IWRM as a Tool for Sustainable Development

Victor Dukhovny, Vadim Sokolov

Scientific-Information Center of the Interstate Commission for Water Coordination in Central Asia, Uzbekistan

Keywords: water crisis; water security; global water declaration; integrated water resources management; harmony

Introduction to Central Asia

Central Asia includes territory of five countries – former republics of Soviet Union: Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan (see map in figure 1).

Figure1. Location of Central Asia

Water resources management is the art of delivering required amount of water to a necessary place in needed moment of time. The history of this art in Central Asia accounts millenniums, but the most intensively water resources started to be used in XX century, especially after 1960. That was caused by fast growth of the population, intensive industry development and, mainly, irrigated agriculture.

Why We Need Integrated Approach?

The humanity has faced with coming water crisis recently. What is the reality in this statement? The most popular thesis is that our generation has already observed the global fresh water scarcity, but the main problem is not in actual deficit of water on the Earth but in poor management. The water crisis appeared as the Earth's revenge on humanity for non-wise behavior. The climate change is a reaction of the Earth to the humanity in response to the abuse of natural resources. By changing climatic

parameters and re-directing of air and moisture mass transfer over the globe the Earth tries to protect itself against humanity's attempts to create better livelihoods and lifestyles following by own vision (which mostly accounts not demands of nature, but political and economic interests of the elite).

We have to pin our hopes on the fact that with evolution of civilization there was growth of the human "wisdom" (in the form of ethics, religion, science, etc.). Now the key question is - do both «the Earth and its Humanity» have enough wisdom to be in proper harmony to overcome water crisis?

Water resources management is the art of delivering required amount of water to a necessary place in needed moment of time.

There are three keys to sustainable development on the basis of water use – as a way to water security and harmony: 1) the social equity, 2) economic growth, 3) environmental and ecological sustainability. The practical instrument for these - is proper implementation of integrated water resources management (IWRM).

Understanding of IWRM in Central Asia

The IWRM could be seen not only as a good theory, but as a real practical instrument. Proper implementation depends on clear understanding of the concept. For that it was recommend de-fragmented vision on IWRM = water resources management (WRM) process + governance system + managerial tools (see Figure 2).

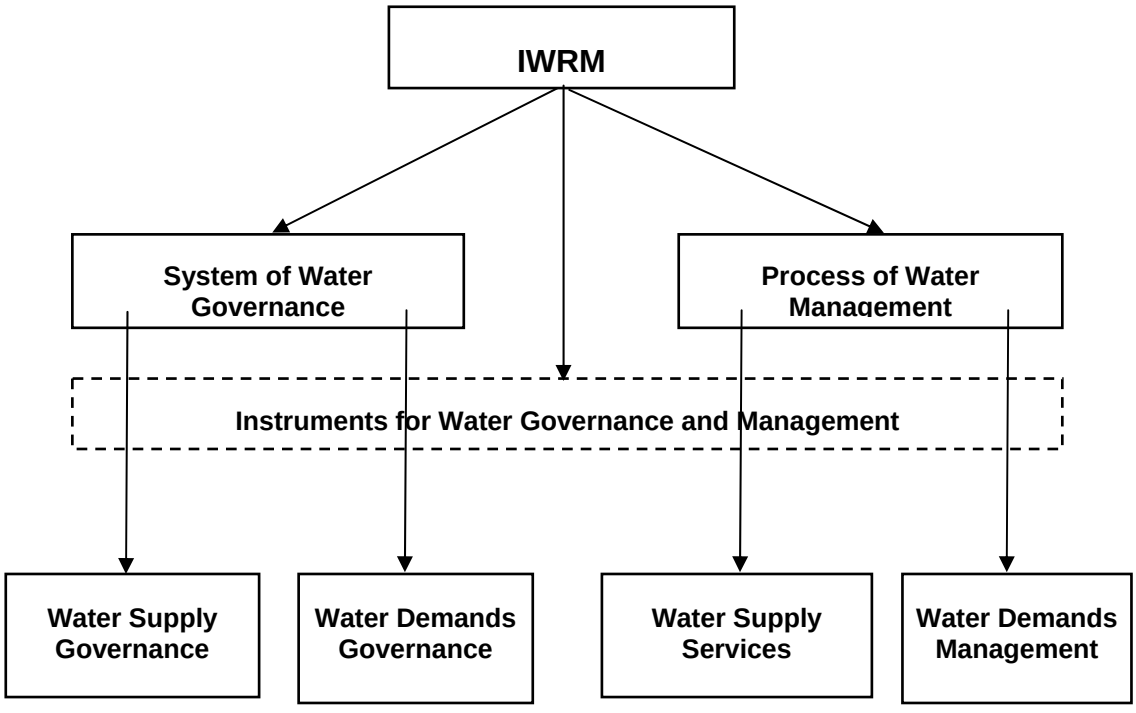


Figure 2. Structure of IWRM

By turn, **water resources management process** involves a number of key interrelated components (see Table 1). First of all, there should be available water resources

