

Chapter 5. INTEGRATED WATER RESOURCES MANAGEMENT FOR UZBEKISTAN'S FUTURE

As was mentioned in Chapter 1, the developed world has considerable experience in implementing IWRM approaches. However, analysis of reviews shows that process of introducing IWRM in Uzbekistan and Central Asia, as well as in other developing countries, is not proving very successful. This is due to the different existing economic environment and possibilities, and also to a lack of understanding or misinterpretation of the main principles of IWRM [106]. This problem is complicated by the considerable vulnerability of arid lands and the high sensibility of their ecosystems to abrupt changes. Therefore, extreme care should be taken with the current human interventions, so that they are all technically, economically and environmentally acceptable in order to avoid repeating the mistakes of the past and increasing future risks and threats.

Water resource management requires a deep understanding of the special role of water for life on Earth, the importance of water resources for social and economic development, and the principles of interaction between people and the envi-

ronment. Only if we have a profound understanding of the numerous interrelationships between human activities and the balance of nature, can we expect success in water resources management. The general objective is the coordinated and comprehensive management of water, land and associated resources in order to achieve equilibrium between water and energy resources, and the needs of society and the natural ecosystems, and to ensure social and environmental sustainability on which the livelihoods and welfare of the present and future generations must be based.

The experience gained and lessons learned in the region over the last ten years with support from the international community have helped increase the possibility of a successful transition to IWRM principles and approaches in Uzbekistan. Lessons learned from a successful example of IWRM in another part of the world are illustrated later in this chapter (5.3).

5.1. Main Dimensions and Strategic Objectives of IWRM

Of the challenges facing the water sector and the imminent crisis over fresh water require a strategic approach with sustainable water resource management as its corner stone. Development of a realistic and comprehensive strategy will depend on a clear understanding and analysis of the key management problems, an assessment of the acceptability and feasibility of decisions for all beneficiaries, compromises between the upper and lower river reaches and interaction between integrated water resources management and environmental services within the watershed. At the same time, it is important to guarantee human rights, justice and consensus between sectors and participants at national, regional and international levels so that people can maintain their livelihoods in the face of inevitable change.

The starting point for transition to the IWRM system is the strategic vision illustrated in Figure 4.4 that indicates the intentions and commitments of the country to sustainable management and de-

velopment. The strategy should aim to tackle all the main economic, social and environmental issues involved in sustainable water and energy resources management. The strategy should be both comprehensive and achievable.

The IWRM strategy should be based on the following dimensions¹⁷:

- *Sectoral and Intersectoral Integration.* This is related to the planning and management of water resources taking into account the competition and conflicts between irrigated agriculture, hydropower, drinking and municipal water supply and sanitation, industry, etc;
- *Economic, Environmental, and Social Integration.* This means that not only the economic costs and benefits of specific decisions on water resources management but also the environmental and social ones should be taken into consideration,

¹⁷GWP Manuals (2002) and the national programs, concepts and main provisions, etc.

- *Administrative Integration.* This is related to the coordination of water resources management at all levels of government (national, oblast and local) and the interaction and interrelationship between these levels. Well-formed and explicitly declared legal and managerial structures are extremely important for the management of limited water and energy resources;
- *Geographical Integration.* This refers to the use of the hydrological units (i.e. watersheds and river basins) or hydraulic units (irrigation systems) as the main subdivision for water resources management. It also means that consideration of watersheds themselves and the interaction between the use of land and the water in rivers, lakes, and streams is part of the decision making for the development and management of all natural resources; and
- *Integration of International Donors.* This involves effective coordination of the external financial institutions that support and assist in the development and implementation of projects in order to ensure efficient and high quality water resources management even though funding may be limited (see Chapter 1).

