

Interstate Commission for Water Coordination of Central Asia	BULLETIN № 2 (61)	July 2013
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**MINUTES OF THE 61TH MEETING OF THE INTERSTATE
COMMISSION FOR WATER COORDINATION (ICWC) OF THE
REPUBLIC OF KAZAKHSTAN, THE KYRGYZ REPUBLIC, THE
REPUBLIC OF TAJIKISTAN, TURKMENTISTAN, AND THE
REPUBLIC OF UZBEKISTAN**

April 16, 2013

Bishkek city

In attendance were:

Abishev,
Islam Almakhanovich

Tashtanaliyev,
Kokumbek Zhumagulovich
Rakhimov,
Sulton Nurmakhmadovich
Mukhammedov,
Akhmed

Mamutov,
Ravshan Aminaddinovich

Dukhovny,
Victor Abramovich

Khamidov,
Makhmud Khamidovich

Kdyrniyazov, Burkitbay
Tadjiniyazovich

Mukhitdinov,
Khayrullo Ergashevich

Makarov,
Oleg Stepanovich

Uzakbaev,
Chyngysbek Makeshovich

Jayloobaev,
Abdybay Shakirbaevich

ICWC members:

Chair of the Committee of Water Resources under the
Ministry of Environment Protection of the Republic of
Kazakhstan

Director General, Department for Water Resources and
Land Reclamation of the Kyrgyz Republic

First Deputy Minister of Land Reclamation and Water
Resources of the Republic of Tajikistan

Deputy Minister of Water Resources of Turkmenistan

Deputy Head of the Central Water Administration
(CWA), under the Ministry of Agriculture and Water
Resources (MAWR) of the Republic of Uzbekistan

ICWC Executive bodies:

Director of SIC ICWC

Director of BWO “Syrdarya”

Director of BWO “Amudarya”

Head of ICWC Secretariat

Director of Coordination Metrological Center, the
Kyrgyz Republic

Invited persons:

Minister of Agriculture and Land Reclamation of the
Kyrgyz Republic

First Deputy Director General, Department for Water
Resources and Land Reclamation of the Kyrgyz

	Republic
Mamataliev, Nurgazy Patiydinovich	Director of the Kyrgyz Branch of SIC ICWC
Koshmatov, Baratali Turanovich	Director of the Department for Implementation of Improved Water Resources Management Project, Department for Water Resources
Eshimbekov, Chyngyz	Director of the Department for International Economic Cooperation under the Ministry of Foreign Affairs of the Kyrgyz Republic
Borodin, Aleksy Viktorovich	First Deputy Director General, OJSC "NESK", Kyrgyz Republic
Baizbekov, Zholdosbek Kaparovich	Leading Engineer of Hydroengineering Service, OJSC "Power Stations", Kyrgyz Republic
Dyikanov, Elmar Bazarbekovich	Leading Expert of the Department for Electric Power Generation and Transmission, Kyrgyz Republic
Zhienbaev, Musilim Rysmakhanovich	Chief Expert of Water Resources Use Regulation and Protection Authority, Committee of Water Resources of the Republic of Kazakhstan
Karlykhanov, Adilkhan Karlykhanovich	Head of the Aral-Syrdarya Basin Inspectorate, Committee of Water Resources of the Republic of Kazakhstan
Nursadykov, Darkhan Kuanyshevich	First Secretary of the Shanghai Cooperation Organization, Asian Cooperation Department, MFA of the Republic of Kazakhstan
Nurzhanov, Omarbek Nurzhanovich	Advisor of Director General, Regional Support Group "Kazvodkhoz" under the Committee of Water Resources, Republic of Kazakhstan
Abdrakhmanova, Gulmira	Press Secretary of the Committee of Water Resources, Republic of Kazakhstan
Gafarov, Bakhrom	Deputy Director of the Tajik Branch of SIC ICWC
Akhmadjonov, Vakhidjon	Deputy Head of the Authority for Water Resources Balance and Water Saving Technologies Implementation, under the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan
Ziganshina, Dinara Ravilievna	Deputy Director of SIC ICWC
Beglov, Iskander Ferdinandovich	Head of Department, SIC ICWC

Agenda

1. The results of the non-growing season of 2012-2013 in the Amudarya and Syrdarya river basins (responsible: BWO “Amudarya” and BWO “Syrdarya”).
2. Consideration and approval of water diversion quotas and operation modes of the multi-reservoir system in the Amudarya and Syrdarya river basins for the growing season of 2013 (responsible: BWO “Amudarya” and BWO “Syrdarya”).
3. Consideration of the finalized “Concept for development of information exchange and mechanisms of relationships among its participants in Central Asia” (responsible: SIC ICWC).
4. Main lines in improving ICWC activity and mechanisms of their implementation:
 - Plan of implementation of main lines for improvement of the ICWC activity;
 - Water Sector Capacity Building Strategy for the CA countries (responsible: SIC ICWC).
5. Agenda and venue of the next 62nd ICWC meeting.

Having approved the agenda, listened to presentations of the participants of the meeting and exchanged opinions, the members of Interstate Commission for Water Coordination in Central Asia decided:

The first item:

1. Take into consideration the information of BWO Amudarya and BWO Syrdarya about the results of the non-growing season and water supply to the states within the Amudarya and Syrdarya basins during the non-growing season of 2012-2013.
2. Note that transit water diversion made by Uzbekistan during the non-growing season of 2012-2013 was enforced, nonrecurrent and connected with the existing water situation in the Syrdarya river basin.
3. Charge BWOs “Amudarya” and “Syrdarya”, starting from the next meeting, with providing monthly information on water quotas and diversion, as well as the operation mode of the multi-reservoir system during the growing and non-growing seasons.

Second issue:

For the Amudarya River basin:

1. Approve water diversion quotas of the states for the Amudarya River basin for the growing season of 2013.

For the Syrdarya River basin:

1. Approve water diversion quotas with 10%-reduction and charge BWO “Syrdarya” to incorporate adjustments, based on actual water content.

2. Under BWO “Syrdarya”, establish a working group composed of specialists who were agreed by the relevant parties, for monitoring and implementing of quotas.

3. The parties are to consider the “Canal Automation in the Fergana Valley” project and submit proposals at the next ICWC meeting.

4. In connection with the lack of accurate forecasts on sources’ water content and respective agreements, charge BWO “Syrdarya” with preparing an operation mode of the multi-reservoir system within the Syrdarya River basin.

Third issue:

The ICWC members are to submit notes and proposals on the “Concept for development of information exchange and mechanisms of relationships among its participants in Central Asia” project by the next ICWC meeting in order to generalize and further submission to the Executive Committee of ICWC.

Fourth issue:

Within two months, the ICWC members are to submit notes and proposals on “Plan of implementation of main lines for improvement of the ICWC activity” and “Water Sector Capacity Building Strategy for the CA countries” projects for consideration at the next ICWC meeting.

Fifth issue:

1. Agenda and venue of the next 62nd ICWC meeting. Дату и место проведения следующего заседания МКВК определить в рабочем порядке.

2. Approve the agenda of the next 62nd ICWC meeting.

Agenda of the next 62nd ICWC meeting

1. Progress in implementation of quotas and operation modes of the multi-reservoir system for the growing season of 2013 for the Amudarya and Syrdarya rivers basins.

2. Consideration of notes and proposals to “Concept for development of information exchange and mechanisms of relationships among its participants in Central Asia” project (responsible: SIC ICWC).

3. Main lines in improving ICWC activity and mechanisms of their implementation:

- Plan of implementation of main lines for improvement of the ICWC activity;

- Water Sector Capacity Building Strategy for the CA countries (responsible: SIC ICWC).

4. Holding of the next 63rd ICWC meeting.

From the Republic of Kazakhstan

Abishev, I.A.

From the Kyrgyz Republic

Tashtanaliyev, K.Zh.

From the Republic of Tajikistan

Rakhimov, S.N.

From Turkmenistan

Mukhammedov, A.

From the Republic of Uzbekistan

Mamutov, R.A.

RESULTS OF THE NON-GROWING SEASON OF 2012-2013 FOR THE AMUDARYA AND SYRDARYA RIVER BASINS¹

1. Amudarya River Basin

For the non-growing season, the actual water content for the Amudarya river basin, in the Atamurat gauging station, upstream of the Garagumdarya, made 109.4 % of the norm. The actual volume was 15 923 mln m³ when the norm was 14 455 mln m³. In the past season, the water content made 92.8 %.

The use of the fixed water diversion quotas broken down by the countries for the reporting non-growing season is as follows:

- the water diversion quota set for the basin as a whole was used by 95.5 %; the actual diversion made 14 994 mln m³ compared with the quota of 15 696 mln m³, including:

- the Republic of Tajikistan used 75.0 % out of the fixed water diversion quota; at the quota of 2846 mln m³, 2135 mln m³ were actually used;

- Turkmenistan used 101.1 % out of its water diversion quota; at the quota of 6500 mln m³, 6574 mln m³ were actually used;

- the Republic of Uzbekistan used 99.0 % out of its water diversion quota; at the quota of 6350 mln m³, 6285 mln m³ were actually used, including the downstream reach of the “Atamyrat” gauging station, upstream of the Garagumdarya, the Republic of Uzbekistan used 98.9 % of the fixed water diversion quota; at the quota of 5980 mln m³, 5913 mln m³ were actually used.

3570 mln m³ of water were supplied into the Priaralie and Aral Sea for the growing season.

The use of the set quotas broken down by river reaches was as follows:

1. Upper reach – 78.0 %; including the Republic of Tajikistan – 75.0 %, the Republic of Uzbekistan – 100.5 %.

2. Middle reach – 97.7 %; including the Republic of Uzbekistan – 96.4 %, Turkmenistan – 98.5 %.

3. Lower reach – 104.8 %; including the Republic of Uzbekistan – 101.8 %, Turkmenistan – 110.7 %.

During the reporting non-growing season, sanitary and environmental releases were used by 100.0 % as a whole; at the plan of 800 mln m³, 800 mln m³ were actually used.

Turkmenistan used 100.0 % out of its fixed sanitary and environmental releases; at the plan of 150.0 mln m³, 150 mln m³ were actually used. The Republic

¹ Materials to the first issue of the agenda of the 61st meeting of ICWC

of Uzbekistan used 100.0 % out of its fixed sanitary and environmental releases; at the plan of 650 mln m³, 650 mln m³ were actually used.

The actual water volume in the Tuyamuyun reservoir made 3535 mln m³ at the beginning of the growing season.

It also needs to mention that following the decisions of the adopted Agreement on Water Resources Sharing between Turkmenistan and the Republic of Uzbekistan in the Lower Reaches of the Amudarya River, 8 meetings of the Commission for water allocation were hold during the reporting period with participation of the leaders of the Production Association Dashoguzsuvkhojalyk”, Lower-Amudarya BISA (Karakalpakstan and Khorezm), BWO “Amudarya” and Tuyamuyun Hydroscheme (TMHS) Management Organization. At those meetings, the TMHS operation modes were determined, and the water diversion quotas broken down by the water consuming countries for one or another period were fixed.

(Tables 1.1; 1.2; 1.3 present more detailed information)

Consideration and approval of the water diversion quotas and operation modes of the multi-reservoir system in the Amudarya river basin for the growing season of 2013.

For the growing season of 2013, the basin states stated the following water diversion quotas for normal water content in the basin:

Republic of Tajikistan	6885 mln m ³
Turkmenistan	15 500 mln m ³
Republic of Uzbekistan	17 220 mln m ³
incl. Surkhandarya province	1200 mln m ³

To ensure normal water content in the Amudarya river basin, total volume of 39 605 mln m³ was requested to be set as a quota.

According to the preliminary estimates, water content in the Amudarya river is expected within 100.0%.

Under these conditions, 2100 mln m³ of water is provided for to supply to the Priaralie and Aral Sea for the growing season.

Taking into account the water content forecast and the emerging water situation in the region, water diversion quotas for the growing season of 2013 (Table 1.4) are submitted for consideration of the ICWC members.

Table 1.5 provides the operation mode of the Tuyamuyun reservoir.

