The PEER research project
"Transboundary water management adaptation in the Amudarya basin to climate change uncertainties"

Amudarya basin:
the present situation and future challenges

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SIC ICWC in Central Asia
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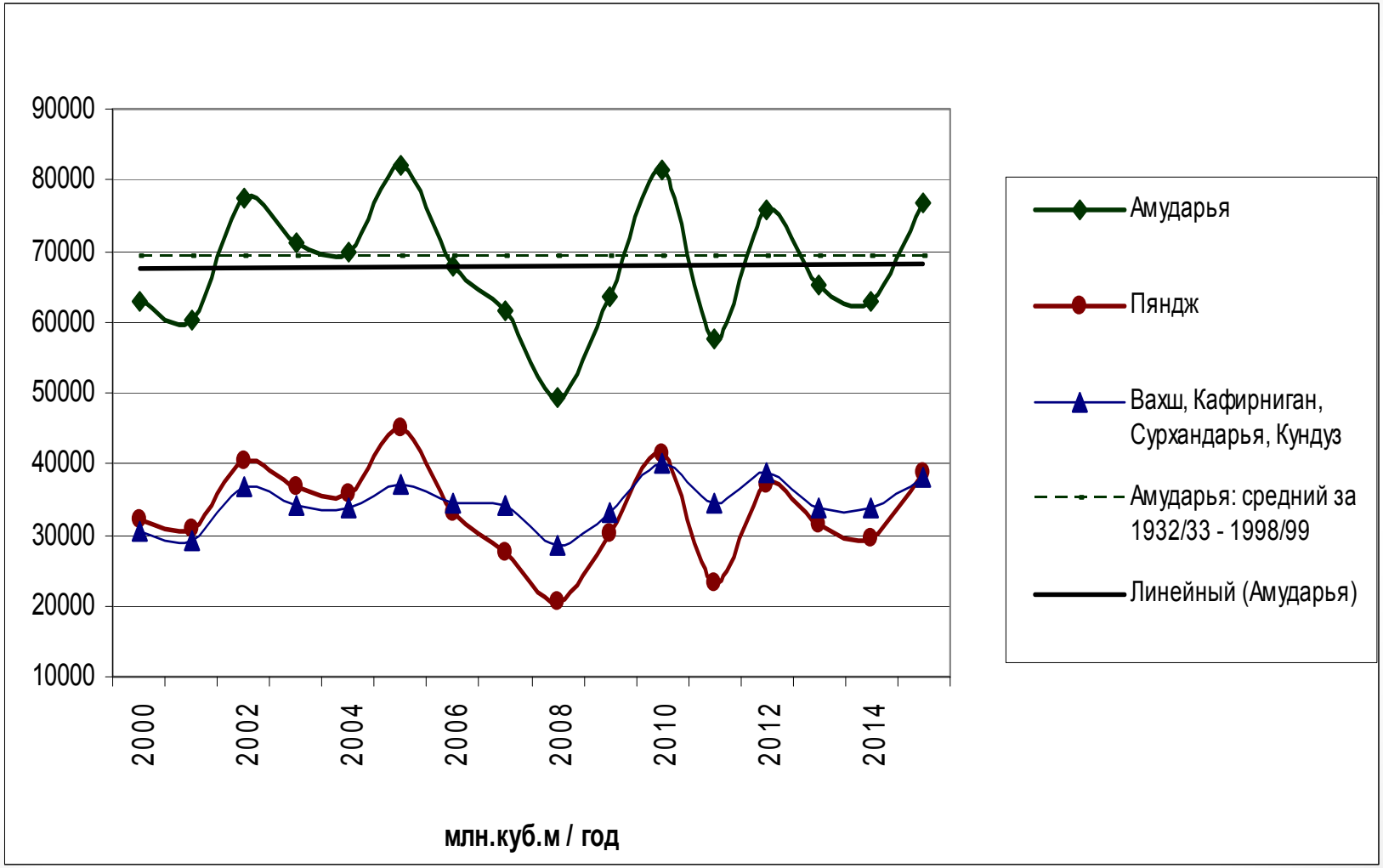
Amudarya – a river of 5 states

