Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

IWRM-Fergana Project

Vision of national IWRM in the Kyrgyz Republic

Prepared by:

National coordinator for the Kyrgyz Republic
IWRM-Fergana Project: Mamataliev N.P.

Responsible for land and water
resources use: Koshmatov B.T.

Water resources expert: Drugalyova Ye.E.

BISHKEK – 2011

ABBREVIATIONS

AAC	Aravan Akbura Canal
AES	Agricultural Extension Services
BWC	Basin Water Council
BWMA	Basin Water Management Administration
BWUA	Base Water Users' Association
CMO	Canal Management Organization
CWC	Canal Water Committee – designed to be a guiding framework for CMO
DB	Database
DWMA	District Water Management Administration
EGKR	Enactment of the Government of the Kyrgyz Republic
FWUA	Federation of Water Users' Associations
GIS	Geographic Information System
Goskomvodkhoz	State Committee for Water Resources and Land Reclamation of the Kyrgyz Republic
ICSD	Interstate Commission for Sustainable Development
ICWC	Interstate Coordination Water Commission of Central Asia
ISFP	Payment of irrigation service fees
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
KR	Kyrgyz Republic
MC	Main Canal
MIS	Management Information System
PC	Pilot Canal
RBMC	Right Bank Main Canal
SAC	Small-Scale Agricultural Cooperative
SDC	Swiss Agency for Development and Cooperation
SIC	Scientific Information Center
UCWU	Union of Canal Water Users – a system, which should replace CWC
WMO	Water Management Organization
WRMIP	Water Resources Management Improvement Project
WUA	Water Users' Association
WUG	Water Users' Group

The integrated water resources management (IWRM) is a continuous process leading to sustainable water development and distribution and monitoring of water use while aiming to solve social, economic, and environmental problems.

A few projects are on-going in the Kyrgyz Republic in order to implement integrated water resources management, particularly at river basin scale.

The governance system of water sector and the existing legislation were analyzed in terms of management, fiscal policy and implementation of IWRM principles. It was found that the effective Water Code needs slight refinement for bringing it in line with IWRM policy.

At large, the WB-financed Water Resources Management Improvement Project (WRMIP) suggested improving the legal and regulatory framework of the water sector and developing a public-private partnership. Such measures should be implemented in parallel with the water management system reforms.

Goskomvodkhoz is in the structure of the Kyrgyz Government and fulfils the functions of public water administration. This allows establishing a National Water Council, providing the centralized strategic planning, organization and control over implementation of interrelated measures for regulation of water relations, monitoring of the status and use of water resources and water-related activities.

Moreover, this would help to make stronger the sense of ownership of water management bodies, avoid duplication of functions and authorities in area of water management as was the case previously with multiple departments and agencies.

In order to reach the objectives set in the Water Code of the Kyrgyz Republic, it is necessary to **establish:**

- national and basin water councils for efficient coordination and flexible interaction of all stakeholders and water using entities, eradication of departmental monopolism and corruption that would be achieved thanks to collective nature and transparency of making strategic management decisions, for timely reaching agreements upon decisions, and reduction of public costs for maintenance of governance bodies.

Vision of international practices in reconstruction of the institutional framework of water management. The Kyrgyz institutions involved in water management were surveyed and their functions were analyzed thoroughly. The analysis was made in order to see how to utilize the international practices and identify reasonable approaches and options for reformation of the water sector in general and of water management in particular. The existing legal water-related documents of the Kyrgyz Republic were studied: draft enactments for enforcement of the Water Code; legal documents supporting the establishment of WUA federations; regulation about Basin Water Administration; and, agreements on infrastructure transfer.

Thus, the international IWRM practices and national experience in water legislation development have been reviewed.

Revision of the management structure requires considerable institutional re-structuring of the water sector. It is necessary to restructure and strengthen existing organizations and establish new ones, in particular:

Existing organizations:

- Hydrogeology bodies under the Ministry of Natural Resources of the Kyrgyz Republic;
- Central Hydrometeorological Authority under the Ministry of Emergency Situations of the Kyrgyz Republic;
- Agency for Environmental Conservation and Forestry of the Kyrgyz Republic;
- Ministry of Emergency Situations of the Kyrgyz Republic;
- Sanitary and Epidemiological Surveillance Department under the Ministry of Public Health of the Kyrgyz Republic.

New organizations:

- National water council (NWC);
- Basin water council (BWC);
- State water administration (SWA);
- Basin water administration (BWA);
- National dam safety commission; and
- Commissions on irrigation and drainage at national and basin levels.

Based on the institutional mechanisms mentioned in the Water Code, the state water administration is seen as a central body responsible for governance of the whole water sector, as the Public provider of water services, a body responsible for development and management, operation and maintenance of water infrastructure, and for reliable and equitable water supply to different stakeholders. After detailed study of the roles and obligations of given organizations for efficient application of the Water Code in terms of implementation of integrated water resources management in the country, a new institutional framework of the national water sector at large was proposed. On the basis of the proposed options of the water management structure, the Kyrgyz Government adopted the governance structure of the water sector as well. From thorough analysis of legislative enactments, the Consultant proposed to make amendments in the Water Code in order to remove inconsistencies and conflicts. A list of laws and decrees to be prepared, revised and corrected for enforcement of the Water Code was drawn up and discussed with the State committee. Draft decrees necessary for the Code, legal documents supporting establishment of WUA federations, the regulation on state water administration, and agreements on infrastructure transfer from the district water management organizations to WUAs and their federations were developed.

