INSTITUTIONAL IMPLICATIONS OF WATER RESOURCES MANAGEMENT IN CENTRAL ASIAN REPUBLICS

D. J. Bandaragoda

27 April 1999
INSTITUTIONAL IMPLICATIONS OF WATER RESOURCES MANAGEMENT IN CENTRAL ASIAN REPUBLICS

D. J. Bandaragoda

Introduction

This report summarizes the institutional setting of water resources management in the five Central Asian Republics (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan). The location of these five states is shown in Figure 1. The report also identifies a few institutional issues related to the present water management crisis in the region and a set of options in institutional interventions, as can be seen in a preliminary assessment of the existing situation.

While the region is seen to have benefited from substantial technological inputs in the past, its current performance in overall water resources management appears to be stagnant at a low level (Micklin, 1991:13-20). In this situation, a restructuring of the water-related institutional framework is likely to be very productive. The five republics have only recently gained independence from a rigid centralized administration of the USSR’s soviet system. In the wake of these changes, the institutional characteristics of the previous administrative system still prevail to a large extent. Given the context of this deep-rooted organizational culture with its clearly discernible technological bias, the institutional reforms are a relatively uncharted territory, when compared with the extensive national and international efforts to improve the region’s resource base. Therefore, the gains from interventions aimed at institutional change at this stage could be substantial.

Particularly from the perspective of impact-oriented research work, institutional analysis aimed at improved water resources management has a considerable potential. Besides, considering the numerous international expert groups working in Central Asia, who are mostly pre-occupied with technological issues, IWMI will have a good comparative advantage in dealing with institutional issues, supported by its complementary work in information technology, water accounting and water saving methods.

However, along with considerable benefits they are likely to bring about, the interventions for institutional changes can also be associated with high risk. Risks of failure, excessive investment of time and other resources, and political backlash are possibilities. Full policy commitment and genuine involvement of local partners, as prerequisites to any program of research-based interventions, can reduce this risk considerably and also enhance the probability of positive impact of change.

---

1 Report prepared on the basis of information collected during a visit to Tashkent, 16-23 May 1999.
Importance of Institutional Improvement

An improvement in water management institutions of Central Asia is critically important for two main reasons. First, there is an apparent complexity of the existing institutional framework for water management in the region, that seems to defy or impede any attempt to improve its efficiency. There is also a general feeling that the relevance of this complex institutional structure is diminishing in the fast changing socio-economic and political context of the region. Second, there is a widely acknowledged urgent need for improving the productivity of overall water management in the region. Effective institutions can increase the return on heavy investment already made on physical infrastructure (Micklin, 1992:32). This need is particularly linked to the daunting environmental problem that arises from the fast declining water level and water quality in the Aral sea.

The complexity of the current institutional arrangements for water resources management in Central Asia is mirrored in the region's highly complicated water resource system. Both of these complexities might have been caused by, and geared to, a highly centralized administration that existed in the soviet system of governance. The relevance of this complex institutional framework in the present context of independent republics, and the viability of any institutional change, can both be assessed only on the basis of a good analysis of the present situation of socio-technical linkages.

Complexity of the Physical System

Moisture deficit is the main climatic feature of most of the Central Asian Region, which is located in the drainage basin of the Aral Sea. Annual precipitation in its lowland desert ranges from 100 mm in the southwest to 200 mm in the foothills of southeastern mountains, and to a very low 30 mm in the Hungry Steppe, southwest of Tashkent. Moisture coefficient (precipitation divided by PET) in this area ranges from 0.1 to 0.6 (Micklin, 1991). Located in this context of high evapotranspiration and severely arid conditions, the region is fed by two major rivers, Amudarya and Syrdarya, and some thirty primary tributaries connected to them. The two rivers originate from the Pamir and Tianshan ranges having high surplus of moisture (precipitation of 800 to 1600 mm and PET of 100 to 500mm), which result in permanent snow fields and glaciers. Thermal conditions are favorably high for crops such as cotton and grain. The conditions in the overall are typically suitable for irrigated agriculture.