Table 1.1

Analysis of use of the water diversion quotas during the non-growing season of 2012-2013 within the Amudarya River basin (mln m³)

Description	Submitted quotas for the non-growing season 2012-13	Actual	In percentage terms
<i>Upper Amudarya Administration</i>	3216	2507	78.0
Upper reach, including:			
Republic of Tajikistan	2846	2135.0	75.0
Republic of Uzbekistan	370	372	100.5
<i>Water diversions from the Amudarya River to the Atamurat gauging station (GS) (Kerki)</i>	12480	12487	100.1
including:			
Turkmenistan	6500	6574.0	101.1
Republic of Uzbekistan	5980	5913.0	98.9
<i>Middle Amudarya Administration</i>	8345	8151.6	97.7
Middle reach, including:			
Turkmenistan	5100	5023.2	98.5
Republic of Uzbekistan	3245	3128.4	96.4
<i>Amudarya Irrigation Canals Administration,</i>	2535	2790.4	110.1
including:			
Turkmenistan	795	959.8	120.7
Republic of Uzbekistan	1740	1830.6	105.2
<i>Lower Amudarya Administration,</i>	1600	1545	96.6
including:			
Turkmenistan	605	591	97.7
Republic of Uzbekistan	995	954	95.9
<i>In addition, sanitary releases, total</i>	800	800	100.0
including: Republic of Karakalpakstan	500	500	100.0
Dashkhovuz province	150	150	100.0
Khorezm province	150	150	100.0
<i>Total for the basin::</i>	15696	14994.0	95.5
including:			
Republic of Tajikistan	2846	2135.0	75.0
Turkmenistan	6500	6574.0	101.1
Republic of Uzbekistan	6350	6285.0	99.0

Table 1.2

Actual operation mode of the Tuyamuyun reservoir
(from October 2012 to March 2013)

Tuyamuyun reservoir	Unit	Actual						Total
		October	November	December	January	February	March	
Volume: at the beginning of the period	mln m3	5742	5843	5785	5893	5647	4879	5742
Inflow to the reservoir	m3/s	577	471	528	555	420	338	
	mln m3	1545	1220	1413	1487	1015	906	7585
Release from the reservoir	mln m3	539	493	487	647	737	840	
	mln m3	1444	1278	1304	1733	7783	2250	9792
Volume: at the end of the period	mln m3	5843	5785	5893	5647	4879	3535	3535
Accumulation(+), drawdown(-)	mln m3	101	-58	108	-246	-768	-1344	-2207

Table 1.3

Information on water supply to the Aral Sea and the Amudarya River delta
during the non-growing season of 2012-13

Description	October	November	December	January	February	March	Water supply from 01.10.12 to 31.03.13
From the Amudarya River through the Samanbay GS	426	293	471	571	123	130	2014
Total release from the Kyzketken and Suenli canals system	129	422	91	304	7		953
CDF	95	77	116	89	120	106	603
TOTAL:	650	792	678	964	250	236	3570
Aggregate	650	1442	2120	3084	3334	3570	

Note: Data on the water supply to the Priaralie are approved by Central Hydrometeorological Service of the Republic of Uzbekistan

Table 1.4

Water diversion quotas from the Amudarya River and water supply to the Aral Sea and the river delta for the growing season of 2013

River basin, Country	Water diversion quotas, mln m ³	
	Total for the year (from 1.10.12 to 1.10.13)	Including for the growing season (from 1.04.13 to 1.10.13)
Total diversion from the Amudarya River, Including:	55070	39605
Republic of Tajikistan	9500	6885
From the Amudarya to the Atamyrat	44000	31520
Turkmenistan	22000	15500
Republic of Uzbekistan	22000	16020
In addition:		
Surkhandarya province of the Republic of Uzbekistan	1570	1200
Water supply to the Priaralie taking into account irrigation releases and CDF	4200	2100
Sanitary and environmental releases to irrigation systems	800	0
Including: Dashkhovuz province	150	0
Khorezm province	150	0
Republic of Karakalpakistan	500	0

Note: Water diversion quotas assume water supply for irrigation, industrial and municipal as well as other needs. Given the changes of the basin's water content, the water diversion quotas will be adjusted accordingly.

Table 1.5

Predicted operation mode of the Tuyamuyun reservoir
(from April 2013 to September 2013)

Tuyamuyun reservoir	Unit	Prediction						Total
		April	May	June	July	August	September	
Volume: at the beginning of the period	mln m ³	3535	3043	3721	4699	4973	4586	3535
Inflow to the reservoir	m ³ /sec	530	1194	1759	2057	1695	715	
	mln m ³	1374	3198	455B	5510	4539	1853	21032
Release from the reservoir	m ³ /sec	720	941	1381	1955	1839	929	
	mln m ³	1866	2520	3580	5236	4926	2408	20536
Volume: at the end of the	mln m ³	3043	3721	4699	4973	4586	4031	4031

Tuyamuyun reservoir	Unit	Prediction						Total
		April	May	June	July	August	September	
period								
Accumulation (+), drawdown (-)	mln m3	-492	678	978	274	-387	-555	496

BWO “Amudarya” propose the following for consideration and approval by the ICWC members: the operation mode of the multi-reservoir system, water diversion quotas, volume of water supply to the Aral Sea and the Amudarya River delta for the growing season of 2013.

2. Syrdarya River Basin

Tentative water diversion quotas for the Syrdarya River basin for the non-growing season of 2012-2013 were considered and noted at the 60th Meeting of ICWC in Almaty on September 20th, 2012. In conformity with the decision of the Meeting, the operation mode of the Naryn-Syrdarya multi-reservoir system was provided for to consider at the next ICWC meeting in 2012, a first half of the non-growing season, with involvement of power engineering specialists. However, the mentioned meeting was not hold.

At the end of the non-growing season, the actual inflow to the upper reservoirs made 5 bln 304 mln m³ of water (Table 2.1), or by 265 mln m³ more than the predicted.

2.9 bln m³ of water were supplied to the Toktogul reservoir, 86 mln m³ – to the Andizhan reservoir, 1.38 bln m³ – to the Charvak reservoir, that is practically correspond to the average annual norm of the flow for the non-growing season. The total inflow to the basin reached 17.4 bln m³, including the lateral inflow in amount of 12.1 bln m³. Total 33.5 bln m³ (Table 2.2), or 1.3 times more than the planned volume were released from the reservoir.

As of April 1st, 2013, total 12.8 bln m³ of water were accumulated in the upper reservoirs of the multi-reservoir system, including in the Toktogul – 11.3 bln m³, Andizhan– 865 mln m³, Charvak – 689 mln m³ (Table 2.3). Compared with the last year, by 1.3 bln m³ of water less were accumulated by the beginning of the growing season.

During the non-growing season, due to the lack of the approved water diversion quotas, water was supplied to the water consuming states in conformity with needs of water users. As of 01.04.13, water supply made as follows:

Kazakhstan (Dostyk canal)	413.82 mln m ³ (103 % of the average annual);
Kyrgyz Republic	25.16 mln m ³ (68 %);
Tajikistan	18.17 mln m ³ (10 %);
Uzbekistan	4924.29 mln m ³ (198 %).

Information on water supply for the Syrdarya basin sections and water users is given in Tables 2.4 and 2.5.

Inflow to the Chardara reservoir for the non-growing season reached 12.2 bln m³. 1.86 bln m³ of water (as per calculations of BWO “Syrdarya”) were supplied to the Aral Sea.

The actual operation mode of the Naryn-Syrdarya multi-reservoir system during the non-growing season of 2012-2013 is shown in Table 2.7.

Table 2.1

Parameters	Volume (from 01.10.2012 to 01.04.2013), mln m ³		
	Predicted	Actual	In percentage terms
<i>Inflow to the upper reservoirs:</i>			
To the Toktogul	2721.64	2936.23	108
To the Andijan	923.38	986.66	107
To the Charvak (total of the 4 rivers)	1394.70	1381.61	99
Sub-total:	5039.72	5304.50	105
<i>Lateral inflow:(Calculation)</i>			
Toktogul – Uchkurgan	398.33	398.33	100
Uchkurgan, Uchtepe - Kayrakkum	4266.08	5019.90	118
Andijan – Uchtepe	2468.66	2357.38	95
Kayrakkum – Shardara	2417.54	3334.78	138
Gazalkent - Chinaz-Chirchik GS	874.68	1022.33	117
Sub-total:	10425.29	12132.72	116
TOTAL:	15465.01	17437.22	113

Table 2.2

Reservoir	Releases (from 01.10.2012 to 01.04.2013), <i>mln m³</i>		In percentage terms
	As per schedule	Actual	
Toktogul	6563.81	9197.31	140
Andizhan	540.86	673.11	124
Charvak (Gazalkent HPS)	2165.18	2106.34	97
Kayrakkum	9004.61	11787.08	131
Chardara	7331.04	9744.54	133
TOTAL:	25605.50	33508.38	131

Table 2.3

Reservoir	Volume of reservoir, mln m ³			
	As of 01.10.12	As per schedule as of 01.04.2013	Actual as of 01.04.2013	Actual as of 01.04.12
Toktogul	17512	13657.25	11266	13219
Andijan	563.8	944.42	865	743
Charvak	1510	729.99	689	496
Kayrakkum	1496	3417.30	3418	3389
Shardara	907	5380.93	3934	5132
TOTAL:	21988	24129.89	20172	22979

Table 2.4

Reach, Water consuming country	Average annual values, <i>mln m³</i>	Actual water diversion, <i>mln m³</i>	In percentage terms
Toktogul – Uchkurgan hydroscheme	1328.40	1640.99	124
Kyrgyz Republic	29.76	22.40	75
Tajikistan	46.80	15.89	34
Uzbekistan	1251.84	1602.70	128
Uchkurgan – Kayrakkum hydroscheme	221.58	505.27	228
Kyrgyz Republic	7.13	2.76	39
Tajikistan	43.48	0.38	0.9
Uzbekistan	170.97	502.12	294
Kayrakkum hydroscheme – Shardara reservoir	1549.61	3235.19	209
Kazakhstan	400.03	413.82	103
Tajikistan Таджикистан	88.89	1.90	2
Uzbekistan Узбекистан	1060.69	2819.47	266

Table 2.5

Water consuming country	Average annual values, <i>mln m³</i>	Actual water diversion as of 01.04.13, <i>mln m³</i>	In percentage terms
Kyrgyz Republic	36.89	25.16	68
Republic of Uzbekistan	2483.49	4924.29	198
Republic of Tajikistan	179.17	18.17	10
Republic of Kazakhstan (Dostyk canal)	400.03	413.82	103

		October	November	December	January	February	March	Total
		Actual	Actual	Actual	Actual	Actual	Actual	mln m ³
depression	mln m ³	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water supply to the Aral sea	m ³ /sec	130.26	103.00	113.87	116.55	111.62	133.91	1861.72
	mln m ³	348.88	266.98	304.99	312.16	270.03	358.67	
Charvak reservoir								
Inflow to the reservoir (total of the 4 rivers)	m ³ /sec	103.91	85.35	71.26	68.24	74.25	122.76	1381.61
	mln m ³	278.32	221.23	190.86	182.78	179.62	328.80	
Volume: At the beginning of the period	mln m ³	1510.00	1372.00	1242.20	991.00	820.00	672.00	
	At the end of the period	mln m ³	1372.00	1242.20	991.00	820.00	672.00	
Release from the reservoir (release from the Gazalkent HPS)	m ³ /sec	140.10	129.70	158.29	131.23	126.29	117.22	2106.34
	mln m ³	375.24	336.18	423.96	351.48	305.51	313.96	
Andizhan reservoir								
Inflow to the reservoir	m ³ /sec	52.80	66.20	72.71	57.71	55.71	70.76	986.65
	mln m ³	141.43	171.59	194.74	154.57	134.78	189.53	
Volume: At the beginning of the period	mln m ³	563.80	457.82	531.60	707.28	844.30	893.30	
	At the end of the period	mln m ³	457.82	531.60	707.28	844.30	893.30	
Release from the reservoir	m ³ /sec	91.47	37.87	6.61	6.00	33.49	80.34	673.11
	mln m ³	244.98	98.15	17.71	16.07	81.01	215.19	

About water diversion quotas from the Syrdarya river stem and the operation mode of the Naryn-Syrdarya multi-reservoir system during the growing season of 2013

The tentative forecast of the Hydrometeorological services was received on March 5, 2013 r, and clarified forecast for quarter 2 of 2013 and April 2013 was received on March 26. In conformity with the forecast by the Hydrometeorological services, during the growing season of 2013, the water content within the rivers basins in the north of the Ferghana and the Chirchik River is expected to be 90–95 % of the norm, within the basins of Karadarya, the river in the south of the Ferghana Valley and Akhangaran – within 95–100 % of the norm.

The inflow of 83% of the norm to the Toktogul reservoir is forecasted, to the Andizhan reservoir – 93 %, the Charvak reservoir – 89 % of the norm (Table 2.8).

In total, the water content of the rivers within the Syrdarya basin is expected to be 90% of the norm, or 26.8 bln m³.

Total, the available water resources for the growing season of 2013, including water reserves in the reservoirs without taking into account the dead storage capacity, are 39.0 bln m³ (Table 2.9). Compared with 2012, the volume of the available resources is expected to be by 6.2 bln m³ less.

