

## Issues of Water Users' Associations for Sustainable Irrigation and Drainage in Central Asia

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### Abstract

Water users associations (WUAs) are expected to play an important role in operation and maintenance (O&M) of the irrigation and drainage infrastructure in Central Asia. The roles and issues facing WUAs in the Kyrgyz Republic and Uzbekistan are reviewed and analyzed in this study. It is identified that continuous financial stability of WUAs after the completion of donors' irrigation projects is crucial for appropriate O&M. Especially, the estimated calculation of the cost recovery, irrigation service fees (ISF) and O&M costs are optimistic rather than realistic cases as these have been determined politically and are based on several assumptions. They should be determined based on economic and financial analysis, taking into account farmers' ability to pay. Collection rates of the cost recovery and ISF should also be improved.

**Discipline:** Irrigation, drainage and reclamation

**Additional key words:** cost recovery, irrigation service fee, operation and maintenance

### Introduction

The Aral Sea basin in Central Asia contains five countries: the Kyrgyz Republic, Uzbekistan, Kazakhstan, Tajikistan, and Turkmenistan. These countries became independent in 1991 with the collapse of the former Soviet Union. Large-scale irrigation and drainage infrastructure

was introduced in the 1940s in order to increase agricultural production in the region. By the late 1980s, more than 7.5 million ha of land in Central Asia were irrigated, mainly for the production of cotton and wheat. The irrigated areas are distributed along the Syr Darya and Amu Darya Rivers (Fig. 1), which are the primary source of the water used for irrigation although groundwater is also used. Two rivers empty into the Aral Sea, but it has



Fig. 1. Irrigated area in Central Asia

Source: Irrigation in Central Asia – Social, Economic and Environmental Considerations, World Bank (2003).

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Received 30 July 2007; accepted 20 December 2007.

become smaller as a result of the diversion of river water for irrigation.

The irrigation and drainage infrastructure has been rapidly deteriorating since the independence of the countries (Fig. 2). The main reason for the deterioration is the lack of governmental funds and human resources necessary for the operation, maintenance and rehabilitation of the infrastructure. Falling levels of maintenance have led the on-farm and inter-farm irrigation canals to deteriorate and the distribution and delivery of water to become unreliable. The deterioration of canals has resulted in lower conveyance efficiency. It is estimated that around half of the water is lost between the source and the farm intake. Drainage has been particularly neglected. It is estimated that less than 30% of farmers do any work on drains. The governments have decided to introduce a management

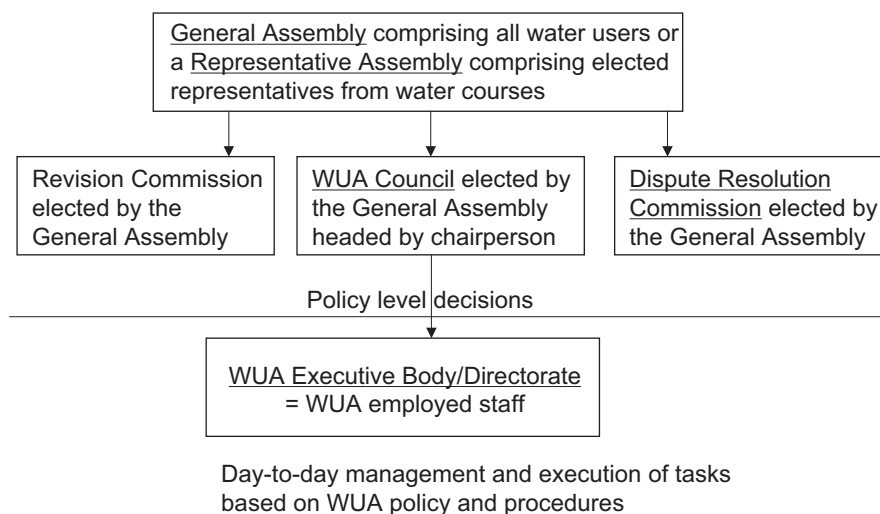


**Fig. 2. Deteriorated irrigation canal**

Source: Irrigation and Poverty in Central Asia: A Field Assessment, Thurman, M. (2001).

