IPTRID **ICID** **Scientific Information Center of Interstate Commission for Water Coordination in Central Asia**

The creation of capacity development of interstate water collaboration in the Aral Sea Basin

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CONTENT

1. Abstract

"The Creation of capacity development of interstate water collaboration in Aral Sea basin"

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The unity of water resources – two principal rivers of Aral Sea basin, the Amudarya and the Syrdarya, – required from five former Soviet Union' states: Kazakhstan, Kyrgyzstan, Tadjikistan, Turkmenistan and Uzbekistan to arrange strong partnership in joint management and development of transboundary water recourses immediately after achieving independence (September 1991). The establishment of Interstate Commission for Water Coordination (ICWC) (interstate agreement was made on 18 February 1992) was the first step towards building capacity to promote such cooperation. Capacity building (CB) within ICWC is developing in several directions: CB to cooperate; CB of regional organizations; CB of national organizations.
The mainstream of this development have been fixed in "The Principal Provisions of Regional Water Strategy of Aral Sea basin" expanded in the form of:

- Creation of regional and national information systems;
- Network of regional organizations and their branches;
- Training system of ICWC with several branches;
- Implementation of IWRM;
- Creation of regional and national communication networks;
- Implementation of SCADA system on the major structures on rivers;
- Organization of work for setting up the legal framework of collaboration.

The understanding difficulties of capacity development for condition states transferred from socialistic system to market should based on statement that it need include not so much new development as measures for saving old capacities and adopted them in new situation.
At present time ICWC and all five states are carrying on "Strategic Planning of Future Development and Water Management" orients to cope with influences of destabilizing factors for the next 25 years.
Case study should include in addition to history of CB development the following:

- A diagnostic study of current problems in regional collaboration and national policies;
- Actions plan for merging above mentioned directions of CB in unified and complex manner;
- Overcoming difficulties of fundraising and weakness of some national economics;
- Involvement of donors in strategic planning and implementation;
- Timetable for setting up CB program.

2. Introduction

Background situation in the Aral Sea Basin

The Aral Sea Basin is located in arid and semiarid zones and covers the territory of the five former Soviet Union and now Central Asian states: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan. Northern Afghanistan, one of the oldest regions of world civilization, also is hydrologically and ethnically linked to the Aral Sea basin due to development of water and irrigation. The basin comprises the watersheds of the two great rivers: the Amudarya and the Syrdarya with their tributaries and many small rivers and creeks, which now divided from their "foremother" – both rivers as result of intensive irrigations (fig. 1).

fig. 1

Soviet system have built up on the basin territory the huge complex of water management: gigantic dams and water reservoirs, well developed irrigation network, the biggest pump stations such as Karshi cascade, Djizak cascade, and the longest canal such as Karakum canal with discharge 600 m^3/sec and length 1260 km. This complex as a whole was managed by a single institutional structure from "top to down" in accordance with strict procedure of water manipulation, water allocation and water compensation.

This system enabled to deliver and allocate water successfully by means of a huge water infrastructure coupled with vast sums of operational costs covered by the central government at inter-farm and even on-farm levels, including the costs of operation and maintenance of drainage. But this water management system suffered from two immense shortcomings. First, water users' and consumers' opinions have not been taken into consideration; as a result, the transition of Central Asian countries' agriculture and economies in general to market-oriented principles showed that many water users became insolvent and not self-sufficient. Second, environment considerations were largely neglected in favor of the needs of water users; hence ecological and sanitary requirements,

along with the environmental needs of deltas, Priaralye, and the Aral Sea itself, were not taken into account and the scope of the problems was understated.
Some aspects of Soviet heritage, however, have had positive impacts on current and future development of the region. They are:

- high level of water education, science, and skills combined to provide a firm basis for building capacity of specialists engaged in water management;
- teamwork of water specialists of the former Soviet Union Republics - working under one leadership within one system according to similar standards, rules, methods, and approaches - created good conditions for sustainable work of future generations: their aspiration has been to keep the coordinated approach that was formed in Soviet times;
- water organizations (BWOs), and allocation of huge investments to various projects, particularly to water supply and social improvements in 1986 (fig. 2) had an immense inertial effect, ensuring smooth operation and transition of water management from the former political formation to a different one - from imperfect socialism to other forms of primary accumulation of capital with various degrees of transition accomplished in different countries.

