INSTITUTIONAL ASPECTS OF CONSERVATION AGRICULTURE: WATER USERS ASSOCIATIONS[1]

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ABSTRACT

Fresh water is a finite resource for many countries around the globe. Its availability is decreasing both in quantity and quality, while the competition for water is increasing due to growing world population and demand for food and attempts to improve living standard. The management of scarce water resources, the need for water conservation and restoration of the environment, damaged due to ineffective water management require changes in the water managing policies and institutions.

The way water resources in FSU were managed in the second half of the past century had both positive and negative effect and contributed to the existing situation. On one hand, extensive development of water resources led to transformation of millions of hectares of virgin lands into agricultural production, providing millions of people with food and livelihoods. On the other hand, the over-exploitation of water resources led to drastic changes of the environment: many water bodies, such as lakes, small rivers, and delta wetlands had dried up. The Aral Sea basin is one of the dramatic examples of the negative impacts of large-scale irrigation interventions.

The state-controlled era of development in the Soviet period has a legacy of standardized procedures and rules formulated at the top. The shortcomings of such a water management included fragmentation, duplication and highly administrative approach, without considering the needs of the environment and input of water users into planning, allocating, and managing of water resources.

Presently, in most parts of the world water users play a growing role in water resources management and water conservation programs, in all water sub-sectors. Especially in irrigated agriculture, which in some countries is using over 90 % of the available water resources, the input of water users into water management is essential. This paper presents an analytical view of the role and importance of water users organizations/associations (WUOs /WUAs) in the irrigated agriculture and under irrigation management transfer (IMT) in Central Asia region.

Water Users Associations are an excellent vehicle to promote participatory irrigation management (PIM) and water conservation in agriculture, offering many water and economic advantages to the farmers who become WUA members. Besides securing water and providing for its equitable distribution, WUAs can purchase a variety of agricultural inputs and machinery, as well assist to obtain a credit. The WUAs can serve as wholesome units for improving water and land productivity at a basin-scale and institutionalize integrated water natural resources management. Other advantage of WUAs is that structurally, they can form a basic unit for water management in the basin and facilitate conjunctive water management, consider protection of groundwater and use of drainage water, as well as sustainability of the environment.

Keywords: Integrated Water resources Management, Water Users, Water Users Associations, Irrigation Management Transfer, Participatory Irrigation Management

BACKGROUND

The world's population may not be growing at the rate projected by different organizations; however, the need for the natural resources in some countries exceeds the reserves of these resources. Amongst the resources, water is the one for which the need is rapidly growing, as most sectors of the countries economies are expanding. Industry and agriculture are two sectors for which the water need is rising. The need for water is predicted to grow from 25 to 100 percent of the level of 1990 in 2025.

At present, water scarcity, either permanent or seasonal, exists when the country water resources base cannot satisfy the multiple needs of the population for domestic use, industry, agriculture, and the needs of the environment. To secure adequate amount of water of good quality for human needs, food production and the environment presents the greatest water problem of our time. Already about 60 % of the natural ecosystems (lakes, wetlands, forests, etc.) have deteriorated due to water supply problems during the 20th century. The key problem is that water resources are being mismanaged, and a serious water crisis is looming. Some elemental reasons may be: i) insufficient time to act, ii) limited tools and measures available for conserving essential water supplies; iii) competing water demands; iv) inadequate ability to deal with and manage water shortages and droughts.

Access to drinking and irrigation water has always been a political issue. Power and politics ultimately are about access to resources, whether they are natural, human or imaginary. Any society needs to find ways of regulating resource ownership, modes

of production and human relationships. The main differences between societies can be defined in terms relating to some of the political issues: decision-making power, law enforcement, access to production factors such as labor, land and water, gender relations. Notably, the awareness that water is not the least important in this series is growing.
History is full of examples of wars fought about land and water. While today the access and control over markets have become more important than the territory, policy makers are looking at water as a strategic commodity like oil, steel or rubber. Increasingly, water shortages in some industrialized countries and competition and struggle over the access to water sources by the growing populations in the developing countries, are leading to better awareness about the need for more efficient use of water. However, in developing countries, productivity of water in the irrigated agriculture is approximately 2-3 times lower than in developed countries.
It is possible, that many users have not yet developed a proper appreciation for the real value of water, because they are isolated from the planning, distributing and managing of water resources, or just simply not aware. However, it is peculiar hat in many developed countries; the use of agricultural water supply is subsidized.