Table 2.8

Parameter as per the forecast by the Hydrometeorological service for the growing season of 2013 (from 01.04 to 01.10.13)	Volume, mln m ³				In percentage terms		
	Norm	Interval of the forecasted values		Average	Interval of the forecasted values		Average
		min	max		min	max	
<i>Inflow to the upper reservoirs:</i>							
To the Toktogul	9588	6760	9088	7924	71	95	83
To the Andizhan	3054	2404	3304	2853	79	108	93
To the Charvak (total of the 4 rivers)	5777	4360	5940	5150	75	103	89
Sub-total:	18419	13524	18332	15927	73	99.5	86
<i>Lateral inflow:</i>							
Toktogul–Uchkurgan	1184	990	1378	1184	84	116	100
Uchkurgan, Uchtepe-Kayrakkum	3352	3178	3881	3530	95	116	105
Andizhan– Uchtepe	2576	2056	2846	2451	80	110	95
Kayrakkum–Shardara	3162	2038	3618	2828	64	114	89
Gazalkent-Chinaz-Chirchik GS (without the Ugam river)	923	717	1037	877	78	112	95
Sub-total:	11197	8979	12760	10870	80	114	97
TOTAL:	29616	22503	31092	26797	76	105	90

The operation mode of the Naryn-Syrdarya multi-reservoir system for the growing season is calculated based on the emerging situation in the absence of the agreement currently on the Toktogul reservoir operation for the coming growing season. When 3 bln m³ of water are released from the Toktogul reservoir during the growing season, the adjustment factor of water diversion quotas is 0.77, i.e. water resources deficit makes 23% (Table 2.10).

Taking into account these conditions, water diversion quotas (Table 2.11) and the operation mode of the Naryn-Syrdarya multi-reservoir system for the coming growing season (Table 2.12) are submitted to the ICWC members.

It should be noted particularly that if water in the amount to provide only the Kyrgyz Republic's needs for power are released from the Toktogul reservoir, water scarcity of more than 500 mln m³ will occur within the reach from the Toktogul reservoir to the Kayrakkum reservoir, and critical water shortage of more than

1.5 bln m³ may be reached within the reach of the Kayrakkum reservoir to the Shardara.

Table 2.9

Years	2008	2009	2010	2011	2012	2013
Inflow total	19868	30091	43705	25493	29726	26797 (forecast)
% of the norm (29,616 mln m ³)	67%	102%	148%	86%	100%	90%
including:						
to the upper reservoirs	12763	19978	29071	16983	17967	15927
lateral inflow	7105	10113	14634	8510	11759	10870
Water reserves in the reservoirs without taking into account a dead storage	8884	9026	12729	18363	15466	12145
including:						
Toktogul	1063	921	4198	9898	7719	5766
Andizhan	540	541	1088	1277	593	715
Charvak	51	418	374	321	70	263
Kayrakkum	2561	2281	2457	2414	2472	2501
Shardara	4669	4865	4612	4453	4612	2900
Total available water resources	28752	39117	56434	43856	45192	38942

Therefore, in order to cover the basin needs during the growing season, taking into account the emerging water situation, stakeholders are required in advance to consider issues on increasing releases from the Toktogul reservoirs and inflow to the basin from other reservoirs.

According to the calculations, the required volume of supplementary releases from the Toktogul reservoir during the growing season can make 2.5 – 3.3 bln m³ of water in general, that is equal to 2.2 – 2.8 bln kilowatt-hour of electric power which is required to take from the Toktogul HHP.

Table 2.10

<i>Components of the balance</i>	<i>Volumes, Mm3</i>
<i>Inflow</i>	<i>3055.10</i>
<i>Releases from the Toktogul reservoir</i>	<i>7541.22</i>
<i>Total lateral inflow</i>	<i>1237.58</i>
<i>Uchtepa gauging station</i>	<i>1880.71</i>
<i>Drawdown from the Kayrakkum reservoir</i>	<i>13715</i>
<i>Total</i>	
<i>Release</i>	
<i>Loss from in-stream reservoirs</i>	<i>938.82</i>
<i>Channel loss and environmental releases in the low reaches</i>	<i>1358.18</i>
<i>Water supply to the Aral Sea</i>	<i>2421.90</i>
<i>Total</i>	<i>4718.91</i>
<i>Total available water resources</i>	<i>8995.69</i>
<i>Needed water resources</i>	
<i>Total water demand of the states</i>	<i>11670</i>
<i>Water availability coefficient</i>	<i>0.77</i>

Table 2.11

Water diversion quotas of the states within the Syrdarya River basin
over the growing season 2013

Components	When receiving electric power, <i>Mm3</i>	Without receiving electric power, <i>Mm3</i>
Total from Syrdarya	11670	8986
Republic of Kazakhstan (Dustlik canal)	780	601
Kyrgyz Republic	185	142
Republic of Tajikistan	1905	1467
Republic of Uzbekistan	8800	6776

Table 2.12

Schedule of the Naryn-Syrdarya multi-reservoir system operation
over the period of April 1, 2012 to September 30, 2013.

		April	May	June	July	August	September	Total, mln m3
Toktogul reservoir								
Inflow to the reservoir	m3/sec	247.90	512.40	785.10	702.50	495.90	256.20	
	mln m3	642.56	1372.41	2034.98	1881.58	1328.22	664.07	7923.81
Volume: At the beginning of the period At the end of the period	mln m3	11266.00	11387.07	12273.89	13787.20	15122.17	15952.15	
	mln m3		11387.07	12273.89	13787.20	15122.17	15952.15	16079.94
Release from the reservoir (calculated)	m3/sec	200.00	180.00	200.00	200.00	180.00	200.00	
	mln m3	518.40	482.11	518.40	535.68	482.11	518.40	3055.10
Release from the reservoir (actual - 2012)	m3/sec	210.00	200.00	330.00	370.00	380.00	290.00	
	mln m3	544.32	535.68	855.36	991.01	1017.79	751.68	4695.84
Kayrakkum reservoir								
Inflow to the reservoir	m3/sec	434.41	377.06	264.62	158.46	183.61	297.56	
	mln m3	1125.98	1009.91	685.89	424.43	491.79	771.28	4509.26
Volume: At the beginning of the period At the end of the period	mln m3	3418.00	3399.54	3400.11	2960.05	2088.05	1488.13	
	mln m3		3399.54	3400.11	2960.05	2088.05	1488.13	1537.29
Release from the reservoir (calculated)	m3/sec	450.00	350.00	380.00	400.00	350.00	250.00	
	mln m3	1166.40	937.44	984.96	1071.36	937.44	648.00	5745.60
Release from the reservoir (actual - 2012)	m3/sec	475.20	495.60	534.10	563.50	537.70	273.70	
	mln m3	1231.72	1327.42	1384.39	1509.28	1440.18	709.43	7602.41
Shardara reservoir								
Inflow to the reservoir	m3/sec	468.50	349.38	197.51	155.06	146.89	274.36	
	mln m3	1214.36	935.78	511.95	415.32	393.42	711.14	4181.98
Volume: At the beginning of the period At the end of the period	mln m3	3934.06	4150.50	3787.25	2969.51	1992.06	1287.34	
	mln m3		4150.50	3787.25	2969.51	1992.06	1287.34	1371.22
Release from the reservoir	m3/sec	350.00	350.00	350.00	350.00	300.00	200.00	
	mln m3	907.20	937.44	907.20	937.44	803.52	518.40	5011.20
Release to the Kzylkum canal	m3/sec	20.00	100.00	110.00	110.00	90.00	25.00	
	mln m3	51.84	267.84	285.12	294.62	241.06	64.80	1205.28
Release to the Arnasay depression	m3/sec	0.00	0.00	0.00	0.00	0.00	0.00	
	mln m3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water supply to the Aral sea	m3/sec	151.43	154.58	152.77	153.10	155.29	151.77	
	mln m3	392.52	414.04	395.97	410.06	415.94	393.38	2421.90
Charvak reservoir								
Inflow to the reservoir	m3/sec	240.00	419.30	544.70	394.80	220.20	133.30	
	mln m3	622.08	1123.05	1411.86	1057.43	589.78	345.51	5149.73
Volume: At the beginning of the period At the end of the period	mln m3	689.00	740.32	1058.25	1559.80	1568.37	1430.17	
	mln m3		740.32	1058.25	1559.80	1568.37	1430.17	1383.52
Release from the reservoir	m3/sec	220.00	300.00	350.00	390.00	270.00	150.00	

		April	May	June	July	August	September	Total, mln m3
	mln m3	570.24	803.52	907.20	1044.58	723.16	388.80	4437.50
Andizhan reservoir								
Inflow to the reservoir	m3/sec	140.00	273.00	294.30	204.80	98.40	70.90	
	mln m3	362.88	731.20	762.83	548.54	263.55	183.77	2852.77
Volume: At the beginning of the period At the end of the period	mln m3	865.00	941.83	1136.39	1250.28	1126.48	851.63	
	mln m3	941.83	1136.39	1250.28	1126.48	851.63	903.15	
Release from the reservoir	m3/sec	110.00	200.00	250.00	250.00	200.00	50.00	
	mln m3	285.12	535.68	648.00	669.60	535.68	129.60	2803.68

INTERNATIONAL FUND FOR THE ARAL SEA SAVING - 20 YEARS TOWARDS COOPERATION

In 2013, 20 years have passed since an important event in lives of the Central Asian states – signing a decision on establishment of the International Fund for the Aral Sea Saving (IFAS) by Heads of the Central Asian states in Kzyl-Orda. In honor of this event, a conference titled "International Fund for the Aral Sea Saving – 20 years towards cooperation" was organized in Almaty and held on May 29-30, 2013 in the premises of the Kazakh National Agrarian University.

The conference was opened by Prof. S.R. Ibatullin, Chairman of the IFAS Executive Committee, who welcomed all participants (more than 300 persons) and highlighted shortly key events in the development of IFAS. Welcoming speeches were made by: H.E. Alisher Salakhutdinov, the Ambassador Plenipotentiary of Uzbekistan in Kazakhstan, Mr. Erlan Nysanbaev, Vice Minister of Environment of the Republic of Kazakhstan, Mr. Abdybay Jalobaev, Deputy Director of the Department of Water Resources and Melioration under the Ministry of Agriculture and Melioration of the Kyrgyz Republic. Mr. Shukhrat Nurushev, Kazakh National Coordinator of the Shanghai Cooperation Organization (SCO), the Ambassador at large, proclaimed a welcoming speech of the Minister of Foreign Affairs of the Republic of Kazakhstan.

Welcoming speeches were also made by: Mr. Saroj Kumar, Regional Director for Central Asia WB, Mr. Andrey Vasilyev, Deputy Executive Secretary of UN ECE, Mr. Fedor Klimchuk, Deputy Head of the UN Regional Center for Preventive Diplomacy (UN RCPD), Mr. Hans-Ulrich Im, Head of the Regional Commission of the German Society for International Cooperation (GIZ), Mr. Laurent Guy, the Ambassador Extraordinaire and Plenipotentiary of Switzerland in the Kyrgyz

Republic, Ms. Ashley King, Administrator of Regional Office of USAID, as well as representatives of Tajikistan and Turkmenistan.



All rapporteurs underlined a great significance of the IFAS activity and a very constructive position of the Heads of the Central Asian states, which created a platform for development and promotion of cooperation. The key address of Mr. Marton Krasznai, Regional Adviser of UN ECE, stated that the IFAS activity and, in particular, assumption of the observer status in UN allowed UN ECE to actively participate in strengthening of partnership between the countries of Central Asia in order to manage water resources and environmental sustainability within the Aral Sea Basin in a rational and efficient manner. Also, reports were delivered by the following persons: Prof. A.V. Dukhovny, Director of SIC ICWC, - "Prospect of improving and strengthening of cooperation on water resources in Central Asia", Mr. F.Yu. Klimchuk - "IFAS and UN RCPD CA: tools for regional interaction among the countries of Central Asia", Prof. P. Esenov – "SIC ICSD Activity (Interstate Commission on Sustainable Development) within the framework of the IFAS activity", as well as Mr. L. Guy – "Strategy for cooperation development of Switzerland in the sector of water resources management in Central Asia for 2013-2016".

Among the followed reports, it is worth to mark out a report of Mr. Espolov, the Rector of the Kazakh National Agronomic University, who with great enthusiasm demonstrated significant development of scope and quality of training of specialists – reclamation and water experts - in Kazakhstan. Also, reports were delivered by representatives of the Russian Academy of Sciences, Belarus, GIZ, as well as International Water Center, Mr. V. Sokolov, Coordinator of Global Water Partnership Central Asia and Caucasus. All the rapporteurs particularly mentioned importance of work of first living ministers of water resources of the CA countries, who were initiators and promoters of establishment of ICWC and IFAS, - Prof. N.K. Kipshakbaev, Mr. M.Z. Zulpuev, Mr. A. Nurov, R.A. Mr. Giniyatullin and his Deputy Mr. A.A. Jalalov, as well as Mr. Ammanazar Ilamanov, former Minister of Water Resources of Turkmenistan and First Chairman of the Interstate Council for the Aral Sea Problems. Veterans-founders of the Fund were awarded with letters of appreciation and commemorative medals.

