WATER USERS ASSOCIATIONS IN ARMENIA:

CURRENT SITUATION AND FUTURE TRENDS

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Abstract

Experiences of Water Consumers Cooperatives accumulated in Armenia during the past six years have been mixed. Some cooperatives have provided evidence of being capable of organizing themselves and responding to the needs of their members more effectively than any central governmental organization. However, many other aspects are still unresolved. Created in 2001, the State Committee for Water Economy (SCWE) agreed recently to follow a more participatory approach in establishment of Water Users Associations and, on the basis of positive experiences worldwide, SCWE is willing also to scale up the process to the level of Water Users Federations.

Index words: Armenia, Irrigation Agriculture, Water Consumers Cooperative, Water Users Association

WATER USERS ASSOCIATIONS IN ARMENIA: CURRENT SITUATION AND FUTURE TRENDS

A small, mountainous, semi-arid country, Armenia occupies about 29,800 square kilometers (km^2) in the South Caucasus region of Europe. About 75% of that area lies more than 1,500 meters (m) above sea level. Of an official population of 3.8 million, about 31% of the population live in rural areas. Nearly 60% of the territory receives less than 600 millimeters (mm) of precipitation, and 20% receives less than 400 mm. The precipitation in Armenia takes place mainly in the non-growing season, requiring the regulation and management of surface flows for agricultural production. For that, 83 reservoirs (dams) have been built, with a total capacity of about 1.35 billion m^3 water (World Bank (WB), Report No. 19362-AM, 1999).

Annual water flow in the country averages 7.2 billion m^3, of which 2.2 to 2.4 billion m^3 (32%) is used for irrigation purposes (WB, Technical Paper, 2001). Approximately 40% of irrigation water originates from groundwater sources (WB, Report No. 12811-AM, 1994). To deliver the available water to the final water consumers, 3,368.7 kilometers (km) of primary and secondary canals, 15,128.7 km of tertiary canals, 403 large and small pumping stations, 1,276 tubewells and 945 artesian wells were built during the Soviet era (1920-1988).

Problem Description

Prior to its independence in 1991, Armenia was largely an industrialized country, but that status has changed dramatically in the past 10 years. By 2001, it had become an agrarian economy, primarily subsistence agriculture. Its arable land comprises 483,500 hectares (ha), the majority of which is irrigated (285,400 ha, or 59%). Approximately

80% of the total agricultural output is obtained from irrigated land (Integrated Water Resources Management Project (IWRMP) Study, 2001). Privatization of land in 1991-1992 resulted in the majority of Armenian households, whatever their profession, acquiring small plots of rural land. As of 2001, there were an estimated 334,858 small farms in Armenia (WB Armenia Irrigation Development Project (WBAIDP), 2001), but the agricultural sector share of the Gross Domestic Product accounted for only 25.9% (WB, World Development Report, 2001).

The nature of farming has also changed in Armenia over the past decade. Farmers have adapted their cropping patterns to severe existing marketing constraints and the needs for family survival; that is, agriculture has become driven by family food needs rather than markets. Crop products increased by 20%, while livestock products decreased by 20% (WB, Report No. 22854-AM, 2001). Perennial and market-oriented crops gave way to basic cereals (wheat, barley) and potatoes. Agricultural output declined at an overall rate of 5% per annum during the '90s.

For a land-scarce, relatively labor-abundant country, such as Armenia, where availability of arable land is only 0.13 ha per capita, irrigation provides an opportunity for higher returns to land. The average incremental income per ha from irrigation was estimated to range form US$210 to US$350, using about 8,000 m^3 per ha to produce this income. Thus, the incremental value produced by 1 m^3 ranges from US$0.026 to US$0.044, about 1.18 to 2.00 times the cost of water (approximately 12.7 Armenian Drams or US$0.022), which suggests that irrigation is economically justified under the Armenian conditions (WB, Report No. 22599-AM, 2001).

The irrigation sector of Armenia originated in the 1920s-1930s, designed and operated as part of the unified infrastructure system of the former Soviet Union. It was highly energy-intensive, not adequately considering the scarcity of energy resources of Armenia. About 165,200 ha (58% of all irrigated land) are irrigated by gravity conveyance schemes, and the rest are irrigated by pumping stations.

Following land privatization in 1992 and the breakup of collective farms, the system came into a critical condition. The high cost of electricity makes about 10% to15% of the total irrigated area economically unviable. At an electricity cost of US$0.038/KWh, average annual pumping costs can represent up to US$300 per ha, or 50% of the gross financial return (WB, Report No. 22599-AM, 2001). Thus, inefficient areas have already gone out of irrigated production. Irrigated area declined from about 330,000 ha in 1988 to only 187,000 ha in 1998, because of failure of pumping and conveyance systems, costly and unreliable pump irrigation, and the inability of on-farm irrigation systems designed to service large farms to adjust to the new, post-socialist realities of small private farms (WB, Report No. 22599-AM, 2001).

Objectives

To manage water resources in an effective and efficient manner, a balanced set of policies and institutional reforms must be in place. The overall objective of this paper, then, is to analyze the current situation with respect to Water Consumers Cooperatives (WCCs) and Water Users Associations (WUAs) in Armenia and identify future trends in their development. Specific objectives include: (1) reviewing and analyzing the current legal and regulatory framework related to the irrigation sector, and (2) providing recommendations to accelerate the process of WUAs/WUFs formation.

Information and Data

The main sources of information and data include: (i) GoA decrees, decisions, regulations and programs related to the water sector; (ii) WB documents and reports focused on water, agriculture and irrigation issues; (iii) Social Assessment (SA) surveys for the Irrigation Development Project (IDP); (iv) data collected under other recent studies of the poverty and the agricultural situation in Armenia; (v) lessons provided by the Irrigation Rehabilitation Project (IRP) completed in 2001; (vi) information provided by the IRP and IDP Project Implementation Unit; and (vii) field visits to selected communities. Data from different sources were cross-checked to improve reliability of information presented and conclusions reached.