The most suitable response to the growing water crisis would seem to be a preservation of crucially important water resources and sources and conservation of water resources that are used to produce food and other goods, along the principle quoted by Kofi Anan – getting more 'crop per drop', as well as improving water management through introducing principles of integrated water resources management and participatory irrigation management.

1 NEW WATER MANAGEMENT PRINCIPLES

In the past, the term 'water resources management' was used by technicians and engineers, who attended to the issues of access, construction, and maintenance of dams, canals and water reservoirs. But dams and reservoirs, or even laws for water resources, do not guarantee equal and fair access to water. Nor do they automatically result in equal distribution (World Bank, 2002). The key issues in water resources management today are largely institutional. Nevertheless, it is very important to understand that some of the more difficult areas for the strengthening of institutional arrangements or capacity building have often physical or other limitations. The main reasons for poor performance in the state governed water resources management maybe:

- Lack of innovative thinking or understanding to apply the proper soil and water management concepts (including design) for the different environmental conditions. Therefore, yields may remain low and various upgrades may have a little effect, thus not providing enough incentives for improvement of soil and water productivity.
- Improper or lack of budget for maintenance of infrastructure and distributing facilities, as well as preventive maintenance and asset management

In the past, many governments, especially those across the countries of the Former Soviet Union and Eastern Europe, were responsible for irrigation system investment planning, policy making, as well as construction, O&M and control of water use. Farmers had practically no involvement. The maintenance that was carried out was marginal, and as a result, the system infrastructure found itself after the states' independence in need of high investments and major rehabilitation.
The above mentioned water management shortcomings are now being well recognized and new trend towards integrated, comprehensive, or holistic water resources management is propagated. Three new principles, issued by the International Conference on Water and the Environment, held in Dublin in 1992 were:

- The "Ecological Principle" requiring holistic water management,
- The "Institutional Principle" requiring participatory water management including devolution of responsibility "to the lowest appropriate level" and greater involvement of NGOs, the private sector, and women, and
- The "Instrument Principle" requiring that water is managed as an economic resource.

There is a consensus among all major technical assistance, research, lending and donor organizations that integrated water resources management (IWRM) is the essential concept within which most solutions to the world's water problems must be found. The concept promotes coordinated development and management of all water resources and sources in a conjunctive manner to maximize the resultant economic and social welfare equitably, without compromising the sustainability of vital ecosystems (adapted from GWP 2000).

IWRM, in contrast to the conventional sectoral management (that maybe fragmented and uncoordinated), aims to integrate at least the following aspects:

- demands for water of different sectors of the economy
- interests of all water and land users and other stakeholders, with attention to upstream and downstream users;

- physical, biological, and human components of needs for water;
- political or administrative levels or units;
- policy, legal, institutional, managerial, technological, financial, research, and development aspects of water resources;
- Management functions of water acquisition, allocation, distribution, conveyance, application, use, and disposal (or drainage).

Integration occurs through a common process of analysis, negotiation, consensus building, decision-making, and management. The objective of IWRM is to find an optimal balance between water use for livelihoods and conservation of the ecosystem within which water resources are used and replenished (Vermillion, 2002).

The IWRM principle is similar to the decentralization of water resources management. Three main trends in decentralization of water services have emerged: private sector participation (PSP), delegation, and devolution. PSP is a spectrum ranging from full privatization to contracting out for services such as irrigation to the private companies. Under the delegation model, governments transfer water management to public or semi-private water companies and to water users. The third trend considers transfer of small-scale irrigation, rural and urban water supply/sanitation to local governments.

The new thrust towards participatory management processes has enabled decentralization to user groups. This comprises the intended beneficiaries, who weigh all technically feasible options, consider capital and recurrent cost implications, make choices, and then manage systems. The approach pays dividends for both governments and communities: communities receive what they need and governments are relieved of the long-term operation and maintenance (O&M) burden.

Where irrigation uses the majority of water in a river basin, without viable participatory management of irrigation systems, effective IWRM will not be possible. Participatory irrigation management means that water users take over primary responsibility and authority for:

- Water delivery and drainage within irrigation systems,
- Maintenance and repair of irrigation infrastructure, and
- Upgrading and extension of irrigation systems.