Speech of Mr. S.R. Ibatullin, the Chairman of the IFAS Executive Committee, at the International scientific and practical conference devoted to the 20th anniversary of IFAS (Almaty city, May 29, 2013)

Part I – Opening of the conference

Your Excellencies!

Dear ladies and gentlemen!

Let me welcome you and express my respect to all the present here leaders and representatives of embassies, ministries and international organizations, all the participants of the conference on the occasion of the 20th anniversary of IFAS.

On March 26, 1993, in Kzyl-Orda city, an important event took place in lives of peoples of Central Asia – International Fund for the Aral Sea Saving was established.

Wisdom of the Presidents of the recently formed independent states within the post-Soviet area was shown in recognition and willingness to solve issues of sharing water resources within the Aral Sea basin as a single entity based on common for all the countries principles and unbiased regulation of their use, in view of interests of all the peoples who live in the region.

For this period, due to political will of the leaders of the Central Asian countries, IFAS and its organizations became an irreplaceable political platform for the negotiation process between the countries, development and adoption of bilateral and multilateral agreements for integrated management, use and conservation of transboundary water resources.

A range of agreements and treaties on cooperation in the sphere of water allocation, joint management, use and protection of the regional water resources was adopted, two Aral Sea Basin Programmes: Building Cooperation for the Future (ASBPs), during which the Small Aral Sea was rehabilitated, were implemented, the 3rd Aral Sea Basin Programme (ASBP-3) was prepared and started to implement.

In December 2008, IFAS received the observer status at the UN General Assembly, that is undoubtedly an additional factor to promote these processes and following building of cooperation between IFAS and UN.

During his speech at the Summit of Heads of States on April 28, 2009, the IFAS President – N.A. Nazarbaev, the President of the Republic of Kazakhstan mentioned: “The activity of the International Fund for the Aral Sea Saving (IFAS) showed significance of joint activities of the states and interstate structures in solution of both regional and global problems”.

Regional cooperation of the Central Asian states under the Fund facilitated qualitatively new interstate relations in the region.

Currently, the rather well-established legal basis of interstate cooperation in the sphere of transboundary water resources management and use was formed and is

using in the Central Asian region.

Regional and sub-regional agreements where the following ones are central are the basis of the water cooperation legal regime in Central Asia

Pentalateral Agreement on Cooperation in the Field of Joint Management of Use and Protection of Water Resources from Interstate Sources (with participation of all the states of Central Asia) (1992),

Agreement on joint actions on resolving the problems related to the Aral Sea and its coastal zone on environmental sanitation and socioeconomic development in the Aral Sea region (1993),

and Interstate Agreement on Water and Energy Resources Use within the Syrdarya River basin (1998).

Declarations and statements of the Heads of the Central Asian States are important regional tools of Central Asia:

the Nukus Declaration of the States of Central Asia and International Organizations on the Problems of Sustainable Development of the Aral Sea Basin (1995)

Ashgabat Declaration (1999),

Tashkent Statement (2001),

Dushanbe Declaration (2002),

Joint Statement by the Head of Founder-States of the IFAS (2009).

Their importance is great in the context of regional water policy.

They were signed by the Presidents of the Central Asian countries, and thus they reflect agreements reached at the top political level. The mentioned declarations and statements include regulations and principles, which the CA countries should follow in all their relations in a water and energy sphere, taking into account the international experience as well.

And we should implement their principles and follow the way towards searching consensus and achieving results of agreed actions.

We highly appreciate the role of international organizations in implementation of the IFAS plans over its 20-year function, including the German Society for International Cooperation (GIZ), World Bank, Eurasian Development Bank, United Nations Economic Commission for Europe, Economic and Social Commission for Asia and the Pacific, UN Development Programme, UN Regional Center for Preventive Diplomacy for Central Asia, European Union, FAO, OSCE, USAID, French Global Environment Facility, Swiss Development and Cooperation Agency, scientists of Denmark, Norway, Russian, USA, Finland, France and Japan.

I express confidence that along with transfer of the IFAS chairmanship in Tashkent, these links will be strengthened, and the Executive Committee activity will receive a new impulse to solve objectives set by the Presidents of the CA countries.

Thank you for attention!

Part II

Dear participants of the conference,

Let me thank our colleagues who spoke at the session with congratulations and specified lines of further cooperation with IFAS.

As you know very well, IFAS is an integral system of regional organizations, and many aspects of present and future cooperation of the Central Asian states in the sphere of water and energy resources sharing, joint environmental protection, improvement of socio-economic conditions of living in the region depend on their joint activity.

In addition, IFAS is a great team and individuals, whose ideas and personal participation promotes useful organization's activity.

Our veterans made an unvalued contribution into implementation of ideas of the Heads of the states within the Aral Sea basin:

- 1 Karibzhanov Zhanibek Salimovich
- 2 Karamanov Uzakbay Karamanovich
- 3 Esimov Akhmetzhan Smagulovich
- 4 Kipshakbaev Nariman Kipshakbaevich
- 5 Shaukhamanov Seylbek Shaukhamanovich
- 6 Musabaev Nazhmadin Turkbenovich
- 7 Sarzhanov Kudaybergen Sarzhanovich
- 8 Nurushev Almabek Nurushevich
- 9 Sarsembekov Tolegen Tadzhibaevich
- 10 Ryabtzev Anatoliy Dmitrievich
- 11 Zulpuev Meyrazhdin Zulpuevich
- 12 Koshmatov Barataly Turanovich
- 13 Eshmirzoev Ismat Eshmirzoevich
- 14 Kaimdodov Kozidavlat
- 15 Aslov Sirodzhiddin Mukhriddinovich
- 16 Akramov Fayzullo Raufovich
- 17 Rakhimov Sulton Nurmakhmadovich
- 18 Hurov Akhtam Hurovich
- 19 Altyev Tekebay Altyevich

- 20 Annabayramov Babageldy
- 21 Esenov Paltamet Esenovich
- 22 Ovezov Amangeldy Ovezovich
- 23 Ballyev Kurbangeldy Begenchovich
- 24 Dzhahalov Abdurakhim Abdurakhmanovich
- 25 Giniyatullin Rim Abdullovich
- 26 Dukhovny Viktor Abramovich
- 27 Nadyrkhanov Ubaydulla Sobirovich
- 28 Pernabekov Serik Tungushevich
- 29 Talipov Shukhrat Ganievich
- 30 Rafikov Albert Abdullaevich
- 31 Khabibullaev Askhat Sharifovich
- 32 Gorshkov Yuriy Konstantinovich

In this connection, it is necessary to mention a role of the present members of the IFAS Management Board and the members of the Governments of the founder-countries of the Fund, which entirely supported the activity of the IFAS Executive Committee on fulfillment of the regulations from the Joint Statement of the Presidents as of April 28, 2009. They are:

1. Shukeev Umirzak Estaevich
2. Sarybay Kayrat Shoraevich
3. Nuryshev Shakhrat Shakizatovich
4. Uzakbaev Chingisbek Makeshevich
5. Murodali Alimardon
6. Yazmyradov Annageldi Orazberdievich
7. Meredov Rashid Ovezgeldyevich
8. Azimov Rustam Sodikovich

During the period of the IFAS chairmanship in Kazakhstan, the IFAS Executive Committee strengthened former agreements and signed a range of new international ones with UN organizations (UNECE, ESCAP, FAO, UNRCCA), as well as with international organizations - GIZ, SDC, USAID, OSCE, French Global Environmental Facility, World Bank, Eurasian Development Bank, International Water Management Institute (IWMI), etc.

In this connection, I am pleased to express appreciation to all the guests who represent authoritative international institutions:

1. Andrey Vasiljev

2. Marton Krasznai
 3. Bo Libert
 4. Fedor Klimchuk
 5. Saroj Kumar Jha
 6. Aleksandr Petrovich Mironenkov
 7. Stefan Bukhmayer
 8. Laurent Guy
 9. Paul Ayner
 10. Ann Arner
 11. Ashley King
 12. Andrey Barannik
 13. Rene Mally,
and international experts
- 1 Sergey Vladimirovich Vinogradov
 - 2 Mikhail Yurjevich Kalinin
 - 3 Nikolay Vasiljevich Aladin
 - 4 Alfred Diebold,
and others.
- Dear ladies and gentlemen!

Let me thank you one more time and confirm again that, in front of threats and challenges, IFAS has a common noble goal – to provide decent living standards to the peoples who live within the Aral Sea basin.

Thank you for the attention!

Report of the H.E. Alisher Salakhutdinov, the Ambassador Extraordinary and Plenipotentiary of Uzbekistan in Kazakhstan, at the international scientific-practical conference “International Fund for the Aral Sea Saving - 20 years towards cooperation” (May 29-30, 2013, Almaty city)

Dear Chairman!

Currently, under active support and involvement of the World Bank, Asian Development Bank, different international organizations and some countries of the world, a range of projects intended for improvement of the unfavourable situation in the region that threatens the genepool of the living here population is implemented.

Assignment of the Observer status to IFAS in 2008 in the UN General Assembly opens new opportunities for its activity globally.

Dear participants of the conference!

All of you know that the value of water is invaluable for further development of Uzbekistan. Due to understanding of social significance of irrigation and wise state policy in the water sector, over the years of its independence, Uzbekistan was able not only to keep its irrigation potential, but successfully modernizes and improves irrigation systems.

Over the years of independence, radical changes took place in water management. IWRM principles, modern water saving technologies, automated systems for water allocation control and management are implemented widely, measures on improvement of a technical state of water-management objects and a reclamation state of irrigated lands, diversification of agricultural production, etc. are taken. In particular,

- in 1993, strict water use limitation was introduced, since 2003 transition to a basin principle of water resources management was implemented, a legal framework for water use is permanently improved;
- agricultural diversification was made. Instead of crops with high water requirements such as rice and cotton, sown area under crops with lower water requirements - grains, melons, orchards and vineyards - were increased. Compared with the 80-s of the past century, the area under cotton reduced from 2 to 1.2 mln ha, the area under rice reduced from 180 to 40 thousand ha;
- significant funds are allocated from the state budget for improved water facilities. During recent 10 years, more than 1.2 bln USD of investments from World Bank, Asian Development Bank, Islamic Development Bank and other international financial institutions were raised to rehabilitate and update irrigation and drainage infrastructure.

Dear Heads of Delegations!

Ladies and Gentlemen!

First of all, let me express my respect to the participating in the conference representatives of the founder-states of the International Fund for the Aral Sea Saving, regional and international organizations, all the participants of the event.

Uzbekistan, being one of the IFAS founder-states, attaches importance to all-round strengthening of its activity. IFAS and its organizations function already 20 years, and for this short historical time-span they became an effective platform to provide a negotiation process, make consolidated decisions on issues of regional water use. This cooperation mechanism allows us to address main issues associated with improvement of environmental situation in the Priaralie, as well as with transboundary water resources management and allocation.

The problem of the Aral Sea has roots stretching back into antiquity. But it took menacing proportions in the 60-s of the XXth century. Increased population and demand for water, intensive new land development, further development of irrigated farming, more frequent years of low water created conditions for one of the greatest global environmental disasters in the contemporary history – drying of one of the most beautiful water bodies under the sun in former times.

In the zone of constant environmental risk, not only population who live in the disaster zone directly, but the whole region of Central Asia and Kazakhstan is under the impact of factors affecting the quality of life, health, and genepool.

In this connection, I would like to emphasize particularly that unquestionable services of the Fund are that it managed to attract attention of the world public, governments of many countries of the world and a range of international institutions to the Aral Sea problem:

- water saving technologies are implemented widely – drip irrigation system, irrigation with flexible pipes, irrigation through films, etc. Over the recent 3 years, drip irrigation system was implemented on the area of 5.5 thousand ha and will be extended by 5 thousand ha every year. As a result, irrigation system efficiency increases and water losses decrease;

- in conformity with the State Programme 2008-2012, 500 mln USD were allocated from the state budget for activities on improvement of conditions of irrigated lands. Activities carried out allowed to improve conditions of irrigated lands of 1 mln 200 thousand ha.

- since 2007, Land Reclamation Fund under the Ministry of Finance has been functioned for improvement of conditions of lands in the republic.

In consequence of the measures taken, Uzbekistan is the one among countries of Central Asia which reduced water diversion from 64 to 51 bln m³ a year or by 21 %, compared with the 80s.

Over the recent 15 years, 380 thousand ha were watered within the Amudarya River delta and local water bodies were established, that facilitates rehabilitation of flora and fauna. In order to prevent salt and dust spreading within the area of the Aral crisis impact, tree planting was carried out on the area of 740 thousand ha, including dried sea bottom of 310 thousand ha.