The IWRM strategy should cover the following main areas:

In the International Context water resources should be managed with observance of all the international agreements, conventions, global values, and good neighborliness that ensure equitable joint use of water resources and benefits from

transboundary water courses;

In the National Context water resources should be managed in a manner that would ensure achievement of the national development goals, such as poverty reduction, the Millennium Development Goals and sectoral objectives in food production, energy, industry, and environment protection;

In the Context of Population and Ecosystem Needs water resources should be managed so as to make them accessible to everybody and to satisfy the main needs of both people and ecosystems. In distribution of water resources priority should be given to the needs of the population and to environmental demands;

In the Context of Managerial Principles the most important principles include: decentralization of responsibilities to the lowest level; public participation in management and the decision making process, including the participation of women; joint management (intersectoral and various agencies); and management within the boundaries of hydrological units (river basins);

In the Context of Financial Sustainability water resources management benefits from the total reimbursement of production costs within the administration system, and water users and polluters pay for services. Payment for water and tariffs, subsidies, incentives, and limitations are the key issues.

5.2. Creation of Favorable Environment for IWRM Introduction

The experience and lessons learned in the region described above show that to introduce a sustainable and integrated approach to the management of water and energy resources will require changes in all spheres and at all management

levels. To achieve the key objectives of IWRM fundamental institutional and legislative reform based on international water law is needed together with improved management procedures and tools.

Improvement of Legislative Basis

The general objective of the legislative reform process is to guarantee legal support for the key decisions and to ensure harmonization between laws and regulatory frames in all sectors of the economy which make use of water resources.

The key objectives for creation of the relevant conditions include:

- Compliance with global environmental conventions and accession to the international



convention and protocols on transboundary water courses, etc;

- Development of efficient mechanisms for sharing the water of transboundary rivers , taking into account the priority of supplying drinking water as well as environmental and social requirements;
- Development of mechanisms for managing water quality and the environment as a whole in accordance with nature protection laws and regulations;
- Ensuring the legislative basis for institutional reforms and provisions on sanctions in case of violation of laws, as well as regulation of situation in cases of water deficiency, floods and emergency situations associated with pollutions;
- Creation of conditions for the recovery of production costs through water charges, as well

as a system of incentives and financial measures ensuring sustainability.

DAI considers the development and implementation of the legislative norms as a type of control over stakeholder involvement and emphasizes five main elements for the reliable operation of the legal management model: *political program – problem analysis – decision makers/lawmakers – implementation – monitoring* [80]. These elements ensure close interaction between regulators and the regulated, as well as with independent observers.

Using information technology really helps to improve the regulatory framework and supervision of sectoral activities. Application of information technology facilitates: (i) encouraging wider and more effective participation in the development of regulations; (ii) improving the implementation of existing regulations, and (iii) introducing legal and regulatory knowledge systems.

Institutional Development

Helping to management at all levels is extremely important for the harmonious fulfillment of legal frames and strategic decisions. The first priority is the improvement of coordination of the activities of the existing institutions and/or the establishment of new organizations as necessary that will be able to implement the following key objectives:

- Separating the management of water resources from the provision of services (irrigation, hydropower, municipal water supply and sewerage) and consolidating their efforts in order to avoid conflicts of interest and to encourage economic self-sufficiency;
- Decentralizing regulation and service provision to the lowest level and ensuring participation of beneficiaries and the public in planning and developing managerial decisions;
- Improving the knowledge and professionalism of staff through a long-term program of capacity building and the implementation of an action plan;
- Broadening the involvement of the private sector and encouraging its potential contribution to financing and providing services (irrigation, hydropower, municipal water sup-

ply and sewerage, etc.)

One important element in the institutional development of IWRM is the establishment of the Advisory or Coordinating Committees of canals jointly headed by the local administration bodies (hakims) and representatives of the BVO, Goskompriroda and the relevant WUAs (i.e. with representatives of political, economic, environmental, and social institutions.) Setting up such committees in Uzbekistan (Boxes 5.3 and 5.4) has helped ensure that all participants contribute to joint decisions and take responsibility for their implementation.

