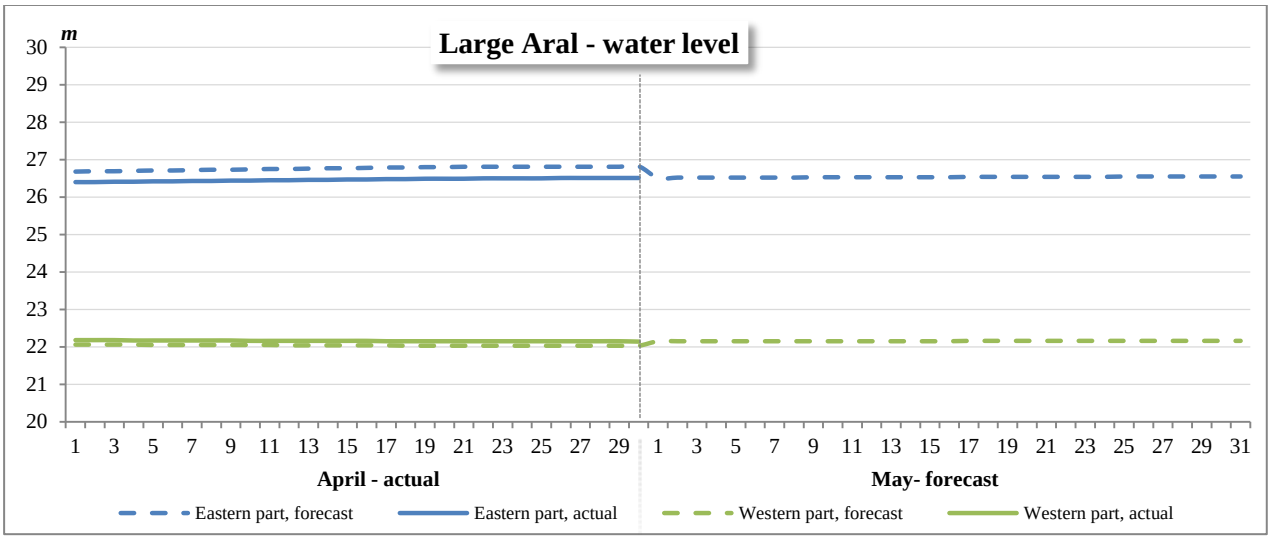
[1] *Note: Including supply to the system of lakes and environmental water releases into canals*

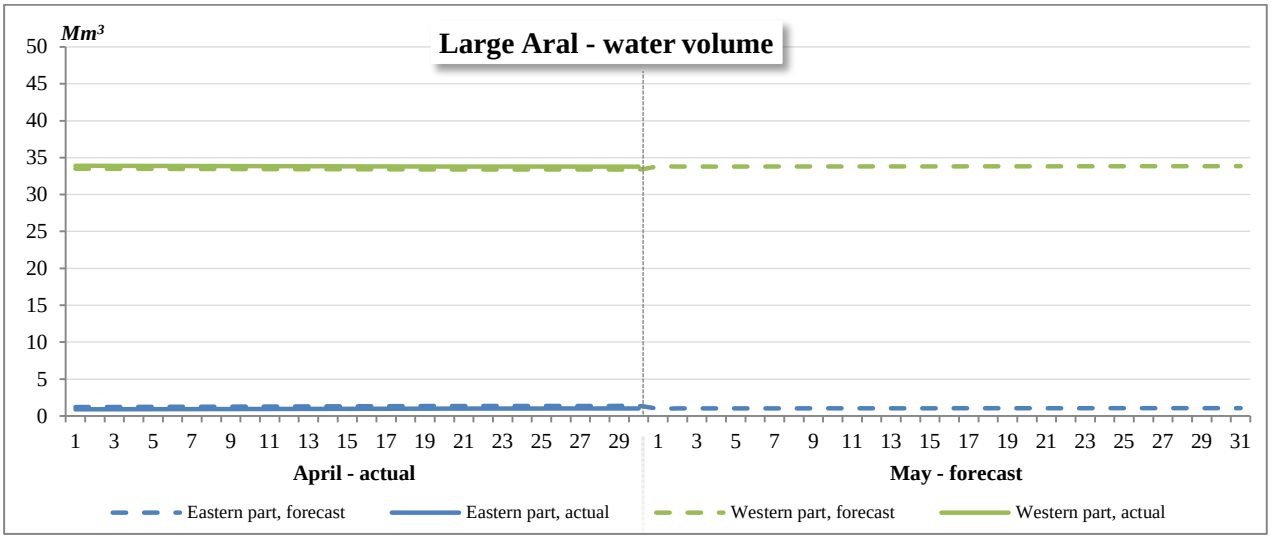


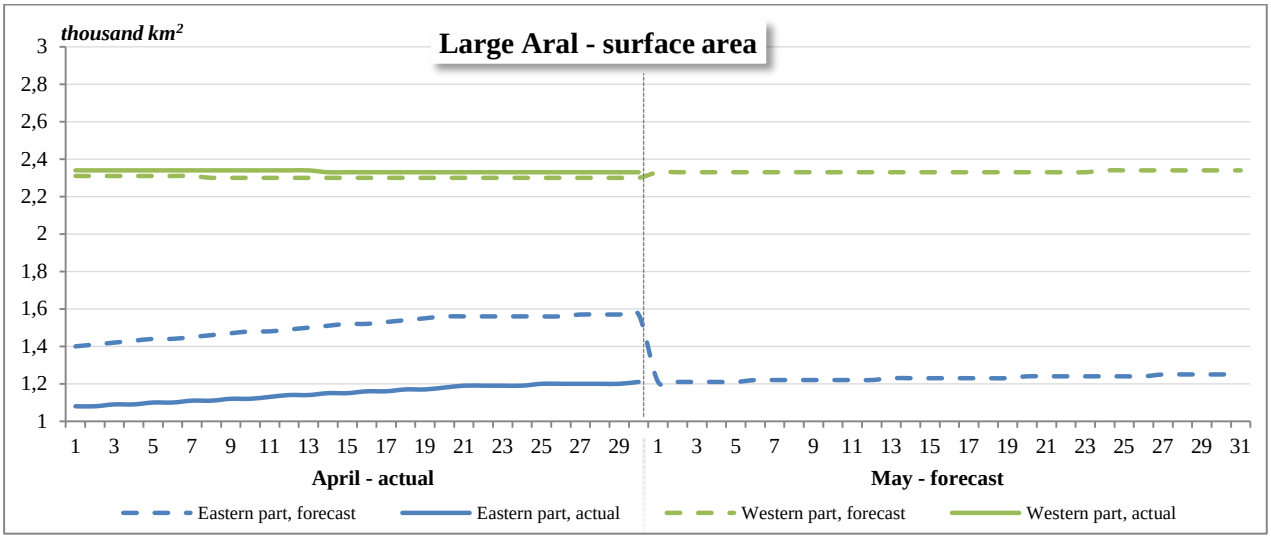
Water volume (**W**), Level (**H**), Surface area (**S**)