(surface, underground, etc.) and engineering infrastructure for water abstraction, storage and delivery to water consumers and users.

Management process envisages the obligatory water requirements assessment, procedures for water allocation based on permanent balancing of water resources and demands, after that - water delivery service and, finally, managing the process of water use and consumption. Water quality control and meeting environmental requirements can be also added to above process.

Table 1. Components and Indicators of Water Resources Management Process

WRM Components		Tasks	Indicators
Available water resources	Governance	Monitoring Development Protection	Amount, quality, regime, renewability, variability
Infrastructure and Assets Management		O&M Maintaining waterworks in operable conditions	Costs / Efficiency / Cost recovery / Safety
Water requirements		Evaluation of Demands	Level/amount/quality/time/location
Water balance and allocation planning (Limitations in case of deficit)		Participation Plan (schedule) Regulations	Norm for flow rate Equitability & rationality criterion (rights / share / quota / limit)
Water Delivery Services		Secured water supply Day-to-day services	Sufficiency of water supply, uniformity, sustainability, minimum unproductive losses
Water use and productivity		Output (products) and water saving	Productivity (more crop per drop) Specific water application
Water use effects (MDGs)		Sustainable development	Sustainable use index
Water quality & ecological flows management		Meeting the environmental requirements	Quality indicators and ecological flow rates
Monitoring & Evaluation		Registration of water availability and uses	Availability of on-line information from all key points of water delivery and distribution
Long-term planning		Adaptation to long-term changes	Water requirements over the planned period are met

In addition, management process has to include forecast of long-term changes of key factors and water balance components, as well as to specify a mechanism for adaptation of the water use system to these changes.

Naturally, outcomes and efficiency of water management process should be regularly monitored and evaluated. Monitoring, assessment, protection and development of available water resources are key objectives of the first component. A key indicator to demonstrate the progress in achieving established objectives is a renewability of water resources in regard to their reserves or level in a source, water quality, and variability of these parameters over time.

One of key objectives related to engineering infrastructure (reservoirs, irrigation and drainage canals, hydraulic structures, water supply network etc.) is proper operation and maintenance (O&M), including maintaining necessary operational regimes and design parameters of structures; their repairing, up-grading, and, if it is necessary – reconstruction or rehabilitation. At present, a quality of O&M is defined by such indicators as costs (financial and material), cost recovery, efficiency and operational life of infrastructure.

Next component of water management process (water requirements) is aimed at assessing the needs of all stakeholders in water resources and managing these requirements are based on available water resources. Major indicators of this component are a record-keeping of all points for water delivery, required amount and time of delivery (some water users may be interested in maintaining necessary water level or water quality in their systems).

After specifying available water resources and water requirements, the next component – water allocation – has to be implemented. In other words, this is the process of drawing up a balance taking into consideration available water resources and water demands. Here, major objectives are maximum possible involving all stakeholders in the process of negotiations (coordinating water allocation) and development of acceptable for all procedures (rules) for water allocation. The proposed indicator for this component is criteria of equity and rationality for establishing quotas or limits of water use (in case of water deficit).

A next component of the water management process is water delivery from a source to water users (water supply). Proposed indicators for evaluating a quality of these services are uniformity and sustainability of water supply under minimum non-productive water losses.

Finally, the last key component is water use, including irrevocable water consumption. Here, the major objective is to produce maximum output by using water or its optimal utilization. The proposed indicator is specific water productivity i.e. an amount of water consumed per unit output – product. Producing output and using water, we should be guided by the principles of sustainable development (providing opportunities for future generations to use water in the same extent as today); and the proposed indicator can be a sustainable use index, exceeding of which is inadmissible.