system called “Water Users’ Associations” (WUAs). These associations are organized by individual farmers for operating, maintaining and rehabilitating the irrigation and drainage infrastructure. However, the concept of the WUAs is quite new in these countries, and the governments need donors’ support and assistance for establishing and developing WUAs, as well as in training WUA staff and members. The Asian Development Bank (ADB), the World Bank and other donors have, therefore, funded projects that include not only the rehabilitation of deteriorated irrigation and drainage infrastructure but also the establishment and development of WUAs. With the donors’ assistance, irrigation and drainage infrastructure has recovered and improved the efficiency of irrigation water conveyance and drainage in restricted areas where the donors’ projects have been implemented. After the completion of the donors’ projects, WUAs are expected to play an important role in the operation and maintenance (O&M) of the irrigation and drainage infrastructure.

A typical pyramidal and hierarchical organizational structure for WUAs<sup>7</sup> is shown in Fig. 3. A general assembly or a representative assembly has the right to vote on resolutions and elects the members of a revision commission, WUA council, and dispute resolution commission, each of which has different origins and proposes resolutions to the general or representative assembly. The WUAs’ roles would include (1) taking responsibility for the O&M of the irrigation and drainage infrastructure, (2) collecting fees from members for O&M and for repayment, (3) ensuring equitable and timely water supply to members, (4) taking the responsibility of cost recovery, (5) participating in the projects’ rehabilitation of irrigation



**Fig. 3. Typical organizational structure of a WUA**

Source: How to establish a Water Users Associations?, International Water Management Institute (2003).

and drainage infrastructure, and (6) training members.

In this study, current status of irrigation and drainage infrastructure, and the roles and issues of WUAs for O&M in the Kyrgyz Republic and Uzbekistan are reviewed and analyzed as examples in Central Asia.

## Kyrgyz Republic

### 1. Economy and Agriculture

The Kyrgyz Republic, which became independent in 1991, is in the midst of a major effort to transform the economy from a centrally planned to a market-based system. Despite the varying economic and social conditions, the Government has continued its commitment to the reform process, simultaneously adopting policies for macro economic stabilization and comprehensive sectoral and structural reforms. The broad sectoral and structural reform measures have included (1) enterprise reform and privatization, (2) industrial and trade policy reform, (3) promotion of private sector development, (4) financial sector reform, and (5) social safety net reform. The Kyrgyz Republic is considered by the funding community to be the most advanced among the Central Asian countries in macrostabilization and structural reforms. It is the first Central Asian country to (1) successfully complete an International Monetary Fund (IMF)-supported Enhanced Structural Adjustment Facility program, and (2) obtain formal membership in the World Trade Organization in 1998.

The Kyrgyz Republic has a predominantly rural economy with more than 65% of the population living in the rural areas. Agriculture and related enterprises are the most significant areas of activity. The agriculture sector accounts for more than 45% of GDP, 40% of employment and 30% of export earnings.

### 2. Irrigation Infrastructure

Approximately 80 percent of arable land in the Kyrgyz Republic is irrigated. Since 1995 the donors' projects rehabilitating deteriorated irrigation infrastructure have been implemented. However, Kyrgyz economic capacity is small, domestic funds are limited and the government has difficulty in decreasing its international debt. Under such serious financial constraints, it is important for the government and the donors to carefully create priorities for the rehabilitation of deteriorated irrigation infrastructure.

### 3. Establishment and Development of WUAs

The Kyrgyz government promoted the transfer of ownership of the irrigation and drainage infrastructure from the collective farms to individual water users in

**Table 1. Outline of Kyrgyz WUA law**

Main components
(1) Purpose and tasks of WUA
(2) Activity of WUA
(3) WUA Establishment procedure
(4) State registration of WUA
(5) Foundation documents of WUA
(6) WUA membership
(7) Rights and duties of WUA
(8) Reception of new memberships into WUA
(9) Termination of WUA membership
(10) Management organs and their powers
(11) WUA finances and property of WUA

1994. The government also promoted the establishment of WUAs that would be responsible for O&M of on-farm irrigation and drainage infrastructure in 1995.