Large Aral Sea	Parameter		April			May		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow	*W, Mm³*	*Planned*	129.12	129.12	129.12	65.00	65.00	71.50
		Actual	76.61	82.83	56.57			
Eastern part, water volume	*W, Mm³*	*Forecast*	1.28	1.35	1.37	1.04	1.05	1.06
		Actual	0.95	1.00	1.02			
Eastern part, level	*H, m*	*Forecast*	26.71	26.78	26.81	26.52	26.53	26.55
		Actual	26.42	26.47	26.51			
Eastern part, area	*S, th.km²*	*Forecast*	1.44	1.52	1.56	1.21	1.23	1.24
		Actual	1.10	1.16	1.20			
Western part, water volume	*W, Mm³*	*Forecast*	33.45	33.40	33.38	33.80	33.82	33.85
		Actual	33.85	33.79	33.78			
Western part, level	*H, m*	*Forecast*	22.05	22.04	22.03	22.15	22.15	22.16
		Actual	22.17	22.16	22.15			
Western part, area	*S, th.km²*	*Forecast*	2.31	2.30	2.30	2.33	2.33	2.34
		Actual	2.34	2.33	2.33			




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 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
April - actual
May- 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 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
April - actual
May - forecast
Eastern part, forecast
Eastern part, actual
Western part, forecast
Western part, actual


Large Aral - surface area
thousand km²
3
2,8
2,6
2,4
2,2
2
1,8
1,6
1,4
1,2
1
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
April - actual
May - forecast
Eastern part, forecast
Eastern part, actual
Western part, forecast
Western part, actual

Syr Darya River Basin

Actual Situation in April and Forecast for May

In April, the available usable water resources in the Syr Darya River 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 3,180 million m^3, of which the inflow to the three reservoirs was 1,460 million m^3. In May, the available usable water resources are expected in the amount of 4,870 million m^3, including 2,980 million m^3 of inflow to the three reservoirs or 204% of the flow in April.

In April, inflow to the Toktogul reservoir was 710 million m^3, and water releases from the reservoir amounted to 750 million m^3. The water volume in the Toktogul reservoir was only 8,710 million m^3 by the beginning of the growing season (1 April) (c.f. 11,641 million m^3 on the same date last year, i.e. 2.9 km^3 more) and decreased further by 50 million m^3 in April. The reservoir's water balance showed a negative discrepancy of 13 Mm^3, indicating to water losses in the reservoir. It is expected that in May the Toktogul reservoir will accumulate water and by the end of month the water volume will be 9,310 million m^3, the inflow to the reservoir is expected in the amount of 1,450 million m^3, and water releases are planned at 800 million m^3.

In April, inflow to the Andizhan reservoir was 280 million m^3, and water releases from the reservoir were 240 million m^3. The water volume increased from 760 million m^3 at the beginning of month to 790 million m^3 at the end of month. Water losses were estimated from balance discrepancy at 14 million m^3. In May, inflow to the Andizhan reservoir is expected to increase to 540 million m^3 and water releases will increase to 380 million m^3. The reservoir will accumulate water to 950 million m^3.

Inflow to the Bakhri Tojik reservoir was 1,240 million m^3, while water releases from the reservoir amounted to 1,450 million m^3 in April. The water volume increased slightly from 3,460 million m^3 to 3,490 million m^3. The unrecorded inflow to the reservoir was detected from the balance method in the amount of 200 million m^3; this is 16% of inflow to the reservoir. In May, inflow to the Bakhri Tojik reservoir is expected to be 1,040 million m^3, and water releases are planned in the amount of 1,030 million m^3. The reservoir will allow natural flow to pass through it and its volume virtually will not change.

In April, the Charvak reservoir was filled with water from 560 million m^3 to 760 million m^3. Inflow to the reservoir was 470 million m^3, and water releases amounted to 310 million m^3. The balance discrepancy was about 40 million m^3 that was attributed to unrecorded inflow to the reservoir (probably, inaccurate estimation of inflow to the reservoir). In May, the Charvak reservoir will accumulate water and its volume will increase to 1,270 million m^3 by the end of month. Inflow to the reservoir is expected in the amount of 1,000 million m^3, while 490 Mm^3 of water is to be released.

Inflow to the Shardara reservoir was 1,200 million m^3 and water releases from the reservoir amounted to 910 million m^3 in April. The reservoir was drawn down from 5,070 million m^3 to 4,840 million m^3, and water was not discharged into Arnasai. Water diversion from the reservoir amounted to 260 million m^3. Balance discrepancy (showing flow losses) was considerable - 250 million m^3 (about 5% of the water volume and 21% of the inflow to the reservoir). The analysis of water losses from the reservoir over past years shows that the balance discrepancy cannot be fully attributed to water losses in the reservoir; inaccuracies possibly take place in measurement of Syr Darya River's flow, namely in inflow to the Shardara reservoir. In May, inflow to the Shardara reservoir is expected to decrease considerably to 470 million m^3, while planned water releases will

increase to 1,390 million m^3. This will lead to lowering of reservoir's water volume to 3,790 million m^3 by the end of month (c.f. last year the same date, the water volume was planned at 5,613 million m^3, i.e. more than 1.5 times). Water discharge into Arnasai is not planned in May.

The Koksarai reservoir accumulated 140 million m^3 of water in April. Water diversion from the Syr Darya River into the reservoir amounted to 330 million m^3, while water releases into the Syr Darya were 190 million m^3 (third ten-day period). The water volume increased from 1,630 million m^3 to 1,830 million m^3. In May, 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 890 million m^3. The reservoir will be drawn down to 940 million m^3.

In April, energy generation by the cascade of Naryn HEPS amounted to 699 million kWh (under energy-generation regime) against planned 546 million kWh, including: Toktogul HEPS - 234 million kWh (107% of the plan). However, as compared to April 2020, due to reduced head at HEPS and discharge through turbines, Naryn HEPS generated 199 million kWh less energy.

The average discharge through turbines of Toktogul HEPS was 285 m^3/s in April (77 m^3/s less than in April last year), while the average head at HEPS was 131 m (13 m lower than in April 2020). No sterile spills were observed. The plan of energy generation for May for the cascade of Naryn HEPS is set at 651 million kWh, including 260 million kWh for Toktogul HEPS.

In April, the total generation at large HEPS of Uzbekistan amounted to 110 million kWh, of which: 56 million kWh at Charvak HEPS, 28 million kWh at Farkhad HEPS, and 26 million kWh at Andizhan HEPS. The discharge at Charvak HEPS was 86 m^3/s, and the head was 104 m. The discharge at Farkhad HEPS reached 156 m^3/s, and the head was 31 m. For Andizhan HEPS, the discharge was 47 m^3/s, and the head was 95 m.

Energy generation by HEPS of the Bakhri Tojik reservoir and by Shardara HEPS amounted to 55 million kWh, respectively, in April. Water discharge at HEPS of Bakhri Tojik was 529 m^3/s, while the head was 20 m. Discharge at Shardara HEPS was 341 m^3/s, and the head was 21 m only.

In April, 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 was 4 million m^3. The balance discrepancy that can be attributed to open channel losses was 100 million m^3 (13% of river flow at the head of the reach).

In the reach of Uchkurgan waterworks facility (tail-water) – Akjar g/s (inflow to the Bakhri Tojik reservoir) water shortage was estimated at 2%, and the balance discrepancy indicated to unrecorded inflow in the amount of 40 million m^3 (11%).

In the reach of Bakhri Tojik reservoir – Shardara reservoir water shortage accounted for 40% (!), and the balance discrepancy (open channel losses) was 60 million m^3 (5%).