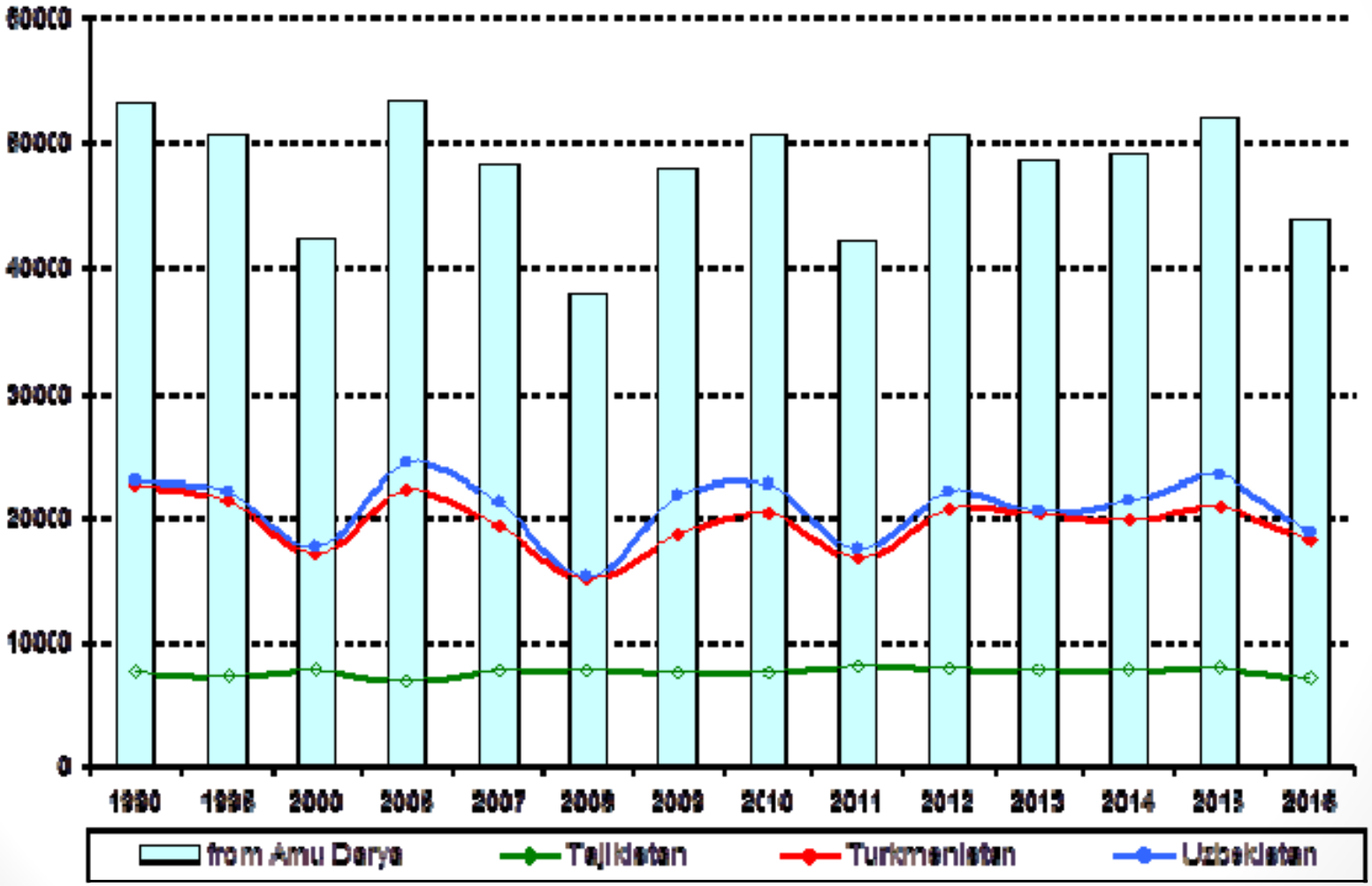
The present situation

- Significant deviation of flow and unreliable forecast
- Five states, 19 provinces with unmet food and power demand
- Weaknesses in regulations and proceedings
- Uncertainty in the future hydropower development
- Late development of Afghanistan
- Lack of investment
- Specificities of river bed and water losses
- Big potential growth of industries and their needs for water supply
- Problems of the Aral Sea and Aral sea coast
- Demographic growth
- Climate changes and need to plan for adaptation and mitigation