The ADB provided a technical assistance (TA) of "Building Capacity for the Formation and Management of Water Users Associations", together with the Agricultural Sector Program (ASP), in 1995. The TA's objective was to strengthen the capacity of the Ministry of Water Resources (MWR) to facilitate the formation and sound management of WUAs. The TA's scope included (1) reviewing the legislation for WUAs; (2) providing advice on the procedures for organizing WUAs, irrigation fee collection and farm level system management; and (3) training key staff at the MWR and selected regional levels<sup>1</sup>.

In 2002, the Kyrgyz Republic became the first country in Central Asia to enact a comprehensive WUA law on the basis of advice provided by the ADB through the ASP. The WUA law regulates the associations' responsibilities and obligations for collecting irrigation service fees, preparing budgets, making decisions regarding O&M, appropriately distributing water, and rehabilitating irrigation and drainage infrastructure (Table 1).

In addition, since 1995, the ADB, the World Bank and other donors have funded projects for the rehabilitation of irrigation and drainage infrastructure and for establishing and training WUAs for O&M. The ADB's Agriculture Area Development Project (AADP)<sup>2</sup> and the World Bank's On-Farm Irrigation Project (OFIP)<sup>9</sup> are examples of effective projects for the establishment and development of WUAs.

These irrigation projects require that WUAs in the project areas pass a series of determined milestones for designing and implementing the rehabilitation of irrigation and drainage infrastructure in order to ensure that the WUAs are operating effectively<sup>8</sup>. These include:

Milestone 1 (WUA establishment, including legal registration and bank account opened), Milestone 2 (Recruitment of WUA staff and necessary training), Milestone 3 (WUA Board has prepared a plan of O&M and the general assembly has approved this plan – this includes setting a sustainable fee to cover O&M and irrigation service fee (ISF) costs), Milestone 4 (WUA members have paid O&M costs and ISF payment to water supplier), Milestone 5 (WUA and Ministry of Water Resources have developed alternative for rehabilitation and determined their costs, involving WUA members in these discussions), Milestone 6 (WUA members have selected an alternative for rehabilitation), and Milestone 7 (A majority of water users in the WUA have agreed to borrow the credit for rehabilitation and to repayment under the projects' terms and the WUA Board officially requests the credit and signs for repayment). When a WUA achieves the fourth milestone, it becomes a candidate for the rehabilitation of irrigation and drainage infrastructure under the projects. When a WUA achieves the seventh milestone, a rehabilitation contract can be signed with a contractor. When WUAs cannot achieve the necessary milestones, their rehabilitation projects will be postponed or they will be excluded from the project areas. These milestones enable WUAs to be sustainable bodies and to be actively involved in designing and implementing the irrigation projects.

#### 4. WUA Issues

Rehabilitation of the deteriorated irrigation and drainage infrastructure is only one element of achieving sustainable irrigation and drainage. It is also necessary to establish sustainable WUAs that can take on O&M responsibilities. Irrigation projects of the ADB, the World Bank and other donors employ international and domestic consultants during the project implementation period to establish and develop WUAs. However, after the completion of the projects, WUAs will have to take on O&M responsibilities by themselves and maintain financial sustainability without support. Otherwise, the rehabilitated

infrastructure will yet again be allowed to deteriorate.

One of the most serious issues for sustainable irrigation and drainage in the Kyrgyz Republic is the financial weakness of WUAs. Cost recovery and the setting and collecting of ISF are critically important for sustainable WUAs. Cost recovery means that farmers should repay a part of rehabilitation cost of irrigation and drainage infrastructure. The ISF means that farmers should pay necessary funds for O&M to WUAs after completion of the rehabilitation.