Irrigation Institutions and Management

After independence in 1991, the Ministry of Water Resources was dissolved, and the responsibility for operation and maintenance of Armenia's irrigation system was transferred to several new organizations and to the Ministry of Agriculture (MoA). The Government of Armenia (GoA) adopted low irrigation tariffs to support the agricultural sector. GoA also subsidized the cost of electricity, for which it set cost recovery tariffs resulting in increased total irrigation expenses. One purpose of the subsidies was to mitigate migration of people from rural areas, especially bordering areas, and thus creating buffer zones with neighboring countries. However, from December, 2002, levels of state subsidies were set to decline from 80% of electricity expenses in 2003 to 20% in 2006 and zero afterward.

Before 2001, functions in water resources management were performed by several ministries and government bodies, and no comprehensive policy approach

relating to the water sector (irrigation and drinking water) existed. Lacking clarity in the allocation of responsibilities for the management of the irrigation system, the water sector was characterized by wasteful irrigation practices and a high rate of water losses at the level of conveyance infrastructure. Water losses in irrigation systems comprised 35% to 52% during 1998-2001, equaling 520 to 932 million m^3 annually. Several factors contributed to the losses: evaporation in the semi-arid climate, poor physical condition of some non-rehabilitated sections of the system, as well as the human factor – corruption in the sector had resulted in continuous misreporting. The share of electricity costs was about 70% of Operation and Maintenance (O&M) expenses, which were consumed disproportionately as compared to the water intake volumes (Table 1).

Table 1. Major Factors of Armenian Irrigation Sector, 1998-2001

Factor	**1998**	**1999**	**2000**	**2001**
Water intake (million m^3)	1,496.0	1,563.6	1,764.6	1,066.5
Water supplied to consumers (million m^3)	972.5	887.5	832.4	742.5
Water losses from system (%)	35.0	43.2	52.8	30.4
Collection rate (%)	69.7	51.2	37.8	52.9
Electricity consumption (million kwh)	294.1	323.8	288	279

Source: "Irrigation" CJSC, 2002

Water Consumers Cooperatives Establishment in Armenia

The first WCCs were created in Armenia in 1996 by the WB-financed Irrigation Rehabilitation Project on the basis of a hydraulic unit. The main objectives of WCCs included the appropriate operation and maintenance of tertiary irrigation water networks,

reliable and timely delivery of services, and provision for collection of charges for them. Subsequently, GoA Decree #117 from February 26, 1998, established WCCs in the rest of the country on the basis of a village unit (one village, one WCC). The establishment of WCCs in Armenia was of critical importance, because they were at the time the only existing farmers' organizations, except for a few seed cooperatives (WBAIDP, 2001). Moreover, WCCs establishment was not only for irrigation sector purposes but for rural development in general, because they had two other important functions - modeling a community-driven development approach in a situation where historical factors prevented participatory processes and demonstrating and helping to develop a "maintenance" culture in the country (WBAIDP, 2001).

The International Fund for Agricultural Development (IFAD) co-financed an IRP component focusing on grassroots capacity building. Eight systems, three pumping stations, 160 tubewells, and four dams have been rehabilitated, enabling provision of reliable irrigation on an area of about 151,000 ha. Approximately 1,250 water meters were installed (WBAIDP, 2001), regularizing relationships between water sellers and consumers and improving general management. Through the funding of IFAD under IRP, 149 WCCs were established on 42,785 ha. By the GoA Decision #117, 332 more WCCs have been established (GoA, Water Policy Paper, 2001), but those remaining WCCs did not receive such support.

For discussion purposes, it can be assumed that there are two types of WCCs in Armenia. WCCs(I) are those WCCs gradually established or subsequently assisted under the IRP or North-West Agricultural Support Project (NWASP). About two-thirds of these WCCs have rehabilitated systems (WBAIDP, 2001). WCCs(II) are those WCCs

established under the GoA Decree that did not receive subsequent support. None of these WCCs have rehabilitated irrigation systems. There were also an estimated 50 villages using irrigation, but with no WCC operating (WBAIDP, 2001).

In fact, there are fairly significant differences between the two WCC groups in terms of their organizational structure, operations and effectiveness. WCCs(I) tend to be smaller and more manageable in organizational terms than the WCCs(II) (IDP Social Assessment (SA) Survey, 2000). The IRP experience suggested that, most effectively, WCCs operate on about 150 to 250 ha having about 100 to 200 members, as in the case of hydraulic unit WCCs. However, some of the WCCs (in both groups) were established on 500 to 1,000 ha and had about 1,000 to 1,500 members (WBAIDP, 2001). These are managerially too large, particularly for a new organization, where participatory processes still have to develop and include all members. Still, the small size of these WCCs makes them inefficient entities, since substantial fees collected are absorbed by fixed costs (IDP SA Survey, 2000).

The WCCs(I) group operate in a more participatory manner than WCCs(II). Approximately 40 original (IRP) WCCs(I) had democratic elections of leaders through a General Meeting. The later additions (about 110 of the total 149 WCCs(I)) and all WCCs(II), have leaders appointed by the chairman of the Village Council, with resulting domination by the village structure. These chairmen could not be removed for incompetence, graft or other reasons, unlike those of the original (IRP) WCCs(I). Some later WCCs(I) additions, with appointed chairpersons, changed their operating style under the IRP training and support (WBAIDP, 2001).

WCCs(I) have greater capacity than WCCs(II), since most of the WCCs(I) group (currently about 66%, but increasing) had an experience in being involved in planning and implementation of the rehabilitation of the on-farm irrigation systems. All received training on legal, accounting, water measurement, water distribution, water rotation, operation and maintenance and other relevant topics (WBAIDP, 2001). Also, there was a higher level of knowledge about irrigation issues among the WCCs(I), while WCCs(II) did not have any similar type of capacity building.

WCCs(I) have greater transparency of water distribution activities. WCCs(I) members knew how much water they needed and paid for, and received clear advance accounting of water tariffs and membership fees (IDP SA Survey, 1998). The WCCs(I) are also more motivated to engage in O&M than the WCCs(II). This is not only because of greater capacity and know-how, but also because most of the first group have a rehabilitated irrigation system, whereas the second group use an inefficient, unrehabilitated system with unsatisfactory performance and multiple problems (IDP SA Survey, 1998).