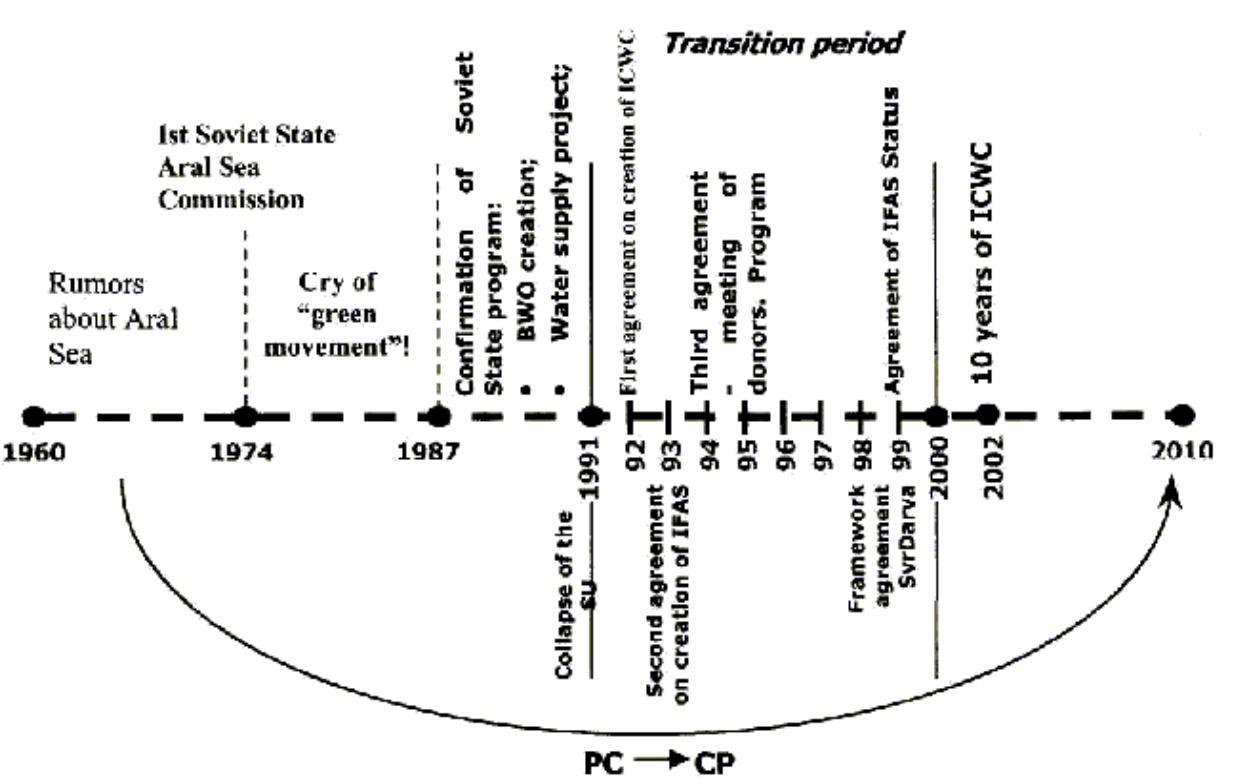

Fig. 2. Chronology of the Aral Sea Basin events

On achieving independence from Soviet Union in 1991, the five states faced a need to cope with new conditions by organizing joint corporative water management in the basin. To honor of the governments of Central Asian states such decision was found – the Interstate Commission for Water Coordination (ICWC) was established in accordance with the Agreement on Cooperation in the Field of Joint Management of the Use and Protection of Interstate Water Resources dated 18 February 1992, and approved by the heads of the states 23 March 1993. ICWC is a collective body that manages transboundary rivers and responsible for: water allocation among countries; monitoring and preparation of preliminary assessments of proposals on institutional, ecological, technical, and financial approaches, based on decisions mutually agreed by all sides. Two BWOs (Amu-Darya and

Syr-Darya), the Scientific-Information Center, and ICWC Secretariat are executive bodies of the Commission.

ICWC took over responsibilities for water management in both basins directly from the former Soviet Ministry of Water Resources, but with appropriate changes reflecting the creation of five new independent states:

- the Commission has five members appointed by the governments. They are equal in rights and obligations. They meet once a quarter to decide all issues related to their activities and responsibilities. The decisions are reached only on a consensus basis;
- two BWOs were transformed into the executive bodies of ICWC; in a similar way a part of the Central Asian Scientific Institute for Irrigation (SANIIRI) was transformed into the Scientific-Information Center (SIC) of ICWC to act as a 'think-tank' for the commission;
- all issues for the ICWC meetings, in accordance with their agenda, should be prepared by the executive bodies and disseminated among the members twenty days before the meeting; this let each country prepare its comments and opinions;
- the principles of water allocation that existed in Soviet times have been retained for the purpose of annual planning until new regional and national water management strategies would be developed and adopted.

The activity of ICWC for last 13 years is unique example of collaboration among five states not only in joint planning, exchange of information, but also in real management, operation and monitoring of transboundary water sources in a single way.
Some reasons formed conditions for such collaboration are:

- common historical, ethnic, customary and even religious roots of all nations in the states;
- mutual activities in the Soviet period;
- political will of leaders of the five states and understanding of decision-makers of the importance of water issues for the region;
- creation of proper "Aral Sea spirit" between water specialists and professional, involved in water management in the region.

This platform, as was mentioned at the Jubilee ICWC Conference in 2002, enabled to organize a smooth transition from the command style of water management to new and more democratic water collaboration on a regional basis (see fig. 2 above) with the following principal results of the Commission's activity:

- conflicts in water management, operation, and allocation among the countries of the region have been avoided;
- thirty-two meetings of the Commission have been held, and have determined all activities undertaken by the ICWC and its bodies;
- a range of important legal, financial, and institutional proposals have been prepared and submitted to the governments of the states, defining the principles of interaction on water issues. Two of these documents have been signed by the heads of the states as international agreements;
- the volume of water used in the region has been reduced from 110 to 103 km^3.

In terms of the second, contrasting challenge, three weaknesses of social and economic situation transient societies should be taken into account:

- high rate of population growth and adverse economic conditions are the two principal destabilizing factors that have complicated improving water situation, and simultaneously ask to solve the problems using low cost (mostly organizational and economic) methods;
- water, land, and mineral resources are distributed inequitably among the states.

On the one hand this initiated a tendency to "hydroegoism," on the other hand it was argued that this induced the only way to guarantee survival and future development: close cooperation, collaboration, and the creation of a cooperative Central Asian market for food and agricultural production (perhaps together with Russia);
- Some local and sectoral interests, aspiring to be the "nouveau riche" in the new economic market (sometimes a very erratic market), have speculated in water as they done with oil, gas, and fuel. This has created obstacles in the path of collaboration, but society needs to make such economic activity unviable.

As a whole ICWC has managed with all the complex situations of water supply and provision even during dry years without conflicts; however, in view of probable restrictions of options for the future, management procedures and capacity should be properly improve and create that would be adequate to changing social-economic, political and nature conditions.

3. Analysis of problems

First official identification of existed problems in water management and water use on behalf of ICWC was presented in “The Principal Provisions of Regional Water Strategy of Aral Sea Basin" (GEF Project 1996 … 97, task manager Prof. J. Kindler, regional coordinator Prof. V.A. Dukhovny). This document was prepared by a working group that consisted of the representative of all five states on equal base, and then it was confirmed by the five governments. The problems were divided on the international and national one.
Regional problems were listed as follows:

- potential conflict between hydropower production and irrigation;
- weak attention to ecological issues;
- weakness of staff capacity since independence;
- collapse of former soviet information network and a lack of new one;
- not all countries have their representatives in the regional organizations;
- procedure of financial contribution from all states in support of regional organizations didn't confirmed by the states;
- not all branches of water economy introduced in ICWC.