In the lower reaches (downstream of Shardara reservoir) the balance discrepancy for the Amu Darya was recorded at 670 million m^3 - 59% of river flow (in April 2020, the balance discrepancy was 694 million m^3 that can be attributed to both open channel losses and unrecorded water withdrawal, possibly water supply to deltaic lakes).

In April, the flow along the Naryn – Syr Darya rivers changed as follows: discharge from the Toktogul reservoir – 750 million m^3, Akjar g/s (inflow to the Bakhri Tojik reservoir) – 1,240 million m^3, inflow to the Shardara reservoir – 1,200 million m^3, Syr Darya – tail-water of the Shardara reservoir – 910 million m^3, inflow to the Northern Aral Sea - 144 million m^3.

In April, inflow to the Northern Aral Sea was 144 million m^3. The water level varied within 41.7…41.9 m. The water surface area was 3.06…3.10 thousand km^2 and the water volume was 24.33…24.81 km^3. The discharge from the Northern Aral Sea into the Large Aral Sea (Amu Darya Basin) was recorded in the amount of 66 million m^3 (c.f., in April 2020, threefold more water was discharged into the Large Aral Sea).

It is expected that in May inflow to the Northern Aral Sea will be only 27 million m^3, and no discharge into the Large Aral Sea will be made. The water level will be 42.0 m, the water surface area will be 3.13 thousand km^2, and the water volume will be 25.1 km^3 by the end of month.

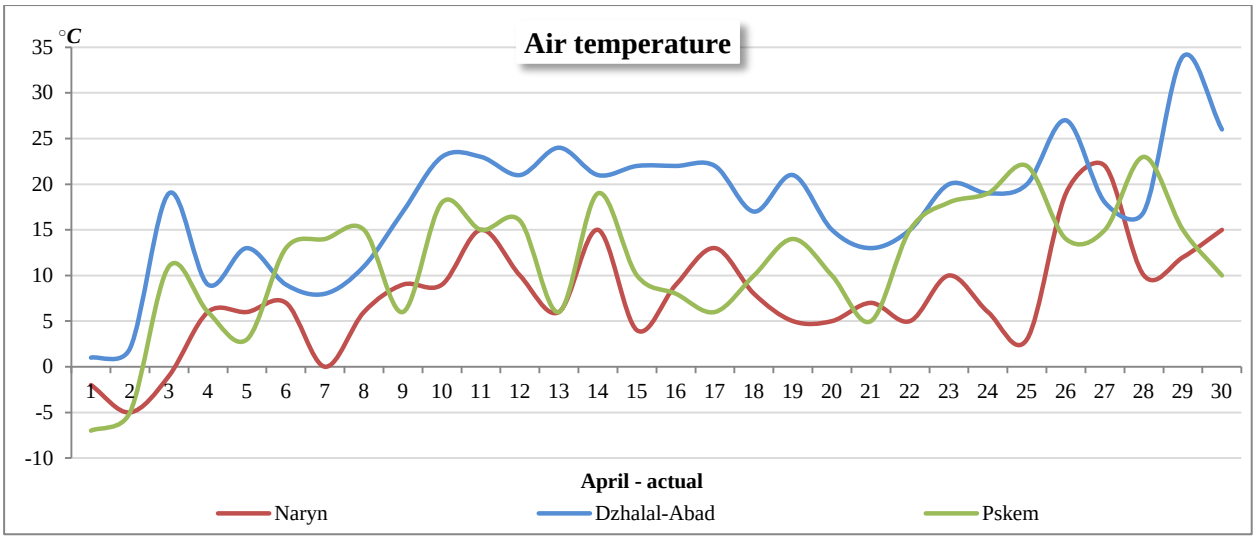
The sections below show daily and ten-day data on climate and water management (reservoirs, HEPS, water distribution).

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		April			May		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Naryn	*T*. °C	*Forecast*	3.0	10.0	10.0	12.0	12.0	14.0
		Actual	3.5	9.0	10.9			
Dzhalal-Abad	*T*. °C	*Forecast*	12.0	21.0	21.0	22.0	22.0	24.0
		Actual	11.2	20.8	20.9			
Pskem	*T*. °C	*Forecast*	7.0	12.0	16.0	18.0	19.0	22.0
		Actual	7.4	11.4	15.6			

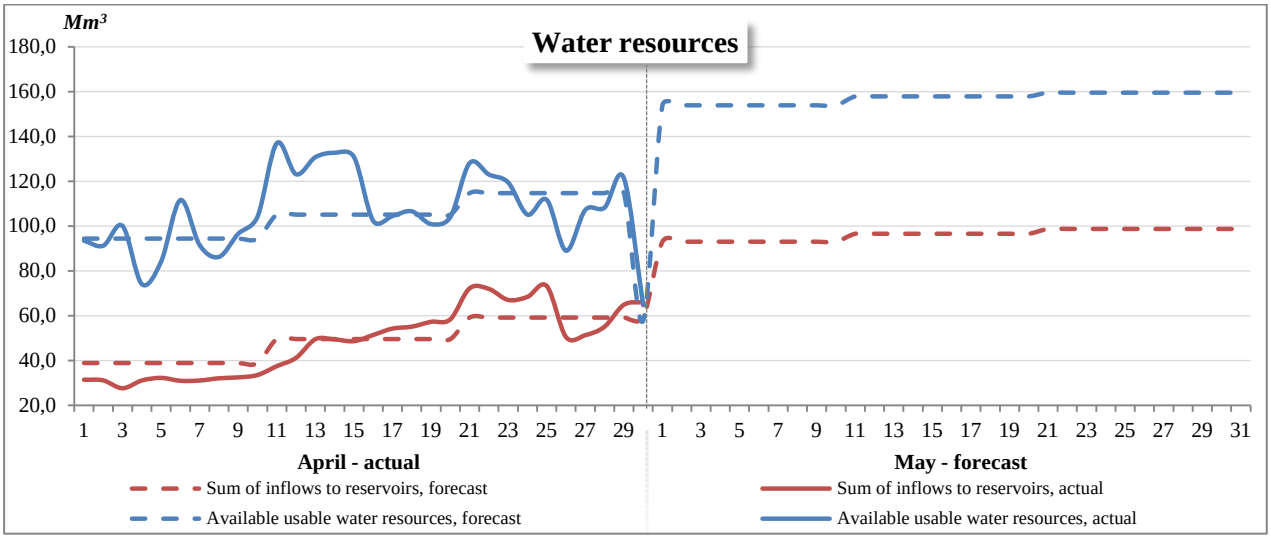


Water resources

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		April			May		
			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*	217	217	217.3	467	467	513.8
		Actual	136	253	317.0			
Inflow to Andizhan reservoir	*W, Mm³*	*Forecast*	67	95	129.6	173	173	190.1
		Actual	72	95	115.6			
Inflow to Charvak reservoir	*W, Mm³*	*Forecast*	105	183	244.5	290	326	382.1
		Actual	105	153	207.9			
Sum of inflows to reservoirs	*W, Mm³*	*Forecast*	389	496	591.4	930	966	1086.0
		Actual	313	502	640.5			
Lateral inflow up to Shardara	*W, Mm³*	*Forecast*	569	569	512.3	643	647	710.3
		Actual	633	684	451.2			
Losses	*W, Mm³*	*Forecast*	14	14	13.8	34	34	41.3
		Actual	14	14	13.8			
Available usable water resources	*W, Mm³*	*Forecast*	944	1051	1090.0	1539	1579	1755.0
		Actual	933	1173	1077.9			