In places where WCCs have the necessary capacity, they can have an important development impact in Armenia through: (i) promoting user participation in irrigation management; (ii) encouraging equitable distribution of water; (iii) increasing cost-recovery and system financial sustainability; (iv) demonstrating new and participatory organizational processes to emerging private farmers; and (v) providing a forum for, and empowering, farmers to represent their needs and concerns *vis a vis* SCWEs, the Ministry of Agriculture and local governments.

Financial Problems of Water Consumer Cooperatives

The long-term sustainability of the rehabilitated irrigation system depends on timely and efficient O&M, which in turn are affected by the collection of water fees. During the Soviet period, irrigation water was provided free of charge, and payment for irrigation water only began in Armenia in 1995. Monitoring of WCCs(I) in 1998 under the IRP indicated that WCCs were in a desperate financial situation. Of the 149 WCCs in this group, 89% had a zero balance at the end of 1998, meaning that WCCs started the irrigation season in March, 1999, with no funds.

Initially, charges were levied on an area (ha) basis, later changing to a cubic meter (m^3) basis. Tariffs have changed from 2.95 Armenian Drams (AMD) per m^3 in 1996 to 1.9 AMD/m^3 in 1998 (politically determined prior to presidential elections; US$/AMD = 1/440) to a differentiated tariff, averaging 2.3 AMD/m^3, in 1999. Non-members of WCCs had to pay a substantially higher rate (6.32 AMD/m^3 in 1999), whereas WCC members had to pay shareholder fees (1.5 AMD/m^3). In 2001-2002, the GoA established the following wholesale tariffs for the created Water Supply Agency (WSA): 0.7 AMD/m^3 for gravity and 1.2 AMD/m^3 for pumping. The planned collection rate established for 2002 was 75%, which was well overestimated (the overall actual collection rate reached just 52.3%).

Since 1995, three collection systems for water tariffs have been tried, none successfully. Initially, local offices collected water charges from individual farmers through the village councils, overloading OME managerial capacity. After the decree establishing WCCs (1998), they took over this responsibility, with payments made in cash or in kind. Collection rates, however, remained low. In 1999, the “Post Office”

approach was adopted, apparently motivated with the desire to minimize collection system based losses. In theory, the Post Office system operates as follows. Individual farmers pay their water charges and shareholder fees to a village Post Office branch, which then forward them to regional Post Offices. Pre-defined percentages of the collected amount are deposited to the OME/WSA/DIMAs accounts, with the rest going to the WCCs accounts. Some *marz* authorities apparently instructed Post Offices not to deposit funds to WCCs accounts until a 100% collection rate was reached. This level of collections would be very difficult, if not impossible, to achieve, given the economic constraints of the transition period, leaving WCCs without funds for operation and maintenance of their tertiary system.

Major constraints, or negative aspects, of the Post Office collection system that need close attention include: additional travel cost to farmers and an opportunity cost of travel time; problems of converting farm produce to cash because of marketing constraints; an unwillingness to pay of those who are using alternative sources, such as tubewells and rivers, which, by various estimates, account for 18 to 30% of farmers in Armenia; Post Office system undermines the WCCs role and functions in terms of management capacity of collecting charges; and Post Office system threatens O&M of farm-level irrigation networks, since WCCs are left without funds for O&M.

The experience of WCCs accumulated in Armenia during the past six years has thus been quite mixed. Some cooperatives have provided evidence of organizing themselves and responding to the needs of their members more effectively than any central governmental organization. But, since the formation of WCCs has been very rapid, the problems and the mechanisms pertaining to the organization of their activities

have not been complete, and unresolved issues remain. Factors that generated these issues include: (i) GoA decision-based rather than voluntary approach in establishing WCCs; (ii) no appropriate legal framework as a basis for their formation (Law on Cooperatives does not specify rights and responsibilities of water users; (iii) small size of the WCCs makes them uneconomic entities (IDP SA Survey, 2000).

Despite the difficulties that have been encountered with the WCCs, by 2001, much higher returns on land with irrigation were registered – about US$550 per ha as compared with US$370 in 1998 (WB, Report No: 23168, 2001). However, as of January 1, 2001, about 3.5 billion AMD arrears had accrued on payables for salaries, social payments, electricity and other suppliers, which exceeded the companies' annual revenues by 2.3 times. Irrigation water tariffs were set at levels from 1.9 to 3.86 AMD/m^3 in 1998-2001, while the cost of 1 m^3 of irrigation water was 8.0 to10.0 AMD/m^3. The resulting financial gap was covered mainly from state funds.

The GoA has thus recognized the importance of drastic institutional reform in the irrigation sector. GoA Decision #92 from February 9, 2001, established the State Committee of Water Economy (SCWE) and transferred all functions of O&M of irrigation and drinking water systems to SCWE (GoA, Water Policy Paper, 2001). During the first quarter of 2002, several organizational and structural changes took place in the irrigation system. "Jrar" (Water Intake) CJSC (or, Water Supply Agency - WSA) was created, which undertook operation and maintenance of irrigation dams, pumping stations, main structures and collectors. Thirteen regional branches (currently only 12) were formed within the CJSC with the responsibility of O & M of main and secondary canals, implemented through the WSA and 12 Drainage and Irrigation Maintenance

Agencies (DIMAs). The GoA adopted tariffs for irrigation water supplied by WSA to DIMAs (0.7 AMD/m^3 for gravity and 1.2 AMD/m^3 for pumped), and for water supplied by the latter to water users (4.2 AMD/m^3), based on contracts between suppliers and users. And a new Water Code of Armenia was adopted by the National Assembly on July 10, 2002, providing mechanisms and legal means for national water resources preservation and became effective in October, 2002.

The New Armenia Water Code

The first Water Code of the Republic of Armenia was passed in 1992, but a number of issues, including the institutional framework and integrated approach towards water resources management, were vague. A new Water Code was approved on July 10, 2002, by the National Assembly and came into force in October, 2002. The Code consists of 121 Articles divided into 17 Sections, including general provisions, management bodies of water resources, strategic use and preservation of water resources and related information systems, water use rights, water systems users' rights, use and management of state-owned water systems, regulation of trans-boundary water resources use, water quality standards, economic incentives and a water charges collection system in the water sector, floods and droughts prevention and management, preservation and state control of water resources, and resolution of disputes in water relationships and responsibility for breaking the Water Code (Republic of Armenia Water Code, 2002).