National shortcomings vary depending on some common features that are as follows:

- the water sector at the national level in its present form chiefly represents the interests of agriculture. National water organizations should represent equally the interests of irrigation and (particularly) hydropower, and set priorities for water supply, water storage, and similar measures;
- the administrative principle that is still in force in the water sector and irrigation creates local pressures from provincial and district administrations’ side on the principle of equal water supply that in turn affects all water consumers;
- from the launching of water management and irrigation projects up to their implementation, relevant decisions are made only by the state agencies without any input from current or potential water users. As a result, there is a situation where the costs of irrigation systems and water structures, which are transferred (completely or partly) to water users, cannot be recovered by water users. Such situations are found in the cases both of salinized lands and of large water lift systems, where the costs of drainage, maintenance, and water lift cannot be covered by income from irrigated agriculture;
- policy of transferring operation and maintenance costs to water users depresses the maintenance system and simultaneously complicates issues related to the development, rehabilitation, and upgrading of irrigation systems. Previous most of advanced systems (lined canals, flumes, subsurface and vertical drains) didn’t exceed normal limits of their durability. However, under current conditions their rehabilitation is an issue that falls between two stools: water uses, that do not feel they should be responsible for it, and the state agencies, that do not address it pleading

Table 1. Results of implementation initial diagnostic study of water resources management and use in the Aral sea basin

Problem	Sub-problem	Measures and solutions	Executed in program	Results
1	2	3	4	5
1. Origin of transboundary conditions as consequence of CAR countries' independence gaining	• Transboundary issues with water allocation; • Different priorities of downstream and upstream countries and sectoral trend;	• development of long-term policy and agreed objective criteria in water allocation and use; • prepared drafts of 4 agreements;	WARMAP-1, WARMAP-2, WEAP	done
	• Inter-sector contradictions in release regime; • competition between irrigation and power;	• finding acceptable and equitable rules of management and regulation of basin management in different conditions; • agreement of 1998 on Syrdarya river;	WARMAP-1, WARMAP-2, NATO, USAID	partly
	• Difficulties of intestate financing of mutual services;	• development and approval of financing rules for interstate structures and joint works;	-	-
	• Collapse of common system of water account and forecast;	• introduction of SCADA system on Syrdarya river;	CIDA Project, SDC Project, USAID	partly
		• establishing regional hydrometservices under EC auspice; rehabilitation 36 hydrological section;	SDC Project GEF Project	done
	• Difficulties in efficient water operation;	• development of common information management system at BWO, MAWR;	WARMAP-1 and WARMAP-2, CAREWIB, RiverTwin	done
	• equal presentation of states in regional bodies;	-	-	-
2. Collapse and weakening of strict management "top-down" and necessity for decentralized management on national level	• single sectoral priority of water sector;	• IWRM introduction;	IWRM Fergana, SP (ESCAPe)	partly
	• administrative principle;	• Public involvement to management, establishing WUA, System Committees (Councils);	-"-	partly
	• absence of involvement of stakeholders; • weakness of staff capacity	• New structures establishing with concerned parties participation;	-"-	partly
	• losses and preparation of qualified staff;	• Training system development;	CIDA, USAID, SDC, ADB	done
	• absence of attention to water conservation	• Set of measures on water availability incentives creation (extension services, payment block system, privileges for water saving)	WARMAP, CIDA, SDC, EU	partly
3. Economic decline and funding scarcity	• low water users' means involvement to fund water sector;	• implementation water service prices		partly

	• states do not contribute to support interstate infrastructure;	• support of interstate infrastructures and bodies;		very small
		• establish gradation of water users' involvement in water sector funding;		none
	• collapse of irrigation and drainage network, especially at in-farm level;	• attract loans and grants from international financial organizations to improve water supply and fulfillment of priority obligations;	ADB, WB Loans	partly
	• Neglecting interstate needs for transboundary objects modernization	• Increasing status of water-related organizations and their transformation into inter-sector bodies, providing their needs including interstate funding as priority driven.		none
4. Neglecting ecologic issues	• Aral sea shrinking and delta desertification;	• approval of obligatory releases to the delta and Aral sea; strict observance of these releases by ICWC and BWO;	NATO Project; WB loan Kazakhstan	done
		• set of nature protection measures for Priaralie new sustainable ecologic profile establishing;		partly
	• River water quality worsening;	• water conservation policy and return and groundwater utilization saving river water;	-	-
	• Growing irrigated land salinization and water-logging;	• strict limits for salt disposal to the rivers; • introduce special program "Irrigated land drainage"	-	
	• Flow formation zone degradation by erosion and deforestation	• development of strategy for flow formation zone conservation.	RiverTwin, Program 6	partly

– for a lack of finances;
– in respect of legislative and financial aspects, there are very vague and unclear issues, especially regarding distribution of responsibilities between users and state budgets in all countries. A common belief prevails that the governments should not assume increasing share of financial burden, but this neglects the fact that decline in irrigation and water saving efficiency can cause productivity losses and a serious decline in the combined efforts of agricultural producers, as well as social consequences. These facts pose a grave danger to the states, and even raise the possibility of social description, in view of resulting decreases in national income and tax returns.