##### (1) Cost Recovery

The cost recovery under the AADP and OFIP requires farmers to repay 25% of the rehabilitation costs of irrigation and drainage infrastructure. Table 2 shows how much farmers should pay for cost recovery based on estimation according to the appraisal document. The cost recovery (US\$/ha) varies significantly between the two projects although the repayment percents are the same. This is mainly due to the difference of the components of rehabilitation between the two projects. The AADP includes not only rehabilitation of irrigation and drainage but also soil improvement while the OFIP does only the rehabilitation. Table 3 shows the estimated necessary years for payment of cost recovery under AADP based on the appraisal document. The large, medium and small farmers would need 24.9, 23.3 and 20.0 y for the payment of the cost recovery respectively. These figures are calculated based on the assumption that all estimated increase of annual farm income can be used for repayment of cost recovery. In addition, these figures do not take into account interest charges for repayment of cost recovery and necessary O&M costs. However, in the real cases, all increase of farm income cannot be used for repayment. Therefore, as these necessary years for payment of cost recovery are extremely optimistic, it can be easily estimated that farmers would not be able to complete repayment of cost recovery within 25 y, which has been agreed with MWR. This is caused because 25% of cost recovery rate is determined politically, rather than on the basis of economic and financial analysis. Therefore, it is difficult

**Table 2. Estimated cost recovery in the Kyrgyz Republic based on appraisal documents**

Project	Irrigated Area (ha)	Budget for Civil Works (US\$)	25% of Budget for Civil Works (US\$)	Cost Recovery (US\$/ha)
Agriculture Area Development Project (AADP)	55,000	17,005,000	4,251,250	77.3
On-Farm Irrigation Project (OFIP)	160,000	15,900,000	3,975,000	24.8

Sources: Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grant to the Kyrgyz Republic for the Agriculture Area Development Project, Asian Development Bank (1999); Project Appraisal Document on a Proposed Credit in the Amount of SDR 14.9 million (US\$20 Million Equivalent) to the Kyrgyz Republic for an On-Farm Irrigation Project, World Bank (2000).

**Table 3. Estimated necessary years for payment of cost recovery under AADP based on appraisal document**

	Estimated Increase of Annual Farm Income (US\$/ha)	Cost Recovery (US\$/ha)	Necessary Years for Payment of Cost Recovery (Year)
Large Farms	3.10	77.3	24.9
Medium Farms	3.32	77.3	23.3
Small Farms	3.86	77.3	20.0

Source: Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grant to the Kyrgyz Republic for the Agriculture Area Development Project, Asian Development Bank (1999).

**Table 4. WUAs' O&M costs and ISF fees in the Kyrgyz Republic in 2000**

WUA	Irrigated Area (ha)	Required Costs for O&M			Actual ISF Fees for O&M			Actual Rate Required		
		On-farm (US\$/ha)	Off-farm (US\$/ha)	Total (US\$/ha)	On-farm (US\$/ha)	Off-farm (US\$/ha)	Total (US\$/ha)	On-farm (%)	Off-farm (%)	Total (%)
A	4,500	10	15	25	3.38	5.63	9.01	33.8	37.5	36.1
B	1,249	10	15	25	2.15	3.80	5.94	21.5	25.3	23.8
C	3,229	10	15	25	2.15	4.79	6.94	21.5	31.9	27.8
D	2,012	10	15	25	1.34	5.44	6.78	13.4	36.3	27.1
E	1,220	10	15	25	1.26	4.10	5.36	12.6	27.3	21.4

Source: Inadequacies in the Water Reforms in the Kyrgyz Republic, An Institutional Analysis, International Water Management Institute (2004).

to say whether it fully takes into account the farmers' repayment ability. Furthermore, farmers may not necessarily fully understand or agree with the proposed repayment scheme when they sign repayment agreements.

## (2) ISF and O&M costs

Table 4 shows WUAs' required O&M costs, actual ISF fees for O&M, and the rates of ISF fees to required O&M costs in the Kyrgyz Republic in 2000. The rates vary from 21.4% to 36.1%, and too low for WUAs' sustainable O&M. The reasons for this situation are that the determined ISF fees are very much lower than the amount required for O&M, and that the actual collection rate is also low and most of it is in kind. It is estimated that the actual collection rate is only 80%, and the cash collection rate is only 30%.

## Uzbekistan

### 1. Economy and Agriculture

Following independence in 1991, Uzbekistan embarked on a transition from a centrally planned to a market-based system, and adopted a gradual approach with the State playing a central role in managing the transition. This gradual approach performed relatively well in maintaining political and social stability, and the Uzbek government managed to avoid the prolonged recessions encountered by the neighboring Central Asian countries,

where social dislocation due to rising poverty and international conflicts occurred.