1.1 World Experience on Implementing Water Management

The attempts to improve performances of government owned and operated irrigation systems have compelled a number of countries to transfer rights and responsibilities for management of irrigation systems from government agencies to users. The Philippines (Wijayaratna and Vermillion 1994, Svendsen 1992), Indonesia (Soenarno 1995), China (Xu Zhifang 1995) and Sri Lanka (Ratnayake 1995) in Asia, Mexico (Gorriz et al 1995) and Colombia (Garcia-Betancourt 1994) in Latin America, and others such as New Zealand (Farley 1994) and Turkey (Devlet su Isleri et al 1996), have made major efforts in this direction. Transferring responsibilities has become seen as a way to reduce pressures on thinly stretched government finances while at the same time improving irrigated agricultural production and ensuring the long term sustainability of irrigation systems (Geijer et al 1996, Vermillion 1991). A number of management options ranging from full agency control to full users control, used in water management systems are shown below. Forms of shared management (agency-users) are the most popular.

Table 1 The Options of Water Management (World Bank, 1996).

Activity	Full Agency Control	Agency O&M (user input)	Shared Management	Users O&M	Users own (agency regulation)	Full control users
Regulation	Agency	Agency	Agency	Agency	Agency	Users
Ownership of structures, water	Agency	Agency	Agency	Agency	Users	Users
O&M responsibility	Agency	Agency	Both	Users	Users	Users
User Representation	Agency	Users	Users	Users	Users	Users

1.1.1 Intermediate and Central Government Functions

In most cases, regulatory functions remain the domain of national level agencies, while operating functions are more likely to be devolved in some way. Central government agencies often have a primary role in establishing legal and regulatory frameworks for water rights, pricing policies, and environment standards. These regulatory functions are the most susceptible to capture the attention of local interest groups and the concerns that they address – potential for environmental degradation and disputes over

the distribution of water - often affecting multiple sub-national jurisdictions. Central governments' broader perspective gives them a comparative advantage as authority in disputes between communities as well as various broad user groups (such as agricultural, residential, etc.)

Central and provincial governments also have a financial and technical comparative advantage in managing and financing capital-intensive main systems. End-users are better able to manage smaller, feeder systems that require local knowledge and ingenuity, local resource mobilization, and enforcement of contracts among secondary and tertiary users (e.g. irrigation channels).

1.1.2 Role of Water User Groups

Water user groups are usually formed around a group of potential users, farmers or rural/urban households, for the purpose of accessing water sources. These groups usually have some sort of legal character (e.g. are legally registered, have elected leadership and a constitution, etc.) and are held together by common interests of members, the public good characteristics of the service, and the expected gains from collective action. User groups work well and fully internalize costs and benefits of schemes when they are certain that they will not be rescued by public agencies if they fail to mobilize the required funds for operation and maintenance.

2 INSTITUTIONAL ASPECTS OF WATER RESOURCES MANAGEMENT

2.1 Brief Historical Development

In the Soviet era, different ministries and institutions were responsible for water management. The Ministry of Melioration and Water Management of the FSU were in charge of Central Asian water resources management. The water resources of Central Asia were considered as water resources of the entire Soviet Union. The water management policy and water allocation between the Central Asian States were based on the maximum economic benefit to the Soviet Union as whole [Jochen Renger, 1998].

Under the FSU, the Central Asia region had a rather unique water management policy and institutions, based on interdependency of the republic. After independence, the Central Asian states put into place different arrangements for regional cooperation in water management, primarily with the establishment of the Inter-state Commission for Water Coordination (ICWC). During the ten years of independence the water management institutions and policies of Central Asian countries had changed and the countries are proceeding in different land and water reforms at their own pace. Kazakhstan and Kyrgyzstan are reforming its institutions and policies faster than the other neighbors are, while Turkmenistan may be the slowest, just now embarking on the road towards reforms. Uzbekistan and Tajikistan seem to be somewhere in between.

In all five states of Central Asia, agriculture is gradually changing from a sector composed of large-scale state farms to a mixture of agricultural cooperatives, joint stock companies, associations of peasant farms, and private independent farms. This transformation has created maintenance problems resulting in an institutional vacuum, posing additional financial burden on the governments. The O&M of canals, which, in the past were maintained by the large cooperative farms, has been gradually transferred under a system of land and water reforms either to the newly created WUAs (in Kazakhstan and Kyrgyzstan), or to shirkats (Uzbekistan) and joint stock companies (Tajikistan).