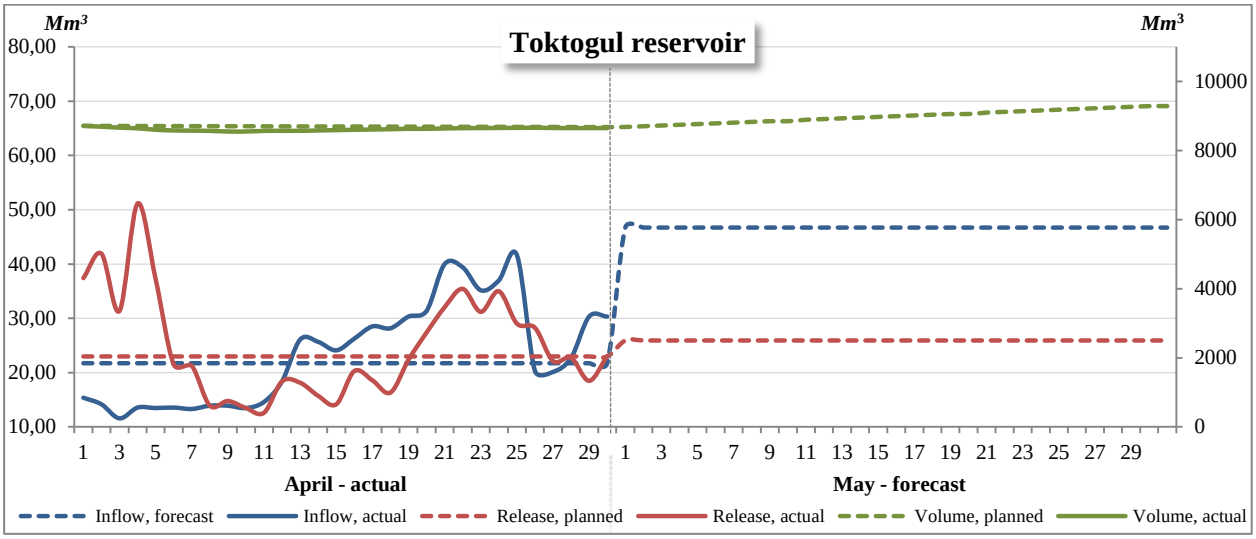


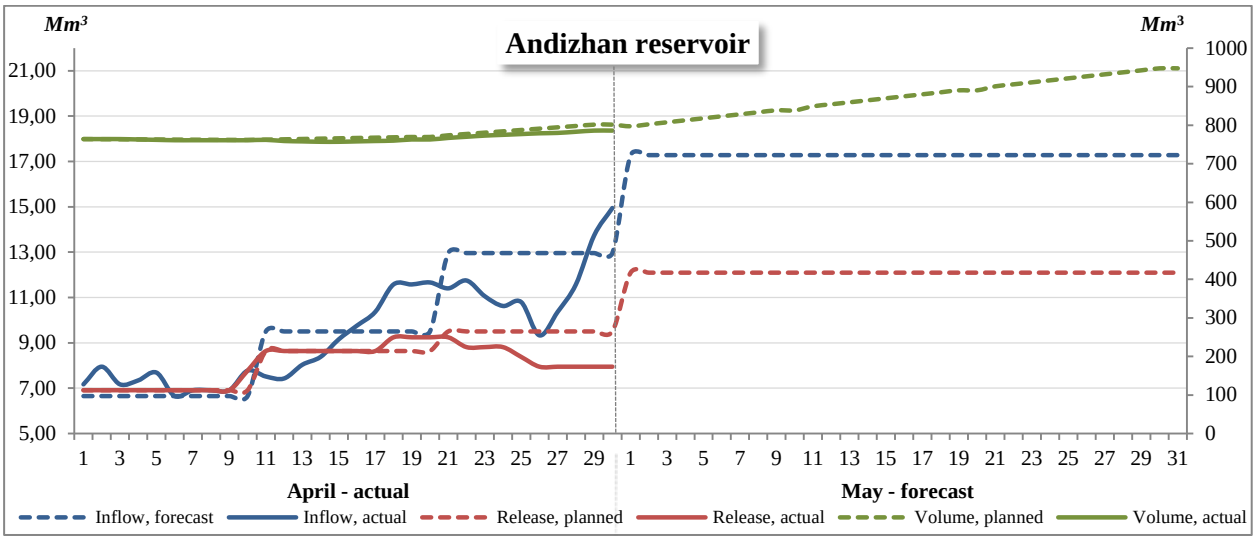
Reservoirs and HEPS

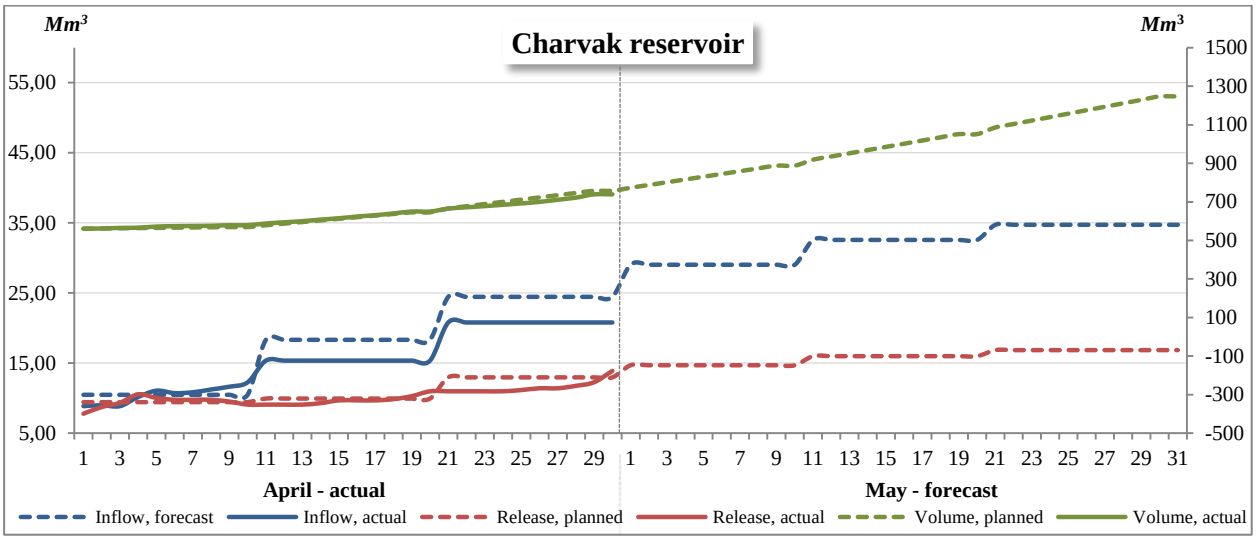
Reservoir	Location			Characteristics				
	Latitude	Longitude	Altitude above sea level, m	Length, km	Width, km	Water-surface area, km²	Full volume, km³	Full reservoir level, m
Toktogul	41.80	72.87	880	65	12	284	19.50	215
Andizhan	40.77	73.11	900	36	1.5-12	56	0.19	905
Bakhri Tojik	40.29	70.07	344	75	20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