The list of needed draft regulatory legal enactments is shown below:

- Draft regulations on the State Committee of KR for water resources and land reclamation (final report approved by the Kyrgyz Government);

- Draft EGKR about amending the Enactment 64 of the Government of Kyrgyz Republic of 3rd February 2006 «About National Water Council»;
- Draft regulations on the Republican Commission on Irrigation and Drainage;
- Draft regulations on the National Commission for Dam Safety;
- Draft standard regulations on Basin Water Resources Administration;
- Draft standard regulations on Basin Water Council;
- Draft standard regulations on Basin Commission on Irrigation and Drainage;
- Draft EGKR about the establishment of the boundaries of main water basins and the zones of responsibility of Basin water administrations and Basin water councils of the Kyrgyz Republic;
- Draft regulations on the State water inspection;
- Draft standard regulations on district (system) water administrations;
- Draft standard regulations on Reservoir Operation Authorities (first version);
- Draft regulations on Hydrogeological and Land Reclamation Expedition;
- Draft Kyrgyz law on amending and addition of the KR Water Code;
- Draft National water strategy of the Kyrgyz Republic;
- Draft law of the Kyrgyz Republic on amending and addition of the Kyrgyz Law 38 of 15 March 2002 about Water User Associations. (This draft was approved by the Kyrgyz Government and submitted to the Parliament of the Kyrgyz Republic for consideration (final version);
- Draft law of the Kyrgyz Republic on amending and addition of the Kyrgyz Law about licensing;
- Draft regulations on the state water licensing system in the Kyrgyz Republic;
- Instruction for maintenance of Land reclamation cadastre;
- Instruction for departmental statistical reporting according to Form 2B;
- Amendment to the enactment № 233-1999 of the Government of KR «About approval of the standard contract for irrigation water supply»;
- Amendment to the enactment № 234-2004 of the Government of KR «About transfer of hydraulic systems and structures to the ownership of WUAs and their units»;
- Draft enactment of the Government of KR about setting of tariffs for water supply services (final version).

A work plan on institutional development was prepared. It describes the conception, as well as the benefits and risks of integrated water resources management and recommends dividing functions among the key agencies dealing with water resources and irrigation infrastructure management. The work plan also recommends a stage-by-stage approach to the reformation of the existing institutional system.

However, the last Government Decree about establishing the State Committee for Water Resources and Land Reclamation (SCWR&LR) made substantial amendments in the suggested institutional framework of the water sector. The Decree also stipulates finalization of the new management structure. As a result, a governance structure of the State Committee was prepared. The proposed structure was submitted

to the Kyrgyz Government and approved by it. In order to implement it in practice, including current institutional changes, huge efforts will need to be taken.

For implementation of IWRM in the Kyrgyz Republic, it is necessary to develop and fulfill the below listed measures:

1. **Elaboration of regulatory-legal framework in the context of IWRM policy:**

- refinement of water legislation,
- adoption of the National Water Strategy of the Kyrgyz Republic,
- comprehensive modernization of regulatory-legal enactments that regulate water relations in the Republic.

2. **Reforming of the water resources management structure in IWRM context in the Kyrgyz Republic:**

- establishment and reforming of central and regional water resources and water infrastructure management bodies in the Republic,
- additional regulation of functions and authorities of central and territorial bodies involved in water management in the Republic,
- ensuring of sustainable maintenance and functioning of water management bodies.

3. **Formation of the system of water management and protection on the basis of IWRM principles:**

- establishment of the boundaries of the main water basins within the Kyrgyz Republic,
- reforming of water management and protection bodies using the hydrographic principle,
- reforming of the scope of irrigation infrastructure management bodies on the basis of systems principle,
- development of the National Water Inventory of the Kyrgyz Republic, including assessment of reserves, quality, and use of water resources within basins,
- organization of Water Users Register and Waterworks Register within basins,
- elaboration and implementation of comprehensive basin's water use and protection plans.

4. **Wider involvement of NGOs, water users and general public in water management:**

- establishment of National Water Council in the Kyrgyz Republic,
- forming of basin water councils,
- forming of system's water councils within the basins,
- widening of NGOs participation to support water and environmental activities in the basins.

5. Wider involvement of independent water users in the maintenance and management of hydraulic systems and structures:

- capacity building and strengthening of water users' associations, federations, and cooperatives in the rural area,
- transferring of public hydraulic systems under control and maintenance of independent water users (WUA, FWUA).

6. Ensuring of water rights in the Kyrgyz Republic on the basis of licensing and contractual system:

- development of the system of licensing for professional water-management activities,
- modernization and development of licensing system for water use,
- modernization of the water supply contract services system.