This natural water resource system has been modified by human interventions to have 20 large and middle size reservoirs and 60 canals of different sizes. In all, it has 51 dams. The massive Karakum canal offtaking from Amudarya river diverts a maximum flow of 320 cubic meters per second over a distance of 840 kilometers to the vast Karakum desert. About 45 cubic kilometers of Amudarya's annual flow of 70-80 cubic kilometers is diverted for irrigation, whereas the diversions from the Syrdarya amount to almost its total annual flow of 30-50
cubic kilometers. The diverted water is conveyed, distributed and used through "a complex web of canals, impoundments, tributaries, irrigation fields, distribution systems and municipal and industrial facilities" (Micklin, 1991). Most of this diverted water is used for a monoculture of cotton. The region's water system is described as "one of the most complicated human water development systems in the world" (Raskin et al, 1992). The massive infrastructure helped increase the area under irrigation from about 5 million ha in 1950 to the present level of about 8 million ha. As virtually all of available surface water is used, no further irrigation expansion is possible, making improved water management the only avenue for increasing productivity.

Complexity of the Institutional Framework

The institutional framework reflects the complexity that is inherent, not only in the management requirements of a massive and complicated physical system, but also in the socio-political implications of a multi-state water resource system. The physical system covers a vast geographical area with different typographical and ecological conditions, whereas the features of the multi-state water system include intricacies involved in serving or catering to different political entities, different ethnic groups and different cultural practices and norms. This situation has been further compounded by the recent transformation of these countries from the status of former soviet republics into newly independent nation states.

In the present context, the institutional framework for water management is a hierarchy with five levels of authority/responsibility (interstate/regional, country, province, district and farm), and serves five main water management functions (allocation, regulation, distribution, application and disposal).

Interstate/Regional Level

The interstate or regional level organizations are in two categories. One set of organizations deal with the political and macro level water resources and environmental management, and funding decisions, whereas the other set deals with the technical aspects of water regulation among the five states.

The Aral Sea Basin Program (ASBP) adopted by the five Heads of State in January 1994 under the sponsorship of the World Bank, UNDP and UNEP is a key institutional arrangement achieved after independence (Whitford et al, 1996). The ASBP has four main objectives:

- to stabilize the environment of the Aral Sea basin;
- to rehabilitate the disaster zone around the sea;
- to improve the management of the international waters of the Aral Sea Basin; and
- to build the capacity of regional institutions to plan and implement the program.
The last two objectives are directly linked to institutional development. In addition, the program also seeks to assist the states to cooperate and adopt sustainable policies and legal frameworks. The ASBP encompasses 8 programs and 19 projects, with a planned preparation of 18 months. An important item in the preliminary phase of the ASBP is the preparation of “the principle provisions of a regional water strategy of the Aral Sea Basin based on the ‘Transboundary Diagnostic Analysis’” (Dukhovny, 1998).

The ASBP arrangement of 1994 sought to newly establish, or strengthen the previously established, organizations to manage the ASBP. These organizations are:

- the International Fund for Aral Sea (IFAS) to fund the program;
- the Interstate Council for the Aral Sea (ICAS) to set policy;
- the Executive Committee (EC) of the ACAS to implement the program;
- the Interstate Commission for Water Coordination (ICWC) to apportion water to the five states; and
- the Sustainable Development Commission (SDC) to ensure that economic, environmental and social factors are given serious consideration in development activities.

The IFAS, which is the major organization for managing the entire basin, is headed by one of the Presidents of the five states (in rotation), and includes their deputy Prime Ministers as members.

The ICWC, also referred to as Interstate Coordination Water Commission for Central Asia, comprising the Deputy Prime Ministers in charge of water resources of the five republics decides on the pattern of interstate water allocation. The Scientific Information Center (SIC) of the ICWC provides the technical backup that is necessary for ICWC’s allocation decisions. The SIC specifically assists in three main areas: (1) establishing the necessary legal framework for interstate water allocation and related conflict resolution, (2) generation of the necessary databases, and (3) developing strategies for improvements in overall water management productivity in the region aimed at reducing the environmental problems associated with the Aral Sea.

Also, at the regional level, there are two Basin Valley Organizations (BVOs), Syrdarya BVO based in Tashkent and Amudarya BVO based in Nukus, set up for the purpose of water regulation, and to ensure that the five countries are receiving water within the allocation limits decided by the ICWC. For this purpose, BVOs are also charged with the responsibility of operating and maintaining physical infrastructure established on the two rivers and the main canals up to divisional structures that deliver water to each country.
Theoretically, BVOs are very powerful organizations having regional authority over the constituent nation states. The personnel in these BVOs are known to be competent and professionally motivated (Bedford, 1996). The cooperative conduct among the states in water allocation is promoted by a 1992 treaty, which is further strengthened by the establishment of the ICWC.

The institutional framework envisaged by these special arrangements is depicted in Figure 2.

Country Level

The responsibility for overall water management below these main division structures is at the country level. The primary responsibility lies with the Ministry in charge of water resources in each of the five countries, which in turn delegates it to the country’s provinces, districts, and collective farms or cooperatives for various functions (allocation, regulation and distribution within the country).