The interactions of management bodies defined by the new Water Code are presented in Figure 1. The National Water Council is the main advisory body that is responsible for developing and presenting recommendations related to the national water policy, national water plans/programs and other regulatory acts. The Water Resources

Management and Preservation Body (WRMP) is responsible for the coordination of activities of various government agencies during the elaboration of national water policy and national water programs. The WRMP Body implements management and preservation of water resources in compliance with the national water plan, and it also defines surface and underground water intake limits and grants water usage licenses.

The Water Systems Management Body (currently, the State Committee of Water Economy, or SCWE) is responsible for the management and utilization of state-owned water systems, supervising organization of works in a non-competitive water supply system. The Regulatory Commission is responsible for implementation of the tariff

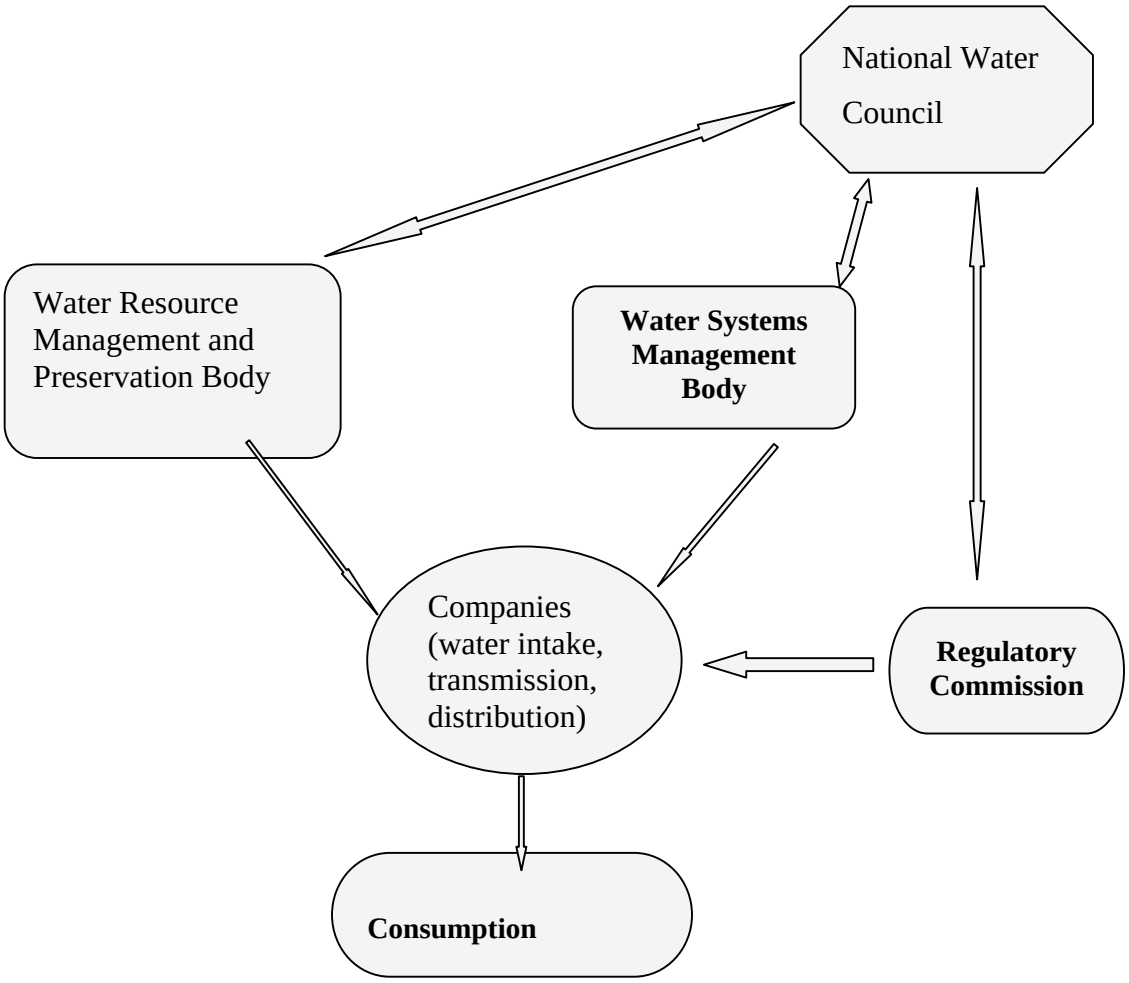

Figure1. Interactions among Water Management Bodies

policy in the water sector and for granting licenses for non-competitive water suppliers for water system usage.

Although the new Water Code differs from the actions before its adoption in 1992, it still has substantial flaws. Despite detailed regulation of some relationships, the Water Code lacks systematized regulation of water relations. The main critique is as follows. The Water Code does not provide a robust mechanism for water rights allocation, and there are no clear guidelines on the structure and authority of state bodies regulating the water sector. Many regulatory issues are not addressed: issues related to licensing and tariffs, cost-of-service regulations, license enforcement, charts of accounts and sub-accounts.

Water Users Associations and Water Users Federations

When the National Assembly approved the Law on Water Users Associations and Federations in July 2002, the objective was to specify the operational basis of WUAs and WUFs, the grounds for establishment and termination, and the principles of their relationships with other state agencies. A WUA is defined as an organization established voluntarily by water users, and a WUF is defined as a voluntarily established union of Water Users Associations. WUAs and WUFs are non-profit legal entities that operate in the public interest to carry out the operation and maintenance of irrigation systems. The WUAs supply water to users located in their service areas – the geographical territory served by a WUA. In turn, the WUFs supply water to WUAs in their service area (RoA Law on WUAs and WUFs, 2002).

Membership in WUAs/WUFs is voluntary and open to all those who meet the eligibility criteria; that is, individuals have to be natural or legal persons owning or using agricultural land. Voting rights are assigned either one vote per each member or in proportion to the size of the land owned or used. However, a single member cannot hold more than one-fourth of the total number of votes. Members are required to pay charges and fees levied by the WUA: for the supplied irrigation water; for operation, repair and maintenance of the irrigation system operated by the WUA; and membership fees (RoA Law on WUAs and WUFs, 2002).