7. Development of a system of water bodies and resources pollution prevention:

- development of organizational and technical base for water quality monitoring,
- refinement of national standards and regulatory base for water quality,
- inventory of current and potential water pollution sources,
- enforcement of "polluter pays" principle when regulating water use and protection,
- development and implementation of integrated water quality improvement programs.

8. Development of a system of monitoring over the state and use of water resources:

- rehabilitation and development of the network of hydrological stations and points located in surface water bodies,
- rehabilitation and development of the network of hydrogeological stations and wells located in aquifers,
- rehabilitation and development of water use measurement facilities,
- modernization of technologies and procedures for monitoring of water bodies and resources.

9. Development of water information systems:

- forming of aggregate information systems on the base of departmental databases,
- application of GIS-technologies in water management processes,
- development of hydrometeorological situation forecasting technology.

10. Achievement of aquatic ecosystem sustainability:

- integrated assessment of aquatic ecosystems, flow formation and dispersion zones, glaciers and snowfields,
- prevention of soil erosion and water exhaustion in the flow formation zones,
- ensuring of minimal acceptable sanitary-environmental flows in the rivers,

- ensuring of efficient utilization of aquifers.

11. Development of water charging mechanisms:

- regulation of tariff policy for charged water supply services,
- application of charges for the use of natural water bodies and resources not related to consumptive water use.

12. Elaboration of programs for multipurpose use of water bodies and hydraulic infrastructure in the Kyrgyz Republic:

- construction of small hydropower plants on rivers, irrigation canals and reservoirs,
- development of commercial and sport fishery in lakes, ponds, irrigation and hydropower reservoirs,
- development of recreation sites, water sports, and tourism in natural water bodies, irrigation and hydropower reservoirs.

13. Development of water-related emergency prevention and elimination system:

- establishment of agencies responsible for strategic hydraulic structure safety,
- inventory of current and potential sources of natural and anthropogenic emergencies in the water sector,
- development of programs for emergency prevention within water bodies and hydraulic systems,
- provision of timely elimination of the consequences of emergencies occurred within water bodies and hydraulic systems.

14. Ensuring of efficient water use and water saving:

- elaboration of mechanisms of economic incentives for efficient water use,
- tightening of administrative responsibility and financial liability for breakage of water use norms and rules,
- ensuring of effective supervision and inspection in the water sector.

15. Development of mass and specialized training programs in IWRM context:

- modernization of training programs for the water sector's staff,
- organization of on-the-job training in the water sector,
- training of representatives of WUA, FWUA, farmers and peasants in new water use and agricultural production technologies.

16. Ensuring of transparency of national water policy and wider access to actual water-related information for the general public:

- promotion of public management bodies' activities in area of provision of water policy transparency and dissemination of actual water-related information,

- widening of participation of research, educational organizations, and NGOs in disseminating knowledge and shaping of public opinion about relevancy of efficient nature use and new technology application.

17. Prevention of water-logging and soil salinization:

- inventory of irrigated and watered land conditions,
- rehabilitation and development of the systems of monitoring over conditions of irrigated and watered land,
- rehabilitation and development of collector-drainage systems (CDC),
- prevention of water-logging of settlements and industrial plants.

18. Development of inter-state water relations at basin level:

- improvement of foreign water policy ideology,
- updating of the legal framework of water cooperation in river basins,
- promotion of activities of the Commission and the Basin water councils,
- development of joint water programs and business projects in river basins.

Besides, the draft documents on establishing the boundaries of Water basin, forming Basin water councils and Basin water management administrations (BWMA) were developed.

The boundaries of main water basins and the zones of responsibility of Basin water administrations were justified earlier and submitted for consideration. Moreover, the draft processes, procedures, and staffing tables were developed for BWMAs.

A pilot Talas basin water council was established and the Talas river basin's water development and use plan was developed. The Kughart river basin was selected as the second pilot basin. By present, the Kughart river basin's water development, use, and protection plan has been finalized.

As to O&M procedures, it was found that the up-to-date system of budgetary reporting has been applied in the water sector and accounted planned and actual amount of work and expenditures, according to the "Form 2B". With further improvement and strict observance, this system can trace accurately the cost and types of work efforts. The development of adequate technology for accurate estimation of irrigation system maintenance costs is an important aspect.

In order to justify the measures for strengthening of technical capacities of organization departments responsible for O&M of irrigation systems, a thorough review of information collected about equipment suppliers, subcontractors offering similar services was made and consultations with the leading staff of respective division at central office of SCWR&LR were held. From the conducted study it was concluded that the divisions of SCWR&LR that were responsible for prevention and elimination of emergency situations in irrigation systems should remain in each province (or district). It is necessary to develop business plans, based on the work loads over the last 5 years.

By present, an analysis has been made to estimate the cost of rehabilitation and the cost of annual maintenance in the Kyrgyz Republic in the next few years.

A note on the assessment of ISF (irrigation service fee) options was prepared. This note includes the review of economic activities of SCWR&LR over the past years, including the analysis of investment sources, O&M cost items, annual budget of the former Department for Water Resources (DWR) and its district divisions over the last years, as well as the results of similar activities undertaken in the international projects under support of ADB, TACIS, USAID, and WB.