Agriculture is the foundation of the Uzbek economy and accounts for 28% of the GDP, 44% of employment, and 60% of export earnings. Fifty-six percent of the country's population lives in the rural areas. The agricultural sector comprises 60% of crops and 40% of livestock, with cotton and wheat being the two major products. Uzbekistan was the largest producer of cotton, fruit and vegetables in the former Soviet Union and is the world's fifth largest cotton producer and the second largest cotton exporter, accounting for 15% of the global cotton trade.

### 2. Irrigation Infrastructure

The expansion of the area irrigated began in the 1950s when a huge amount of irrigation infrastructure was constructed to supply water to semi-desert areas. Since the late 1980s, funds for O&M have been lacking. After 1991, the government budget for O&M rapidly decreased, further accelerating the deterioration of the irrigation and drainage infrastructure. Irrigation water is pumped up in many areas in Uzbekistan, and the electricity consumed by pumping irrigation water is 20% of the country's total electricity consumption.

Approximately 70% of the government's irrigation budget is used to pay for electricity for pumping, and the budget for O&M is underfunded. This continued lack of



funding has lead to even worse deterioration in the irrigation and drainage infrastructure. It is estimated that only 55 to 66% of irrigated areas was appropriately operated and maintained from 2000 to 2003<sup>4</sup>.

### 3. Establishment and Development of WUAs

The government has promoted a decentralized administration of water resources in order to cope with the budget shortage for irrigation and drainage infrastructure. Basin irrigation system authorities have been established to rationalize water allocation in every catchment area of main rivers. In addition, each basin irrigation system authority is setting up WUAs to which the responsibility for on-farm O&M is being transferred. However, WUAs do not have adequate human resources or knowledge to deliver the necessary services. Therefore, the ADB, the World Bank and other donors are implementing irrigation projects, as well as helping to establish, develop and train WUAs.

### 4. WUA Issues

There is no comprehensive WUA law that regulates WUAs' roles, responsibilities, obligations, and legal status in Uzbekistan. Although consultants employed by the ADB, together with the Ak Altin Agriculture Development Project (AAADP)<sup>3</sup>, prepared a draft WUA law, the government made no comments on it and has thus far seemed to be very reluctant to establish a comprehensive WUA law.

#### (1) Cost Recovery

Farmers are required to repay some part of the total costs of repairing the irrigation and drainage infrastructure under the ADB's and the World Bank's irrigation projects. However, the cost recovery rates vary among

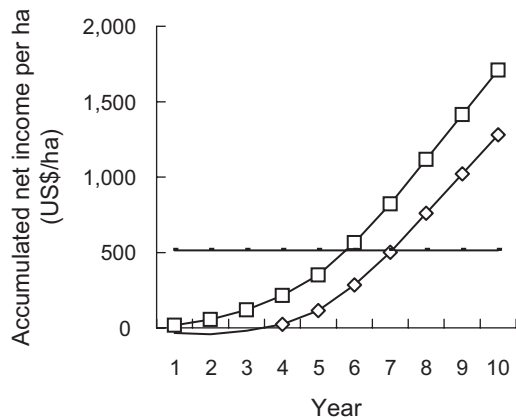
the irrigation projects because they are determined for political and not economic reasons. The cost recovery rates are even different among irrigation projects funded by the ADB. The estimated rates of cost recovery under the AAADP, Land Improvement Project<sup>6</sup> and Grain Productivity Improvement Project<sup>5</sup> based on the appraisal documents are shown in Table 5. The rates of cost recovery under the AAADP, Land Improvement Project and Grain Productivity Improvement Project are 39%, 29% and 65%, respectively. In addition, the cost recovery per ha also varies among the projects. This is mainly due to the differences in the components of the rehabilitation schemes among the projects.