Amudarya flow in 2000-2015



Total water withdrawal from Amudarya river, mln.m^3



BWO data

Indicators of Amudarya states

State	Area th. km^2	Population mln	GDP per capita, USD	Water resources per capita, m^3		Irrigated land area per capita, ha	Electricity production per capita, kWh
				local	consumed		
Kyrgyzstan	199.9	5.89	1258.1	8307	1414	0.17	2.38
Tajikistan	143.1	8.32	1110.6	7627	1405	0.09	2.057
Turkmenistan	491.1	6.15	7793.5	229	4411	0.255	2.959
Uzbekistan	448.97	31.02	2020.9	527	1565	0.14	1.773
Afghanistan	652.2	31.28	666.2	1507	648	0.052	0.026

Dynamic of population on the Amudarya basin, th. persons

	2015	2020	2030	2040
Uzbekistan	8599	9216	10769	12323
Tajikistan	6083	6508	7737	8967
Turkmenistan	4931	5067	5450	5833
Afghanistan provinces in the Amudarya basin	5482	6023	6617	7269
Total on the basin	25083	26814	30574	34392

Water allocation between States

States	km³/year	%%
Uzbekistan	29.6 ***28.7***	48.2
including Aral and Aral sea coast	***5.0***	
Tajikistan	9.5 ***9.5***	15.4
Kyrgyz Republic	0.4 ***0.45***	0.6
Turkmenistan	22.0 ***22.0***	35.8
Total:	61.5 ***60.52***	100

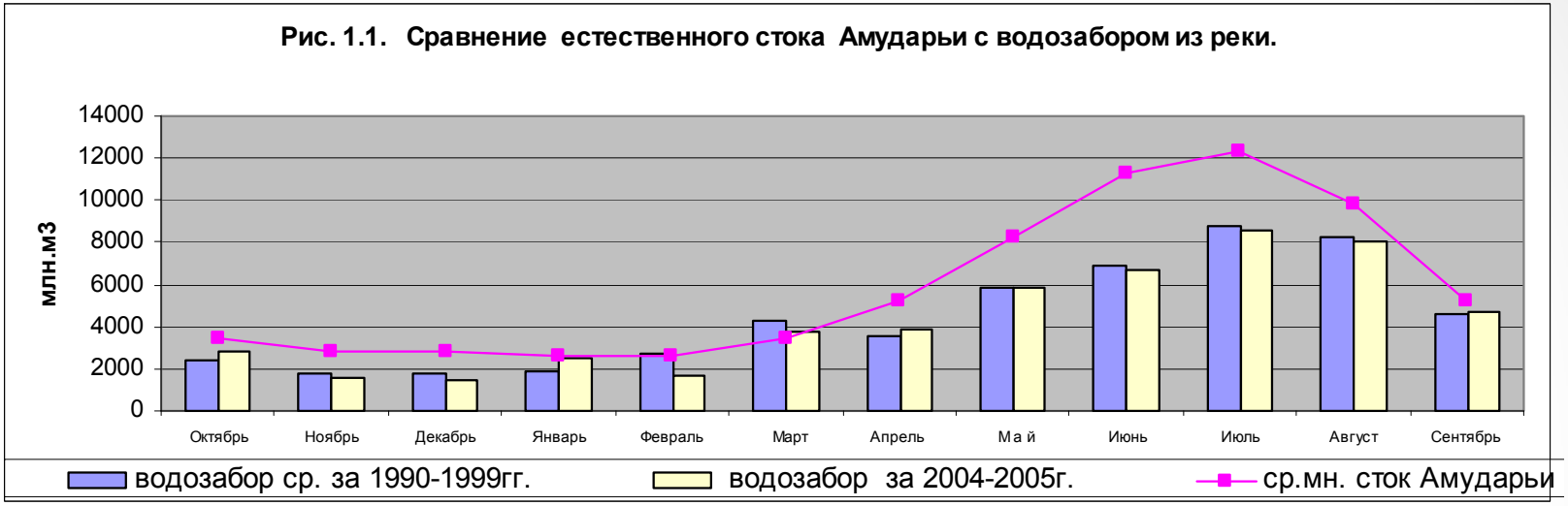
Average deviation in actual water delivery from ICWC agreed plans in 2006-2016, %