Provincial Level

The Regional Water Management Organizations (RWOs) or “Oblalvodkhoz” at the provincial level are responsible for water distribution and delivery to the major irrigation schemes. The RWOs control main and distributary canals, and their area of control ranges from 300,000 to 600,000 ha.

District Level

Within each province, the District Water Management Organizations or “Ravodkhoz” are responsible for water distribution among the collective farms (“kolchozes”) or cooperatives. The DWMOs’ authority is to deliver water by “intra-farm canals” up to the gates of the collective farms. The size of a DWMO varies between 20,000 and 25,000 ha.

Farm Level

The management of the collective farm or cooperative is responsible for water distribution among the farm units. The collective farms are typically of size between 1000 to 2000 ha. In case of privatization and subdivision of these large farms into smaller farms, water distribution at the inter- and intra-farm level will need substantial institutional strengthening.

Related concerns are on the present system of assessing and levying water charges, pricing of farm produce, and the planned actions to fragment the large collective farms in the process of converting them into private farms.

See Figure 3.
THE STRUCTURE OF INTERSTATE ORGANIZATIONS FOR ADDRESSING THE ARAL SEA CRISIS

HEADS OF STATES

- State Committee of Water Resources of Kazakhstan
- Ministry of Water Resources of Kyrgyzstan
- Ministry of Water Resources of Tajikistan
- Ministry of Water Resources of Turkmenistan
- Ministry of Agriculture Water Resources of Uzbekistan

INTERSTATE COORDINATING COMMISSION FOR WATER RESOURCES

- Scientific-Information Center of ICWC
- BWO Syrdarya
- BWO Amudarya

INTERSTATE COMMISSION OF SUSTAINABLE DEVELOPMENT

- Scientific-Information Center of CSD

BOARD OF GOVERNORS ARAL SEA FUNDS

INTERNATIONAL FUND FOR ARAL SEA

EXECUTIVE COMMITTEE OF THE IFAS
The numbers 1-7 refer to Themes.
- MWRM: Ministry of Water Resources Management
- BVA: Basin Valley Authority.
- RWO: Regional Water Management Organization.
- RBBCD: Right Bank Collector Drain (under study)
- point source pollution (program 3.1.A.) from cities, municipalities, industries
- agricultural production, non-point source pollution (Colchoze)

Linkages

Only an integrated approach can solve system-wide problems. The operational and maintenance deficiencies in the entire basin management system, which includes barrages, reservoirs, main and branch canals, distributaries and intra-farm canals, converge on the farm level and social level eventually, causing low water management, agricultural and economic performance. Any institutional solution, therefore, should necessarily address all of these management problems and should cover all of the levels mentioned above. Isolated institutional interventions targeted at selected problems or subsystems are unlikely to produce desired results. For example, even the best water users association trying to improve water distribution at the collective farm level will be constrained by operational problems in the branch or the main canal, or by non-economic consideration of water.

Similarly, no one agency, however efficient it may become, can solve all the problems of water resources management. Since irrigation and water management is associated with fairly complex social systems, the institutions operative in the context of irrigation and agriculture in rural societies are profoundly complex. The major part of this complexity lies in the society itself; farmers are of different distinct social groups with different sets of goals and objectives, and different alliances. The formal rules designed to govern their conduct in an orderly manner give way to flexible informal rules. For instance, the decreed cooperation among the states has already been identified as an “illusion of unity” (Olcott, 1994). The treaty of 1992 is said to have achieved little in terms of reducing wasteful water use practices. The collapse of the centralist soviet administration appears to have provided an excuse for greater disregard for conservation (Bedford, 1996).

By nature, institutions are intrinsically inter-linked. In the present context, new management procedures, old regimented procedures, different political ideologies are criss-crossing various categories and groups of people. Because of this inter-linked network of relationships, a change in one institutional aspect requires or generates corresponding changes in others. Giving recognition to this concept means that the planners need to think of an integrated package of institutional reforms, rather than of isolated items in an ad-hoc manner.

Water Management Performance

Since late 1970’s, no water from the average annual supply of 48 cubic kilometers in Syrdarya reached the Aral Sea, and Amudarya with a total supply of 85 cubic kilometers supplied only dwindling quantities. See Figure 4.