The complicated process of capacity building new water sectors in five states and on the interstate regional level can't to be analyze in statistic statement – almost 15 years functioning it in new conditions led to big transformations in governance same in measures carried off in capacity development. From this point of view it should be recognized in dynamic of time and executions.
The establishment of ICWC and its bodies was accompanied with an approval of the first Aral Sea Basin Program (ASBP-1) by the five CA states in 1994. Analysis of existed problems transformed in CB needs assessment enabled to prepare "Diagnostic study". This study generalized proposed measures, decisions and their implementation to four superproblems and subsequent subproblems. The information about results of this study contributed to proper view of current problems, in particular, it have demonstrated on which points attention are more close, and the points were set aside(table 1). Conclusion is very clear – all attention concentrated on the smoothing growing transboundary problems and decisions regarding reassessment of new approach to management. Such priority of these two superproblems caused by danger of collapse of guarantee water supply and delivery water to huge irrigation network, which are feeding needs of 60% rural population, in one or other measures connected with agricultural production. Decision-makers couldn't ignore these urgent needs because it could create social disaster and catastrophic exposure of people's violence. But subproblems related to next two superproblems, namely a lack of financing, economic fail and environment, remain without actions, because they deal with long-term vision, which now are outside of view and hearts of decision makers. Nevertheless, needs to meet these requirements couldn't be completely out of spectrum of the national governments plans, which approved in 2003 so-called "Aral Sea Basin Program – 2" (ASBP – 2). ASBP-2 covers most of the indicated problems.

4. CB needs assessment and lessons, learned

The previous 12 years activity of the regional and national organizations resulted that big part previous problems and subproblems get their decision – fully, partly or in initiative stage. The remaining problems clarified on five groups:

- legal and institutional aspects of interstate and national CB;
- financial aspects of CB;
- CB for BWOs;
- CB for Hydrometservice;
- CB for ICWC.

4.1. Legal and institutional aspects of CB

Preparation of legal tools for collaboration has started by ICWC decision in 1996 and lead to preparation of four agreements, which cover major directions of joint activities of the five states on the transboundary waters: institutional arrangement, information exchange, regulations of water use, environmental protections. In 1996 … 1999 drafts of these agreements were negotiated during the meetings of working group represented by each states and regional organizations. These drafts were agreed by all members of this group. One of the agreements – about information exchange - was signed by ICWC members and submitted for approval by the national governments.

The other framework agreement was signed in 1998 on Syrdarya river, between Kazakh, Kyrgyz and Uzbek governments (later joined by Tajikistan) and agreed conditions of release water from Toktogul reservoir in summer with delivery gas, oil, coal and winter power. Although Agreement 1998 didn't pass the test of time and its provisions should be supplemented in reality each year by the interstate protocol, but it played proper role in creation of legal conditions of water management on Syrdarya river.

Results of this activity

Water resources specialists as well as NGOs acquired extensive knowledge and orientation in principal provisions of International Water Law and proper experience in providing negotiations for single method preparation of mutual legal regulations. Experience of two framework agreements, signed by States, is positive and may serves as indicators of political will to get a strong legal long-term base for mutual activity on the transboundary waters.

Decision of legal and institutional aspects of regional level should concentrate attention on:

- to preparation, agreeing and approval by the national governments principal interstate agreements such as “Agreement on the Exchange of Information and the Establishment of the Aral Sea Basin Database for the Transboundary Water Resources"; "Agreement on Strengthening the Institutional Structure for the Aral Sea Basin Transboundary Water Resources Management, Protection and Development"; "Agreements on the Rules for Water Use on the Amudarya and Syrdarya rivers (separately)"; "Agreement on the Ecological Sustainability of Transboundary Waters of Aral Sea Basin";
- to assume the "common use" doctrine as a basis for inter-sectoral water relations.

Simultaneously strengthening regional bodies of ICWC along with enhancing their rights, authorities, and responsibilities should become. Institutional strengthening collaboration, described in corresponding Agreement will decide all aspects of first priority on the interstate organizing level.

The improvement of national water Law started from New Water Code of Kazakhstan (2003), Kyrgyzstan (2004), Turkmenistan (2005), Decree of President Uzbekistan "The implementation of hydrographic methods of water management" (2003) and some other national legal documents.

Transfer to basin and subbasin management discovered needs to include in the National Law involvement of stakeholders at all levels water hierarchy. Public participation should create the atmosphere of *transparency* and *openness*, in which the probability of making decisions that do not meet public interests decreases. The broader public participation, the less favorable conditions for corruption and public interest neglect. This would help to prevent local or agency level egoism in water use. This is a platform for equitable, responsible decisions on water allocation under growing water shortage with respect to the nature and other members of society.

Since water is not only a personal but also a public good, it is evident that public participation is the major element of water management.

Public participation is the most important factor for fighting against any kinds of "hydroegoism". Even if under previous existed administrative way of water management water users faced administrative hydroegosim, under which decision makers of administrative territorial agencies have practiced dictates for their own benefits, with high opportunities for corruption, despotism, and infringement of other entities’ rights, transition to hydrographic management as such do not imply transition to IWRM – such approach opens the way for professional hydroegoism since, in the absence of public participation, water-management organizations themselves plan, establish limits, correct these limits and control them. Therefore, public participation is a guarantee of equity, equality and consideration of all interests in the management. Role of the public could be increased by *establishing, parallel to water-management organizations, public structures in form of «Union of canal (system) water users, Councils or Committees.*

These are representative bodies that manage relevant systems. Representation implies participation in the process guidance of all interested parties, namely: representatives of water-management bodies; representatives of water use sectors (municipal sector, industry, fishery, etc.), direct water users, local authorities, public organizations, and non-governmental organizations. Union, Committee or Council coordinates activities of legal and physical entities of water relations, water management and use within an area, which is served by a system or a canal.
Regional and national environment aspects should get priority in future regional and national water Law. "The agreement on guarantee of ecological sustainability" has prepared for regional level audit need upgrading and approval for meeting of regional environment needs. Similar strengthening of national environmental Law need on level of land and water national ecology.

Lessons learned

- setting up adequate legal framework on transboundary waters requires permanent activities of a working group, authorized by the national governments with delegating them strong responsibilities similar works expected on the national levels;
- the working group should be multisectoral with representatives of all stakeholders and ministries interested in water use to promote negotiations and mutual approaches;
- negotiation requires public participation and a lack of ambitions;
- donors assistance is welcome to enable permanent activities of the working group on legal issue.