In addition, thorough examination of Human Resources Management and Development Department (HRM&DD) under umbrella of SCWR&LR was made. As a result, a number of areas were identified where HRM&DD should be improved:

- Control of performance indicators;
- Training;
- Program of career and human resources development;
- System of staff promotion;
- Staff reporting.

Assistance in developing functions of the Committee's divisions and departments was given. Proceeding from the examination results, it was recommended to hold regular monitoring of quantity and load of staff at certain stages of State Committee's activities. While introducing monitoring, the staff of divisions at basin level will undergo changes as well. For instance, initial request for water allocation license will require more efforts than application and keeping of water licensing system. Monitoring, management and adjustment of human resources component is under responsibility of Human resources division, while its control and analysis refer to SCWR&LR competence.

Supporting WUAs through improved water management

Demonstration plots of water management

In order to monitor the results of investing in the water sector, a list of potential demonstration WUA plots was prepared and passed to the Consultant, and final selection of the plots was made during a workshop in October 2008. The international irrigation engineer developed the Guidelines for demonstration plots, including their preparation, design, and arrangement. In addition, it included basic data on demonstration plots and information on flow rate and seepage measurement, as well as manual for efficient irrigation and performance monitoring.

In October 2009, the staff of WUA support and regulation division from the central office and districts was trained in application and arrangement of demonstration plots. The training included discussions on logistics of the demonstration program, on the need to get basic data from region before implementation of the program, as well as training in surface irrigation technologies, irrigation scheduling on the basis of Cropwat model, and use of devices for measurement of evaporation, etc.

A list of equipment to be bought for successful implementation of the demonstration program was prepared.
WRMIP has developed the terms of reference for agricultural extension services in order to give advices on arrangement of 25 demonstration plots, development of training materials, dissemination of good practices among farmers - water users, and improvement of water management at the level of irrigated field.

The Consultant also drew up the report "Equipment specifications for WUA demonstration plots". The list of equipment for the demonstration plots was agreed with the World Bank and then, manufacturing of the equipment from this list was started.

The demonstration plots have been organized by present. The international irrigation engineer trained the staff from the extension services and other specialists in utilizing the equipment, which was enlisted for the demonstration plots. 16 WUAs selected for demonstration plots (64% of the total quantity of demonstration plots) were visited from 28 April till 11 June. Formal training was conducted in 8 WUAs (per one course in each province, except for Chu province, where 2 courses - additional course for students of the Kyrgyz Agrarian University - were held), while other WUAs took a special training in utilizing the class A evaporimeter and rain gage along with visits to the demonstration plots.

The development of Analysis-Information System (AIS) involves three tasks. In order to cope with those tasks, the Consultant studied information flows to SCWR&LR and external information sources and prepared proposals on the development of technical framework for AIS of the water sector and of the unified database.

For demonstration of system's capabilities, the Consultant developed a prototype of AIS for the Kyrgyz water sector, which consists of several computer programs and sub-systems.

As we know, any system of databases should have the storage of classifiers. These classifiers should contain major facilities and sites (keys and titles). For the water sector such classifiers are as follows:

1. Register of irrigation systems, with complete data on certification;
2. Land reclamation cadastre;
3. Water cadastre;
4. Register of water users.

The analysis of training needs was made. The training results were incorporated into the report on training needs analysis. A training plan consisting of training modules was elaborated. In turn, all the modules were elaborated as well. The training course plan was divided into three blocks: water sector; water resources management; and, WUAs and farmers. This plan was discussed at a meeting of the Committee's scientific and technical council and approved by all stakeholders.

While using the experience accumulated under IWRM-Fergana and the Chu-Talas Rivers Commission, it is planned to implement IWRM in the pilot Talas river basin in the Kyrgyz Republic:

- Commission on Irrigation and Drainage should provide possibilities for consolidation of efforts of republican and local authorities, water users, business, and local communities for rehabilitation and development of irrigation and drainage systems, ensure implementation in practice of such principles, as decentralization and democratization of irrigation and drainage system management by transferring functions and authorities to lower level, gradually reduce load on national budget through increased use of local budgets and wider involvement of water user associations in maintenance and development of the above-mentioned hydraulic infrastructures.
- Commission on Dam Safety should ensure the standard safety level of strategic water infrastructure through regular monitoring of its state and timely taking of necessary measures, while directing efforts and resources of republican and local authorities, production and operating entities towards provision of the safe regimes of dams and other structures operation.
- Strengthen control over the state and use of water resources. Due to not enough consistent institutional and market reforms in the previous period, the Kyrgyz system of state control and inspection of natural resources, including water, has degraded significantly. The poor conditions of irrigation fund and the global climate change indicate to adequacy of shared financing by water users of hydrostructure O&M and of compensation of damage from floods and mudflows and other natural disasters. Besides, participatory approach to the improvement of glaciers situation in mountainous areas and of climatic and environmental conditions in flow formation zones is needed.
- building material-technical and human capacities in the water sector would allow establishing a unified information base on the state and use of water resources for efficient planning and would contribute to attraction of additional investments for the purposes of efficient water use and protection;
- strengthening the economic potential of water relations, water-management and water-protection activities would create conditions for regulation of ownership of hydraulic infrastructure, first of all, related to rapid transfer of non-strategic structure under the ownership and responsibility of water user associations and individual water users, for improvement of water pricing and tariff policies leading to optimal reduction of load on republican and local budgets.