Increasing rural community participation, will require accelerated development of independent WUAs that unite all farmers using a single irrigation system or part of it. These WUAs should have well-defined responsibilities, be free from state control over cropping and production (free from the state order) and be able to make decisions on the management, operation and maintenance of the system. As the number of private farms continues to increase, well-run WUAs will play a key role in the management, operation and maintenance of the I&D systems at the on-farm level.

Management Tools

Achieving the IWRM objectives will involve the following:

- Collection of comprehensive information and assessment of water resources (surface, underground and marginal) waters, and development of specialized monitoring and control services;
- Strategic planning and policy making at basin level, and the development and protection of water resources through the use of the decision support system;
- Development of water distribution mechanisms and identification of norms and rights for all types of water consumers and users;
- Resolution of any conflicts in regard to water resources (for instance, between water intake and disposal of wastewaters);
- Measures aimed at the management and protection of water bodies, such as rivers, and lakes; and
- Capacity building and human resource development, including training of specialists in the area of threats, environmental, social, and economic assessment and solution of institutional issues.

5.3. Experience and Lessons Learned

5.3.1. World Experience and Lessons for the Future

The experience of other countries may serve as a good lesson for the successful introduction of IWRM principles at the national and local levels. One of the best examples of the introduction of IWRM is the Murray-Darling rivers basin initiative in eastern Australia (Box 5.1).

The main factors in the success of this initiative were: (i) strong institutional frameworks; (ii) good knowledge base; (iii) integration of issues associated with natural resources, legal and researches / policy / realization; and (iv) strong community participation (Figure 5.1). Finding a solution to the conflicting needs to improve water quality in the lower river reaches and to discharge

drainage waters from the upstream irrigated lands was one of the first tasks of the initiative. The joint program of works is unique in that it takes into account both river and land management and environmental effects. The upstream states contribute funds for the construction of facilities to intercept ground water along the river course (or divert the drainage flow), and the other states and/or polluters carry out the construction. They have the right to discharge salts into the Murray river only within the approved limits. Limitations in regard to discharge of salts into the river have led to a significant improvement in irrigation practice and water use efficiency.