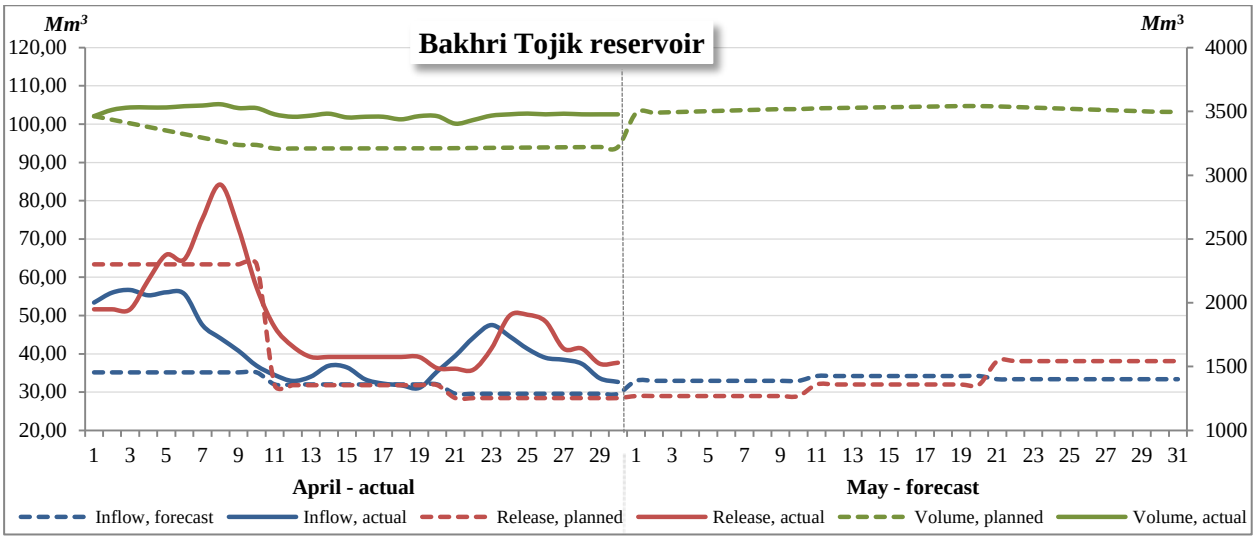
Inflow (**I**), Releases (**R**), Volume (**W**)

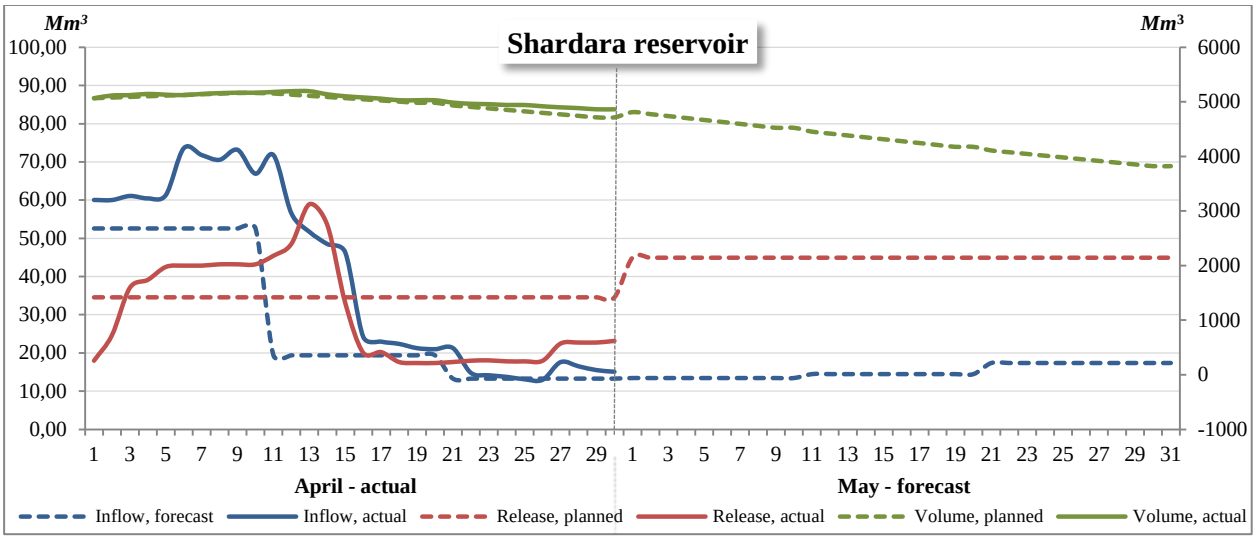
Reservoir	Parameter		April			May		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Toktogul reservoir	*I, Mm³*	*Forecast*	217.33	217.33	217.33	467.11	467.11	513.82
		Actual	136.34	253.50	317.00			
	R, Mm³	*Planned*	229.82	229.82	229.82	259.20	259.20	285.12
		Actual	284.00	184.03	277.34			
	W, Mm³	*Planned*	8701	8688	8676	8868	9076	9305
		Actual	8567	8637	8660			
Andizhan reservoir	*I, Mm³*	*Forecast*	66.53	95.04	129.60	172.80	172.80	190.08
		Actual	72.49	95.47	115.60			
	R, Mm³	*Planned*	69.12	86.40	95.04	120.96	120.96	133.06
		Actual	69.98	88.21	83.81			
	W, Mm³	*Planned*	762	770	805	844	896	953
		Actual	761	765	792			
Charvak reservoir	*I, Mm³*	*Forecast*	104.72	183.17	244.51	290.30	325.73	382.05
		Actual	104.57	153.48	207.91			
	R, Mm³	*Planned*	94.26	99.36	129.60	146.88	159.84	185.33
		Actual	94.26	96.63	115.75			
	W, Mm³	*Planned*	570	654	769	902	1068	1265
		Actual	586	658	759			
Bakhri Tojik reservoir	*I, Mm³*	*Forecast*	351.56	320.07	295.78	329.50	342.02	367.13
		Actual	502.33	338.69	398.22			
	R, Mm³	*Planned*	633.79	318.16	284.39	289.73	319.94	419.10
		Actual	634.30	399.47	419.79			
	W, Mm³	*Planned*	3209	3211	3222	3522	3544	3492
		Actual	3502	3443	3482			
Shardara reservoir	*I, Mm³*	*Forecast*	525.84	193.80	132.82	134.31	144.62	191.07
		Actual	658.92	386.67	154.73			
	R, Mm³	*Planned*	345.60	345.60	345.60	449.28	449.28	494.21
		Actual	376.62	332.12	198.29			
	W, Mm³	*Planned*	5175	4963	4689	4489	4141	3791
		Actual	5175	5009	4843			




Andizhan reservoir
Mm³
Mm³
April - actual
May - forecast
Inflow, forecast
Inflow, actual
Release, planned
Release, actual
Volume, planned
Volume, actual