Tariffs that do not cover the current costs do not contribute to irrigation water saving and better water use. In order to optimize fiscal and tariff policies, the project recommended to gradually decrease - on a long-term horizon - the government subsidies for repair and maintenance of irrigation systems, while, at the same time, increase the fiscal burden of direct consumers of irrigation services, taking into account their real paying capacity. In the mid-term, it is recommended to keep government subsidies and collection of fees for irrigation water supply from water users. Due to limited capacity of local budgets, their contribution to financing of

irrigation measures will be insignificant in the near future but should increase at later stages.

For the purposes of solving this task, a World Bank's project is carrying out the pilot rehabilitation of small irrigation systems, with their further transfer under responsibility of water user associations and their federations.

Kyrgyzstan accumulated huge experience in involving water users in water management process through WUAs established and supported by the state. The IWRM-Fergana project and the WB's Water Management Improvement Project have developed drafts of necessary regulatory legal acts, decrees, orders, and recommendation for effective functioning of WUAs. As a result of projects, both WUAs and water users are getting added evidence that this way of development was the right choice. For improvement of WUA's capacities, business plans were developed for procurement of machinery and equipment for adequate maintenance of their irrigation infrastructure. It is planned to procure this equipment by the end of this year. The WUAs' members themselves and other water users showed active interest in implementation of planned measures and arranged demonstration plots.

Involvement of stakeholders in water management process at interstate level is matured through the established Joint Bilateral Chu-Talas Rivers Commission of Kyrgyzstan and Kazakhstan and its Executive Secretariat. Experience gained during operation of this Commission will be disseminated among other republican rivers of interstate importance.

The planned additional component of the IWRM-Fergana Project on Fergana Valley's small rivers may consider the experience of the Chu-Talas Commission. However, taking into account characteristics of the Fergana Valley and the conditions of small river use by local population, IWRM principles should be tested in such local conditions, and special approaches and solutions should be elaborated.

Achievements of the IWRM-Fergana Project in the Kyrgyz Republic

The main project achievement in the Republic is that the principles of public participation and economic-financial viability of water sector's actors were achieved. It is clear that the project could not cover the whole water resources utilization system and a very complex land reclaiming system but, as in any other business, first of all, one had to select pioneer sites, where pilot implementation of IWRM were to be organized.

To this end, a hydrographic study was organized in the first phase (Inception report, SIC ICWC, January 2002) and produced two major outputs:

assessment of the general state of water-management systems in the area under consideration and identified main problems in 2001;

selection of representative pilot sites, where experimental implementation of IWRM was to be organized at the three levels of water hierarchy along an inter-farm main canal and in an on-farm water network, where Water User Associations (WUA) were established.

As a result of the discussion among all stakeholders, the following pilot zones were selected in the Ak-Bura river basin:

- Aravan-Akbura Main Canal,
- Right-Bank Main Canal.

As opposed to other approaches (UNDP, WB), IWRM ideas were implemented here on "bottom-up" basis with covering the water users of on-farm network from former collective and state farms (kolkhozes and sovkhozes), as well as of main canals in the area of the selected pilot zone.

Implementation of IWRM was accompanied by continuous joint work with multiple stakeholders, by analyzing and learning lessons, understanding new ideas, and generating a collective product.

It is recognized that the regional offices of SIC ICWC and IWMI played an important role by sharing their ideas with project actors and local executors.

As a result, local executors under guidance of regional offices have succeeded to elaborate a unique approach to IWRM, which was somewhat different from classical GWP's approach.

During implementation, a new system of governance was developed. This system takes into account all water resources (surface, ground, and return) within hydrographic boundaries and harmonizes the interests of different water using sectors and hierarchical levels. Participation of all stakeholders in decision making contributes to effective use of water, land and other natural resources to the benefits of the nature and human society.

The results, except for the above-mentioned new ones, achieved within the framework of the IWRM-Fergana Project in the Kyrgyz Republic are described below:

- By using the hydrographic principle, the Aravan-Akbura Canal Administration and the Right-Bank Main Canal Administration were established under the project.
- The institutional, legal, and financial-economic changes in the national water and agricultural sectors over the last decade were assessed;
- The progress in creating the basis for IWRM implementation was evaluated.
- The main IWRM indicators in the pilot zone were compared with non-project area. The comparison indicated to an undoubted advantage and achievements of the project zones, including water-management organizations and water users. This is reflected in the reduction of both total water withdrawals and unit water use, the equitability and stability of water supply, the coverage of stakeholders, participation of water users in payment of services provided by newly established Water Users' Associations and Water Users' Unions, the improved water

accounting, and the integration of all water and land use actors for the purpose of more efficient use of these natural resources.

– Data of statistics and institutional databases used in the hydrographic study demonstrate that significant progress was made in all agricultural and water-related indicators. Gender analysis made in the Osh province found that both the well-being and the role of women in rural area were improved.