The General Meeting is the highest governance body of a WUA/WUF. It is composed of all members (or their representatives) and must meet at least once a year. The internal structure of WUAs and WUFs consists of an Administrative Council, a Supervisory Committee, and Management. The General Meeting elects an Administrative Council from WUA/WUF's members. Administrative Council is in charge of WUA/WUF's general management and is accountable to the General Meeting. Sessions of an Administrative Council are summoned at least once in a month. Administrative Council elects a Chairman who conducts the works of a General Meeting, sessions of an Administrative Council and represents a WUA/WUF in other organizations. The General Meeting elects, through direct voting, a Supervising Committee to perform supervision of the economic and financial activities of a WUA/WUF carried out by an Administrative Council and its Chairman (RoA Law on WUAs and WUFs, 2002).

The Charter of the WUA/WUF can create a Dispute Settlement Body. The members and a Chairman of an Administrative Council, members and chairman of a

Supervising Committee, as well as members and chairman of a Dispute Settlement Body are not paid workers. The salary of a Management and its Director are determined by a General Meeting, based on the proposal of an Administrative Council (RoA Law on WUAs and WUFs, 2002).

To further implement institutional reform in the Armenian irrigation sector, a number of other legal acts and documents need to be developed. Draft regulations to support the implementation of the new Water Code and the Law on WUAs/WUFs have been prepared and discussed within the GoA (WBAIDP, 2001). These documents include prototypes of a Transfer Agreement, a Water Delivery Contract, a WUA Charter, a WUF Charter, and Rules on Irrigation Water Supply and Use. Consultations with farmers' representatives and with local authorities have been organized by the unit in charge of the IDP.

Farmers' Willingness and Ability to Pay for Water: Shirak Water Users Association

Interviews with farmers during field visits in March 2003 indicated that farmers' willingness to pay for water is affected by a number of historical, economic and other factors: historical antecedents of free water – "God-given"; belief of some farmers with land plots located far away from the tertiary canal that their on-farm systems are natural spin-offs from the main system, just like streams; opportunity and direct costs of travel to a regional Post Office; arguments by many that if they did considerable O&M of the system, they should not pay water charges; insufficient, unreliable and untimely delivery of water; lack of enforcement of sanctions for non-payment; non-payment by some of the local elite; and alternative urgent uses of limited available cash. When farmers were directly asked if they were willing to pay for water, most of them replied affirmatively,

but conditionally. A common response was that they would pay "after the harvest", at the same time adding "but how can I pay if the yields were not good?" In practice, sanctions are difficult to enforce; cutting off irrigation water for one delinquent farmer also means no water for many of his neighbors on the same on-farm canal.

Shirak WUA will serve 2,715 people (Table 2 provides cropping patterns, revenues, and expenses in the Shirak WUA in 2003). On average, the cost of irrigation water per ha is 11,510 AMD, with total irrigation expenses of 54.441 million AMD divided by total area (4,731 ha). The share of irrigation water cost to revenues is about 1.88%; that is, 4.76% of input production costs, or 3.10% of income 3.10%. Thus, it appears that cost of irrigation water for the WUA members is affordable. There can also be differences in costs of irrigation water between farmers with rehabilitated and non-rehabilitated systems, but data available are limited. Losses in non-rehabilitated systems can be enormous, with farmers expected to pay for as much as four times more water than they have actually received. This affects both their willingness and ability to pay.

The plan for establishment of WUAs was developed by taking into account priorities based on readiness of communities to assume new functions. This implies that the first WUAs will be established in areas with high net returns to lands and marketable agricultural products to ensure success of the process. The process of establishing WUFs will incorporate enough flexibility to allow farmers to progress in stages, starting with WUAs in conformity with the financial means and management capability available to them. Given the novel nature of WUFs, the project will provide for rehabilitation of tertiary systems, intensive training of elected representatives in such fields as accounting,

Table 2. Revenues and Expenses for the Shirak Water Users Association

Crops	Unit	Irrigation area
Wheat	ha	2.152
Barley	ha	755
Corn	ha	0
Multi-year grass	ha	881
Orchards	ha	35
Potato	ha	554
Vegetables	ha	354
Grapes	ha	0
Tobacco	ha	0
Other	ha	0
TOTAL	ha	**4.731**

	Unit	Quantity	Amount (million AMD)
Total Revenues			**2.897.599**
Wheat	ton	6,456	548.760
Barley	ton	2,114	187.995
Corn	ton	0	0.000
Multi-year grass	ton	6,167	154.175
Fruits	ton	415	51.909
Potato	ton	15,512	1,551.200
Vegetables	ton	14,160	403.560
Grapes	ton	0	0.000
Tobacco	ton	0	0.000
Total Expenses			**1.142.962**
Wheat			330.977
Barley			116.800
Corn			0.000
Multi-year grass			86.955
Fruits			19.033
Potato			501.370
Vegetables			87.827
Grapes			0.000
Tobacco			0.000
Total Income			**1.754.637**

According to types of expense

Total seeds expense		**2.796.0**	**448.493**
Wheat	ton	645.6	80.700
Barley	ton	211.4	28.313
Corn	ton	0.0	0.000
Multi-year grass			
Fruits			
Potato	ton	1,939.0	332.400
Vegetables			7.080
Grapes			
Tobacco			

Total fertilizer expense			**192.256**
Wheat			62.408
Barley			26.425
Corn			0.000
Multi-year grass			3.524
Fruits			4.136
Potato			65.372
Vegetables			30.391
Grapes			0.000
Tobacco			0.000
Total mechanization expense			**308.461**
Wheat			131.272
Barley			44.168
Corn			0.000
Multi-year grass			56.384
Fruits			2.594
Potato			55.954
Vegetables			18.089
Grapes			0.000
Tobacco			0.000
Total irrigation expense		**10,888.6**	**54.441**
Wheat	th. m3	4,562.2	22.811
Barley	th. m3	1,208.0	6.040
Corn	th. m3	0.0	0.000
Multi-year grass	th. m3	2,114.4	10.572
Fruits	th. m3	98.0	0.490
Potato	th. m3	1,773.0	8.864
Vegetables	th. m3	1,133.0	5.664
Grapes	th. m3	0.0	0.000
Tobacco	th. m3	0.0	0.000
Total labor expense			**139.311**
Wheat			33.786
Barley			11.854
Corn			0.000
Multi-year grass			16.475
Fruits			11.813
Potato			38.780
Vegetables			26.603
Grapes			0.000
Tobacco			0.000

Share, irrigation water expense	
Of revenues	**1.88%**
Of production costs	**4.76%**
Of income	**3.10%**

Source: Field Visit, March, 2003

administration, meeting management, self-governance, planning and implementation of O&M activities, procurement of services and contract negotiation.