This process of closure is attributed to three major causes: excessive diversions for irrigation (mainly for cotton production), poor operation and maintenance of irrigation systems and mismanagement of water resources (Bedford, 1996).
Deterioration of the Aral Sea

- Level (m)
- Area (1000km²)
- Volume (10km³)
- Salinity (g/l)

Several projects are under way to assess the water diverted at various points in the river and canal systems (Dukhovny, 1998; and Raskin et al, 1992). Micklin (1991:6-7) reports 1980 data from the Institute of Water Problems to conclude that "the water management crisis in Central Asia is caused by irrigation". In 1980, irrigation accounted for 84% of total withdrawals, and 85% of consumptive use. The total withdrawals for the two major rivers increased from 61.5 cubic kilometers in 1960-65 to 93.1 cubic kilometers in 1976-80 (Tsutsui, 1994). Over 50% of this was used for cotton production.

The Aral Sea, which is the fourth largest lake in terms of surface area is now about half of its surface area and one-third of its volume in 1960. The two major rivers, Amudarya and Syrdarya, carried about 50 cubic kilometers per year to the Aral Sea 30 years ago, but today, they supply only a trickle. The concern for performance improvement is in the backdrop of this continuing environmental degradation.

While the present performance levels signal an almost inevitable environmental disaster, some professionals think that the earlier planners were blinded by a technological fix to build gigantic irrigation systems. The famous Russian climatologist, A. I. Voevko had stated in 1908, that the Aral Sea was a mistake of Nature! It collected and evaporated massive amounts of water flowing from the mountains in a natural depression without allowing any benefit to mankind (Golubev, 1993). His fellow scientists probably wished to correct this Nature's folly by capturing the water up stream for beneficial purposes.

Given that the benefits have been established, a reversal of the whole development process is most unlikely. Some relief may lie in the water saving measures, which requires strong institutional support.

**Options for Institutional Reforms**

The need and opportunities for research and actions related to institutional development lie in a proper assessment of performance. Conceptually, the performance of the physical system is what the institutions achieve. The people’s structured behavior (roles) and their underlying norms and procedures (rules) determine how a man-made physical system would deliver the intended outputs. Judging from how the individuals and groups have organized, and are conducting various tasks in the present situation, the need for restructuring or improving of the present institutional framework can be assessed. Accordingly, the methods of achieving institutional improvement can be developed.

The program of activities aimed at institutional improvement needs to be considered in four phases: diagnosis, strategy development, action research and evaluation of short-term impact.
1. Diagnosis

Even a preliminary survey raises a number of questions. Is the perceived complexity of the present institutional framework a productive feature? If not, can the structure be rationalized to make it more efficient and effective? Do the BVOs have sufficient legal coverage to effectively act within different national boundaries? Can the BVOs be effective in ensuring the adherence to national water rights if they are restricted to the river system only? Should the water management organizations below the BVOs be established on the basis of hydrological boundaries rather than administrative boundaries?

Three main areas need to be investigated to find answers to these questions. The three areas are:

- Current policies, institutions and management modes related to water resources management in the region;
- Rapid appraisal of the existing physical and social system in the basin area; and
- An assessment of the present water management performance, particularly related to the productivity and sustainability of water resources use.

These surveys across the borders of the five states would indicate the institutional and physical conditions under which water is relatively more productively or more unproductively managed. The investigation would also point towards the potential performance improvement. The crafting of institutions (including the adaptation and improvement of institutions) has to take account of the unique combination of variables in a given system (Ostrom, 1992).

2. Strategy Development

Based on the results of the diagnostic surveys, contextually appropriate strategies for institutional change can be developed. Already, some professionals engaged in discussing rudimentary institutional changes in the agrarian sector of the region emphasize the need to develop their own models. Many foreign experts and externally aided projects are working mainly on infrastructure development and modern decision support systems. It is unclear whether these efforts are widely appreciated. However, major institutional changes, which could have attracted greater dissent, are not in this agenda of projects and programs. Literature frequently refers to consistent failure in achieving program objectives, particularly in improving the productivity of water management (Micklin, 1991:37).

In the development of institutional reform changes, minimum social engineering inputs by external professionals will be possible through capacity building exercises, so that mistrust and misinterpretation can be avoided or minimized. Workshops can be used as a major method of obtaining local opinion for
developing new strategies. A step-wise gradual effort, through a series of workshops and seminars, is recommended for strategy development, so that each step can be assessed and results can be used in developing the next step.

3. **Action Research**

Subject to the results of diagnostic surveys and participatory strategy development efforts, action research can be envisaged on enhancing coordination mechanisms, improving management accountability, re-orienting the water management organizations and updating the legal framework. Also included would be eliminating or reducing the dysfunctional elements of the existing institutional structure. For instance, many commentators have expressed the view that no performance improvement can be achieved without curtailing corruption, which is also part of the rules-in-use that pervades the society. The recommended mode for action research is essentially through NARS.