Water Governance - Key part of IWRM

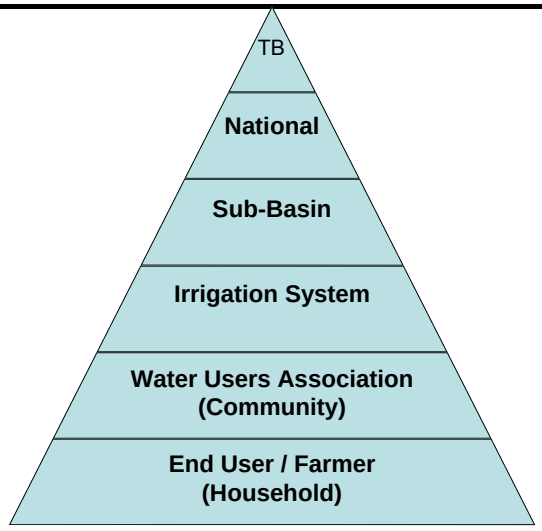
Within the IWRM system the all above mentioned components of water management process should be managed by proper governance framework. The main goal of governance framework is to provide equal democratic opportunities for all stakeholders involved into water resources management process. The main components of the governance framework are the following: political commitment; institutional arrangements; legislative framework; financing and incentives; public participation; managerial tools and instruments; capacity development.

The governance framework is not static in time – it should be permanently adapted to changes: natural, political, social, economic, and technological. In the large extent it can be referred to management rules that are the most vulnerable parts of the modern management system, and require paying the most attention of all specialists from the

water sector because each basin, and each water system, has its own features. This is not predetermined only by specific landscape, configuration and lithology of a watershed, but also by conditions and parameters of water withdrawal and distribution; the combination of hierarchical water management levels, composition of operational works.

It is important to gain a general understanding of the importance of the co-ordination at all levels of water management hierarchy, and of the input of each participant into integrating water resources management. The governance system covering the all hierarchical levels of water management (see Figure 3) should facilitate to achieve those indicators shown in Table 1.

From the other side, the governance framework should provide horizontal integration among sectors. There should be created platform for effective participation in decision-making process of different sectors (government, NGOs, science, private sector, professional organizations) and sub-sectors (agriculture, hydropower, nature, water supply and sanitation and etc.).



Indicators
Minimum of Unproductive Losses and Sustainable Ecosystems
Contribution of Water Sector to GNP/ MDGs
Aggregated Basin Productivity
Aggregated System Water Productivity
Aggregated Water Productivity in Community
Water Productivity in Field / Farm/Household

Figure 3. Levels of Water Governance Hierarchy and Key Indicators

The main criteria for evaluation success of this integrity are: inclusiveness (voice), equity (opportunities), transparency, effectiveness, accountability, coherency, responsiveness, comprehensiveness, and ethical considerations. The Governments should define those frames, within that water management agencies should operate for the interests of all economic sectors and water users. The management system should provide conditions for achieving (or approaching to) the maximum water productivity by all water users (in irrigated farming, industry, and domestic water supply, etc.) and for successful surviving. It means that for producing unit of production the minimum water volume should be used that is close to biological or technologically needed water consumption under minimum water losses over all the technological cycle including water intake, water conveyance, water supply, and water use (so-called potential water productivity).

Regional Experiences with IWRM Implementation into Practice

Putting IWRM principles into practice in the water sector has been started even prior to the independence of Central Asian countries. Over a long time, this process was being implemented without the general strategy of adapting this approach to local conditions, spontaneously putting some IWRM elements and principles into practice.

The most significant step towards IWRM was made in the frame of the regional project "IWRM-Fergana" implemented by specialists representing Authorities of Water Resources of Kyrgyzstan, Tajikistan, and Uzbekistan under overall co-ordination of the SIC ICWC and IWMI and financial support of the Swiss Development Cooperation (SDC). An overall project objective is "to contribute to more secure livelihoods, increased environmental sustainability, and greater social harmony, and to support rural restructuring in Central Asian countries through the improved effectiveness of water resources management on example of the Fergana Valley".