An estimated 61 WUAs would need to be established on 232,700 ha of irrigated land to provide an operational basis for effective participation by water users in the management of the country-wide irrigation system (IDP, 2003). Most WUAs would cover a command area ranging from 3,000 to 5,000 ha, although small local schemes may justify the establishment of WUAs on much smaller areas. A proposed 24 WUAs could be organized in such small schemes (less than 3,000 ha) serving individual communities, while 33 could be organized into larger schemes (more than 3,000 ha) serving a varying number of communities. These divisions would be based on water basin and hydro-unit principles (IDP, 2003). In larger schemes, an estimated 23 WUAs could further enhance services to their membership by organizing themselves into six WUFs.

One of the most important questions for farmers was to know who is responsible for paying for water losses. Ideally, farmers would be required to pay only for water ultimately received, regardless how much was the outflow from WSA or DIMA. But, to achieve this, water meters must be installed on all tertiary level canals, not currently realistic. Another important issue for farmers was to know, before the irrigation season starts, how much they would need to pay for irrigating 1 ha of land.

Problems Common in All Communities

The information campaign is a real problem, since the number of members in almost all proposed WUAs exceeds 5,000. To keep all of them informed about the on-going process becomes increasingly difficult, especially taking into account the absence of mass media in some places. Besides, the information campaign now is not very

effective, because farmers do not believe that there will be positive changes. Former WCCs activists, including Water Masters and Chairmen, are, in most cases, selected to be members of an Initiative Group. The major advantage is that these people are quite familiar with the process and clearly understand the problems. A disadvantage is that farmers do not always trust them, because of previous unsuccessful experiences.

In general, WUAs are being created on the same areas where DIMAs operated before, actually replacing them. Thus, farmers say, "Let's just change the name. Why do you want to complicate things?" One of the key issues is to ensure cooperation between DIMAs and Initiative Groups. Currently, there is no cooperation. Another problem is with communities located in bordering areas. Irrigation on many of these areas could not be considered commercial or economically justified. Farmers are mainly involved in subsistence agricultural activities. However, it is a social, as well as political, issue and it is important to ensure irrigation there, even through subsidizing it, to mitigate migration of people from these buffer zones that could affect the state security.

Instead of subsidizing economically unviable agricultural activities, however, it might be better to find other sources of income for the population of those buffer zones in future. For example, the GoA could encourage, through appropriate incentives, the private sector to set up small businesses there to employ inhabitants of those areas (possibly, by providing tax holidays). The technical state of the irrigation system is also a concern; it is important to ensure transferring to WUAs only those structures and systems that are objectively in a good technical condition to minimize water.

Water Users Associations Budgeting

Primary data, collected at a community level during field visits, is used for the following analysis and assumes development of break-even budgets. The main objective of this analysis is to determine a level of tariff at which all the incurred expenses will be covered by collected revenues. Particularly, draft budgets are developed for potential WUAs. Assumptions made during the process of developing budgets can be grouped into the following categories: (i) tariffs, both irrigation and electricity; (ii) membership fees; (iii) collection rates; (iv) O&M expenses (excluding electricity and salaries); (v) staffing and salaries; and (vi) state subsidies.

The Government of Armenia (GoA) has decided to set tariffs for 2003 for the wholesale irrigation water equal to 0.7 Armenian Drams (AMD) per cubic meter (m^3) for gravity irrigation water and 1.2 AMD/m^3 for pumped irrigation water. Simultaneously, the GoA set a flat tariff for retail irrigation water equal to 4.2 AMD/m^3. Two types of electricity tariffs are set by the GoA -- one is for big pumps (18.86 AMD/kWh) and the other for small pumps operating tubewells (25.00 AMD/kWh). Each WUA, depending on a combination of their revenues/expenses (including share of pumping irrigation, and especially tubewells irrigation), can set their own tariffs. Tariffs calculated and suggested are defined based on break-even points.

For all WUAs included in the analysis, membership fees are assumed to be the same, equaling to 500 AMD annually. At the current (2003) exchange rate (US$1 = 590AMD), this is a symbolic contribution of just US$0.85 per year. A unified rate of water charges collection is assumed for all potential WUAs – 75 percent; nearly all the communities included in this analysis demonstrated approximately 75 percent collection

rates in 2002. All expenses that WUAs could incur during their functioning are divided into two groups: operation expenses and maintenance expenses. Operation expenses include payments for water to suppliers, electricity expenses, expenses for materials, supplies, and fuel, salaries and contributions to the Social (or Pension) Fund and office expenses. The underlying assumption related to operation expenses, excluding payments for water, electricity and salaries, is that they should approximate 15% of total expenses. Maintenance expenses are expected to fall between 25% and 50%, depending on the condition of the irrigation network (anticipated urgent repair works could increase the share of maintenance expenses).

According to the WUAs/WUFs Law, the only paid body of the WUA is Management. The sample staffing of the Management body (administration) could be as follows: Executive Director, Chief Accountant, Accountants (number of staff depends on size of the WUA in terms of members), Accountant Cashier, Senior Hydro-Technician, Hydro-Technician, Secretary-Assistant, Guard, and Office Helper. In addition to those administrative staff, operations staff, such as Water Masters, and, depending on WUA land area, 1 to 3 persons for each community will need to be employed during the irrigation season (3 to 5 months) to perform these functions. The main assumption related to salaries of all personnel working in a WUA suggests that the share of salaries, combined with contributions to the Social Fund, should not exceed 30%.