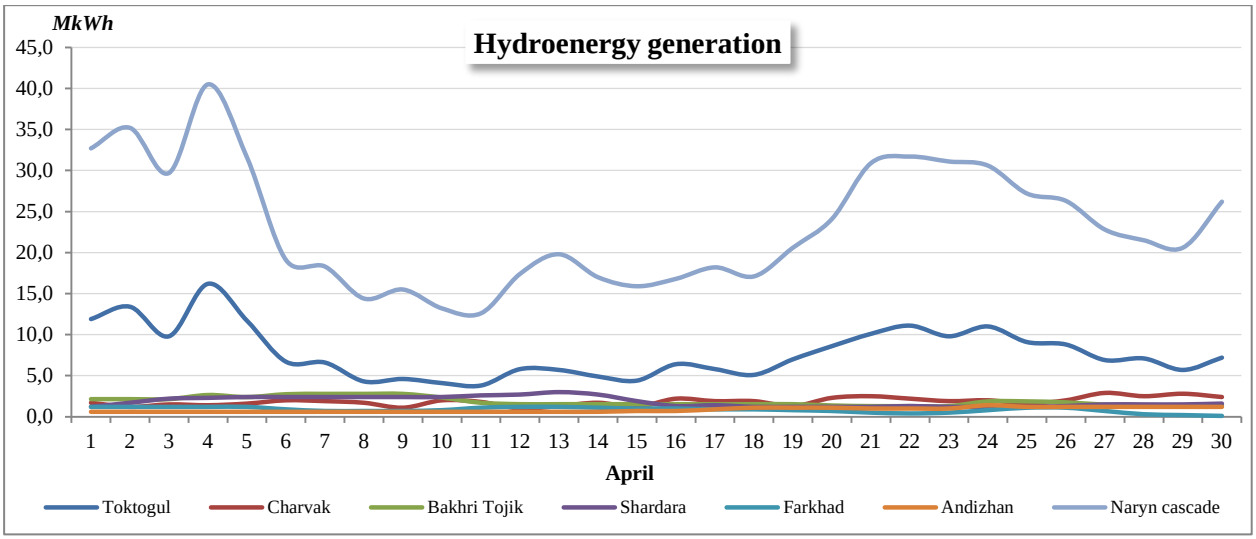

Charvak reservoir
Mm³
Mm³
April - actual
May - forecast
Inflow, forecast
Inflow, actual
Release, planned
Release, actual
Volume, planned
Volume, actual

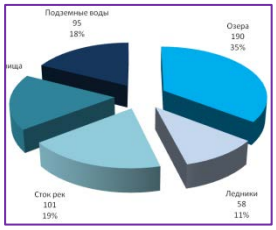

Bakhri Tojik reservoir
Mm³
Mm³
April - actual
May - forecast
Inflow, forecast
Inflow, actual
Release, planned
Release, actual
Volume, planned
Volume, actual



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

HEPS	Parameter		April		
			I ten-day	*II ten-day*	*III ten-day*
Naryn cascade	*G, M kWh*	*Actual*	250.2	179.5	268.9
Toktogul	*G, M kWh*	*Actual*	89.3	57.5	86.8
	Q, m^3/s	*Actual*	326.0	210.5	318.8
	H, m	*Actual*	130.6	131.0	131.0
Andizhan	*G, M kWh*	*Actual*	6.0	8.0	11.6
	Q, m^3/s	*Actual*	35.0	49.1	57.0
	H, m	*Actual*	95.0	95.0	95.0
Bakhri Tojik	*G, M kWh*	*Actual*	24.9	15.3	14.9
	Q, m^3/s	*Actual*	697.1	450.3	438.6
	H, m	*Actual*	21.0	20.0	20.0
Farkhad	*G, M kWh*	*Actual*	9.8	9.9	5.7
	Q, m^3/s	*Actual*	177.4	188.9	102.4
	H, m	*Actual*	30.6	30.6	30.6
Charvak	*G, M kWh*	*Actual*	16.1	16.6	22.8
	Q, m^3/s	*Actual*	77.8	77.5	101.8
	H, m	*Actual*	101.1	103.7	107.6
Shardara	*G, M kWh*	*Actual*	21.8	19.2	13.5
	Q, m^3/s	*Actual*	430.5	367.0	225.0
	G, M kWh	*Actual*	20.8	21.1	21.3



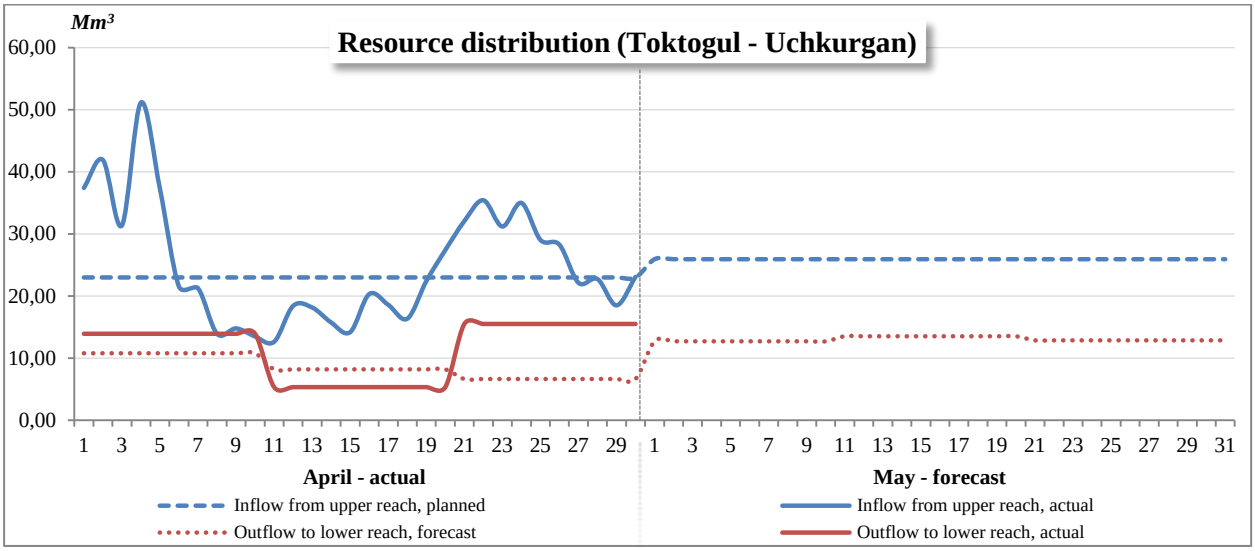


Water distribution

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**		**April**			**May**		
			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*	229.82	229.82	229.82	259.20	259.20	285.12
		Actual	284.00	184.03	277.34			
Lateral inflow[2]	*W, Mm³*	*Forecast*	63.99	63.99	63.99	93.50	93.50	102.85
		Actual	47.78	69.64	96.42			
Water withdrawals	*W, Mm³*	*Planned*	154.99	180.92	196.47	206.15	198.03	225.05
		Actual	153.01	173.48	187.16			
Losses	*W, Mm³*	*Forecast*	31.10	31.10	31.10	19.60	19.60	21.56
		Actual	39.67	27.05	31.68			
Outflow to lower reach[3]	*W, Mm³*	*Forecast*	107.72	81.79	66.24	126.95	135.07	141.36
		Actual	139.10	53.14	154.92			