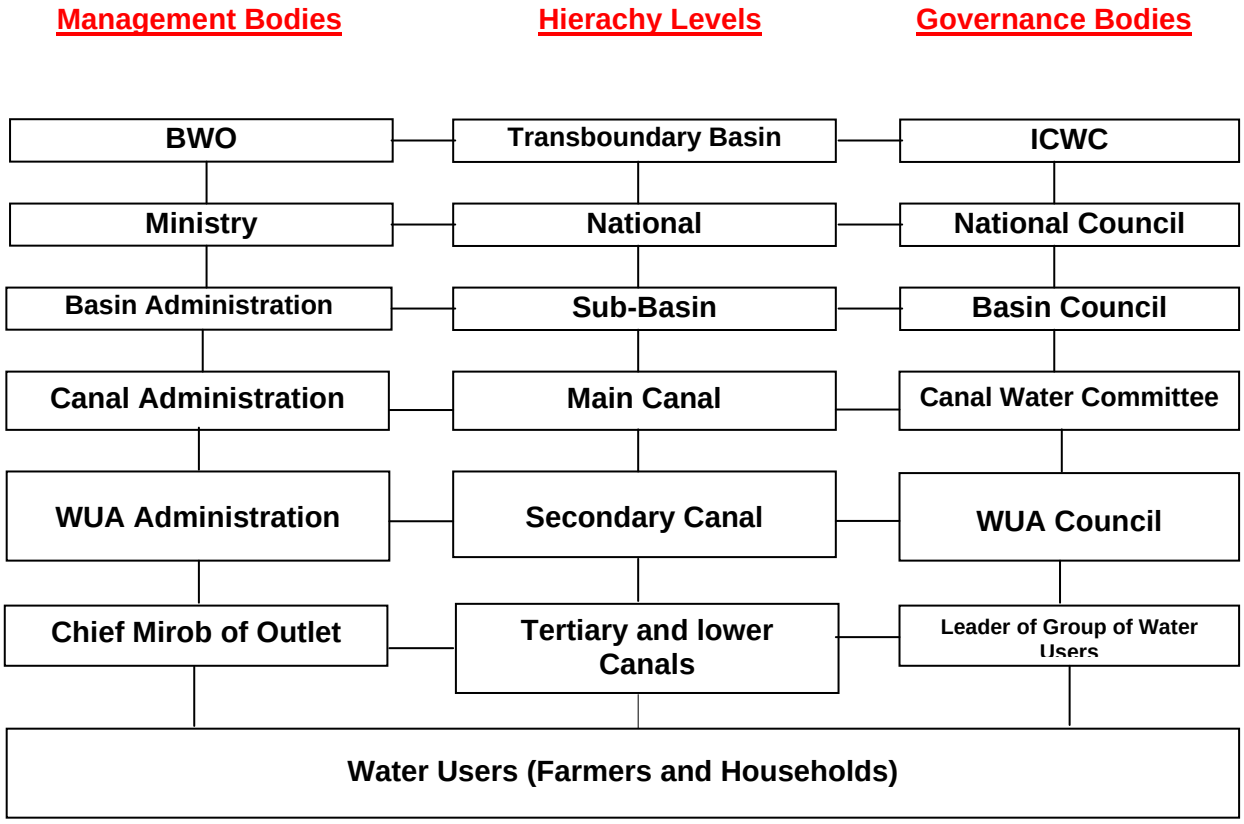


Figure 4. Levels of water hierarchy, where IWRM principles were implemented for interests of irrigated agriculture in Fergana Valley

The Project activities were based on the engineering measures and IWRM tools in combination with organizational, legal, and financial measures. To implement these measures it was necessary to combine efforts of all stakeholders starting from water management organizations, Union of the Canal Water Users, Canal Water Committee, WUAs/Communities and ending by farmers/households themselves. Such joint efforts were based on agreed procedures and methods for stabilizing water provision, providing equitable water distribution, and establishing a proper public control by water users themselves. As a result, the proper concept of Institutional set up was implemented (Figure 4).

The joint activities of stakeholders at the each level of hierarchy and in junction points were based on the agreed procedures and methods for equitable water allocation and public supervision. By this way, the six key IWRM principles (Figure 5) were implemented in Fergana Valley: the hydrographic institutional setting, linking of a few hierarchy levels, integration of sectors (in the form of Union of Water Users), linking of different types of water, shift from supply management to demand management, and finally – water saving.