At present, private farms are becoming quickly members of the newly created WUAs - approximately 80 % in Kyrgyzstan, 65% in Kazakhstan, 25% in Uzbekistan, and 10% in Tajikistan. In the irrigation systems that are managed by WUAs, some progress in O&M and water conservation can be seen (an example of "Best Practices" project executed in a partnership of IWMI-SIC below).

2.2 Water Users Organizations and Participatory Irrigation Management

Within the PIM terminology, water users associations are comparable to water user groups, from the point of view of the size and level of responsibility that corresponds to the tertiary or secondary system units (or parts thereof) within the irrigation schemes, depending pretty much on the size and layout of the schemes. In most countries the WUAs at the tertiary level are informal, and not necessarily legally constituted. Nevertheless, WUAs can also be formed at the tertiary level and established as formal legal entities to assume irrigation management responsibilities for a hydraulic unit, however, mostly at the secondary system level. WUAs can then federate to create a WUF for primary (or secondary) system management that will assume responsibilities typical of a large WUA as legal entity.

What is generally proposed under well-developed legal framework, are WUAs of suitable size (from around 3,000 to 5,000 ha; definitely over 2,500 ha to be financially sustainable), the WUFs formed at the sub–scheme or scheme level, again, depending on the size of the scheme and its layout. Such an organizational set up enhances chances for sustainability of the irrigation system. There are different models for the organizational set up of WUAs and WUFs, however, the principles and practices remain the same, generally evolving under the country specific conditions.

The basic progression of steps for the WUA to function as a management unit is the following:

- Creation of WUAs at a minor canal level
- Transformation of basic O&M responsibilities for the minor and smaller channels to the WUA, with farmers participation in the O&M
- Allocation of water and delivery of water to the WUAs by the water providing entity, accordingly with annual agreements
- Applying water charge to WUA for water service on the basis of the volume actually delivered (volumetric pricing).

2.3 PIM/ WUAs and Water Conservation – as viewed under the 'Best Practices' project[4]

Participatory irrigation management can lead to significant increases in the efficiency of water use and the value of irrigated agricultural production. In countries, where PIM and IWRM principles were applied, generally, positive results have been achieved. Amongst those are: improved availability and reliability of water supply, flexibility in cropping pattern enabling farmers to make shifts in cropping pattern towards high value crops; and more efficient use of water.
Farmers in the Syr-Darya basin (H.Murray-Rust et. al., 2002) have reported general improvement in yields. Another noticeable benefit to farmers was the time saved for receiving water without having to apply for it and apply separate payments. Additionally, more equitable water distribution resulting in reduction in conflicts is also visible. This in turn has led to improved understanding and goodwill in the farming community. Farmers are spending more time on repair and maintenance, and as a result, the field systems are in a good condition. Improvements in irrigation efficiency and reduction in seepage losses are noticeable. Willful damage to the infrastructure has been considerably reduced, because farmers are watchful for each other, and start developing a different sense of collective action. WUAs have adopted new water distribution rules suitable to local conditions. These rules are pragmatic and ensure equity.

The PIM also serves well to the water providing entity. The irrigation agencies have had to make additional investments in improving the physical system condition before handing over to farmers for water distribution. They have also had to provide management subsidy and repair and maintenance grants to the WUAs. Significant benefits to the agencies have been marked in the increased recovery of water charges, and reduction in time spent in water distribution, conflict resolutions and recovery of water charges.

The concept of Irrigation Management Transfer (IMT), handing over the O&M and control over water related resources to the water users, with the implied expectation that they now have to live with the consequences of their management, appears to be the key to make users effectively manage their resources. Users maintain the physical structure of the system better when substantial responsibilities are transferred to them. The equity in water distribution also improves when WUAs distribute water amongst the water users.

Some preliminary indications are that the shift to volumetric pricing of water is beginning to make farmers think more seriously about conservation and about the value of water. Therefore, volumetric pricing coupled with improved physical conditions of the systems and increased reliability of water supply will help in increasing the value of agricultural production and the efficiency of water use.

Water saving competitions conducted earlier under the Best Practices predecessor - the A2 component of the GEF (World Bank project) combined the need to increase productivity of irrigation water under the increasingly worsening conditions of water scarcity. The competition was to stimulate wider circle of water users and involve them into water savings. Its primary strategy was to propagate application of inexpensive technical and managerial methods and measures to save water by users themselves. The first year of the 'Best Practices' project accomplished broader involvement of water users into the water conserving methods, therefore continuing of good water management practices. It also continued to involve the water supplying organizations and various groups of water users (collective farms, farmers, and water users' associations) that participated under the A2 component. In total, some 144 water saving initiatives participated in the original competition: 30 district water management organizations (DWMO), 8 WUAs, 58 collective farms (CCF) and 61 private farms (PPF) from 8 oblasts of the Aral Sea Basin.