– Collected opinions of water professionals, users, and other stakeholders about development of IWRM methods and measures to be undertaken by the Government and local authorities, as well as on strengthening of their own initiative.

– Organized social mobilization of water users when establishing WUA on the basis of **hydrographic** principle.

– Completed work on analysis of field data regarding water use at farm level, certification of fields, and estimation of crop water requirements.

– Completed work on social mobilization program for WUA development.

– Analyzed water conflicts, disputes and ways for their settlement.

– Implemented concept of water management improvement along the pilot canals of AAC and RBMC.

– Completed analysis of field data and undertaken measures aimed to address negative cases in farm water use, field certification, and crop requirements estimation.

– Arranged water accounting along main canals and in offtakes to WUAs and farms.

– Established Water Committees of pilot AAC and RBMC.

– Work completed in pilot sites for effective performance of irrigation and agronomic measures aimed to improve water and land productivity and for dissemination of these measures among farmers in the project zone.

– Constructed water measuring structures and gates.

– Introduced water use plans in BWUAs and pilot canals.

– Organized work on improvement of water distribution along pilot canals and of CWC and UCWU.

– Organized work among the staff of CWC, CMO, and WUA on making observations, collection of source information on use of irrigation water, agronomic measures, and monitoring of farms in the pilot zone.

– Arranged activities of accountants in pilot zone's WUAs regarding financial management of WUAs.

– Conducted environmental monitoring in the area of WUAs and farms located in Kara-Su district of Osh province.

– Organized work on implementation of water distribution method at the level of WUA, WUG, SAC and farms in the project zone.

– Introduced new method of water use plan development. Transition from ten-day to daily water distribution between users.

– Organized work on water accounting in WUA (selecting place and type of water measuring device, certification of water meters, organization of water accounting system).

– Trained staff of CMO, UCWU, and WUA in business planning.

– Organized work of CMO and WUA on water governance along main canals by involving all stakeholders (local governments, agriculture, industry, nature management, drinking water supply, etc.) in decision making.

– Implemented institutional, legal, and financial-economic measures for sustainable functioning of WUA.

– Arranged monitoring and assessment of water distribution by using MIS.

– Introduced operational planning of water distribution by using MIS.

– Introduced methods of planning, correction, and monitoring of water distribution, water delivery and water management improvement at all hierarchical levels (CMO-WUA-WUG-farms).

– Set up business planning and management of capital assets in CMO and WUA.

– Organized implementation of IWRM and water governance along the Right-Bank main canal.

– Set up principle of women participation in water governance (pilot canal and WUA levels).

– Set up principle of elders participation in water governance (pilot canal and WUA levels).

– Organized use of methods and proposals on differentiated tariffs of WUA services, depending on profitability of grown crops and plants, and preparation of WUA business plans.

– Transition to volume-based payment of irrigation service fees (ISFP).

– Conducted workshops and practical training by SIC branch in the Osh city Training Center.

– Conducted training for hydrometry specialists, hydraulic engineers and farmers in WUA in developing water use plan in each base WUA and WUA located along the main canal.

– Conducted training courses on operation and reporting regarding water use, on development of water use plans and organization of water distribution among users during the growing season.

– Training of water users and managers in efficient water use.

– Training in computer use for local project executors.

– Conducted training courses for water users on legal norms in force in the water sector, including the development of appropriate dispute settlement mechanisms in the pilot sites in Osh province.

– Training of WUA, CMO, and stakeholders in legal aspects of WUA development on Osh province.

– Dissemination of project experience on water and land productivity improvement in higher educational institutions.

– Training of trainers and probationary employees of District water management organizations (DWMO), WUAs and farms in South Kyrgyzstan in efficient water use within the WB project "On-farm irrigation".

– Trained WUA staff in preparation of legal documents for establishment of hydrographic WUAs.

– Trained WUA staff in planning of O&M of irrigation and drainage systems in WUA.

– Conducted workshop on development of extension services for farmers in the republic.

– Trained staff of CMO, UCWU, and WUA within the project zone in operation of databases.

– Conducted training courses in irrigation scheduling and estimation of main crop water requirements.

– Trained representatives of WUA in improving operation of WUA Council and setting WUG.

– Training and organized work on involvement of stakeholders in water governance in the pilot canals zone (safety, improvement of water availability, ecology, drinking water supply, land reclamation, encouragement of water saving and water fee collection) at AACA, RBMCA,WUA, and UCWU levels.

– Trained staff of CMO and WUA in development and preparation of water use plans, with consideration of all water sources (surface, ground, return water) on the basis of hydromodule zoning.

– Trained staff of CMO and WUA and provided assistance in preparing annual accounting report and analysis of collection of fees for WUA and CMO services.

– Automated control of structures in AACA.

– Trained database operators of WUAs in DB maintenance and daily planning of water distribution in WUA.

– Hands-on in installation of water meters and gates.

– On-going training of trainers in water governance at WUA level.

– Organized cooperation with agricultural extension services (AES).