All maintenance and repair works needed to be carried out on both secondary and tertiary levels of irrigation system would be contracted. A GoA decision (#1951 from December 13, 2002) defines levels of the state subsidies to cover electricity expenses for subsequent years: for 2003 – 80%; for 2004 – 60%; for 2005 – 40%; for 2006 – 20%; and

for 2007 – 0% subsidy. The subsidy is thus being phased out, but for 2003 the analysis assumes an 80% subsidy for 2003 for covering incurred electricity expenses.

In the process of budgets development for potential WUAs, the most important issue is definition of tariffs. To define the correct level of tariff for each of the WUAs under consideration, the following methodology of budget development is used, beginning with the notation:

TE – Total Expenses

TE_s – Total Expenses with Subsidy

TR – Total Revenues

OE – Operation Expenses

ME – Maintenance Expenses

S – Subsidy

R_1 – first part of the Total Revenue

R_2 – second part of the Total Revenue

T – Tariff

MF – Membership Fees

WU – Number of Water Users

W – Amount of irrigation water supplied

To define the amount of total expenses, it is necessary to calculate all expenses, both operations and maintenance, taking into account the assumptions above. Payments to the WSA are defined based on the amount of water expected to be supplied multiplied by wholesale tariffs. Differentiation is made between gravity and pumping irrigation water supply to use the correct tariffs with corresponding water amounts. Electricity

expenses, then, are being calculated both for pumping stations and tubewells, where applicable. Using data obtained from the field visits, we estimate the cost of materials, supplies and fuel necessary for the operation of the irrigation system in the WUA service area. Salaries and office expenses estimation will be required to complete calculation of operation expenses (OE).

Calculation of maintenance expenses (ME) is based on the estimation of costs for spring preparation works and for capital and current repairs. The latter depends upon the physical condition of the system, and the figures used in the examples are provided by specialists of the IDP Implementation Unit (PIU). In like manner, during the estimation of a Re-equipping Fund and Emergency Fund, opinions of the PIU engineers are used. *ME* is a sum of all the above mentioned expenses.

Total expenses incurred will be defined by summing up operations and maintenance expenses:

$$TE = OE + ME \qquad (1)$$

However, we must then consider the amount of subsidy that is allocated from the state budget to cover 80% of electricity expenses. Thus, the total expenses will be reduced by the amount of subsidy:

$$TE_s = TE - S \qquad (2)$$

This *TE* will be the amount that must be covered by total revenues. Total revenues of a WUA are comprised of two parts:

$$TR = R_1 + R_2 \qquad (3)$$

One part is a collection of membership fees (multiplying 500 AMD by the number of WUA members):

$$R_1 = 500 \times WU \quad (4)$$

The second part (R_2) comes from water charges collection. The objective of this exercise is to find a level of tariff at which all expenses are covered. That is, we must find a break-even point, which means that total revenues must approximately equal total expenses. To define the amount of the second part of revenues needed for the break-even, the first part of revenues is subtracted from total expenses.

$$R_2 = TE_s - R_1 \quad (5)$$

Recalling the assumption about the 75% collection rate, the necessary level of tariff is found by:

$$R_2 = T \times W \times 0.75, \text{ or} \quad (6)$$

$$T = R_2 / (W \times 0.75) \quad (7)$$

or

$$T = (TE_s - R_1) / (W \times 0.75) \quad (8)$$

Draft Budget for Aygabats Water Users Association

Aygabats WUA is proposed to be created in Shirak marz, with a service area of 3,372 hectares (ha) and 3,290 water users (members). The WUA will provide irrigation water service using both gravity and pumping methods, with about 91% by gravity and about 9% by pumping (no tubewell irrigation). The annual volume of irrigation water that will be used by water users of the WUA is estimated to be 11.89 million m^3, of which 10.68 million m^3 will be supplied by gravity and the rest (1.21 million m^3) by pumping. For the pumping irrigation, the annual consumption of electricity by the WUA is estimated to be 0.4 million kW/h, which will result in electricity expenses amounting to 7.6 million AMD (electricity tariff for pumping stations is 18.86 AMD per kW/h).

Calculating all expenses, both OE and ME, and taking into account all our assumptions, expenses total 54.70 million AMD (Table 3). The total expenses after subsidy (6.08 million AMD) comprise 48.62 million AMD, which leaves the self-cost of 1m^3 irrigation water equal to 4.09 AMD/m^3. Thus, a tariff level is defined equal to 5.27 AMD/m^3 (Table 3). For comparison, last year's price of 1 m^3 of irrigation water in this area was 6.70 AMD. Thus, members of Aygabats WUA will be better off paying 1.43 AMD/m^3 less and taking care of their irrigation problems themselves.

While conducting sensitivity analysis, different factors affecting costs can be employed. However, in this case, the most likely variable factor that is not under the control of a WUA is irrigation water wholesale tariffs defined by the GoA. So, three different assumptions are used for the sensitivity analysis: (i) tariff increase by 20 %; (ii) tariff increase by 50%; and (iii) tariff increase by 100%. The resulting net revenues received are remain favorable to WUA members. Even if tariff is doubled for the next (2004) year, the farmers of Aygabats WUA would be better off compared with last year's situation. To break even, the WUA would need to establish its tariff at a level of 6.44 AMD/m^3, which is 0.26 AMD less than in 2002 (see Table 4).

Economic analysis of Aygabats WUA irrigation activities also refers to two different scenarios for 2003-2006. Scenario 1 is based on the assumptions of subsidy phase-out combined with tariff increase at a rate of 20% a year. All other cost items are assumed to be constant. The results related to tariffs of the WUA are presented in Table 5 (for more information, see Alaverdyan). We conclude that farmers would still be better off, compared with 2002.