When IWMI had decided to build on the previous work and continue the monitoring and evaluation of the applied water saving practices, the initiative focused on reaching wider public to adopt basin wide water conservation practices. The overarching goal of the project is to forge a gradual change of attitude of water users and water managers at all levels of hierarchy towards water as a limited resource and prepare indicative recommendations for policy makers regarding water allocations of irrigation water within the region. The strategy is to select the best objects from the previous competition, monitor the water use, productivity and salinity situation, and encourage the other water users through demonstration to conserve water. In this process, the local NGOs are to be involved to promote water savings campaign in irrigated agriculture and disseminate water conservation results to public at large.

The organization of the second year of the Best Practices is slightly different, due to financial limitations. The number of the participants has decreased to: 12 DWMOs, 9 WUAs, 15 CCFs and 24 PPFs, including 6 oblasts of the Syr-Darya Basin and 3

oblasts of the Amu-Darya basin. The project outcomes from general data collection is now oriented towards the data on water productivity. Also, attitude for water saving had changed from competition into participation (Murray Rust, et.al. 2002). The WUAs mainly cover the territory of former kolkhozes and sovkhozes, the cultivable command area is similar, but crops grown have slightly changed, however, the main crops still remaining cotton and wheat, occupying 60% of the land.

The water delivery changes in the project sites are given in Table 2, showing that in all reaches of the Syr-Darya basin, the WUAs have lowest water supply rates, among all other types of water users/units. This proves that best results in water conservation can be achieved under the collective arrangement and PIM principles of WUAs. In all reaches, WUAs have two times lower water supply rates, in comparison with collective/cooperative farms, in spite of their similar sizes and cropping pattern.

Table 2 Water Deliveries to Different Types of Unit, and Different Locations (mm/season) (Hammond Murray Rust, et.al.2002)

	CCF*	PPF**	DWMO***	WUA	Average
Head	986	498	934	483	831
Middle	862	949	1123	482	961
Tail	1883	870	1122	782	974
Average	966	831	1080	525	913

Note: CCF- collective/cooperative farms, PPF- private/peasant farms, DWMO- district water management organizations.

The key indicator in assessing performance of different water users/management organizations is considered water productivity. For the different types of users/organizations and for different oblasts of the Syr-Darya Basin the water productivity ($/m3) is calculated and the results are presented in the Table 3. Again, it shows, that WUAs have the highest water productivity amongst all users/organizations.

Table 3 Productivity of Water by Oblast and Type of Unit ($/m3), all lands (Hammond Murray Rust, et.al.2002)

Type	Djalalabad	Osh	Fergana	Sogd	South Kazakhstan	Kzylorda	Average
CCF	0.12	0.12	0.21	0.10	0.15	0.03	0.11
PPF	0.10	0.11	0.23	0.16	0.22	0.04	0.14
DWMO	0.05	0.06	0.13	0.03	0.14	0.02	0.06
WUA	0.13	0.15	N/A	N/A	0.24	N/A	0.17

N/A- WUAs are not represented among the project sites.

The following may be the main reasons for highest water productivity in the newly created WUAs of Central Asia:

- Agriculture production responsibilities are divorced from water resources management, which makes it easier for WUAs, in comparison to the CCFs;
- Involvement of water users in O&M and water management within the WUA organization leads to more efficient water allocation and reduced water losses;
- Introduction of water fees makes it possible to conserve more water, leading to the increase of its productivity

3 CONCLUSIONS

The major response to the growing water crisis would be conservation of critical water resources or “crop per drop” principle, improving of water management through the implementation of principles of integrated water resources and participatory irrigation management.

Some preliminary indications are that the shift to volumetric pricing of water is beginning to make farmers think more seriously about water conservation and the value of water. Therefore, volumetric pricing coupled with improved physical conditions and increased reliability of water supply will enhance the increase of agricultural production and the efficiency of water use

Irrigation management transfer of the O&M and/or the systems to Water Users Associations, as well as a specific involvement of farmers in a participatory process to develop and manage the land and water resources may lead to a substantial increase of land/water productivity in the many parts of the world.

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