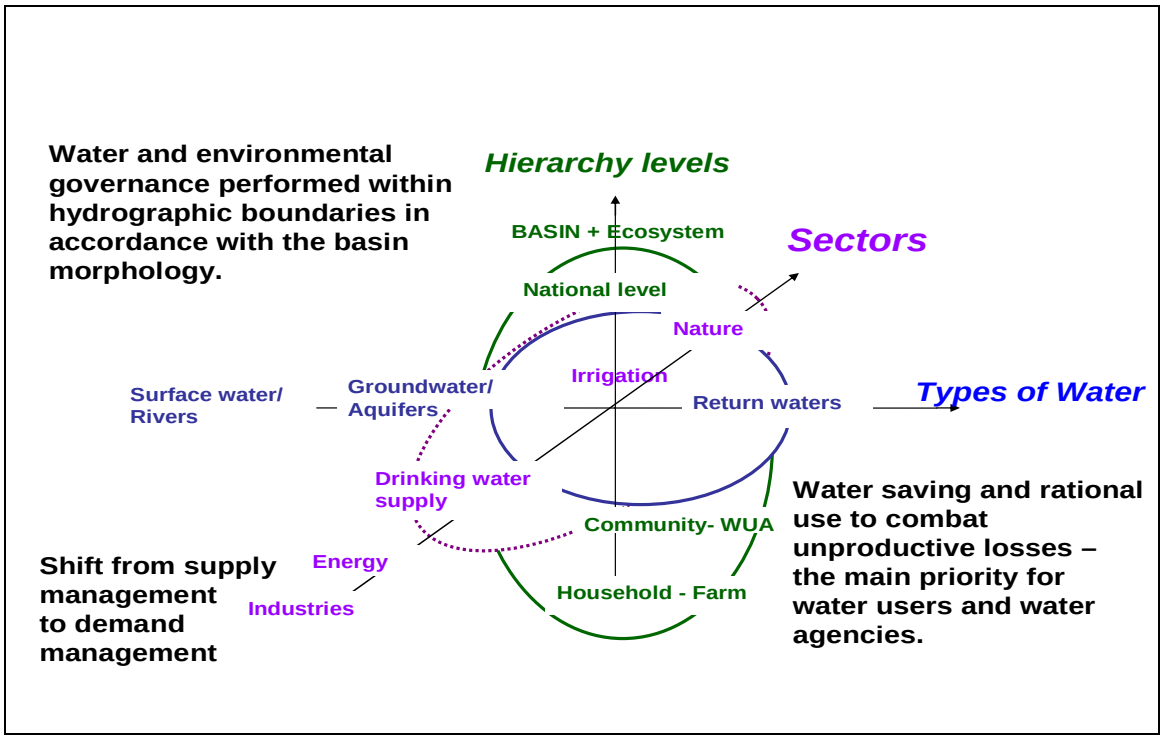


Figure 5. IWRM Consistence in the "IWRM-Fergana" Project

The principal goal for recent stage of water development in Central Asia is to achieve significant reduction of water withdrawal from river. As it follows from the Figure 6, the project has achieved this goal in pilot areas.

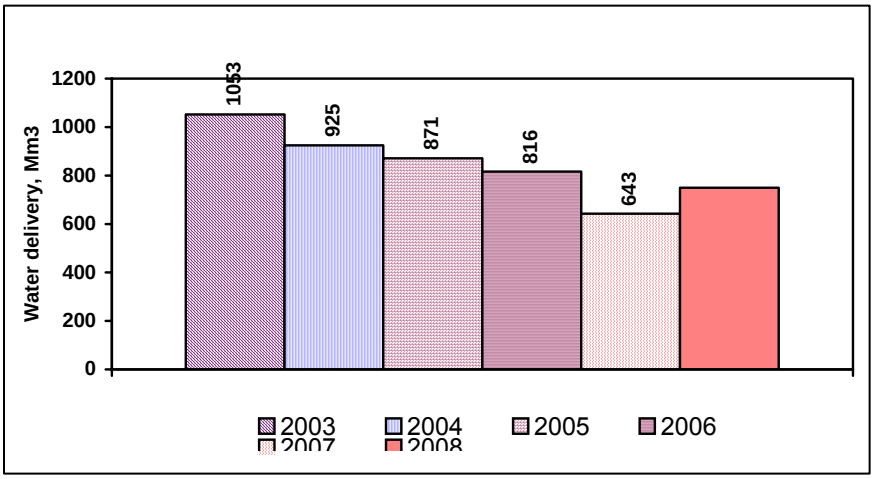


Figure 6. South Fergana Canal: Total Water Withdrawal during Vegetation Period

During the seven years of project activities the total water withdrawal to the system of the South Fergana Canal in Uzbekistan was decreased more than by 20 per cent – mainly due to institutional reforms and improvement of mutual discipline of water managers and water users.