In 1992, Uzbekistan stated its position first with the initiative of joining efforts of the Central Asian states and international community to overcome effects of the Aral crisis, keep environmental balance and create safe environment for the regional population.

The initiative of the Uzbek side on establishment of regional organization on the Aral Sea problems was supported during the Meeting of the Heads of the Central Asian states, which was held in Tashkent in January 1993.

Dear the participants of the conference!

The most important objective for overcoming of effects of drying of the Aral Sea and environmental improvement of the Aral Sea basin is seen in implementation of the following actions in the first place:

- establishment of local water bodies on the already dried bottom of the Aral Sea, flooding of the delta water bodies to reduce dust and salt storms, rehabilitation of biodiversity and delta ecosystem;

- tree planting – it is of great importance - on the bottom of the Aral Sea dried long ago, fixation of shifting sands, reduction of ejection of toxic particulate pollutant from the dried bottom;

- drinking water supply and provision of public utility and healthcare companies with devices on water decontamination, re-equipment of intake structures with chlorinating equipment, etc., that save and revitalize the population;

- system study of the impact of growing environmental crisis within the Priaralie area on health status and genepool of the population, prevention and prophylactics of broadly distribution of different dangerous region-specified human diseases, deployment of a dedicated network of prophylactic and medical institutions for the population living here, implementation of a broad programme of actions on advanced development of social infrastructure.

Talking about the Aral tragedy and actions on its overcoming, it is required to realize that the solution of the objective is directly collected with problems of rational use of water resources from the regional transboundary rivers, which met vitally important needs of the states located in the river basins at all times.

In this connection, growing aspiration of the upstream countries to conduct their hydropower lines of diktat for river regimes, as well as their plans on implementation of rather controversial projects on construction of large hydrostructures on heads of very important transboundary rivers causes growing concerns.

When solving problems emerging in the sphere of transboundary water resources management, Uzbekistan proceeds on the basis that any actions on their use must take into account interests of all the states located whining their basins and on the basis of universally recognized norms of international law. We are committed to the International Water Law. Uzbekistan is the only one state in Central Asia, which signed both UN Conventions on the Protection and Use of Transboundary

Watercourses and International Lakes as of March 17, 1992 and the UN Convention on the Law of the Non-Navigational Uses of International Watercourses as of May 21, 1997.

From our point of view, movement to international law gives common guidelines for our future joint solution of all complicated problems.

Dear participants of the conference!

This year, presidency in the International Fund for the Aral Sea Saving is transferring from Kazakhstan to Uzbekistan. Taking the opportunity, I would like to thank our Kazakh colleagues represented by MFA of the Kyrgyz Republic and the Executive Committee in Almaty city for three-year successful presidency in the Funs.

In Uzbekistan, IFAS is considered as an important platform for interaction between the regional countries at solving issues of water resources management and environmental protection.

We hope that one and all founder-countries will show constructivism in implementation of principal ideas and objectives identified by the Heads of the IFAS founder-states.

In turn, during its presidency in IFAS, the Republic of Uzbekistan is planning to pay a priority attention to issues of strengthening a regional dialogue based on the norms of international law, strengthening IFAS potential, improving the social-economic and water-environmental situation in the Priaralie, as well as expansion of international contacts of the Fund.

Our countries need to make joint efforts to raise international authority and the role of the International Fund for the Aral Sea Saving, and efficient implementation of the “Aral Sea Basin Programme: Building Cooperation for the Future” Phase III. 68 projects of the total amount of 2 bln 715.4 mln USD were included in the Programme for their implementation in Uzbekistan only.

These amounts clearly demonstrate that Uzbekistan actively deals with practical solution of the Aral Sea basin problems.

In conclusion, I would like to particularly note that Uzbekistan is intending to strengthen cooperation under IFAS and ensure efficient activity of the IFAS Executive Committee in Tashkent during the period of its presidency for the following three years. And, in this connection, we sincerely hope for constructive interaction on the whole spectrum of issues with our partners, including international donor community.

Thank you for attention!

Welcoming address of the Vice-Primer E. Nasynbaev at the International Conference “International Fund for the Aral Sea Saving - 20 Years Towards Cooperation” (Almaty city, May 29, 2013)

Dear Ladies and Gentlemen! Dear participants of the conference!

Let me greet you on behalf of the Ministry of Environment Protection of the Republic of Kazakhstan in the “southern” capital and express gratitude to the organizers for the invitation to the anniversary conference devoted to 20th anniversary of the International Fund for the Aral Sea Saving.

Today, it may be noted that the International Fund for the Aral Sea Saving established with the decision of the Heads of the Central Asian states (January 1993, Tashkent city) is an important political platform for cooperation among the countries of Central Asia.

In the joint Statement of the Heads of the CA states at the IFAS Summit hold in April 2009 in Almaty city, the attention was paid to challenges, which the CA states faced the recent years.

In this connection, taking into account the significance of the IFAS activity in the reality, the Heads of the states again confirmed interest in formulation of a mutually acceptable mechanism for multipurpose use of water resources and environmental protection within the Aral Sea basin, taking into account interests of all the regional countries, as well as in continuation of cooperation directed at the improved mechanism of regional coordination.

Formulation of a legal and economic mechanism, taking into account international experience in efficient water resources management, is the ground for cooperation in Central Asia both at regional and national levels.

It is also obvious that we are not able to solve serious challenges related to the environmental disaster of the Aral Sea by means of statements and grants only. Therefore, it is also important to use as much as possible capabilities of new and increasingly accessible technologies and green investments – for transition to “green economy” – in conformity of the decisions made at the Rio+20 Top-Level Summit. Dedicated mechanisms for transferring technologies, attracting investments, building capacity at all levels are required to produce to this end.

In conclusion, I want to assure that Kazakhstan always supports comprehensive study and application of international experience in water resources management. International experience in the sphere of water relations clearly bears evidence that only based on solidarity of legal positions, mutual adherence to respecting interests, it is possible to ensure regional stability, solving problems of joint management and protection against water resources pollution, that will allow to successfully solve problems related to improvement of living conditions of population and food security in the region.

I am calling to my colleagues for aiming joint efforts at further development of the regional policy on water resources use in Central Asia, as the main priority within the region.

We hope for further fruitful development of cooperation among all the countries and structures of IFAS under the chairmanship of the Republic of Uzbekistan.

Thank you for attention!

Prospects of improved and strengthened cooperation on water resources in Central Asia – the address of prof. Dukhovny V.A., Director of SIC ICWC, ICWC Honorary Member

Celebrating the 20th anniversary of establishment of the International Fund for the Aral Sea Saving (IFAS), it is required to mention over and over the outstanding role of the Heads of the states of Central Asia and their political long-sight in establishment of regional cooperation on common water resources management immediately after collapse of the single state.

The first step in formulation of the cooperation mechanism was signing of 1992 Agreement on Cooperation in the Field of Joint Management of Use and Protection of Water Resources from Interstate Sources, where rules of joint management of transboundary water resources were stated, and Interstate Commission for Water Cooperation was established (ICWC). 21 years of the ICWC activity show that, despite of low- and high water years, the Commission was able to keep the peace and avoid conflicts in the water sphere among dedicated water agencies. Here, it is important to note the following as the basis:

1. Adoption of the principal regulation on keeping a share of each country in water diversion from transboundary rivers, in accordance with quotas fixed by Schemes of Integral Water Resources Use for both basins, is the basic postulate, which is strictly followed for all these years.

2. Both BWOs, despite of incomplete scope of all water diversions within the basin, formulated such a mechanism, which puts this water allocation into practice.

3. Information System created in SIC ICWC and program complexes in both BWOs created a mechanism of transparency when making decisions on water management and the basis for common understanding.

4. Implementation of a range of joint regional projects, starting from formulation of the Regional Water Strategy (World Bank, 1995-1998), European Union project WARMAP (1998-2002), Dialogue on Water Resources of Asian Development Bank, NATO projects of the Amudarya and Syrdarya deltas, CIDA projects on training, automation and adaptation and climate change united specialists of top and medium echelons for creation of common understanding of

necessity for joint work of water professionals on implementing rational water use and sustainable management. 10-year joint work of specialists from three countries together with SIC ICWC and IWMI under the sponsorship of SDC on development and implementation of IWRM and Syrdarya River Basin Automation for the first time in the arid area holds a special place here.



The current moment is a game-changer when centrifugal tendencies in cooperation, which are caused by both growth of differences in political, economic and social contexts of the countries and certain change of leadership in national water agencies, have strengthened. Tendencies for acceleration of national interests in water management are supported and developed by donors who prefer to work on a bilateral basis, as preparation of large investment loan projects. This all facilitates weakening of joint activity under ICWC.

At the last meeting of ICWC, “Main lines in improving ICWC activity and mechanisms of their implementation” to be considered at the following ICWC meeting were presented. It is well-known that further development of Central Asia (CA) region will increasingly encounter the growing water resources stress associated with both the growth of demographic tension and social-economic need for “green growth” and climate change. Moreover, a water factor will be central if all the CA countries seek to achieve food security, energy development and ensure sustainable ecosystem.

Main lines in improving ICWC activity and mechanisms of their implementation were proposed for further consolidation of joint activities under the current conditions, strengthening of ICWC authority and its executive bodies.

These regulations attempt to revitalize joint activities of all water management bodies of the CA countries in those activities, which are the common interest and cannot be the bone of contention. Such lines are four:

- Water saving;
- IWRM implementation as a tool for green growth and adaptation to climate change;
- Improvement of quality and accounting of water resources and implementation of automation facilities in water distribution;
- Strengthening of regional and national organizations' potential, including development of information systems and training.

What does the program include?

Water saving

Based on the results of modeling the prospects of water situation in Central Asia, it becomes clear that in 2030-2034, the available water resources could decrease by approximately 7-10 km³ for Amudarya and 1-2 km³ for Syrdarya, while water decrease could reach 13-15 and 2-4 km³ a year respectively during low-water years. Based on comparison of these figures with the expected population growth, water availability per capita would make 1800 m³/man a year as per the optimistic variant or 1400 m³/man a year as per the pessimistic variant, compared with the current 2430 m³/man or less by one third at best. It means that for normal survival in these conditions, it is needed to reduce unit consumption of water by 15-20 %, at least, and to drastically improve water use productivity. Work on-site shows that these indicators are rather achievable.

In the water saving plan, a special place should be occupied with introduction of new irrigation technique. For this, it is appropriate to resume the zoning for use of drip, fine-dispersed and other types of irrigation, including return to using of flexible hoses. It should be noted that this introduction must be oriented at economic interests of farmers, and cliché should be avoided while selecting the irrigation technique, as indiscriminate utilization of, for instance, drip irrigation could cause farmers' losses and extra need for electric power.

The essential condition for development of the water saving program is to introduce an economic mechanism, for instance, by way of payment for volumetric water supply services with step tariff connected with saving or overexpenditure of water. Currently, such approach is being developed in Uzbekistan, for instance, in connection with the issue of a new Regulation "On rules of water use and water consumption in the Republic of Uzbekistan" approved by the Decree of the Cabinet of Ministers as of March 19th, 2013.

IWRM implementation

In the region, certain experience in IWRM implementation was gathered, and the total coverage area made about 400 thousand ha, the most part is within the area of Uzbekistan. National visions on further development of IWRM were elaborated. “Guide on IWRM implementation” was developed, duplicated and translated into three languages of the regional countries by specialists. Here, a special attention should be paid to building of public participation, transformation of WUAs into a body of water users themselves with big possibilities. To this end, government help is required by way of support for WUAs, their crediting, installation of water meters and their potential building in a regular manner. In Kuva district of Ferghana province, payment per ha achieved 14-30 USD (on average 4-5 USD for the republic) in WUAs, where up to 30 % of lands are under cash crops. When WUAs achieve financial sustainability, contributions in Union of Water Users will be increased, and on behalf of them – extra pay to staff of water-management organizations for observance of requirements of WUAs and farmers on water supply. Such financial mechanism was developed under the “IWRM-Ferghana” project, and we hope that it will be developed during the following phases of the project, which was funded by SDC and other donors.

Provision of consultations to farmers and their risk monitoring is a special important component of IWRM, which was proposed and tested as a network of Agrarian Knowledge Centers that should be distributed throughout the region.

Improvement of quality and accounting and implementation of automation facilities in water distribution;

Though CA canals are sufficiently equipped with water accounting facilities, the main problem is lack of permanent on-line recording of canal flow fluctuation and breach of stable water supply, from which farmers suffer. Although the IWRM mechanism to some extent improves this situation, but these shortcomings may be avoided only by means of introduction of SCADA at main canal systems and drawing-up of special requirements for flow stability in transboundary rivers.

SCADA accounting at river beds will increase not only water supply stability, but improve accuracy in water supply from $\pm 10\%$ to $\pm 2\%$.