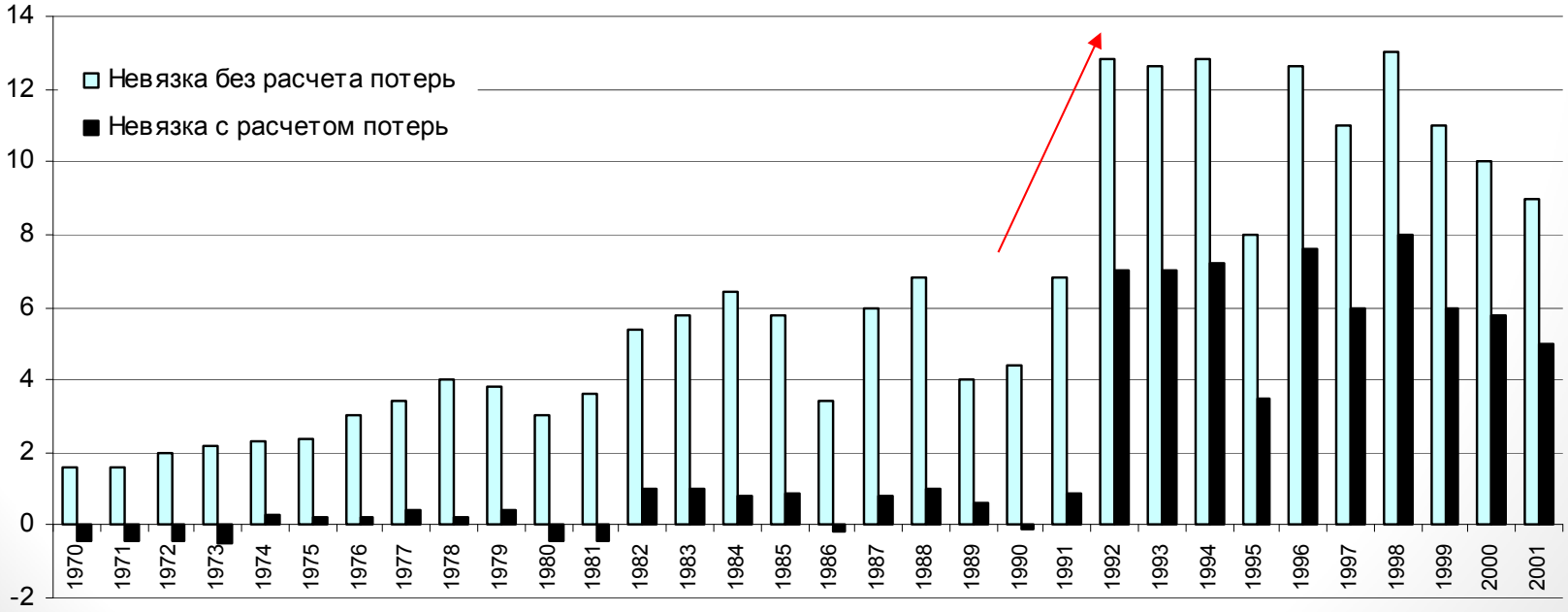
States	Vegetation	Non vegetation
Tajikistan	14,3	25,99
Turkmenistan	14,67	5,55
Uzbekistan	12,91	5,81

Changes in Amudarya annual flow

Параметр	Period	Source of data	Units.	Pyanj	Vakhsh	Kafirnigan	Surhandarya	Kunduz	Amudarya total
Annual average flow for period	1932/1933 - 1998/1999	БД НИЦ МКВК	км^3/год	35,91	19,99	5,51	3,38	4,44	69,23
	1999/2000 - 2014/2015	PEER	км^3/год	33,39	21,12	5,61	3,38	4,34	67,84
	1932/1933 - 2014/2016	НИЦ МКВК / PEER	км^3/год	35,43	20,21	5,53	3,38	4,42	68,97
	по данным до 1970 года	САО Гидропроект, 1972	км^3/год	34,9	20	5,56	3,82	3,66	67,94
Changes of annual flow for period	1999-2016 от 1932-1999		км^3/год	-2,52	1,13	0,1	0	-0,1	-1,39
			%	-7,0	5,7	1,8	0,0	-2,3	-2,0
	1999-2016 от 1932-2016		км^3/год	-2,04	0,91	0,08	0	-0,08	-1,13
			%	-5,8	4,5	1,4	0,0	-1,8	-1,6