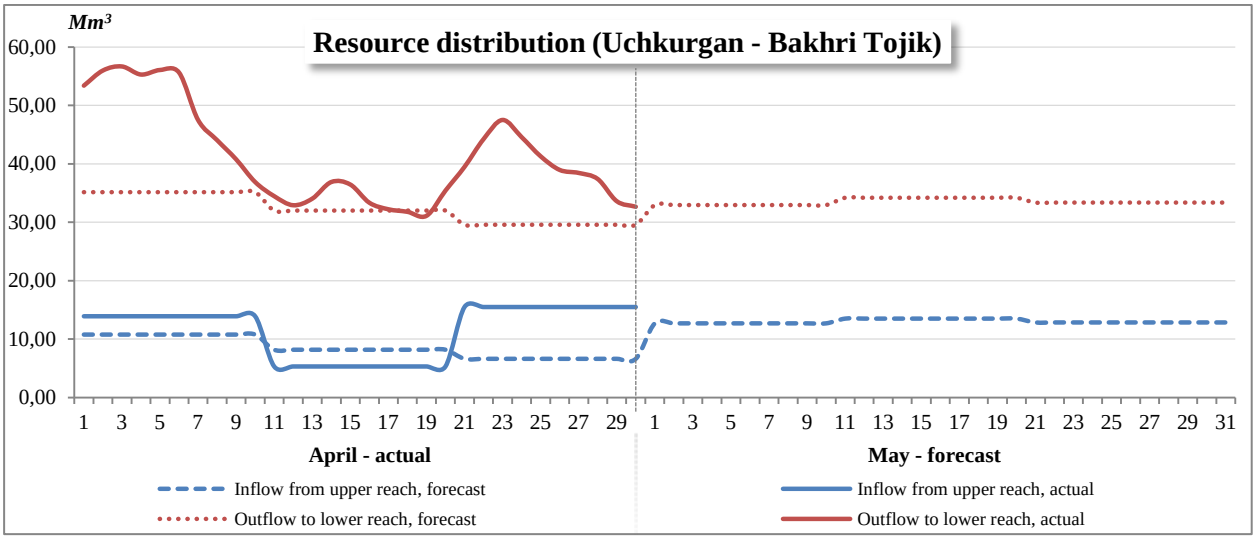


Water volume (**W**)

Uchkurgan – Bakhri Tojik	**Parameter**		**April**			**May**		
			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*	107.72	81.79	66.24	126.95	135.07	141.36
		Actual	139.10	53.14	154.92			
Lateral inflow	*W, Mm³*	*Forecast*	273.94	270.36	261.78	232.57	236.99	259.09
		Actual	323.67	311.13	286.76			

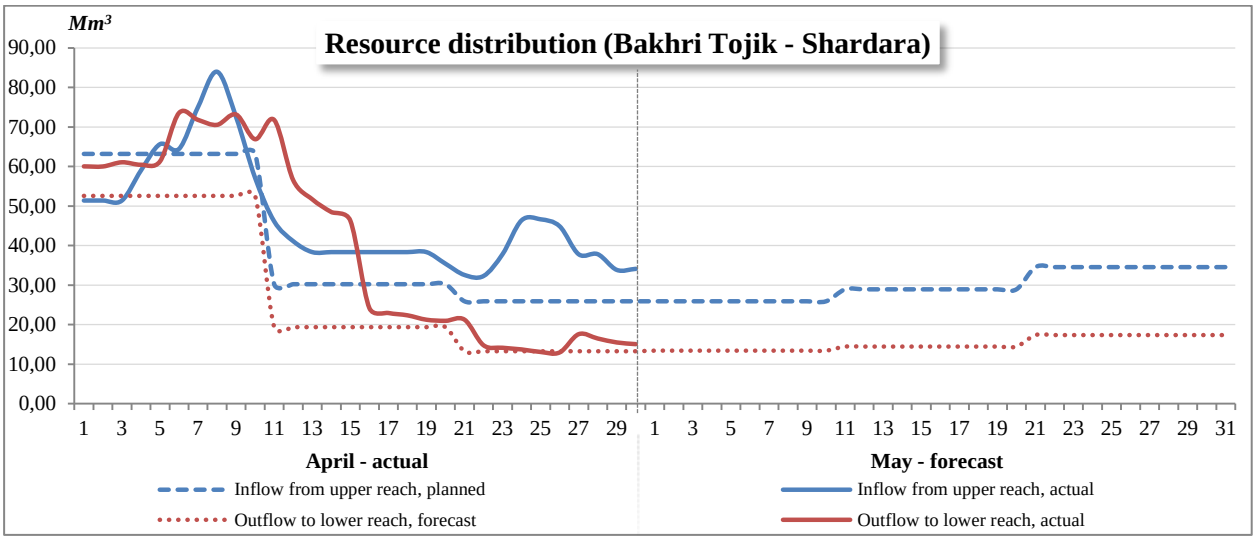
[2] *Incl. Karasu left and right*
[3] *Uchkurgan waterworks facility*

Water withdrawals	*W, Mm³*	*Planned*	20.10	22.08	22.24	20.02	20.04	22.33
		Actual	20.23	22.52	23.86			
Losses	*W, Mm³*	*Forecast*	10.00	10.00	10.00	10.00	10.00	11.00
		Actual	-59.79	3.06	19.60			
Outflow to lower reach[4]	*W, Mm³*	*Forecast*	351.56	320.07	295.78	329.50	342.02	367.13
		Actual	502.33	338.69	398.22			



Water volume (**W**)

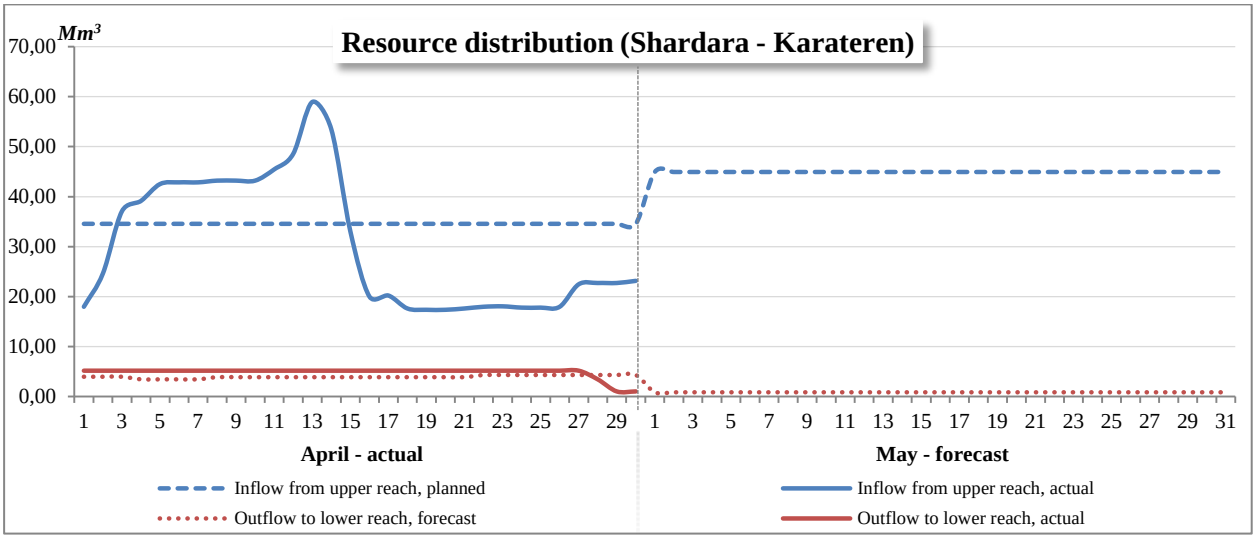
Bakhri Tojik - Shardara	Parameter		April			May		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach[5]	*W, Mm³*	*Planned*	632.02	302.40	259.20	259.20	289.44	380.16
		Actual	632.02	391.22	384.31			
Lateral inflow	*W, Mm³*	*Forecast*	276.87	228.07	233.37	221.37	213.11	238.26
		Actual	231.12	182.11	122.83			
Water withdrawals	*W, Mm³*	*Planned*	323.05	306.67	329.75	316.26	327.93	394.35
		Actual	147.52	222.70	310.07			
Losses	*W, Mm³*	*Forecast*	60.00	30.00	30.00	30.00	30.00	33.00
		Actual	56.70	-36.04	42.34			
Outflow to lower reach	*W, Mm³*	*Forecast*	525.84	193.80	132.82	134.31	144.62	191.07
		Actual	658.92	386.67	154.73			