Based on experience of the IWRM-Fergana Project, the following needs to be undertaken in:

Project zone:

1. Put into practice volume-based payments at basin level.
2. Establish UCWU at basin level.
3. Establish CWC at basin level.
4. Finish hydrographization of WUA at basin level.
5. Enhance activities of WUA Councils.
6. Strive towards sustainability and self-financing of UCWU.
7. Equip with water meters all WUA offtakes.
8. Promote prepayment of irrigation service fees by water users.

9. Keep working on institutional issues among stakeholders.
10. Work towards establishing WUGs and involving community leaders in WUA Councils.
11. Regularly conduct training workshops among stakeholders.
12. Collaborate with mass media for propaganda of IWRM principles.
13. Work towards establishing Water-Land Commission at basin level.

Non-project zone:

The first step to be taken is to disseminate IWRM principles throughout basins in other Kyrgyz provinces. 40 Water Councils covering 258.6 thousand ha of irrigated lands were established in the Republic as a whole. By present, 25 Federations of WUA covering 184 thousand ha of irrigated lands have been registered. The Republican Union of water user associations was established in October 2005. The Union unites 210 WUAs with more than 100,000 members and the total irrigated area of more than 300 ha. The experience of the IWRM-Fergana Project can be disseminated in any province, the priority one being, for example, the Talas province, which has well-developed farming and adequate infrastructure. The Issyk-kul province also can be considered as priority one since it has a lot of small rivers, each as an individual system.

At the same time, it is clear that a number of tools and new solutions need to be fine-tuned. For instance, this relates to harmonization of economic and financial mechanisms. It is necessary to develop a mechanism for encouragement of not only users but also water management organizations in water saving since now their interests are sometimes opposite.

Integration of activities of water-management and land reclamation organizations, development of reasonable performance procedures of extension services, and elaboration of such legal tools that promote self-sufficiency and self-discipline of IWRM institutions, and many other things are the area for seeling rational solutions.

Review of IWRM legal framework (LF) at different water hierarchical levels in Kyrgyzstan

Hierarchical level	IWRM principle	Achievements	Shortcomings	What to do
Basin	**- Hydrographization** **- Integration of water users and stakeholders** **- Public participation**	LF supports LF does not prohibit LF does not prohibit	in force only in the pilot zone	Establish LF at country level
MC	**- Hydrographization** **- Integration of water users and stakeholders**	LF supports LF does not prohibit	in force only in the pilot zone	Establish LF at country level

	- Public participation	LF does not prohibit		
WUA	**- Hydrographization** **- Integration of water users and stakeholders** **- Public participation**	LF supports LF does not prohibit LF does not prohibit	in force only in the pilot zone	Establish LF at country level

Review of the hydrographization extent in the Osh province at different water hierarchical levels

Hierarchical level	Zone	Achievements	Shortcomings	What to do
Basin	**project**	Developed and approved conception on formation of sub-basin institutions (Sub-basin management administration, Union of sub-basin water users, Sub-basin water committee) for the Akbura river		
	non-project	Transition to basin management in 1997 and basin organizations (BWMA) established	BWMA established within provincial boundaries	Reorganize BWMA units on the basis of 1) principle of hydrographization (in terms of water delivery), and 2)administrative-territorial principle (in terms of water use).
MC	**project**	Transition to hydrographic principle: established AACA and RBMCA; RWMO does not interfere in CMO zone	Poor financial viability of AACA and RBMCA. Institutional instability of RBMCA	Improve financial viability of CMO. Ensure institutional stability of RBMCA
	non-project		RWMO (rayvodkhozes) operate under	Water delivery functions should be transferred to

			umbrella of BWMA	Main canal management administrations, while RWMO should keep only water use functions.
WUA	**project**	Hydrographization of WUAs completed within AACA, partially completed within RBMCA	Insufficient hydrographization of WUAs at the level of secondary canals	Continue hydrographization process at the level of secondary canals under AACA and RBMCA
	non-project		Degree of WUA hydrographization is lower in non-project zone	Increase degree of WUA hydrographization
Farm	**project**	Partial establishment of WUG and SAC	Farms are quite small and usually hydrographic principle is not followed there	Promote integration of farms on the basis of hydrographic principle into 1) WUG 2) SAC
	non-project	Outreach activities are underway	Farms are quite small and usually hydrographic principle is not followed there	Promote integration of farms on the basis of hydrographic principle into 1) WUG 2) SAC

The first step towards the integration within the framework of the project was the integration of farms and other water users into WUA. The second step implies the integration of the interests of sectoral ministries-waters uers.

Thus, the conception of integration of all water users and all water hierarchical levels as developed under the IWRM-Fergana Project should be put into practice.

At present it is evident that the lack of public participation in governance of agricultural and water sectors was and still remains one of the main factors limiting efficiency of agricultural production and water management quality in the region.

The conception on adoption of public participation principle was developed and implemented under the IWRM-Fergana Project.

To this end, it is necessary to establish and strengthen community organizations that integrate water users (WUAs, UCWU), aim for establishment of governance bodies at all levels of water hierarchy (WUA, irrigation system, UCWU, CMO, sub-basin, etc.), where representatives of all water users could have a right and opportunities for participation in decision making in terms of water delivery (CWC) and water use (WLC).