4.2. Financial aspects of CB.
Financing of transboundary water (TBW) management and development regulated on the initial stage base by the agreement 1992, where all expenses allocates between states proportionally to water allocation. But it was related only for BWOs and ICWC bodies for their operational activity. Many aspects and proposals remains without clear decision:

- reliable financial support by the states for all water management agencies, hydrometeorological services, and nature conservancy authorities in flow formation and delta zones;
- as a substitution for fuel/energy-water exchange, put into practice payments for flow regulation in reservoirs (over an annual, seasonal, or other period) with participation by all countries of the Aral Sea Basin in covering expenses for flow formation, as well as protection of the deltas;
- absence of financial tools for environment management such as ecological flow support, responsibility for outtake water from river above ecologically permitted limit; responsibility for pollution of TBW.

On the national level financial situation remained more unstable, that depends from different political and economic situation in 5 states. As result irrigation and drainage system hasn't scources for recovery all needed expenses for operation, maintenance and moreover rehabilitation. Initially some states tried to transfer most part of financial pressure on the shoulders water users, but such line of action caused failure of capacity water and irrigation system, especially on the former onfarm level. Rehabilitation works required the big contribution supported partly by the different foreign loans, but not enough – compare with Soviet period the investment in infrastructure rehabilitation reduced more than in 10 times!!!

Lessons learned

- scarcity of financing resources of states definited concentration attention of financial bodies only on the support operation and maintenance in cutted size on the regional and national levels;
- attempt to minimize government contribution and weakness of water users caused big difficulties for work of operation staff and failure such infrastructure as hydrometservice, drainage (especially vertical);

- payment for water became common line, but paying capacity of water users depends from fiscal and agriculture policy different States.

Sustainable water management requires definition of strict rules of payment allocation between stakeholders, governments and local authorities depends from level of net benefit water users.

4.3. CB of BWOs

BWOs are carrying on enough successfully annual planning, water allocation, operation and ongoing repair and maintenance of transboundary structures, that clear from record of more than 15 years activity. But this work connected with big difficulties overcame by skill and experience of staff:

- lack of modern equipment and communication capacity;
- low degree of accuracy of water forecast and lack in hydrological information some time, especially from upper watersheds states;
- weak public participation;
- to establish well-defined regulations for operating regional organizations under various conditions and in different situations (water scarcity, floods, etc.); make these activities equitable, multinational, and transparent.

CB of BWOs "Amydarya" and "Syrdarya" needs:

- equip headquarter and their regional units by modern computers, telephone and communication net;
- organize on this base dispatch service and information;
- equip all head works of BWOs with automatic control and management system (SCADA) for prevention any possible uncontrolled water withdrawal from the river.

The proper steps in decision this need were done with assistance of different donors (USAID, SDC, UNDP), most in implementation of the modern technology: modeling, GIS, remote sensing, SCADA. Organizing of round tables with principal stakeholders (power ministries and organizations, water and agricultural institutions) promoted decisions of water regime and allocation especially in conditions of droughts and floods (2000, 2002, 2003, 2004 years).

Lessons learned

- the improvement of technical levels of equipment and monitoring especially SCADA implementation permitted to increase accuracy water delivery on the equipped structures up to ± 2 % instead of ± 10 % before: such type works are very efficient;
- spontaneous investment by donors in modernization work of BWO can't to decide long-term improvement – it requires of states and donors contributions;
- stakeholders met with big interest their involvement in BWOs activity. Organizing of Public Council of BWO will assist to stand this relation on the stable order.

4.4. CB of Hydrometservice

Collapse of Soviet Union destroyed practically all existing system of hydrometservice in 5 states by failure of many monitoring stations on the rivers, climatic stations, mountain monitoring network on glaciers and snowfall in upper watershed. Most dangerous consequences became cutoff system of exchange informations between national hydrometservices and brains drain. Proper measures for combat of these disadvantages carried with assistance of GEF, WB, SDC project; 24 hydrometrological stations, station on the glacier Fedchenco were rehabilitated; republican hydromet organizations received big quantity modern equipment. Now CB of Hydrometservice at regional and national level needs are:

- rehabilitation of existed and construction of new hydrological monitoring stations on the transboundary waters with installation modern equipment;
- rehabilitation of monitoring stations on main glaciers, which are indicative points for both rivers;
- organizing satellite network communication between monitoring stations and national centers;
- organizing Regional Hydromet Center which can merge forces national Hydromets and join them with end water-users (BWOs, ministry of waters, etc);
- improve system of river forecast by using modern models of precipitation and flow formation;
- arrange general public awareness, especially end-users in forecast and real data.

4.5. Capacity building of ICWC consists from some principal items:

- information network between ICWC members and their partners as well as within the states and from top to bottom;
- information network "ICWC – foreign partners";
- training activity.

Major information network interlinked regional bodies and national water-related agencies. This network is maintained by SIC ICWC and interconnects ICWC with many international organizations such as WWC, ICID, INBO, IWRA and serves as a direct way to world water community and donors' window.

ICWC developed some interconnected information systems within each national Ministries, BWOs and SIC ICWC. Setting up these systems was done by single hierarchic methods and as a result got single format and interconnected views thanks to assistance of SDC through CAREWIB (Central Asia Regional Water Information Base) project. This project has broad dissemination tools in e-net, internet, printed form and based on the pyramid of information sieve from down to top which supported by information feeding from different projects and sources, implemented by SIC ICWC as well as other ICWC bodies.

Information system* consists of:

- information portal with more than 20 different windows including knowledge base, ongoing of ICWC, ongoing information about water resources picked up from Hydromerservice, ongoing situation on water allocation from information system of both BWOs;
- data base of dynamic social, environment, economic, land use information from all five states;
- set of analytical modules and models for analyze of situation on the basins, forecast of different situations which can be predicted on annual and multiyear water situation.

Besides inert users of CAREWIB inside of ICWC we are monitoring permanent growth of users' interest to our system, which lead to more than 1300 persons 2 GBs visitors of one month.

Lessons learned

- is should have clear and convince interface and to be accompanied by training of users from "roots";
- is need to include models and modules stimulated interest of users to support of system.

Training system

Training needs have been very high as result of collapse of Soviet system's professional education.