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

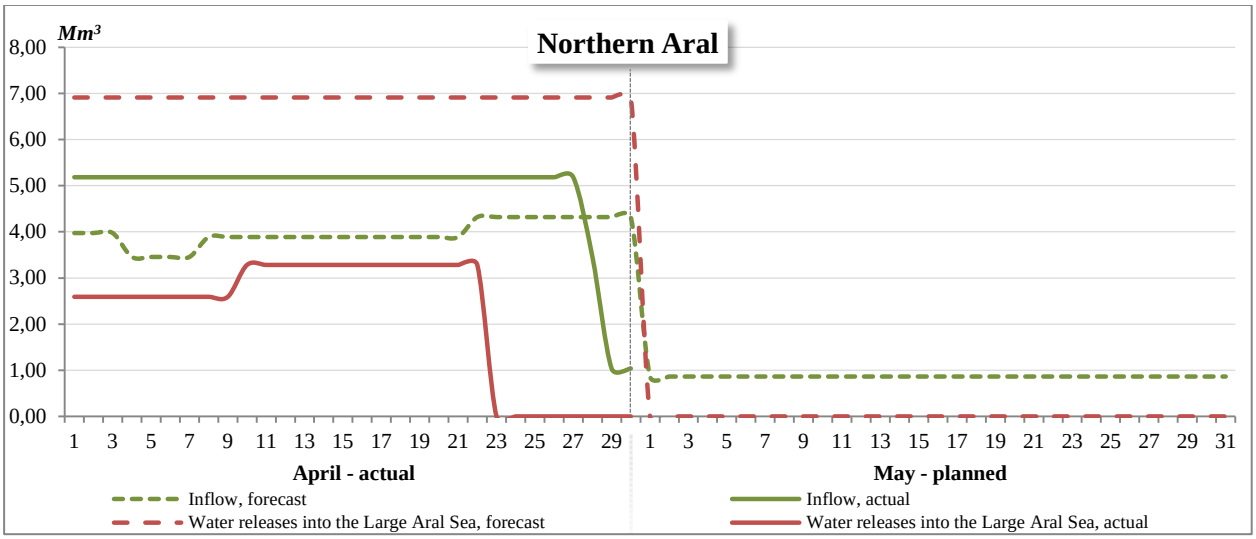
Water volume (**W**)

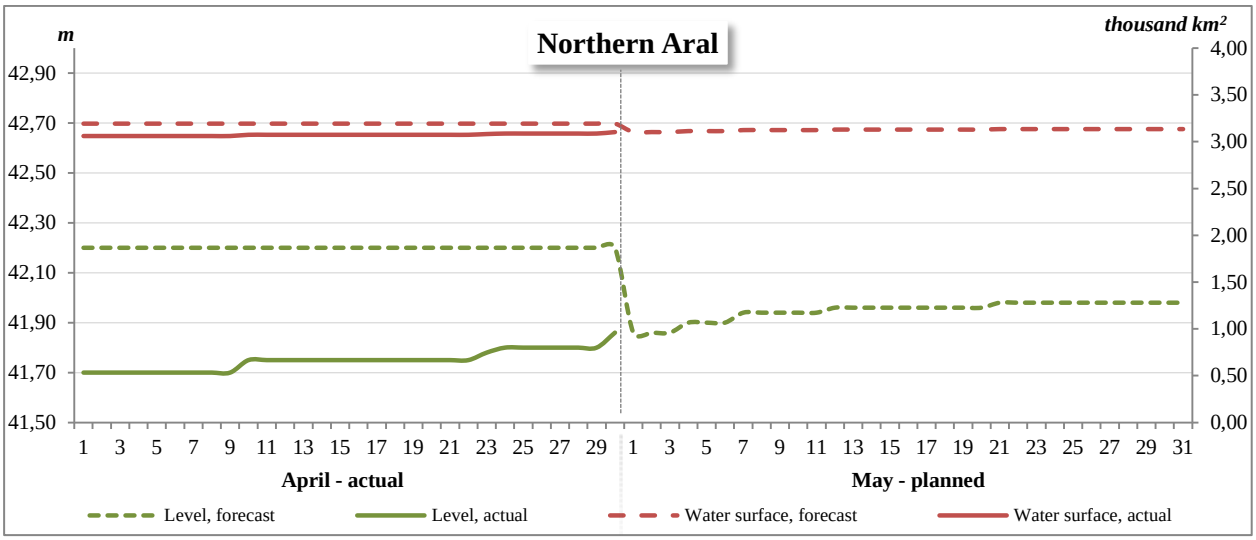
Shardara - Karateren	Parameter		April			May		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow from upper reach	*W, Mm³*	*Planned*	345.60	345.6	345.6	449.28	449.28	494
		Actual	376.62	332.1	198.3			
Lateral inflow	*W, Mm³*	*Forecast*	10.54	37.1	12.4	11.30	25.00	17
		Actual	144.63	57.6	18.9			
Filling (+), draw down (-) of Koksarai reservoir	*W, Mm³*	*Planned*	0.0	121.0	250.6	259.2	302.4	333
		Actual	-254.9	-77.8	194.4			
Water withdrawals	*W, Mm³*	*Planned*	38.9	50.4	181.6	310.0	406.7	471
		Actual	18.3	30.9	128.0			
Losses	*W, Mm³*	*Forecast*	279.8	414.3	384.2	401.1	361.3	362
		Actual	196.2	229.2	241.7			
Outflow to lower reach	*W, Mm³*	*Forecast*	37.4	38.9	42.8	8.6	8.6	10
		Actual	51.8	51.8	41.8			



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

Northern Aral	Parameter		April			May		
			I ten-day	*II ten-day*	*III ten-day*	*I ten-day*	*II ten-day*	*III ten-day*
Inflow	*W, Mm³*	*Forecast*	37	39	38.45	9	9	9.50
		Actual	52	52	40.78			
Water volume	*W, Mm³*	*Forecast*	24.38	24.3	24.2	24.94	25.1	25.2
		Actual	24.35	24.48	24.6			
Water level	*H, m*	*Forecast*	42.20	42.20	42.2	41.90	41.96	41.98
		Actual	41.71	41.75	41.8			
Water surface area	*S, th.km²*	*Forecast*	3.19	3.19	3.2	3.11	3.13	3.13
		Actual	3.06	3.07	3.1			
Water releases into the Large Aral Sea	*W, Mm³*	*Forecast*	69	69	62.21	0	0	0
		Actual	26.61	32.83	6.57			





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