If some parochial resistance is successfully overcome and donors are attracted to the Amudarya River basin, then there will be an opportunity to avoid great (up to 6 km³) unaccounted losses, which would be able to relieve tension of future deficit for the river.

Strengthening of regional and national organizations' potential

This position has two main lines – strengthening of information sharing with improved accuracy of forecasts and organization of training of specialists along with strengthening of training of young specialists.

Strategies were developed for both lines. Regarding information sharing, it is proposed to shift from the information system on water resources only towards developing under IFAS the information field on water, land and ecology in Central Asia, and to this end involve the IFAS Executive Committee (IFAS EC), SIC ICWC, Regional Center for Hydrology (RCH) “Hydromet”, ICSD and Regional Environmental Center (REC) for Central Asia to coordinate the information system.

To strengthen the strategy for development of training, which was drawn up together with IHE-UNESCO, training programs were prepared for four lines: IWRM, improved irrigated farming, international water law, cooperation for transboundary rivers.

The Ministry of Agriculture and Water Resources (MAWR) of Uzbekistan has already started regular training of staff from water-management organizations. According to national strategies, the training should cover up to 2.5-3 thousand persons a year instead of 650-750 specialists now. Moreover, training of farmers should be extended for development of knowledge centers.

The sensitive issue of human resources is to raise prestige and attractiveness of a water sector through raising salaries, growth of creative initiatives in the sector, development of data sharing with foreign specialists at a middle level of the water hierarchy and bringing a role of water professionals up to an earlier region-wise valued position of mirabs, aryk-aksakals, etc.

The mechanism of implementation will be strengthened, if:

- Meetings of ICWC (as per the “Regulation”) will be hold quarterly;
- ICWC members will be regularly take participation at ICWC meetings, they can delegate their powers to authorized representatives only as an exceptional case;
- The issue of joint funding for executive bodies of ICWC is resolved;
- Activities of working groups on the lines were restored, and the issue of joint funding for their activities is resolved;
- Development of regional programs for research and development work and innovations on urgent issues of the region is restored, and the issue of their joint funding is resolved.

Inefficient water management, which affects a great volume of initially consumed water, may be overcome by joint efforts only. There is no place to take water from outside – we need to create understanding of holiness of water since childhood, its careful use and necessity for its provision to every person within the

region, a province, a district, along each canal. Let's make the tool of advanced experience dissemination our common tool!

ECOLOGY OF THE ARAL SEA: SUSTAINABLE DEVELOPMENT AND INTERNATIONAL COOPERATION

The International conference entitled "Ecology of the Aral Sea: Sustainable Development and International Cooperation" was held on March 27-28, 2013 in the city of Dashoguz, Turkmenistan. The Conference was organized on the initiative of the President of Turkmenistan with the aim of considering the environmental situation in the Priaralie and discussing the lines of cooperation between international organizations and the regional countries. Representatives of research institutions, officers of the Ministries and agencies active in the area of protection of environment and water resources, representatives of regional organizations (IFAS Executive Committee, SIC ICWC, SIC ICSD, CAREC) and international organizations and missions (UN Permanent Mission to Turkmenistan, World Bank, ICARDA, FAO, UNEP, the Ambassador of the European Union) took participation in the conference. Besides the Central Asian countries, representatives of Russian, Ukraine and Belarus participated in the conference as well.

Welcome addresses of the delegations from the Central Asian countries were confined to the gratitude to the President and the Government of Turkmenistan for organization of that event and the attention paid to solution of the Aral Sea problems. Mr. N.K. Kipshakbaev, the Representative of Kazakhstan, told about the history of IFAS and ICWC. The representatives of the Kyrgyz Republic did not make reports.

The work of the conference was organized in a form of three sessions. The address of the President of Turkmenistan was read to the conference participants at the plenary meeting. Then, the representatives of the Central Asia (CA) countries and the Chairman of the IFAS Executive Committee made their welcome addresses. The rapporteurs thanked the Turkmenistan leadership for their attention to the environmental problems and congratulated IFAS with its 20th anniversary (the Kzyl-Ordyn Agreement was signed on March 26th, 1993).

The *first session* entitled "Ecology of the Aral Sea – a principal line of regional cooperation" was chaired by Mr. S.R. Ibatullin, the Chairman of the IFAS Executive Committee. Mr. S.R. Ibatullin reported on strengthening of international cooperation on Transboundary Rivers of CA. Ms. K. Karibaeva covered the issues of regional coordination and support in increasing a level of regional cooperation

between the European Union and CA in the sphere of protection of environment and water resources. Mr. Ekrem Yazici (FAO) told about the FAO methods and practices of land resources management. Mr. Z. Kobuliev, Director of the Institute of Water Problems, Hydropower and Ecology of the Republic of Tajikistan, the ICSD Member, made a report entitled “Partnership in a water sector as a factor of sustainable development in CA”. Mr. Z. Khalikulov (ICARDA) told about the Collaborative Research Program for Sustainable Agricultural Development in Central Asia and South Caucasus (CAC).

The *second session* entitled “Desertification prevention, biodiversity conservation and environment protection in the Priaralie through forestation” was chaired by Mr. K. Sadykov, the Head of the Delegation from Uzbekistan. The session had mainly a scientific line where the rapporteurs introduced the available achievements in the area of tree-planting, biodiversity conservation and land degradation control.

The *third session* entitled “Sustainable water resources management in the Priaralie” was chaired by the Minister of Nature Preservation of Turkmenistan. Mr. Kojakhmetov P. reported about probable dynamics of a hydrological regime in the North Aral Sea with a view of economic activities and climate change within its basin. Mr. Kalinin M. introduced the participants with the application of the UNECE experience on adaptation of a water sector of economy and ecosystems to climate change within arid areas. Ms. Yudina V. told about the experience of Basin Councils as a managerial element at local level by experience of the Kazakh part of the Aral Syrdarya Basin. Mr. Zonn I. introduced the participants the prepared publications on the Aral Sea, in particular the Encyclopaedia of the Aral Sea. Mr. Starodubtzev V. covered the issues of delta landscape change under economic activities.

In conclusion, the address of the conference’s participants to Mr. G. Berdymukhamedov, the President of Turkmenistan, was read where the participants of the conference thanked the President for organization of the conference and attention to the Aral Sea environmental issues. With this the conference closed.

GENERAL ASSEMBLY OF THE EUROPEAN GEOSCIENCES UNION *(Vienna, April 6–12, 2013)*

The Annual General Assembly of the European Geosciences Union was held in Vienna in the complex of the Austrian Centre and gathered more than 12 thousand of individuals, mostly young scientists from 95 countries. The most impressive delegation was from Germany – 1954 persons, Great Britain – 997, France – 994, Italy – 784, USA – 706, Austria – 564, Switzerland – 479, Holland – 434, Spain – 383, Russia – 313 persons. Representatives from Kazakhstan – 9 persons and from Uzbekistan – 4 persons participated from Central Asia. At the Assembly, 4684 oral reports and presentations and 8207 poster presentations were heard and discussed at 448 sessions and 143 passing meetings. Discussions at the Assembly were held on 25 thematic lines, including the following ones, out of the lines close to us, were considered: climate, strategic resources and ecology, geosciences from the space, hydrological sciences, natural damages, oceans, including landlocked bodies of water; soil sciences and education.

The specialists of SIC ICWC participated in sessions on climate, hydrological sciences, damages, oceans, and soils. Moreover, they made reports at a special session on mountain and submountain regions.

As the threshold of the General Assembly, the Global Mountain Research Initiative (Prof. Greg Greenwood) organized a workshop devoted to development of an integrated method of mountain region management. More than 20 specialists from different countries, including Switzerland, Poland, Italy, Brazil, Spain, Canada, Austria, Ukraine and France, participated at the workshop.

The most part of reports was devoted to risk assessment at mountain landscapes based on combination of surface and remote measurements. The mutual opinion is that anthropogenic factors play a much more important role in change of natural landscapes and creation, to some extent, of threat to normal development of fauna and flora and habitation of people. Information systems of early warning went further in all the countries of the Alpine region. At that, the early warning system operates in accordance with the exterritorial principle, thus providing information to all the neighbouring countries located within one catchment. Similar observations are organized within the Carpathian Mountains, where scientists from Ukraine, Hungary, Poland, and Slovakia have the common information system, which is aimed at overcoming risks – floods, rock-dammed lakes, avalanche, landslips and mudflows.

Most reports mentioned reduction in volume of glacier and increase in number of landslips and dammed events. The participants showed the great concern about reduction of forest areas in many countries, not only in developed ones, but in European as well, for instance, in Norway, Poland, Ukraine, Chile, Nepal, etc.

At the workshop, Prof. Dukhovny V.A. reported about activities of SIC

ICWC on assessment of change of mountain and submountain landscapes within the Chirchik and Akhangaran River basins, based on research, which was carried out together with German and Greek scientists. The mutual opinion is that climate change affects much less than anthropogenic activities.

Representatives from the USA and Canada noted great impact of fires on degradation of slopes. During the workshop, on the results of the report of Prof. Dukhovny V.A., Dr. David Finger from Switzerland and Dr. Jozef Anton Morgone showed a great interest to ongoing activities in Central Asia and simultaneously aspiration to work on joint projects. In this respect, Dr. Finger proposed to address to the International Centre for Integrated Mountain Development (ICIMOD), which is in Nepal and headed by Mr. David Molden, the Deputy Director of IWMI. The program of ICIMOD, which until recently worked in the Himalayas only, envisages to cover the Amudarya River upper reaches. Presently the SIC ICWC staff study research materials provided by Dr. Finger in order to try to choose a program of common activities.

The following decisions were made at the workshop:

1. Mountains and submountain regions, being upper catchment areas, should be considered as a “capital of water”, which provides a long-term guarantee of water supply for society, nature and production. Over the recent 50 years, these areas are affected by climate changes (temperature variations, glacier dynamics) and more intensive anthropogenic impact (construction of hydropower plants with reservoirs and various dams, irrigation development in submountain areas, loss of forests and overgrazing on pastures).

2. Special hazard is caused by damage of forests located on the upper catchment area, which is exposed to fair, disafforestation for heating, pastures and construction of houses without specified procedure and license, that leads somewhere to loss of natural value of mountain landscapes. Forests are a natural air source for mountainous areas, but simultaneously play a great role in support of stable watercourses and erosion control at big slopes. Loss of forests leads to more frequent extreme events - droughts and floods, because forests' accumulating capacity dramatically reduces. Monitoring of the situation to avoid deforestation in the future and the analysis of conditions of different mountain streams affected by deforestation, in order to compare past hydrological cycles and long-term pictures of localities will allow to understand by decision-makers the importance of taking specific measures on protection of forests as an important natural flow regulator.

3. Stability of the water situation within upper catchments requires organization of dedicated basin tools, including databases, GIS, modeling systems, integrated interdependency of climatic and natural conditions taking into account hydrologic and land dynamics to assess their impact on social and economic changes at present and in future. This will help to involve broad public opinion and public participation for protection and support of sustainable long-term livelihoods and improved anthropogenic and natural environment and water stability, even in

the conditions of growing water deficit. Introduction of such recommendations should be prepared on the basis of such tools as IWRM.

4. IWRM is a specific and accepted all over the world approach. Based on the Dublin and Rio conferences, it is to be a specific counteraction against attempts of different countries to transform reservoirs, which are of longstanding regulation and constructed for complex needs within upper catchment areas, into a mechanism of water management in the basin only in interests of electric power producers, without taking interests of neighboring countries and nature into account.

A special session, dedicated to the problem of oceans and landlocked lakes, was headed by Mr. P. Zavyalov, Deputy Director of the Institute of Ocean Sciences of the RAS and was devoted to states of the Dead Sea, the Aral Sea, the Mediterranean, Black and Baltic Seas. All rapporteurs stated worsening of water balance of both landlocked water bodies and off-lying seas. Within the Black Sea, anomaly phenomena are intensely developed and caused by considerable inflow of organic pollutants through deltas of big rivers in the off-lying sea. In particular, in the Black Sea, blue-green algae spread over 150-200 km from deltas of the Dnieper and Danube. Even in such great amount of freshwater lakes as the Lake Ontario in Canada, also there is a growth of different pollutants due to with waste from large megalopolises, particularly in the coastlands. The Dead Sea is continuing to decrease, while salinity increases. The Dead Sea level reaches 428 m below ocean level. The content of chlorine in water makes 220 g/l, the TDS (Total Dissolved Solids) rough estimate shows that the total dissolved solids exceed 340 g/l, the density of water reaches 1.24 g/cm³.