In 1999 SIC ICWC in cooperation with McGill University submitted to CIDA a program of permanent training for specialists of Central Asian water agencies at interstate level. This program, namely ICWC Training Center establishment, was approved by CIDA and started its activity in 2000 in Tashkent. Later two branches of the Training Center were established: in

* Detail information about work of this system is available on our websites www.cawater-infor.net and www.sic.icwc-aral.uz

Urgench for lowlands of Amudarya – Turkmenistan and Uzbekistan with assistance of CIDA and in Osh for all 7 provinces of Fergana valley in Kyrgyzstan, Tajikistan and Uzbekistan with assistance of SDC.

While past five years CIDA and ICWC Training Centre has become a center of improvement, which promotes advanced methods of water resources management and environmental protection in Central Asian region. Over 1500 specialists were trained in Tashkent office and in the branches. First of all ICWC found the opportunity to cooperate in solving the issues through the dialogue not only between governments but also between various sectors of economy, between governmental and non-governmental organizations engaged in water management issues. The idea of integrated decision-making, possible damages of hydroegoism was always highlighted during the workshops.

Taking into account the role of SIC ICWC, as a center of improvement, and TC promotion of best practices, the participants were familiarized with experiences on reclamation, irrigation, water saving, planning of water use, community mobilization provided by different projects, which were led and introduced by SIC ICWC. The participants obtained skills on water management, in particular on Water Users' Association (WUA), O&M of drainage and hydrological structures, application of information systems in water management and reclamation, development of water use plans under conditions of numerous water users in contrary to previous large collective farms system.

Some difficulties in this activity were connected with:

- a need to cross the national boundaries for participation in training;
- unequal educational level of participants;
- lack of experimental base.

Lessons learned

- net of training should be developed more broadly to meet current demand for training which is in fact in 10 times greater;
- training should be organized for specific audience not only for water specialists, but also water users;
- gender perspectives in water use and management should be considered;
- training activity should have a separate item in the budget of national and regional water organizations.

4.6. CB National organizations in water are most complex part that depends from political and economic policy of States and their financial capacity.

Principal direction of this part CB transformed in last 3 … 4 years in specific program "The implementation IWRM", that are developing under umbrella GWP in close collaboration ICWC, national water organizations and GWP Caucuses and Central Asia (GWP CACENA). Integrated Water Resources Management (IWRM) is a combination of all possible organizing, managing and technical measures which used as principal tool to involve stakeholders in this measures for fighting against "hydroegoizm" of different forms. From our point of view IWRM is a system of management which characterized by principal features of transition:

- from administrative boundaries to hydrographic one (basin and system);
- from sectoral management to inter-sectoral one;
- from "top-bottom" approach to bilateral one: "bottom-up" – requirements and "top-bottom" – limitations and support;
- from command-administrative method to cooperative management with water users participation at all hierarchic levels;
- from resource management to demand management;
- from close professional systems of water managers to open information-confidential involvement of water users and stakeholders.

We suggest to consider IWRM as a management system based on taking into account and interactions of available waters (surface, ground, return) and associated land and other natural resources within hydrographic boundaries, connecting interests of various sectors and water and environment use hierarchic levels involving all stakeholders in decision making, planning, funding, support and development to meet society and nature needs sustainable.
Take in account that this part of CB belong to special program, we didn't describe it, but we refer to "The IWRM in Central Asia – experience and lessons", Prof. V.A. Dukhovny, Dr. V. Sokolov interesting audience.
Only one specific need to be underlined the role is of public-private partnership crucial in developing methods and ways help to transform water sector into the nation-wide cause especially of water allocation in the former on-farm network. The engineering techniques were not enough here, especially today when number of water users has sharply increased. If one WUA includes up to thousand water users or even 100 water users – this is too much – then no WUA can efficiently manage water without grouping of water users or cooperation of farmers, existence in each of canals of more than tens of their plots, and only in this case one can understand complexity of organization of equitable and stable water allocation, which is close to irrigation schedule requirements at this level.

5. Plan of actions – road map of future development and implementation

Actions plan can be built up taking into account the provisions of new based on the "Diagnostic study" problems analysis. This process we describes as "Road map", which allows to indicate which problems, how and when will be solved.
The principal role in providing and carrying on this plan should belong to "The Strategic planning of regional collaboration", which started during the round table meeting arranged by ICWC and Asian Development Bank (ADB) on April 2005 as kick-off-meeting of the project ADB RETA. The project aims to prepare a strategic vision of future strengthening CB of ICWC. Five heads of the national WMOs signed a protocol that is a decision of ICWC in which main contents of the project was determined as follow: "RETA project within its tasks regarding water-related policy development and improvement, should first of all at the regional level encompass both Syr-Darya and Amu-Darya river basins. ICWC and the regional bodies must evaluate through concerted efforts existing shortcomings and set off necessary measures. Previous activities within framework of “Main Provisions of Water Strategy”, SPECA and GEF projects should be accepted as a basic material for this work".
It is expected that RETA will give a incentive to program and agreed content of future legal and institutional works described in the scheme. The first phase should produce a document 1S – as revised provisions of Regional Water Strategy that will include reassessment of proposed structure of regional organizations. On the basis of this document proper legal work on the finalizing and approval of draft agreements prepared earlier (1) and their organizing implementation (3) would be developed. Next step is a strategy for future improvement 2S including simplification of structure of regional bodies for avoiding duplication of their activities and mandates, a feasibility study for setting up "Water Energy Consortium", and inclusion of all transboundary waters under the jurisdiction of ICWC and interconnection with Hydrometservices. This strategic work should lay the foundation for a start of preparation "The transboundary water code". Approval of 1L will open door for institutional final reform "3", as well as a ratification of "Water code" (2b) – same for reform "4", including setting up the "Water Energy Consortium".
Strategic work needs to be developed in the direction of analysis of ongoing changes in the results and situation as well as proper plan of development activity in information example especially – in IWRM as main tools for penetration of idea to increase water productivity at all strata of water hierarchy (3S). This work should overlap the results of "IWRM-Fergana 3" project, implementation of national plans of IWRM by Global Water Partnership in Central Asia and the Caucasus (GWP CACENA), as well as components of IWRM in other projects, provided by World Bank, ADB, TACIS.