Fig. 4 shows estimated accumulated net income per ha after completion of rehabilitation of irrigation and drainage infrastructure under AAADP based on the appraisal document. This indicates that cooperative farms and private farms would be able to complete repayment of cost recovery in the 8<sup>th</sup> and 6<sup>th</sup> year after completion of the rehabilitation. However, these figures are too optimistic as this calculation is based on various assumptions which are far from the real cases. All estimated net increase is calculated as being used for repayment of cost recovery. This calculation does not take into account interest charges, the grace period of the cost recovery and O&M costs. The most serious assumption is that the state procurement is expected to be completely abolished. The government still maintains the state procurement that determines the production quantities and prices of cotton and wheat, and forces farmers to obey them. Especially, the government still buys from farmers almost all the produced cotton and wheat at much lower prices than the international prices. The ADB and the World Bank request the government to abolish the state procurement and give

**Table 5. Estimated cost recovery in Uzbekistan based on appraisal documents**

Project	Cost Recovery Rate (%)	Irrigated Area (ha)	Budget for Civil Works (US\$)	Cost Recovery of Budget for Civil Works (US\$)	Cost Recovery (US\$/ha)
Ak Altin Agricultural Development Project (AAADP)	39	37,000	48,800,000	19,032,000	514.4
Land Improvement Project	29	162,300	53,920,000	15,636,800	96.3
Grain Productivity Improvement Project	65	6,000	9,653,300	6,274,645	1,045.8

Sources: Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grant to the Republic of Uzbekistan for the Ak Altin Agricultural Development Project, Asian Development Bank (2001); Report and Recommendation of the President to the Board of Directors, Proposed Loans and Technical Assistance Grant Republic of Uzbekistan: Land Improvement Project, Asian Development Bank (2006); Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grant to the Republic of Uzbekistan for the Grain Productivity Improvement Project, Asian Development Bank (2003).



**Fig. 4. Estimated payment of cost recovery under AAADP based on appraisal document**

Source: Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grant to the Republic of Uzbekistan for the Ak Altin Agricultural Development Project, Asian Development Bank (2001).

—◇—: Cooperative farm, —□—: Private farm,  
—: Payment of cost recovery.

farmers the freedom to determine the quantities of cotton and wheat produced, as well as using market mechanisms to determine their prices. However, the government is very reluctant to abolish the state procurement. As the figures in Fig. 4 are calculated based on the assumption that the state procurement would be abolished and the selling prices of cotton and wheat would significantly increase, they are very optimistic for farmers' repayment of cost recovery.

#### (2) ISF and O&M costs

The government's O&M budget expenditure in 2002 was about US\$130 million. According to estimates of the Ministry of Agriculture and Water Resources, however, the annual requirement for O&M and depreciation is US\$550 million. These estimates do not fully consider energy prices for pumping irrigation water, which could add another US\$200 million per year to the cost.

Under the AAADP, WUAs are required to be responsible for the O&M of on-farm irrigation and drainage infrastructure after the completion of a project. The state will continue O&M of inter-farm irrigation and drainage infrastructure for a limited period. However, when WUAs have adequate human resources and knowledge for appropriate O&M, WUAs will be also responsible for the O&M of inter-farm irrigation and drainage infrastructure. Therefore, WUAs will further need to collect necessary funds for O&M as ISF from farmers.

## Conclusions

In this paper, the current status of irrigation and drainage, and the roles and issues of WUAs in the O&M of the irrigation and drainage infrastructure in the Kyrgyz Republic and Uzbekistan are reviewed and analyzed. It is identified that the continuous financial stability of WUAs after the completion of donors' irrigation projects is crucial for appropriate O&M. Especially, the estimated calculation of the cost recovery, ISF, and O&M costs are optimistic rather than realistic cases as these have been determined politically and are based on several assumptions.

The following steps should be taken to ensure that WUAs are able to take on the required responsibilities for sustainable irrigation and drainage in both countries: (1) establishment and appropriate implementation of comprehensive WUA laws; (2) healthy financial management, including cost recovery and ISF; and (3) provision of appropriate training of WUA staff and members.

Healthy financial management of WUAs requires determining the appropriate rate of the cost recovery for the rehabilitation of the irrigation and drainage infrastructure and setting an appropriate ISF. These decisions should not be made on a political basis but rather on the basis of economic and financial analysis, taking into account farmers' ability to pay. Collection rates of the cost recovery and ISF should also be improved.

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