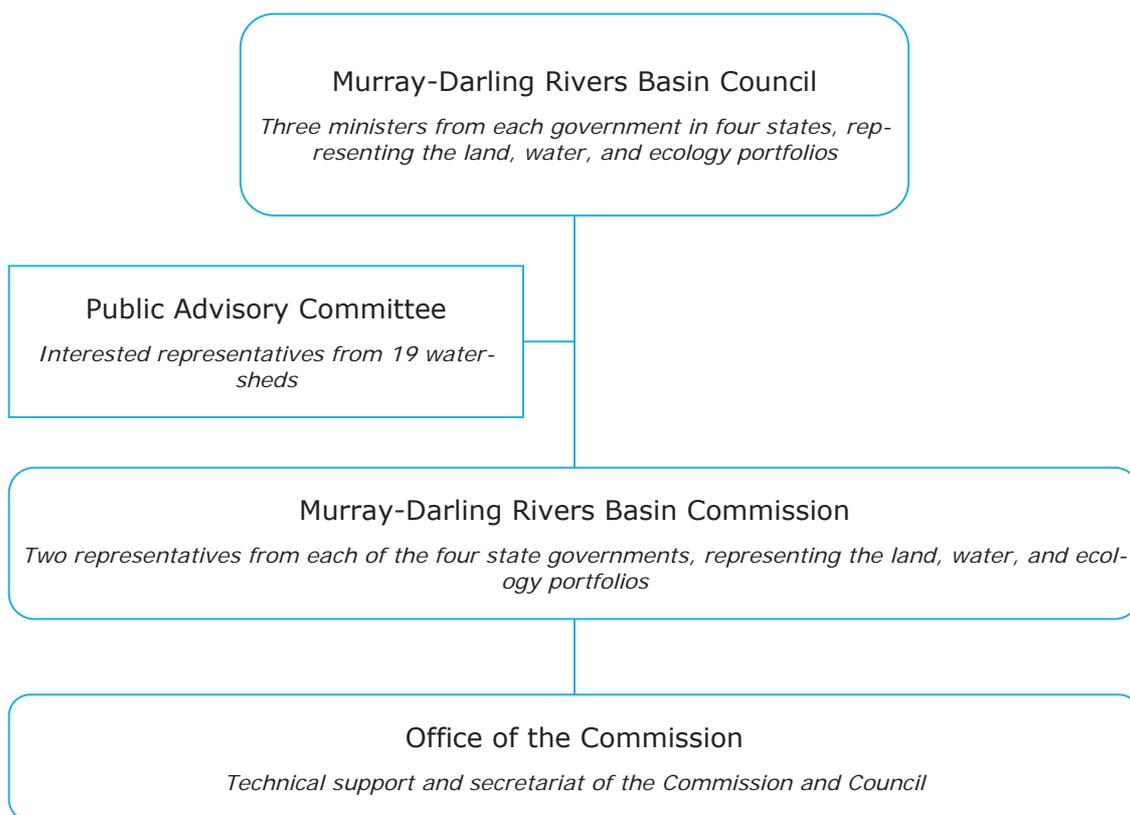
Box 5.1

Murray-Darling Rivers Basin Initiative

The total basin area is around 1 million km² (equivalent to the combined size of France and Spain). The Murray and Darling rivers (3,700 km long) cross four independent states: New South Wales, Victoria, South Australia, and Queensland. This is the main agricultural province of Australia producing 33% of agricultural production with a total annual value of AUD 10 thousand million. The basin comprises 75% of the country's total irrigated area, and around 25% of livestock production.

To promote efficient planning, management and sustainable use of the basin's water, land and natural resources an agreement between the Federal Government and Governments of the four states on establishing a Council of Ministers and Commission for the Murray-Darling river basin was signed in 1988. The strategic program of this initiative involves community groups in the development of comprehensive plans for land and water resources management in all regions. A characteristic of these plans is the joint leadership by the community and the government that ensures support when the need arises. The strength of such plans is the separation of costs. The major part of these costs is met by the community (M. Falkemark, 1999).

Figure 5.1. **Management Structure of Murray-Darling Rivers Basin, Australia 1997**



Source: D. J. Blackmore. 1997

The Murray-Darling Rivers Basin example highlights a number of principles which are prerequisites for the successful management of an inter-state watershed:

- **Government Leadership.** Mature and forceful leadership is required from the government. This may involve relinquishing some sovereign rights to other stakeholders. It also includes raising community awareness and providing the means for local communities to manage local environmental issues. The government must also define a framework which ensures that downstream impacts are considered in upstream management decisions.
- **Community Leadership.** Successful environmental management is much easier to achieve where the local community is demanding actions and is committed to developing and implementing action plans. Raising awareness of local communities of the need to act is a critical first step. Community-based monitoring of water quality and involvement

of educational institutions and schools have been shown to be effective ways of expanding community awareness. Some features of successful public participation in land and water planning are: the commencement of consultation early on in the planning procedure; guidelines and planning procedures required at the outset; community awareness of the objectives of its involvement and the level of power being offered; efforts made to include all stakeholders; information available to everyone, and adequate administrative and technical resources available for the required tasks and meetings.

- **Technical Knowledge.** Impacts often occur distant from the site of mismanagement, but the symptoms of mismanagement are often treated rather than addressing the cause. For this reason, successful plans can only be built on a strong knowledge base and comprehensive studies ensuring profound understanding of the root causes, effects and impacts of the various management options. It is rare, how-



ever, for knowledge to be complex. Consequently, an assessment of the risks of incomplete information should be made and flexible plans must be adaptable and regularly updated on the basis of new information.