IWRM-Fergana project covered about 104,000 hectares in Uzbekistan and its success initiated further IWRM experience dissemination within RESP-2 project on the area above 250,000 hectares. Actually, total area under IWRM practice in Uzbekistan is more than 450,000 hectares, or about 15 % of total irrigated area.

Another project "National IWRM and Water Efficiency Plan in Kazakhstan" started in June 2004 with support of UNDP, the Norwegian government, DFID (UK) and methodological support of the Global Water Partnership.

The Kazakhstan Governmental Decree #978 of 11 October 2006 "On signing agreement between the Government of the Republic of Kazakhstan and UNDP concerning project "National integrated water resources management and water efficiency plan for Kazakhstan" approved the development of the Programme "Improving integrated water resources management and water efficiency in Kazakhstan up to 2025". The Programme is actually under proper implementation via 8 basin authorities with involvement of all stakeholders.

It is worth to underline different approaches of the IWRM implementation used in Uzbekistan and in Kazakhstan. In Uzbekistan implementation process started from bottom – from end users level to higher levels of water management hierarchy: WUA – Irrigation System – Basin, with involvement of specific stakeholders at those levels. The problems and barriers on the way towards IWRM leaded to better understanding of bottleneck issues at the national level. As a result, Uzbek Government revised Water Law in 2009 by anchoring IWRM principles and procedures. Special attention now is paying to support system needed for community (WUA) and household (farm) levels. In Kazakhstan the process was started from top level: there was adopted National IWRM plan and implemented actions at the basin level. Unfortunately, up today the lower levels still remain without proper attention. As a result, real improvements of water efficiency are not clearly visible.

Experiences of Kazakhstan and Uzbekistan recently taken into account by Kyrgyz and Tajik water authorities, who stimulated movement towards IWRM implementation from both sides – from top and from bottom. Expected, that these will require less time for real practical outcomes. The only one common lesson could be learnt - IWRM implementation needs strict governmental support.

Vision for Future

The following recommendations for wide IWRM implementation process could be suggested:

- Institutional structure for water resources management should be reformed with the aim to subdivide functions – one part have to be responsible for water delivery services, second part – for use of water, the third should provide control (inspection) of the both first. Combination of those functions in one hands (as it is today) not effective from view point of economic mechanisms and incentives.

Division of functions will create stimulus for minimization of unproductive losses of water within the water delivery and water uses.

- Institutional set up for water delivery could not be within administrative boundaries – the only on the hydrographic principles to avoid administrative pressure (hydro-egoism).

- Institutional set up, responsible for water use and control could be organized within administrative boundaries, because economic and social, public activities structured on the administrative basis in the countries.

- The policy-making process within the water governance (as opposed to the same within water management) should be organized from bottom to top. It will allow to avoid professional / sectoral hydro-egoism, and to put the process into democratic way with involvement of the key stakeholders.

- Investments for improvements of infrastructure will be not effective without adequate (above-mentioned) institutional reforms

- Institutional changes without improvements of managerial instruments also will be not effective. First of all, there are needs for economic mechanisms and financial instruments to provide financial sustainability at the lower institutional levels, where final products are created by means of water uses.

- During reforms, and day-to-day activities in water sector orientation should be addressing not to actions but to practical outcomes, achieved in result of those actions. The all changes (even institutional) should be measured by proper water indicators – more drop of saved water per any action.

- Orientation to the only social equity or only to the economic effectiveness of water uses not admissible. There should be proper balance among social equity and economic effects with accounting ecological stability. From this point of view, there is need for special programme on “water education” and creation of thnew generation of water leaders.

References

Dukhovny, V. A., Sokolov, V.I., and Manthrithilake, H. eds. 2009. IWRM – From Theory to Real Practice: The Experience of Central Asia, Tashkent, Uzbekistan: SIC ICWC/IWMI and SDC

GWP TEC. 2004. Catalyzing change: a Handbook for developing integrated water resources management (IWRM) and water efficiency strategies. Global Water Partnership. Sweden.

Lessons on Cooperation Building to Manage Water Conflicts in the Aral Sea Basin, Victor Dukhovny and Vadim Sokolov. PCCP Publication. UNESCO-IHP, Paris, 2003, 50 p. (www.unesco.org/water/wwap/pccp)

Regional water portal CAREWIB: www.cawater-info.net