4. **Short-Term Evaluation**

In a multi-phase and multi-year program of research interventions, it should be possible to assess the effect of processes and the short-term results achieved. Since the work is to be carried out in five countries with varying degrees of economic and political development and transformation into private enterprise mode, the evaluation can identify conditions that promote or inhibit the introduction of institutional change and the improvement of water management productivity.

**Key Characteristics of a Program of Institutional Interventions**

Based on international experience, and the brief reconnaissance survey on the present situation in the Central Asian Region, some key elements of an appropriate program of activities by IWMI can be suggested:

- The institutional changes should be introduced in a package of reforms for them to effectively gain root in the given context. This suggestion implies that that a narrow focus on water users associations alone, as expected by some local professionals, would not be fruitful. It needs to be accompanied by some corresponding changes in policy, legal basis, procedures, incentives, interface with state authorities and support systems.

- Prior consent (or approval) at the highest possible government level for studies as well as subsequent results dissemination and implementation should be a prerequisite to any program. Particularly, institutional change, even the least controversial procedural change cannot be achieved without a clear policy direction in the given governance structure.
• For maximum effectiveness, research as well as research-based strategy development should be through a participatory approach. The recommendation by Ostrom (1992) that involving the users and suppliers of a water resource system throughout the institutional design process is typically applicable to the present socio-political context of the region. In the wake of change from the soviet system, the public as well as the bureaucracy both tend to have some mistrust of the external influence for change.

• Activities on institutional aspects should be closely integrated with research on technical aspects. For instance, performance assessment through RS, GIS or modeling can be used in strategy development for institutional change.

• The development of strategies, particularly those for locally managed water resources at the lower levels of the water resource system should necessarily be founded on government’s declared policy. However, attempts may be made through research-based information sharing to help in the policy formulation. For instance, should the existing large farms prove to be more advantageous in economies of scale, water users’ or farmers’ organizations may be designed to take over collective responsibility for such large units in order to avoid fragmentation of land holdings.

Many on-going research and consultancy efforts in the region can provide very useful inputs into this suggested interventions for institutional change. The various research institutes associated with the original Academy of Sciences are having a stronger research culture, compared to those in South Asia. Their professionals are very keen to collaborate with international centers, such as IWMI. These local research institutes see the value of institutional change and are likely to interact with their respective political authorities to obtain the necessary approvals for initiating research-based change. Some countries (eg. Kazakhstan) in the region are already adopting free-enterprise economic models more seriously than others. The five countries, therefore, would offer a good typology in terms of change adoption. In many respects, Central Asia seems to offer excellent opportunities for IWMI to work and show impact.
References


Dukhovny, Victor; and Sokolov, Vadim. 1996. The basic idea and principles of water strategy for Aral Sea basin. Paper R. 1.09, Q. 47, ICID Seventh Congress.

Dukhovny, V. A. The regional water strategy as mechanism and set of measures for sustainable water management of the Aral Sea Basin.


Persons met:

Mr Michael Armitage, Irrigation Economist, WARMAP, EU-Tacis Program
Director, Institute of Social Science and Agro-chemistry, Tashkent

Director, Institute of Water Issues, Academy of Science, Tashkent

Dr Surendra Beniwal, ICARDA, Regional Coordinator, Central Asia

Prof Dr Victor A. Dukhovny, Director, SIC-ICWC

Mr Pieter vander Hoven, Consultant, EU-Tacis Program.

Mr Mikhail G. Horst, Deputy Director of SANIIRI

Dr Zakir I. Khalikulov, Consultant Scientist, and Head, Project Facilitation Unit (CGIAR)

Dr Myker A. Pinkhasov, Leading Researcher Economist, SIC-ICWC

Dr Nerozin Sergey, Head of the Dept of Agricultural Investigation, Central Asia Scientific Research Institute of Irrigation (SANIIRI)

Dr Albert M. Shapiro, Planning Division Chief and Groundwater Specialist, SIC-ICWC

Dr Vadim I. Sokolov, Regional Coordinator of “WARMAP”, EU-Tacis Program

Dr Iraida A. Sorokina, Chief of Regional Information Corporate Center, SIC-ICWC

Dr Pulatkhon D. Umarov, Deputy Director, SIC-ICWC

Ms Annie Vanslambrouck. Irrigation Engineer On-Farm Water Management Project (“French Project”) EU-Tacis Program