- *Use of Market Instruments.* It is necessary to estimate the total incurred costs of resources that users pay for. In particular, off-site costs and the costs of degradation which will not appear until some time in the future are rarely included in the costs of production. For this reason, the Government is well-placed to ensure that these costs are included in day-to-day decision-making as an incentive for resource users to find the most efficient and least costly management options. In the same way the Government extends subsidies and tax-breaks to encourage certain activities

Analysis of the GWP reviews (2002) shows that the main problems facing engineers, scientists, and planners are not technical in nature. They are problems of reaching agreement on facts, alternatives, and/or decisions. In assessing the implementation of 121 projects concerned with the rural water supply systems in Asia, the World Bank (2005) stresses that “participation of beneficiaries” is the most important factor determining how well decisions are implemented [37]. It also helps improve access to and control over water resources. Involvement of the public often not only leads to an increase in public responsibility and steadfastness of judgment, but also assists in resolution of conflicts, building of confidence, and strengthening local communities for carrying out other activities. Therefore, public involvement and conflict management techniques are key in being able to introduce and implement innovations. Community involvement from the initial planning stage encourages ‘joined up’ decision making and

innovations by individuals because they are not tied to the official status quo. However, this costs money. For instance, New-York City allocates a portion of its budget for major projects to “Citizen Advisory Committees”, which involve citizens, environmental organizations, and industry [95] The planning and governing authorities involved in watershed management must perceive themselves as agents of change and innovation.

Innovations are encouraged if:

- management is integrated across the boundaries of a basin;
- integration exists between functional state sectors (agriculture, forestry, water resources, environmental regulations, nature conservation, land use-government level);
- integration exists between disciplines, common sectors and directions;
- integration exists between knowledge providers and knowledge users and no destructive tension exists between the scientific/research communities, design and planners of resources.

Therefore, the successful model for changing poor management practices and adopting innovations involves: commitments, resources, a substantial knowledge basis, and a well-planned change process including attitude of land users, cost-sharing, and group activities. When one of these elements is missing, changes either will not occur or will take place in a direction that is not sustainable.

5.3.2. Experience and Lessons in Uzbekistan and Central Asia

As was mentioned in previous Chapters, since 2002 the Technical Committee of GWP CACENA and IFAS with support from international institutions and donor countries have been promoting the introduction of IWRM in Central Asia. The main elements and mechanisms of IWRM and the specific requirements for introducing these in the context of Central Asia have been formulated on the basis of experience gained from the NATO project in the Amudarya river delta and the SIDA

“IWRM-Fergana” project in the Fergana valley [41].

Due to the efforts of the international community over the past decades, the development of comprehensive participatory approaches and methods of water resource and environment management has already begun in the country. These methods can be adapted to specific conditions and disseminated at the national and basin level. Some

donor-funded projects and programs in the area of water/energy and natural resources management, have already been discussed in previous

chapters. A complete list of projects is provided in Annex 5.

Projects Oriented to Integrated River Basin Management

The “*Drainage Project of Uzbekistan*” is an example of how IWRM principles can be successfully developed for equitable shared use of trans-boundary water courses. Within this project a package of technical interventions and all possible options and scenarios for CDW management on the right bank of the Amudarya River have been developed (Box 2.3) [77]. The process of environmental assessment (WB, 1998) identified potential projects from the integrated river basin management viewpoint and established explicit objectives for the management for each sector (Annex 5) [98]. These objectives complement one other, but at the same time they may come into conflict. Therefore, there is a need to search for compromises in order to reach consensus and achieve equilibrium of environmental and social needs. One of the best models for joint participatory management is the WB “*Drainage, Irrigation, and Wetlands Improvement Project*” (DIWIP) in Southern Karakalpakstan (see Chapter 2).

A successful example of IWRM principles being implemented to support the needs of population and ecosystems is the GEF pilot project “*Restoration of the Lake Sudoche Wetlands*” [30]. The main objective of this project is to demonstrate comprehensive approaches to management, conservation and restoration of the delta ecosystem biodiversity and provision of stable incomes for the local population (Box 5.2). One of the target tasks of this project is to qualify the Lake Sudoche lzone for protection under the Ramsar Convention.