But strategic work should continue even later through permanent analysis of situation, change and especially preparation of framework for transfer from IWRM to IEWRM – Integrated Environment and Water Resources Management (4S). First approach to this we are trying to create within "RiverTwin" EU project for Chirchik – Angren – Keless subbasin and "IWRM of deltas Amudarya" and "IWRM for delta Syrdarya" NATO project, which must be followed by proper new legal work (5) and institutional changes (6).
Simultaneously by development of all other line of CB will be move accordance the mutual Strategic planning (SP).
The detail measures, long term actions and outputs from each action included in "Road map of CB" introduced in table 2.

Implementation of this "road map" should permit:

- to stabilize interstate water management to 2010;
- to create legal and institutional framework up to 2015;
- to create national CB to 2015;
- to achieve broad implementation IWRM to 2015 with full overlapping of all water branches of economy to 2020 … 2025;
- donors and recipients are partners: both participate in the development of action plans and common methodology, and they work together in the same way;
- broad use is made of local expertise and project implementation under the control of an independent steering committee, with participation from donors. SDC, for example, authorized ICWC and BWO "Syrdarya" to contract the local company "Sigma," which operated a SCADA system for years at a cost per gate of only $6,000 per unit (instead of the $30-40,000 expended on similar structures by other donors using their own labor and equipment);
- payment for work should be made only after its completion and after acceptance of the output by the beneficiaries.

6. Conclusion

1. CB of interstate collaboration should be assessed as framework for successful movement to sustainable water and environmental situation on the basin and all riparian states.
2. Development of CB is process of planning, implementation and monitoring, which follow to the dynamic changes of situation and requirement and adopt planning measures to strengthening of the CB possible to be in line with demands of time.
3. Development of CB should be a combination of CB at all level of water hierarchy in it simultaneous combination. Plan of CB needs to be based on the penetration from top to bottom and meeting destabilizing factors of development.
4. Role of donors in CB are very high from position of covering by donors and beneficiaries financial resources and support of it by proper technical assistance, required in practice.

Fig. 4. Road map for future development of CB ICWC

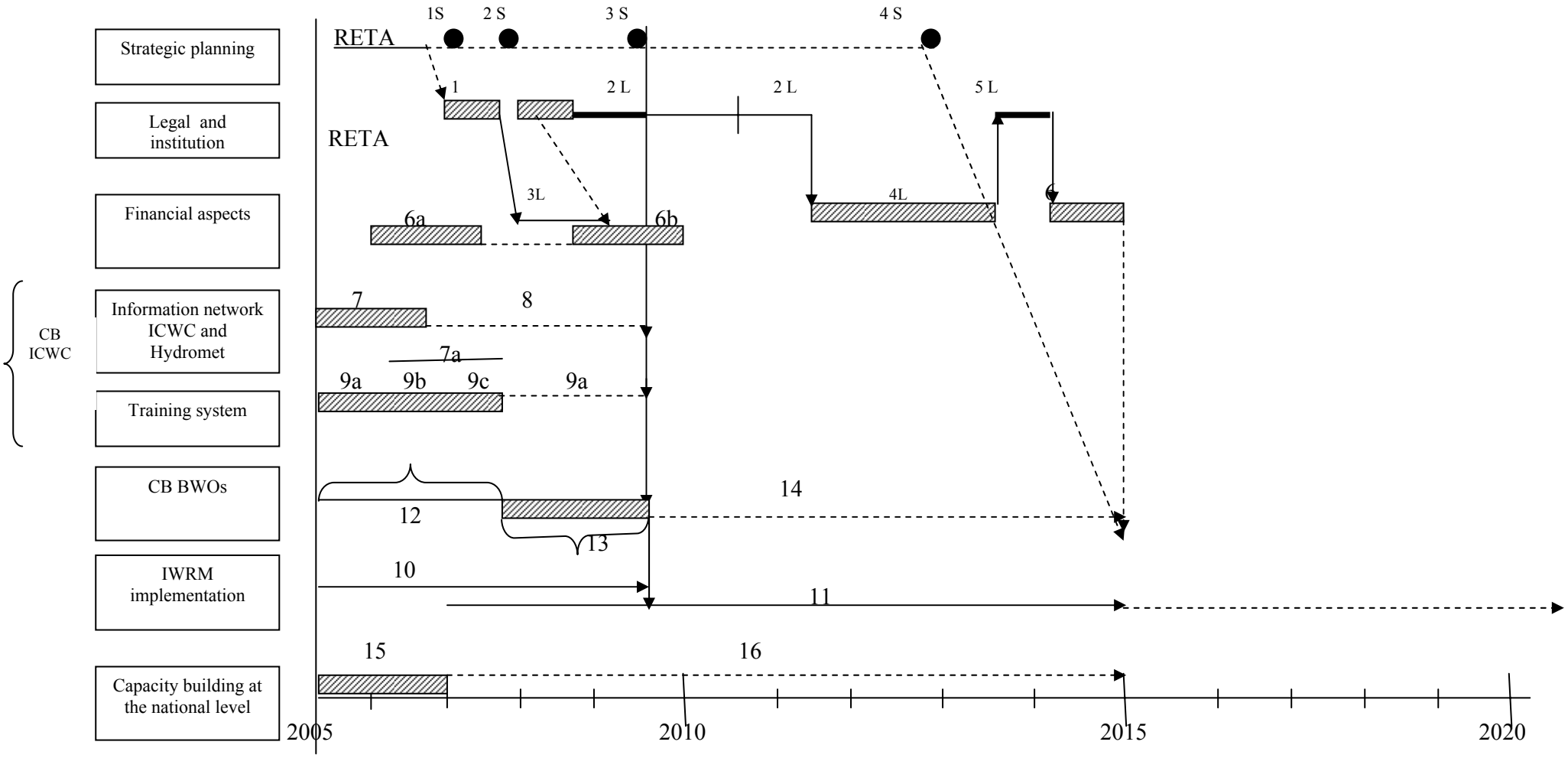

Table 2. Diagnostic study and road map on capacity development of water resources in Aral Sea Basin on 2000 … 2020 years