Our report on the Aral Sea was devoted to the results of monitoring of the dried bottom of the Aral Sea, development of afforestation, self-overgrowing, as well as the forecast evaluation of further situation development of areas of seas. A big discrepancy between the actual situation of the Western Sea and the carried out forecast is registered. As per the forecast made 8 years ago, if there is no water inflow from the Eastern Sea, the Western Sea should have decreased more drastically, however the actual level of the Western Sea variates within 1 m, although there is almost no water inflow from the Eastern Sea. There is an impression that due to the deep depth of the Western Sea – more than 30 m – it overlaps aquifers, which feed this sea from the Amudarya delta. This hypothesis is indirectly confirmed with Mr. P. Zavyalov's observations on the chemical content of the sea water. The observations show decrease of water salinity by 10-15 g/l with regard to the average profile at the depth of about 20 m. Underground waters in the Priaralie and the Amudrya delta has salinity of about 40 g/l in depth horizons, and obviously outcrop of the waters determines an inflow component of the Eastern Sea.

Interest researches were demonstrated during a hydrological session by Italian and Spanish scientists, who since 2008 have regularly made satellite monitoring of irrigated lands in four irrigated areas of Camparia region, Spain on the area of 4000 ha and the similar area in Italy. Service of farmers is carried out on the basis of the SPEIDER information system developed by the Italian satellite company and the University of Castilla-La Mancha. A possibility of cooperation

with these organizations and application of these tools in the conditions of Central Asia is considered.

Three poster sessions were organized at the Assembly. Each of the sessions was presented by hundreds of posters with demonstration of the research results in different fields of geosciences.

Works on use of satellite pictures are of great interests.

This perspective line allows studying simultaneously both large areas and receiving a broad spectrum of data and simultaneously carrying out their deep analysis in GIS.

Other modern methods include use of stable isotopes in geological, hydrological and soil researches.

The isotope methods currently study the age and origin of water in ecosystems, moisture conveyance processes, share of underground waters in water balance, and other issues.

At the Assembly-parallel exhibition of modern means in the sphere of Earth, the UMS, LI-COR companies and others demonstrated devices, which enable to study climate change impact, saturated and unsaturated processes in a soil layer, laboratory isotope equipment, etc.

WORKSHOP ON DISCUSSION OF THE REPORT ON THE GREEN GROWTH IN THE ARAL SEA BASIN

On April 17th, 2013 in Bishkek city, the Kyrgyz Republic, the workshop on discussion of the Report on Green Growth in the Aral Sea Basin was hold. The report was prepared by the Global Water Partnership (GWP) Central Asia and Caucasus, Scientific-Information Center of the Interstate Coordination Water Commission (SIC ICWC) for Central Asia (CA), with support of the Global Green Growth Institute (GGGI) (Korea). Representatives of water-management agencies from Central Asia and ICWC executive bodies participated at the work of the workshop.

Prof. V.A. Dukhovny, SIC ICWC, gave brief information on the concept of “Green Growth” and its application to water resources. In his report *Green growth: How do we understand it and what should be done?*, Prof. Dukhovny V.A. described how the draft document was prepared and how the proposed priority lines of green growth development in water sectors of Central Asian countries were selected. The given recommendations are suggested, and this list of recommendations can be adjusted and supplemented in each country when developing national plans. At the end of his report, the rapporteur mentioned that notes and proposals submitted by the parties will be considered and incorporated

into the report when finalizing it.

Then representatives of the countries gave their proposals and opinions on the draft report.

Mr. S.N. Rakhimov, First Deputy Minister of Land Reclamation and Water Resources of the Republic of Tajikistan, mentioned that, in order to state the material in an unbiased manner, the report should be reviewed with involvement of national experts. He noted that the concept of “Green Growth” supposes divergence from fuel power sources to renewable ones, among which hydropower occupies a prominent place, meanwhile development of hydropower is shown in a negative light. The rapporteur mentioned that he does not agree with the approach to development of such type of regional reports, which are prepared by regional organizations and then submitted for endorsement. We are ready to cooperate if such an approach is changed.

Mr. Mamutov R.A. expressed the view of the *Ministry of Agriculture and Water Resources of the Republic of Uzbekistan* on support of the report as a document initiating the start of future activities.

Mr. Jienbaev M. voiced the view point of *the Committee for Water Resources of Kazakhstan*. In particular, he noted that the concept of “Green Growth” is supported in Kazakhstan where active works are carried out to implement “green” technologies throughout. The rapporteur noted that the “Green Growth and Water in Central Asia” project is needed, and the Committee is interested in such activities. Mr. Jienbaev M. expresses the need for finalizing the report regarding clarification of issues of pollution of the Syrdarya River within the territory of Kazakhstan.

Mr. Jayloobaev A.Sh., First Deputy Director General of the Department for Water Resources and Land Reclamation of the Kyrgyz Republic, mentioned that the report properly states that the Kyrgyz Republic promotes a vector of Green Growth in the national report for the RIO+20 Conference, in the National Sustainable Development Strategy and other documents. Now, the National Development Strategy is being developed in three stages - till 2017, till 2020 (the implementation stage), and till 2030 (the successful implementation stage). All these documents state water resources and maximal use of available water resources is the basis of green growth. One of the lines is hydropower, not only of small and middle scale, but rather of large scale, as the area and local characteristics do not enable to use fully small-scale hydropower in the Kyrgyz Republic. Mr. Jayloobaev A.Sh. supported the speech of his colleague from Tajikistan regarding the negative sight of development of large-scale hydropower in the report and expressed the need for drastic revisit of the report.

Mr. A. Mukhammedov, the Deputy Minister of Water Resources of Turkmenistan, expressed support for the line of green growth and mentioned the necessity to take into account notes and suggestions of the previous rapporteurs, and work further in this needed direction.

Mr. Khamidov M. Kh., Head of BWO “Syrdarya”, pointed the report should certainly reflect two aspects. First, how to rationally use water resources, including

use of modern irrigation methods. Second, industry as a water user. He also mentioned that it needs to try to endorse the concerns of both the upstream countries and downstream ones in the report. It is required to involve national experts and to search for trade-offs.

Ms. Sakhvaeva E.P., Representative of the the Department for Water Resources and Land Reclamation of the Kyrgyz Republic, supported the opinion of the previous rapporteur regarding the need for search of tradeoffs and mutual understanding. She pointed that the transfer of the Toktogul reservoir to a power generating mode was caused by need, as the country depends on power generation by the HPP by 90 %. The decision on construction of large HPPs was made at high level, and we will not be able to change it within the framework of the project. She also mentioned the need for associativity of all programs associated with sustainable development and expressed the opinion that preliminary discussion of the issues at national level and their further generalization at regional level could mitigate friction.

In the conclusion, *Prof. Dukhovny V.A.* pointed that the main goal of the presented report was to expose interest to green growth in the region. During 1.5 months given for drafting the report, it was impossible to conduct national consultations and gather reports of national experts. However, national experts were involved in elaboration of the report. He expressed the hope that national experts would send their notes for revisit of the report.

THE 5th SYMPOSIUM ON WATER SECTOR CAPACITY DEVELOPMENT

On May 29-31, 2013 in the Netherlands, the Delft 5th Delft Symposia on Water Sector Capacity Development “Developing Capacity from Rio to Reality - Who's Taking the Lead?” was hold. It was organized by UNESCO-IHE together with the Asian Development Bank, Cap-Net UNDP, the Ministry of Foreign Affairs of the Netherlands and Vitens-Evidens International. The main goal of the symposium was to reveal who is taking the lead in knowledge and capacity development across sectors, disciplines and other boundaries so it can be leveraged to become more effective and efficient? The Symposium was organized on three thematic lines: 1) problems and challenges, 2) available experience, 3) innovations, and had the objective to contribute in development of Sustainable Development Goals.

During the plenary meeting, the key reporters (Andras Szollosi-Nagy, Ambassador Kitty van der Heijden, Ndey-Isatou Njie, H.E. Ambassador Casaba Korosi) mentioned the importance of data gathering and analysis as a key component of capacity building. As per NASA data, capabilities for data gathering have undergone a considerable decline since 1979 all over the world. Though data

on water quality in many countries are considered as confidential, secrecy often falls away due to development of new means for track and data transfer to regular citizens via mobile phones and other communication means. Other problem is insufficient skills to learn and share one's experience. Even in such developed countries as the Netherlands, there are problems of ensuring succession of data transfer and management.

The session "Exploring Water Leadership Development", which was organized by ADB, Vitens-Evidens International and UNESCO-IHE, discussed what leadership is and how to develop it. UNESCO-IHE and ADB are implementing the joint project on Global Quality Standards and Initiatives for Water Leadership Development Programs. A dedicated pioneering water leadership program was created by the International WaterCentre (IWC) in Brisbane, Australia. The modern design of this program was based on recent international research into leadership development, including the proven principle of the '70:20:10' rule of leadership development, which broadly states that only 10% of development occurs from structured training, 20% from coaching and mentoring feedback, and 70% from on-the-job experience through challenging assignments. It is considered as urgent to make Central Asia water-sector staff familiar with leadership issues and shift in emphasis in staff training through development of staff leadership skills to solve daily objectives and challenges of the future.

The session "Boosting proficiency in water professionals" focused on IWRM proficiency certification. Kenneth Irvine (UNESCO-IHE), in particular, mentioned a possibility to certify the courses in three forms: institutional accreditation, certification of training programs, and international accreditation of training and education institutes. There is need for a fixed proficiency competence framework, which is to be related with career development. Also, the rapporteurs stated the importance of having fixed criteria to track an IWRM implementation succession, therefore knowing to what extent IWRM principles are implemented, and how it is captured in IWRM training programs.

The session "Measuring for sustainable success" considered a challenge to measure capacity and knowledge of individuals and institutions. Methodologies to evaluate impact are developed insufficiently. For example, only now the first methodologies are being developed which allow to measure the impact of education in economic terms. On the opinion of the rapporteurs, it is important to work on the improved impact assessment of interventions, taking into account time scales and new challenges, which a water sector faces.

The session "Assessment of Capacity Development Progress in IWRM" presented four presentations, which illustrated relevant work experience in different parts of the world – in the Rhine River basin, Eastern Mediterranean countries, Central Asia and Indonesia. The rapporteurs emphasized the role of training processes for trust building among stakeholders, importance of partnership, data bases and information systems, as well as feeding training processes with outcomes of scientific research and applied projects.

The session “Good Practices in e-Learning for Water Sector Capacity Development” discussed different approaches to development of distance training programs. An interest case was presented by the Water Training Center under UNU-INWEH, which offers distance IWRM courses through its regional offices. A detailed course composed of lecture and practical materials in the form of CD is given to a student. Information on the CD is synchronized with a common system when connected to Internet. This allows to track materials learnt and student progress. On completion of the course, a diploma is given to a student. Under UN-Water, the distance training method as an extra method to traditional trainings is in practice. Finally, UNESCO-IHE developed a distance training program for attraction of students who have no possibility to pay their stay in Delft.

The separate session organized by Water Ethics Network and Water Integrity Network discussed issues of capacity development on water ethics through network activities.

The session “Fostering the Adoption and Adaptation of Innovative Solutions for Water Challenges” dealt with a new approach of the transfer of innovations in the field of water. Earlier the transfer of technologies and knowledge was considered as a kind of charity from developed countries to developed ones, then now it is likely the investment issue. Therefore, it is important to involve and foster a private sector to solve these issues. Another innovation is the meaning of “innovation”: earlier “innovation” implies, first, technical solutions, then now the emphasis is shifted to social innovations. The rapporteurs especially emphasized the importance of systematic decisions.

THE EIGHTH INTERNATIONAL CONFERENCE "RIVERS OF SIBERIA AND THE FAR EAST"

On June 6-8, 2013 in Irkutsk, the 8th International Conference “Rivers of Siberia and the Far East” was held and dedicated to the International Day of Natural Environmental Preservation.