Studies of the population in the project area have identified priority measures to improve employment and conservation of biological resources of Lake Sudoche. These include: (i) provision of local population with the rights to catch certain quantities of fish and muskrat, and to cut reeds for domestic use; (ii) involvement of the population in the management of wetland biodiversity and reproduction of biological resources; (iii) use of the experience of the local self-administration bodies (makankenesy) and the traditional institutions of local leaders (the so called “biy”), etc. Certainly, the CMLS, jointly with the supervisory public commissions, should carefully coordinate implementation of the Sudoche wetlands management plan developed during preparation of the detailed design. They should also carry out socio-ecological monitoring and implement mitigating measures to maintain the integrity and viability of the wetland.

Another successful example of IWRM in the context of human and ecosystems needs is the UNDP/GEF project “*Establishment of the Nuratau-Kyzylkum Biosphere Reserve*” which is located in the middle reaches of Syrdarya River. The main objective of this project is to demarcate the general boundaries and internal zones of the reserve, and to develop a long-term plan for the management of the Nuratau-Kyzylkum Biosphere Reserve based on normative, legal, environmental, and socio-economic criteria and principles of sustainable natural resources use. The management approaches and methods being demonstrated by

Box 5.2

Sudoche Wetland, with a total area of 500 km², is made up of the main lakes (open ponds) Akushpa, Karateren, Begdulla-Aidyn, and Big Sudoche in the Amudarya river delta. This is one of the best preserved ecological zones in the Amudarya river delta and a place where the biological diversity typical of the region is being maintained.

In 1999, the Council of Ministers of the Republic of Karakalpakstan established the Committee for the Management of Lake Sudoche (CMLS). This comprised associate members (representatives of the responsible ministries, institutions, and organizations), and supervisory public commissions, established in the seven adjacent settlements. Implementation of the engineering measures for construction and rehabilitation of water structures and other infrastructure will ensure an annual water inflow volume of not less than 300 million m³. Over a period of three years this will allow water mineralization to be reduced from 18 to 6-8 g/l. The area of wetland will be increased up to 200 thousand ha with a water depth of 3.0-3.5 m. The area of water surface free from reeds will reach 130 thousand ha. This will ensure favorable conditions for the mass movement of water and the improvement of the wetland oxygen regime. (GEF/IFAS WEMP project, Component E. Final Report, 2000)



this project make a real contribution to achieving sustainable links and compatibility between land/water use and protection of the ecosystems within the watershed. In general implementation of the project will increase the area of reserves in

Uzbekistan by up to 6%.

Projects Focusing on Integrated Water/Land Management in Agriculture

The various investment projects and technical assistance programs that are being implemented in the country demonstrate the integrated management and use of water and land resources (Box 5.3). The common objectives of these projects are to: (i) support the development of institutional reforms at all levels of water management with involvement of all stakeholders; (ii) implement technical interventions for reconstruction of the I&D infrastructure, measurements and control over distribution of water; (iii) promote a pur-

chasing and pricing policy and agricultural services which encourage farmers; (iv) develop a policy for reimbursement of expenses through the introduction of a system of payments for delivery of irrigation water; (v) establish advisory services and develop training programs in order to raise public awareness and participation. One of the most important target tasks to be carried out within these projects is to support the development of WUAs that took over responsibility for the on-farm water management.

Box 5.3

Investment Projects that are being Implemented with Donors Support

ADB Project *"Rehabilitation of the Amu-Zang Main Canal and Pumping Stations"* (\$73 million);

ADB Project *"Development of Agriculture in the Ak-Altyn Rayon"* (\$ 36 millions);

WB Project *"Support to the Agricultural Enterprises"* (\$ 36 million);

WB *"Irrigation, Drainage and Wetlands Improvement Project"* (\$ 40 million);

ADB Project *"Improvement of Grain Crops Productivity"* (\$ 26 million,) and others (see Annex 5).