IRWM-FV Project activity in the education

In the Kyrgyz National Agrarian University (KNAU) named after K.I. Skryabin the Project has been developing since 2009. The following representatives of KNAU were involved in the Project: Head of Science Division, Doctor in Agriculture, Saipov, B.E.; Head of the Chair "Land Reclamation and Water Resources Management", PhD in Agriculture, Senior Researcher Drugaleva, E.A.; Head of the Chair "Hydraulic Engineering Construction in Mountainous Areas", PhD in Agriculture, Associate Professor Beboeva, R.S. They participated many times in the workshops on the familiarization with project materials. Basic methodological developments were handed over to KNAU for the purpose of introducing those into the curriculum.

The course "Integrated Water Resources Management" was developed in the course of the methodological elaboration of the project materials and introduced in the working curriculum of the area of Environmental Engineering under the Land Reclamation, Recultivation and Protection of Lands specialty and in the working curriculum of the area of Water Resources and Water Use under the Engineering Systems of Agricultural Water Supply, Irrigation and Water Diversion specialty. Beginning from the academic year 2009-2010, the IWRM course has been delivered for 130 hours, of which 71 hours are of classroom-based nature and 58 hours are independent work of students when training engineers in the above-mentioned areas. A syllabus was developed for this course; it includes 36 hours of lectures (18 lectures), 18 hours of practical training and 18 hours of laboratory-based practicals (themes of the lectures see in the Appendix below).

This initiative was supported by the OSCE Office in Bishkek, Public Fund "Akmena" and Public Fund "Ekois" within the Project "Network of schools and higher educational institutions: water quality in Kyrgyzstan". Owing to the project support, IWRM was introduced in the curriculum in Natural Science Department of the Osh State University, Talas State University, and Naryn State University. More detailed information on the results of the project activity is available on the website http://www.ecobilim.kg.

In the academic year 2011-2012, the three following graduation theses were completed under the supervision of Ms. E.E. Drugalyova:

1. Automation of the Aravan-Akbura canal field service in the Osh province under integrated water resources management;

2. Improvement of land reclamation in the Osh province WUAs under integrated water resources management;
3. Improvement of land productivity in the Osh province WUAs under integrated water resources management.

Appendices

Themes of the course “Integrated Water Resources Management”

Themes of lectures

Lecture 1. Introduction. Causes and prospects of IWRM implementation in CAR.
Lecture 2. Importance of water for environment and human being. Global and regional (Central Asia) water crises.
Lecture 3. Current state of water resources management in the light of sustainable development.
Lecture 4. Water resources and water use in the Kyrgyz Republic in the light of climate change.
Lecture 5. Public access to drinking water. Current state of the drinking water quality in the Kyrgyz Republic (KR). Addressing the water supply problem as the priority in the sustainable development of KR.
Lecture 6. classification of water systems, hydraulic structures. Canals and hydraulic structures on them.
Lecture 7. River waterworks facilities and reservoirs. (Drinking, irrigation) water quality and methods to improve it.
Lecture 8. basic concepts and definitions of IWRM. International initiatives in the water resources management. Global water partnership.
Lecture 9. United Nations Integrated Water Resources Management principles. IWRM advantages over the traditional approach to water resources management.
Lecture 10. Implementation of IWRM in the Kyrgyz Republic. The IWRM-FV Project and other IWRM related initiatives in the Kyrgyz Republic and Central Asia.
Lecture 11. Reclamation systems and basics of their designing.
Lecture 12. reclamation types and methods. Agricultural irrigation techniques.
Lecture 13. Effective water saving practices.
Lecture 14. Impact of the industrial sector and agriculture on water resources.
Lecture 15. Water Users’ Associations. Water Users’ Groups. Canal Management Organization.
Lecture 16. Opportunities for business development in the water supply area.

Lecture 17. Water resources management related laws of the Kyrgyz Republic. International legal principles for the cooperation in the management of transboundary watercourse water resources. IFAS and ICWC.
Lecture 18. European water initiative for the cooperation in transboundary river basins. International treaties on transboundary watercourses. International practice of the cooperation in transboundary river basins.

Practical training

Practical training 1. Discussion: water resources.
Practical training 2. Water saving practice for farmers.
Practical training 3. Design of an open canal and pipeline.
Practical training 4. Irrigation ways and water applications types.
Practical training 5. Irrigation ways and water applications types.
Practical training 6. Crop irrigation regimes.
Practical training 7. Crop irrigation regimes.
Practical training 8. Rational water use at the local level (case studies of water use related dispute issues).
Practical training 9. Business game “Agreements in the Water Management Area”.

Laboratory practicals

1. Drinking water quality assessment.
2. Irrigation water quality assessment.
3. Water accounting ways.
4. Calculation of the efficiency of an open canal.
5. Calculation of the water supply rate for the “Chigir” device (Persian/water wheel).
6. Calculation of the efficiency of the “Gidrotaran” device (pump).
7. Calculation of the capacity of a small hydropower station powered by a “Gidrotaran” device
8. Studying the complex of the headworks of the system of water supply to a human settlement (tour).
9. Studying the complex of the treatment facilities of the sewerage system of a human settlement (tour).