Table 3. Draft Budget for Aygabats Water Users Association

		Measurement unit	2003	% share
TECHNICAL CHARACTERISTICS				
1	***Number of water users-members***	person	**3,290**	
2	***Irrigated area***	ha	**3,372.0**	
2.1	Gravity irrigation	ha	3,073.0	91.1%
2.2	Pumping irrigation	ha	299.0	8.9%
2.3	Tubewells irrigation	ha	0.00	0.0%
3	***Volume of irrigation water***	M m3	**11.89**	
3.1	Gravity irrigation	M m3	10.68	89.8%
3.2	Pumping irrigation	M m3	1.21	10.2%
3.3	Tubewells irrigation	M m3	0.00	0.0%
4	***Electricity consumption***	M KW/h	**0.40**	
4.1	Pumping stations	M KW/h	0.40	
4.2	Tubewells	M KW/h	0.00	
4.3	Electricity tariff for pumping stations	AMD	18.86	
4.4	Electricity tariff for tubewells	AMD	25.00	
5	***Tariffs and membership fees***			
5.1	Association tariff	AMD/m3	5.27	
5.2	WSA tariff, including:			
	gravity	AMD/m3	0.70	
	pumping	AMD/m3	1.20	
5.3	Membership fee (annual)	AMD	500.00	
REVENUES				
6	***Total revenues***	M AMD	**48.64**	
6.1	Membership fees	M AMD	1.65	
6.2	Water charges collections (75%)	M AMD	47.00	
OPERATION EXPENSES				
7	***Total operation expenses***		**39.92**	**73.0%**
7.1	Payment to WSA	M AMD	8.93	16.3%
7.2	Electricity expenses, including: - pumping stations - tubewells	M AMD	7.60 7.60 0.00	13.9%
7.3	Materials, supplies, fuel	M AMD	6.35	11.6%
7.4	Salaries and contributions to Social Fund	M AMD	15.32	28.0%
7.5	Office expenses	M AMD	1.72	3.1%
MAINTENANCE EXPENSES				
8	***Total maintenance expenses***		**14.78**	**27.0%**
8.1	Spring preparation works	M AMD	5.77	10.5%
8.2	Emergency fund	M AMD	2.00	3.7%
8.3	Capital and current repairs, including:	M AMD	2.50	4.6%
8.4	Re-equipping Fund of the system	M AMD	4.51	8.2%
Total O&M expenses		M AMD	**54.70**	
Prime-cost of 1 m3 of irrigation water		AMD/m3	**4.60**	**87.3%**
Subsidy for pumps consumed electricity (80%)		M AMD	**6.08**	
TOTAL EXPENSES (with electricity subsidy)		M AMD	**48.62**	
BALANCE (total revenues - total expenses)		M AMD	**0.02**	
Prime-cost of 1 m3 of irrigation water with subsidy		AMD/m3	**4.09**	**88.9%**

Source: Field Visit, March 2003

Table 4. Sensitivity Analysis, Wholesale Tariff Increase

Tariff	2002	2003	↑ by 20 %	↑ by 50 %	↑ by 100 %
Wholesale tariff:					
- For gravity	0.70	0.70	0.84	1.05	1.40
- For pumping	1.20	1.20	1.44	1.80	2.40
WUA tariff	6.70	5.27	5.64	5.94	6.44

Table 5. Comparison of Proposed Tariffs under Scenario 1

Years	Tariffs (AMD/m^3)	Difference (AMD/m^3)
2002	6.70	
2003	5.27	-1.43
2004	5.64	-1.06
2005	6.05	-0.65
2006	6.51	-0.19

Scenario 2 is based on more strong assumptions: salary increases at a rate of 20% per year combined with the subsidy phase-out and increase of wholesale tariffs at a rate of 20% a year. These are quite realistic assumptions, and the results are presented in Table 6. The results provide strong evidence that for the first two years, when the WUA is in a stage of formation, farmers will pay less while receiving a reliable, timely service and maintaining their credibility. This will likely contribute to increased yields and consequently farmers' incomes. In the year 2006, Aygabat's WUA would then be able to charge more from its members, based on their increased ability to pay.

Table 6. Comparison of Proposed Tariffs under Scenario 2

Years	Tariffs (AMD/m^3)	Difference (AMD/m^3)
2002	6.70	base
2003	5.27	-1.43
2004	5.98	-1.02
2005	6.80	+0.10
2006	7.76	+1.06

Conclusions and Recommendations

Water resource management that follows the principles of comprehensive analysis, opportunity cost pricing, decentralization, stakeholder participation, and environmental protection will yield more coherent policies across sector, will promote conservation and improve the efficiency of water allocation. Establishment of WUAs in Armenia is critically important for both farmers, as primary beneficiaries, and the Government of Armenia, removing much of its financial burden for O&M of the irrigation system from the state budget. Among the main benefits of transfer is a sense of ownership by farmers that results in a better protection of the irrigation infrastructure and leads to reduced maintenance and repair needs. A second benefit is substantially improved water delivery at a lesser cost.

Aspects of successful reform that are common in all countries studied include three main pre-conditions: regulatory and legal framework, adopted state policy, and willingness to cooperate and participate. Armenia has in place the first two of the above pre-conditions. Although there is a need for additional legal regulations, the legal

framework necessary for institutional reform has been created. The GoA has adopted policies for the institutional changes and WUAs/WUFs formation. The last pre-condition will require time. Also, efforts must be placed on informational programs to ensure that the process is clear for beneficiaries. One impediment is the absence of mass media in most areas, while an information campaign is one of the key factors for success.

This study developed a methodology for drafting break-even budgets for potential WUAs and for determining the appropriate level of tariff for each particular case. Through sensitivity analysis that considered different scenarios, the levels of tariffs determined in the budgeting process have been validated. The overall conclusion is that farmers in selected communities will be better off if WUAs are established in their areas. An urgent need for capacity building and empowerment of the WUAs should involve: i) regularization of the legal and operational relationships between the WUAs, the WSA and local governments; ii) ensuring a regular source of income for WUAs from membership fees and a flexibly defined portion of irrigation water payments; iii) training of WUAs leaders and members on an ongoing basis; and iv) establishing unions of WUAs – Water Users Federations -- on a voluntary basis and empowering them in their relations with WSA, SCWE and provincial governments. The focus should be on payment rates, enforcement of sanctions for non-payments, distribution of WSA and WUAs portions of payments as agreed, improvements of the system's efficiency, and enabling WUAs to borrow and invest in irrigation development.

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