Projects Focusing on Improving Water Productivity and Water Saving

The practical results of the on-going projects and programs show that the adaptation of IWRM principles in order to increase water productivity in irrigated agriculture is entirely achievable.

The regional project "IWRM-Fergana" introduces the main provisions of the IWRM concept into the existing water management systems in Fergana valley (Box 5.3) [35]. Experience of another ICARDA project - (*"On-farm management of water and land resources for maintenance of sustainable agricultural systems in Central Asia"*) has shown how some effective and efficient water use techniques can be used in Uzbekistan. This includes the drip irrigation of vineyards and vegetables growing on steep slopes, the practice of bio-drainage and the creation of forest shelter belts. These techniques bring substantial economic and environmental benefits including the saving of surface water.

The results of other pilot projects such as EC-TACIS, WARMAP (a WUFMAS sub-project), CIRMAN-ARAL and others show that the priority measures for ensuring water saving are: (i) measures on improvement of water use discipline; (ii) measures on improvement of crop irrigation technologies and methods; and (iii) thorough field preparation and tillage. Although these measures come at a certain cost, they ensure efficient on-farm water use and make a significant contribution to water saving [76].

UN FAO supports projects which aim to demonstrate best-practice in on-farm land and water management on degraded land within the country's arid zones. Application of agriculture conservation system and bio-drainage in combination with drainage facilitates resources saving and transfer 30-70% of the expendable part of water balance to its ecologically clear transpiration part.

FAO experience also confirms that management methods in the system “rainfall water – soil – crop”, such as rainfall harvesting techniques, and a combination of runoff farming with soil moisture management are important ways of ensuring security in livelihoods and food production for the growing population.

The revival of the active involvement of the population makes a special contribution to water saving, especially at local community Level. These issues are discussed in Chapter 3.

Box 5.4

“Integrated Water Resources Management in Fergana Valley” Project (2001-2005)

The project considers three levels of the water resources management hierarchy: “system (canal) – WUA – farm”. The results of the first target task are as follows:

- *Increased field application efficiency of irrigation water from 42-51% to 69-81% due to a reduction in tail escape and infiltration losses;*
- *Increase in uniformity of water delivery by the South Fergana canal between outlets up to 70-95% as against 25-76% in 2003.*

Canal Water Committees (CWC) were established within this project. These comprise representatives of all parties interested in the use of water resources [35].

Projects Focusing on Improving Knowledge and Awareness about IWRM

In regard to advocacy and training in the IWRM concept the ICWC initiative, supported by the governments of the five republics as well as donors [35], has been significant. Since 1996, opportunities have been provided for training seminars, exchange of experience and participation in international forums. A network of training center branches and field seminars has enabled approximately 2000 people each year to upgrade their qualifications. It has also strengthened public awareness of IWRM. USAID, through its “*Natural Resources Management Program*”, and other donors provide technical assistance to the responsible institutions in management and monitoring of water resource quality, automation of irrigation systems and capacity building in water supply and management.

IWRM also envisages broad involvement of rural communities, farmers, and vulnerable population groups, especially women, in water resource management and use, and environment protection. Therefore, training of farmers and dekhkans, who came to agriculture from other sectors of the economy and have insufficient knowledge and experience in the area, is extremely important.

The contributions of the international institutions

in the development of farming have already been discussed in Chapter 3. The approaches to training and raising community awareness that were demonstrated within the FAO program “*Field Farmers School*” deserve attention. However, the absence of special departments and/or extension services as well as a lack of awareness within the Ministry of Agriculture and Water Resources and in other responsible organizations limits the wider introduction of best practice in water and land management at the national and local levels.

One of the best examples of interdisciplinary research and the training of young Uzbek scientists is the UNESCO/ZEF Bonn project “*Economic and Ecological Restructuring of Land- and Water Use in the Region Khorezm of Uzbekistan*” (2002-2012). The objective of this project is to elaborate a regional development concept based on the integration of natural resources management studies with economic and institutional research, and to suggest strategies for decentralized development which adhere to sound environmental principles.