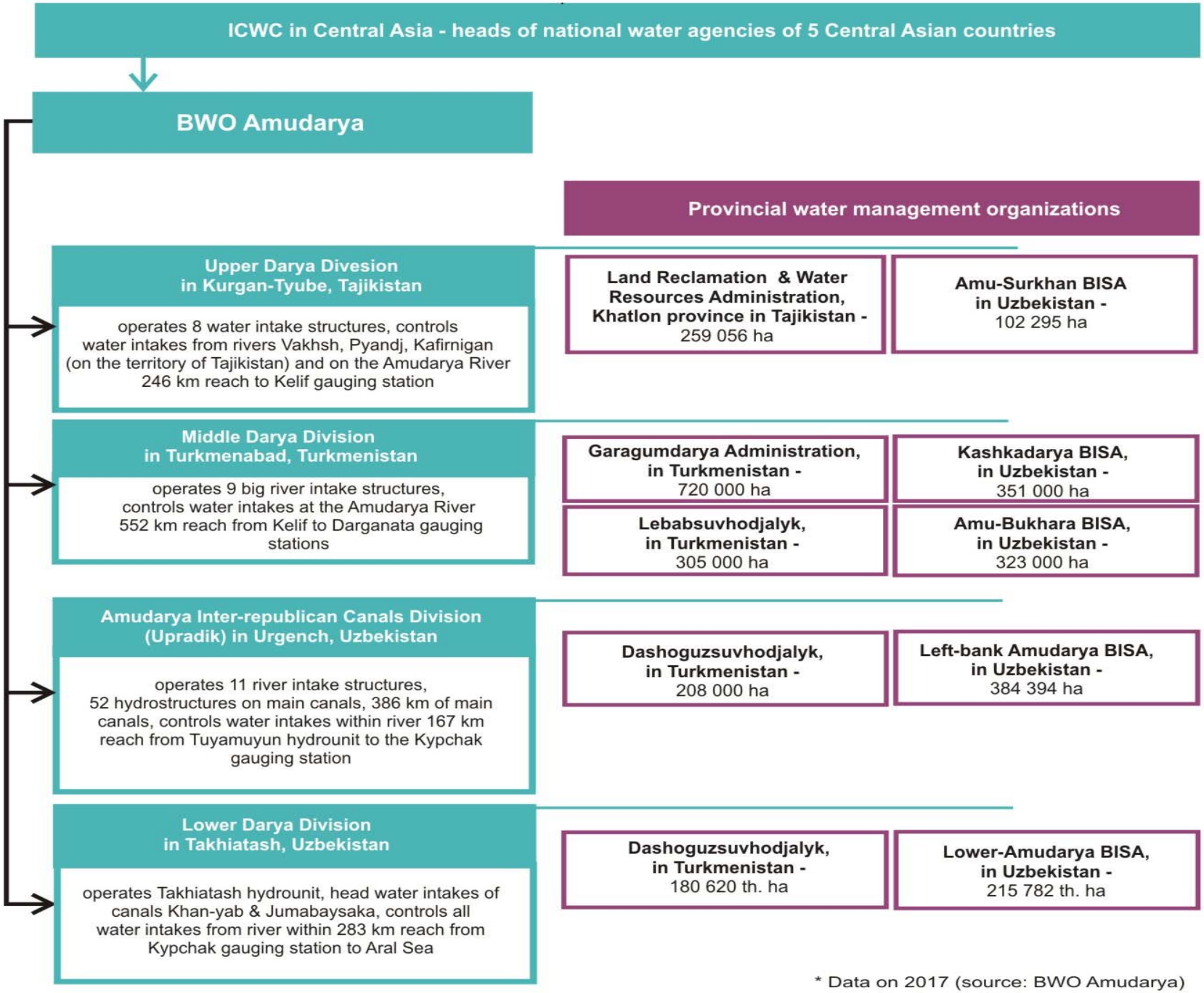
Increase in losses after 1993



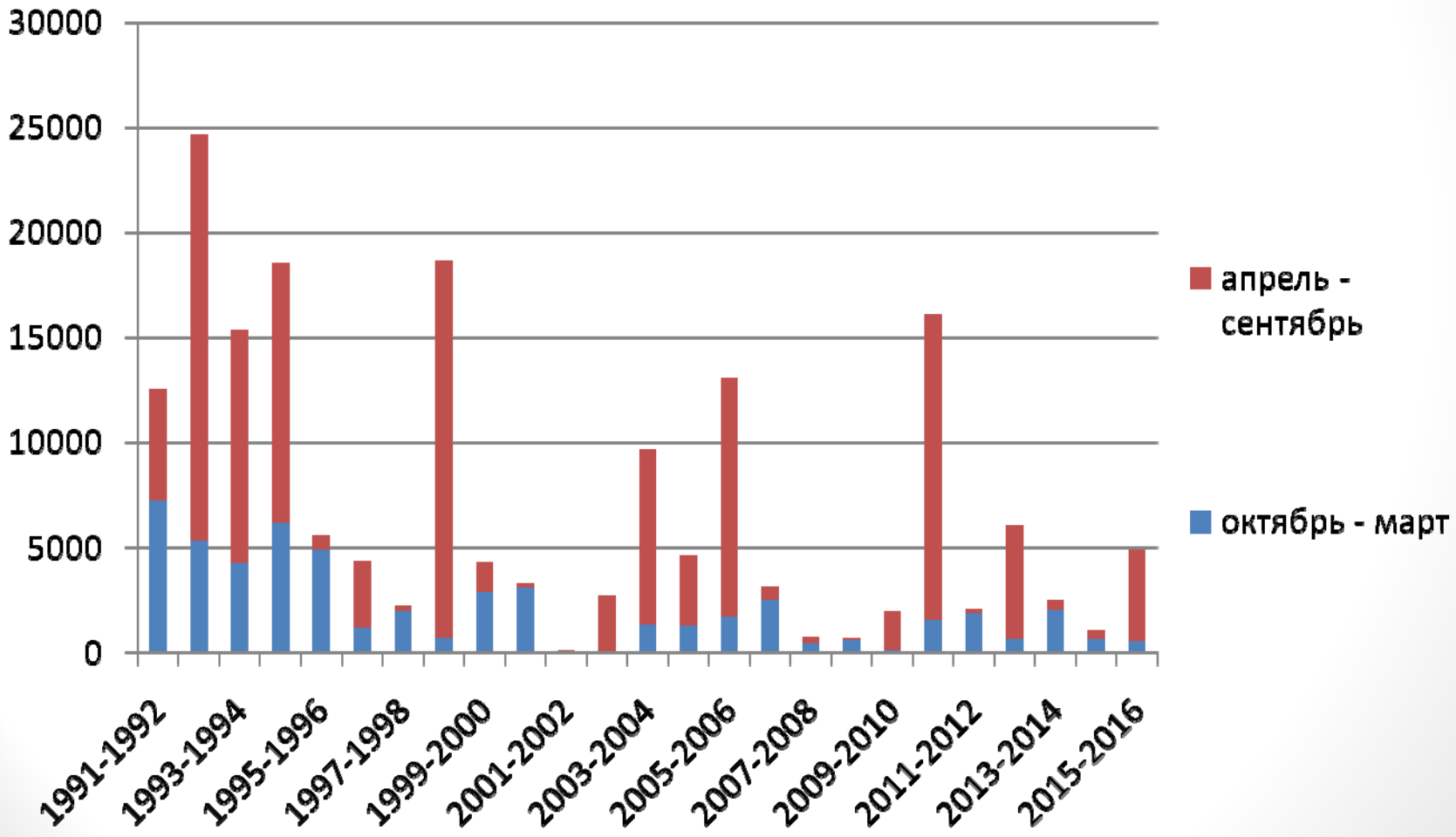


Irrigated indicators in Amudarya basin

	Irrigated area, th. ha	Irrigated rate, th.m^3/ha
Afghanistan	488,5	6137
Kyrgyzstan	20,0	20,000
Tajikistan	466,0	15,223
Turkmenistan	1429,7	12640
Uzbekistan	1549,0	12091