The conference was organized by Irkutsk Regional NGO “Baikal Environmental Wave”, the International coalition “Rivers without Boundaries”, NGO “Buryat Regional Association on Lake Baikal”, World Wildlife Fund - Russia, ISAR - Sibir Interregional Public Environmental Fund, Movement of public organisations and initiative groups “Siberian Rivers Network”, Krasnoyarsk Regional NGO “Plotina” (“Dam”), Amur Regional Public Ecological Organisation “AmurSEU”. The conference gathered over 200 participants from Russia, China, Mongolia, the USA and Australia. The opening was held in the Akademgorodok in the premises of the new Irkutsk Provincial State Scientific Library named after I.I. Molchanov-Sibirskiy and then was transferred directly to the Lake Baikal, in the

premises of “Pribaikalskaya” hotel, Listvyanka village. Besides participants from NGOs active in the region, the meeting was attended by representatives of Basin Organizations for Ob, Yenisei, Amur and Baikal regional environmental organizations, scientists from Krasnoyarsk, Vladivostok, Irkutsk, Novosibirsk and China, representatives of the local administration. Prof. V.A. Duhovniy participated by invitation of the organizers of the Eastern European Caucasus Central Asia Network of Basin Organizations. The conference was opened by Mr. A.Yu. Knijnikov on behalf of the World Wildlife Fund - Russia. The welcome speech was delivered by Ms. M.P. Rikhvanova, the Head of NGO “Baikal Environmental Wave” and the organizer of the meeting, and by Mr. Peter Osipov, the Director of “AmurSEU”. Mr. Marco Keiner, Director of the Environment Division of UNECE, opened the meeting with the report “The UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes”. He noted that Russia and its environmental movement is a significant basis for creation of environmental well-being worldwide through actively participating in the promotion of the Convention and developing its understanding on-site. This meeting is very significant, since it is dedicated to water and environmental issues of the unique reservoir of the world - Lake Baikal, and the Amur and Angara transboundary basin waters. Both rivers are transboundary and the area of intensive industrial development and pollution, both in Russia and in China. Therefore, their future depends on what extent water protection requirements will be monitored and followed in collaboration of NGOs and government agencies. He welcomed the representatives from Mongolia and China at the Conference and expressed the hope that the two countries will join it in the context of the opening of the Convention for signing not by members of the European part of the UN. Among the most important contributions of the UNECE, he pointed projects in Central Asia: Regional Dialogue and Cooperation on Water Resources, Dam Safety; Chu-Talas; CAREWIB; River Water Quality, etc.

Mr. Sergey Shapkhaev, Director of the Buryat Regional Union for Lake Baikal, reported on fluctuation of levels of Lake Baikal in result of construction of the Irkutsk HHP along the Angara. To date, however, there was no any cogent new scientific data that refutes the hypothesis that in order to achieve a new quasi-equilibrium state, which guarantees the biological optimum for the unique ecosystem of Lake Baikal, it is necessary to follow the lake level regime as close as possible to their dynamic characteristics to natural conditions before the regulation. Meanwhile, it is rational to consider separately the problem of matching the intra- and long-term fluctuations of the regulated level regime to the natural one. He appreciated the value of the Resolution of the Government of Russia, which established the fluctuation limits of the Irkutsk HPP banked-up levels that support the level of Lake Baikal. However, at the same time, he proposed to specify the mode in the long-term context in order to contribute to the restoration of the biota in shallow water due to minimizing the backwater effort impact on the Angara River source during extreme flood discharge. This example of the regulation of the HPP operation modes is a quite remarkable role model to prevent the certain diktat of hydropower industry regarding use of rivers only in their own interests, forgetting

about other values of the rivers as natural objects first of all.

Continuing the Great Lakes topic, Mr. David Klein (The Nature Conservancy, USA) spoke about the experience of the International Joint Commission of the United States and Canada on achievement of the balance of economy and environment by example of Lake Ontario and the St. Lawrence River, which a new plan for regulating the water body levels for ecosystems conservation and the local economy development is now being discussed with the population.

The report on the planning principles of water use opportunities in the arid area (V.A. Dukhovny, A. Sorokin) was started with the memory of a remarkable hydrologist from Irkutsk the Academician Igor Petrovich Druzhinin, USSR Academy of Sciences, a prominent expert in the field of systematic approaches to the developing water-management opportunities, a supporter of flow redistribution of the Siberian rivers to Central Asia. Our presented IWRM-based approaches, seeking for the integrated accounting of combinations of possible development scenarios - climatic, socio-economic, agricultural and water management – on the basis of the ASBmm modeling complex, aroused great interest and discussion. At the same time, the demonstrated capabilities to mitigate the negative impact of energy releases from large reservoirs raised questions about the Rogun HPP construction, and the position of Uzbekistan was explained from the international law viewpoint on these questions. Strangeness of the UNECE position, which continues in every way to support the countries of upper catchment areas, was emphasized, although the leaders of these countries constantly proclaim the unacceptability of both Conventions to their views on sharing transboundary waters and strongly oppose their use in terms of both information transparency and automation in the Syrdarya basin. The experts of Siberia showed their wish to use our models in linkage to perspective planning of their rivers.

Mr. P. Osipov (AmurSES) presented the description of applying norms of acceptable impact by example of the Amur River, and the suggestions for their improvement. Ms. Yu Ying (China) delivered a report on the scale of the government-approved hydropower development plan for the 12th five-year period. As a result of this program, “the China’s rivers are in mortal biohazard”. The scientific community in China, being concerned about this, created the “Method for evaluation of hydropower project conformity to sustainable development criteria”, and the Governing Board for Sustainability in Hydropower was organized.

An interesting report by Mr. John Sandstrom “Challenges and successes of attempts to restore rivers in Oregon state” reflected the current trend in the western US to abandon the use of a large number of dams and other barriers to fish passage, restoration of rivers meanders in order to restore the production of salmon. The Wild Salmon Center led this work in Oregon, and now extended it to Sakhalin and other points of the Far East.

T. Ketelson (Australia) delivered a big presentation on the problems of the Mekong River Basin development. Due to the construction of six large dams by China in the Mekong upper reaches, a wide scale of flow characteristics declined.

This allowed Laos and Cambodia to plan construction of 12 HHPs with reservoirs on the middle and lower reaches of the Mekong. The total capacity of hydropower production will reach 14697 MW. The cost of foreign direct investment will make \$25 billion USD. At the same time, the socio-economic assessment has determined that there will be serious social and environmental change. Over the past 15 years, the volume of sediments declined by half - from 160-165 million tons per year to 80 million due to the construction carried out. And a new construction will reduce it by half - to 42 million tons. As a result, this will reduce the flow of natural fertilizers to fields and, therefore, reduce the reproduction of fish by 340 thousand tons per year. Later, by 2030, the fish catch will decline by 42% compared with the level of 2000! Overall, more than 2 million of people will be jeopardized due to the construction of these facilities.

Then the participants were divided into 8 sections considering different aspects of water and environmental issues. The results of a comprehensive environmental and socio-economic assessment of hydropower development in the Amur River system were the subject of serious discussion at the section “Strategic issues of water resources use and area development” (E.A. Simonov, etc.). Serious violations of microbiological characteristics were found in all the Angara cascade reservoirs (Gorshkova and Drucker), the section “Environmental problems of the basins of Lake Baikal and Yenisei” focused an attention on increased anthropogenic pressure on the Baikal coastal zone and the need for strengthening monitoring. Another concern is the supposed, on the World Bank’s loan, construction of a reservoir and HPP “Shuren” in the middle reaches of the Selenga River, which is one of the main tributaries of the Baikal, and that will significantly change both the water inflow and, especially, flow of nutrients with sediments.

From the viewpoint of cross-border relations along the Amur, the comparison of water resources development on the Chinese side of the Amur River watershed and its tributaries draws a wide political resonance and water-management resonance. Three provinces of China located here are characterized by a sharp population growth and extension of irrigated lands, and those both are far exceeding the rate of average Chinese ones. In the Selenga basin, total water consumption over 30 years increased from 17.1 to 40.3 km³ per year. Interestingly, the current stage of the water sector development is characterized with significant reduction in the unit water consumption for irrigation, for example, from 16,875 m³/s in 1985 to 7,643 m³/s in 2009 in Heilongjiang province. Against this background, poor development on the Russian side and the lack of intention to somehow set a time limit for water prospects in the basin of the large Amur just staggered.

Cleaning of impoundment areas under HPP reservoirs during their construction is of great importance. The current started construction of the Boguchan HPP on the Angara River roused the environmental movement to combat the effects of flooding. Submerged weight of the wood in the basins of the Angara-Yenisei region (20 million cubic meters) affects the water quality, navigation, damages fish farming, and endangers the work of turbines.

During the conference, round 2 tables were hold: ecotourism development

and strategic evaluation of development in river basins. At one of them, by request of organizers, Prof. Dukhovny V. made statements on fundamental theses.

In general, the following should be noted: the high activity of NGOs in Siberia and the Far East in collaboration with scientists on water-related and environmental challenges and development; cooperation with the local authorities in the field; extensive community involvement, and finally, cooperation with NGOs in China and Mongolia. On the other hand, the hydropower construction worldwide, while solving issues of energy provision, is a significant factor damaging the nature and food safety. The extent of the damage depends on the extent to which the public and the opinion of the local population, as well as experience of previous errors are taken into account in the design, construction and operation of these facilities.

THE BONN DECLARATION ON GLOBAL WATER SECURITY

In the short span of one or two generations, the majority of the 9 billion people on Earth will be living under the handicap of severe pressure on fresh water, an absolutely essential natural resource for which there is no substitute. This handicap will be self-inflicted and is, we believe, entirely avoidable.

After years of observations and a decade of integrative research convened under the Earth System Science Partnership (ESSP) and other initiatives, water scientists are more than ever convinced that fresh water systems across the planet are in a precarious state. Mismanagement, overuse and climate change pose long-term threats to human well-being, and evaluating and responding to those threats constitutes a major challenge to water researchers and managers alike. Countless millions of individual local human actions add up and reverberate into larger regional, continental and global changes that have drastically changed water flows and storage, impaired water quality, and damaged aquatic ecosystems.

Human activity thus plays a central role in the behavior of the global water system.

Since 2004, the Global Water System Project (GWSP) has spearheaded a broad research agenda and new ways of thinking about water as a complex global system, emphasizing the links that bind its natural and human components. Research carried out by GWSP and its partners has produced several important results that inform a better global understanding of fresh water today.

- Humans are a key feature of the global water system, influencing prodigious quantities of water: stored in reservoirs, taken from rivers and

groundwater and lost in various ways. Additional deterioration through pollution, now detectable on a global scale, further limits an already-stressed resource base, and negatively affects the health of aquatic life forms and human beings.

- At a time of impending water challenges, it remains a struggle to secure the basic environmental and social observations needed to obtain an accurate picture of the state of the resource. We need to know about the availability, condition and use of water as part of a global system through sustained environmental surveillance. History teaches us that failure to obtain this basic information will be costly and dangerous.

- Humans typically achieve water security through short-term and often costly engineering solutions, which can create long-lived impacts on social-ecological systems. Faced with a choice of water for short-term economic gain or for the more general health of aquatic ecosystems, society over-whelmingly chooses development, often with deleterious consequences on the very water systems that provide the resource.

- Traditional approaches to development are counterproductive, destroying the services that healthy water systems provide, such as flood protection, habitat for fisheries and pollution control. Loss of these services will adversely affect current and future generations.

- Sustainable development requires both technological and institutional innovation. At present, the formulation of effective institutions for the management of water lags behind engineering technologies in many regions.

- Research from the GWSP and elsewhere confirms that current increases in the use of water and impairment of the water system are on an unsustainable trajectory. However, current scientific knowledge cannot predict exactly how or precisely when a planetary-scale boundary will be breached. Such a tipping point could trigger irreversible change with potentially catastrophic consequences.

The existing focus on water supply, sanitation and hygiene has delivered undoubted benefits to people around the world, but equally, we need to consider wider Sustainable Development Goals in the context of the global water system. Ecosystem-based sustainable water management, a pressing need that was reaffirmed at the Rio+20 Earth Summit, requires that solving water problems must be a joint obligation of environmental scientists, social scientists, engineers, policy-makers, and a wide range of stakeholders.

These realities motivate the water community assembled in Bonn for the Global Water System Project Conference “Water in the Anthropocene” to make a set of core recommendations to institutions and individuals focused on science, governance, management and decision-making relevant to water resources on earth. Given the development imperatives associated with all natural resources at the dawn of the 21st century, we urge a united front to form a strategic partnership of scientists, public stakeholders, decision-makers and the private sector. This partnership should develop a broad, community-consensus blue- print for a reality-

based, multi-perspective, and multi-scale knowledge-to-action water agenda, based on these recommendations:

1) Make a renewed commitment to adopt a multi-scale and interdisciplinary approach to water science in order to understand the complex and interlinked nature of the global water system and how it may change now and in future.

2) Execute state-of-the-art synthesis studies of knowledge about fresh water that can inform risk assessments and be used to develop strategies to better promote the protection of water systems.

3) Train the next generation of water scientists and practitioners in global change research and management, making use of cross-scale analysis and integrated system design.

4) Expand monitoring, through traditional land-based environmental observation networks and state-of-the-art earth-observation satellite systems, to provide detailed observations of water system state.

5) Consider ecosystem-based alternatives to costly structural solutions for climate proofing, such that the design of the built environment in future includes both traditional and green infrastructure.

6) Stimulate innovation in water institutions, with a balance of technical- and governance-based solutions and taking heed of value systems and equity. A failure to adopt a more inclusive approach will make it impossible to design effective green growth strategies or policies.

The recommendations above, taken collectively, can constitute the centrepiece of a blueprint to promote the adoption of science-based evidence into the formulation of goals for sustainable development. Stewardship requires balancing the needs of humankind and the needs of nature through the protection of ecosystems and the services that they provide. Without such a design framework, we anticipate highly fragmented decision-making and the persistence of maladaptive approaches to water management.

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