Problem	Subproblem	Capacity needs	Measure and solutions short herm	Long term actions	Outcomes	
					1 L	**2 L**
1. Legal and institutional aspects of CB	regional interstate relations not clear in all aspects	• rules of management and regulations of basin management and operation; • avoiding intersector competition	**1 L** • The Agreement on water management and operation of Amudarya river; • Revision the Agreement of 1998 for Syrdarya river; • creation of Water Power Consortium	**2 L** Transboundary Water code of Aral Sea Basin	• agreed rules of operation, management; • regulation of interstate activity; • providing conditions for sustainable functioning all regional organizations and network; • regulation of information activity	• ground water and return flow are managed by ICWC, including management of quality; • BWOs manage all rivers with special divisions in deltas; • mechanism for constructions and rehabilitation on TBW; • targets of water saving; • conflict resolution
		• internationalization of regional water bodies; • public participation in BWOs; • diplomatic status of regional bodies	**3 L** The Agreement about institutional strengthening of regional water bodies, information exchange	**4 L** Second stage of institutional restructuring	**3 L** • creation of Water Council of basins; • internationalization of regional bodies; • openness and mutual trust of states and principal stakeholders	**4 L** • spreading institutional capacity of BWOs and their scope of responsibilities; • avoiding duplication and overlapping in regional organization activities
	national legal framework should be accepted for new water policy and interrelations	• creation of policy for implementation of IWRM and public participation; • legal framework of new organizational forms – WUAs, system councils	**1 L *** • New national Water Codes ***** • Law son WUAs	**2 L** Amendments to national water codes	**15** • National Plan of IWRM approved by national Law	**16** • IWRM approved as single legal approach in all states
	regional and national environment instability	• acceptance of environment priority; • environment flow of rivers and deltas satisfact ecological needs; • transfer to management return flow; • decision of salinity of waters and lands	**1 L** The Agreement on ecological sustainability of Aral Sea Basin. Drainage programs on national levels	**5 L** Preparation of legal framework for transfer to Ecologico-Water Integrated resource management (IEWRM)	**1 L** • creation of managing bodies for deltas Amudarya and Syrdarya;	• creation of Environment Water Council of subbasins; • limitation of pollution on rivers; • hydroecological complex of upper watershed
2. Financial aspects of CB	difficulties of interstate financial of mutual services	• development and approval of financing rules for interstate structures and joint works;	**6 a** • regulations on financial framework of interstate activity; • water – power consortium	**6 b** • payment for regulation of water in reservoirs; • principle "polluter-pays";	**6 a** • trade off interstate rights on waters;	**6 b** Interstate Fund transform in Interstate Basin Bank for regional projects.

		• financial tool for environment management	establishment •			
	national infrastructure hasn't sustainable financing for operation, maintenance and rehabilitation	• involvement of stakeholders; • government contribute stable and follow proper rules; • donors contribution	• implementation payment for water; • payment to WMOs connected with productivity of water and water saving; • donors project increase efficiency •	• state, provincial and local municipalities participates together with stakeholders in financing IWRM	• block system of payment	
3. CB of BWOs	• lack of modern equipment for operation; • low degree of monitoring accuracy; • weak public participation	• SCADA and modeling system implementation all structures; • approach to monitoring net of Hydromet; • all principal stakeholders in work of WMOs	**10** • SCADA Project got full financing; • connection Hydromet net thru satellite	**11** • Interstate Groundwater and return flow include in sphere of activity BWOs	**10** • rehabilitation of all monitoring section on TBW; • implementation of SCADA and dispatch serving on all TBW; • improvement of water management quality;	**11** • development of extension services and water saving; • BWOs managed quality of water and allocation; • Public Council of BWOs
4. CB on Hydrometservise	• weakness of previous monitoring network; • interconnections national Hydrometservises has not stability; • accuracy of forecast didn't satisfact water users	• rehabilitation of existed and construction of new hydrological and climate stations; • rules of exchange in formation between Hydrometservises; • monitoring network in glaciers and upper watershed	**7** • program of national "Hydrometservise network" support by states; • regional Hydromet Center created and served ICWC and BWOs; • models of watershed flow developed	**8** • all monitoring network completed including quality of waters; • satellite system of information implemented	**7** • approach to regional DB on rivers and climate for BWOs and ICWC; • coordination CAREWIB and RHMC	**8** • creation nieve of data from "bottom – to top" • increase degree of correctness hydrological forecast;
5. CB on ICWC	• regional information system didn't connected with national; • weak information system on all levels of hierarchy	• information exchange organized on all levels and interconnected in transparent view	**7** • CAREWIB completed on regional levels and approached; • plan development national system approved by states	• national information system created on all level of water hierarchy; • nieve data from "bottom to top"	**7** • transparency and openness information to stakeholders of basin; • preparation of a single approach of MIS, GIS for implementation at the national level	• preparation of a framework for assessment consequences any actions on the TBW;
	training system required increase of capacity for education and training all staff	sustainability Headquarter Training Center ICWC and organizing its 5 branches	**9** "Training program" approved by states and supported by states and donors	Training serves WMOs and stakeholders	**9** • self-sufficiency of HQ TC and branches; • improvement of water education in colleges and universities	

6. CB on the national levels		• implementation of IWRM with broad involvement of stakeholders;	**12** • National plans of IWRM; • programs IWRM implement thru pioneers projects	**13-14** IWRM got all national distribution	**12** involvement of public participation at all levels of water hierarchy;	**13-14** • payment depends from water service
		• managerial Land technical performance	**15** introduction pioneer level	**16** national system guarantee of approach to potential productivity	**15** • increase financial potential of WMOs; • allocation expenses between government and stakeholders; • business plan of WMOs;	**16** • communication network of low-level WMOs; • connection it with WUAs