ICWC in Central Asia - heads of national water agencies of 5 Central Asian countries
BWO Amudarya
Provincial water management organizations
Upper Darya Divesion in Kurgan-Tyube, Tajikistan
operates 8 water intake structures, controls water intakes from rivers Vakhsh, Pyandj, Kafirnigan (on the territory of Tajikistan) and on the Amudarya River 246 km reach to Kelif gauging station
Land Reclamation & Water Resources Administration, Khatlon province in Tajikistan - 259 056 ha
Amu-Surkhan BISA in Uzbekistan - 102 295 ha
Middle Darya Division in Turkmenabad, Turkmenistan
operates 9 big river intake structures, controls water intakes at the Amudarya River 552 km reach from Kelif to Darganata gauging stations
Garagumdarya Administration, in Turkmenistan - 720 000 ha
Kashkadarya BISA, in Uzbekistan - 351 000 ha
Lebabsuvhodjalyk, in Turkmenistan - 305 000 ha
Amu-Bukhara BISA, in Uzbekistan - 323 000 ha
Amudarya Inter-republican Canals Division (Upradik) in Urgench, Uzbekistan
operates 11 river intake structures, 52 hydrostructures on main canals, 386 km of main canals, controls water intakes within river 167 km reach from Tuyamuyun hydrounit to the Kypchak gauging station
Dashoguzsuvhodjalyk, in Turkmenistan - 208 000 ha
Left-bank Amudarya BISA, in Uzbekistan - 384 394 ha
Lower Darya Division in Takhiatash, Uzbekistan
operates Takhiatash hydrounit, head water intakes of canals Khan-yab & Jumabaysaka, controls all water intakes from river within 283 km reach from Kypchak gauging station to Aral Sea
Dashoguzsuvhodjalyk, in Turkmenistan - 180 620 th. ha
Lower-Amudarya BISA, in Uzbekistan - 215 782 th. ha
* Data on 2017 (source: BWO Amudarya)

Flow of the Amudarya River at Samanbay g/s, Mm3/season



Usable water resources in the Amudarya basin, km^3 on 2035 - 2040

Indicator	Normal year	Driest 2008	Scenario B2		Scenario A2	
			Average year	Dry year	Average year	Dry year
Surface water:						
Amu Darya	79.3	59.4	73.7	55.2	71.3	53.5
Groundwater:	16.9	13.5	16.4	13.1	15.7	12.5
Amu Darya	5.9	4.7	5.5	4.4	5.3	4.3
Return water:	32.4/21.6	12.9	20.8	12.5	20.1	12.0
Amu Darya	19.06/9.7	5.8	9.0	5.4	8.7	5.2
Water losses in river channel:	13.9	13.9	13.9	13.9	13.9	13.9
Amu Darya	8.9	8.9	8.9	8.9	8.9	8.9
Environmental demand:	8.0	5.2	8.0	5.7	8.0	5.7
Amu Darya	4.8	3.2	4.8	3.2	4.8	3.2
Total water availability:	133.05	94.1	126.4	88.7	120.6	85.0
Amu Darya	81.3	57.9	74.6	53.0	71.7	50.9
Syr Darya	51.7	36.1	51.7	35.6	48.7	34.0

Challenges

Challenge	Water
Demographic pressures (320 th.persons/year)	2.5 km^3
Reductions of flow due to climate change	1.5 km^3
Growth demand of North Afghanistan	3.0 km^3
Growth of water demands in irrigation lands of Tajikistan, Turkmenistan and Uzbekistan	1.0 km^3
Total	**8 km^3**

Adaptation measures

- Implementation of IWRM in the basin
- Revision of water supply and irrigation norms, including irrigations norms and efficiency
- Reassessing water demands of irrigated lands, taking into account the advantages of temperature growth (Dr. Stulina's research findings)
- Implementation of SCADA system
- Shift in regimes of flow regulation from priority hydropower production to combined hydropower and irrigation regime

Thank you
for your attention!