FRAME – Knowledge Sharing for the Natural Resources Community

IRG Project No: 3006-000

Case Study Highlighting Impacts from Sustainable Land Management Investments in the Central Asian Republics and with a Particular Focus on Kyrgyzstan

(DRAFT)

TECHNICAL REPORT

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Contents

1. Introduction

1.1 Objectives and Tasks

This case study identifies and assesses impacts from investments in Sustainable Land and Water Management (SLM) in the Kyrgyz Republic including the conditions that contributed to or enabled the impacts. The study is intended to contribute information and lessons learned to the Kyrgyz Republic's National Programming Framework (NPF) which is aimed at promoting more comprehensive and integrated approaches to combating desertification (ADB, 2006b), and to illustrate the integral linkages between SLM and economic growth, poverty reduction, and good governance. The NPF serves as an important building block in the Central Asian Countries Initiative for Land Management (CACILM) that aims to help the five Former Soviet republics to achieve economic growth and combat desertification through sustainable land management (ADB, 2004a).

In order to better understand the reasons for the actual results, structural impacts and lessons learned from Kyrgyzstan's investments in combating desertification, the USAID FRAME Program decided to commission a case study analyzing how investments in Natural Resources Management (NRM) can improve peoples' livelihoods, decrease land degradation rates, and strengthen local environmental governance. The case study is a contribution and support for the efforts of the Kyrgyz Focal Point for the UN Convention on Combating Desertification (UNCCD). One of the FRAME program's objectives is to identify positive NRM impacts and the policies and other enabling conditions that made such positive impacts more likely. In contrast to typical formal evaluations, the FRAME Case Study approach does not judge performance of a particular project or program; rather, it identifies the long-term impact of many actions and changes to institutions (or creation of new institutions) and in order to identify lessons that could be used on a larger scale or adapted for use in other countries.

In this study, an assessment was made of the impacts of natural resource management (NRM) investments in the Central Asian Republics (CAR) over the last decade and longer. In particular, the study has looked at water user associations (WUAs) in Kyrgyzstan as an institution in which substantial investments have been made over a significant period of time accompanied with appropriate legal and institutional developments and which have yielded positive results. Developed within USAID's "nature, wealth and power" (NWP) framework, which looks at the critical links between resources, who uses them as economic assets and how they are controlled or governed, the NRM assessment provides an understanding of the outcomes, on the ground, of the many investments made over the years in conserving, restoring and improving natural resources and especially the management of water resources.

1.2 Consultant Terms of Reference

The point of departure for this study is the identification of sites in Kyrgyzstan where NRM initiatives have produced positive impacts. The Consultant's main responsibility was to:

- Carry out a survey of the literature on Kyrgyz sustainable land management investments during the last 10-15 years.

- Select a site at which Kyrgyzstan-based consultants could conduct selected interviews in order to
    - identify areas where NRM impacts are evident:
    - assess impacts on economic growth, governance and degradation;
    - identify enabling conditions that contributed to the adoption of NRM technologies by local populations; and
    - identify activities that contributed to those enabling conditions.
- Work with Kyrgyzstan-based consultants to develop an approach to get information on revenues, productivity, perception of degradation rates, and governance issues;
- Synthesize findings and conclusions from previous bodies of analytical work that have been focused on identifying and rationalizing interventions to create enabling conditions for sustainable land management or to address on-the-ground land degradation problems (e.g., national programs for the CACILM).
- Use the "Nature, Wealth and Power" framework (USAID, 2005) to assess the impacts of these investments on peoples' welfare and local governance, in addition to describing how investments in NRM reduced degradation.

1.3 Report Structure

The Kyrgyz case study begins with a summary of the regional agro-ecological setting, in the post-Soviet Central Asian Republics (CAR). In particular, this section looks at the principal causes of land degradation and desertification, nearly all of them due to fundamentally mistaken economic and land management policies, mainly in the Soviet period. The next section focuses on description of the current Kyrgyz republic environmental, socio-economic and institutional setting, including the changes in land tenure and land management institutions since Independence and their broad impact on the Kyrgyz economy, especially agriculture. Finally, the case study examines the secondary information available from a number of donor-commissioned studies of the performance of Kyrgyz water-users associations, one of the most important new resource management institutions in the post-Independence period and a critically important institution to combating desertification.

2. Desertification and Land Degradation

2.1 Processes of Desertification and Land Degradation

Desertification is "land degradation in arid, semi-arid and dry sub-humid areas, resulting from various factors, including climatic variations and human activity" (UN, 1994). Land degradation is "...any form of deterioration of the natural potential of land that affects ecosystem integrity either in terms of reducing its sustainable ecological productivity or in terms of its native biological richness and maintenance of resilience" (GEF, 2003). Land degradation reduces the productivity of land resources and adversely affects the stability, functions of, and services derived from natural systems, reducing agricultural yields. The causes of land degradation are multiple, complex, and vary among countries, but are largely attributable to the abuse and over-exploitation of the natural resource base, particularly inappropriate and unsustainable agricultural practices, overgrazing, deforestation, forest degradation, and natural disasters (ADB, 2004a).

The main problems of land degradation are the disruption of ecosystem functions and integrity, including (ADB, 2006b):

- Soil degradation – fertility depletion, soil erosion, loss of vegetative cover, and salinity;
- Deteriorated irrigation systems, water loss and inefficient water utilization;
- Degradation, overgrazing, erosion of new the village pasturelands, plugging weed covering and an incomplete use of mountainous pastures;
- Deforestation and inadequate regeneration and afforestation;
- Loss of genetic and biodiversity resources;
- Floods and land slides; and
- Deterioration in water and air quality and pollution.

The UN Convention on Combating Desertification (UN, 1994) aims to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas.

2.2 Land Degradation in Central Asia

2.2.1 Water and Soil Resources of Central Asia

(adapted from UNCCD, 2003, Annex A)

Central Asia can be divided into three hydrological basins: the Aral and Caspian Seas and Lake Balkhash. The Aral Basin occupies an area of some 1.5–2.0 million km^2. The rivers' headwaters are located mainly in the Pamir Mountains and central Tien-Shan in Kyrgyzstan, Tajikistan and Afghanistan. The main water users in the lowlands are Uzbekistan, Turkmenistan, and Kazakhstan. Total annual runoff is about 120 km^3. The Balkhash Basin occupies an area of about 0.5 million km^2. The main source of water is the Ili River, with an annual runoff of about 15 km^3. The Caspian Sea is the largest intra-continental lake on Earth. It is fed mainly by the Volga, Terek and Ural Rivers. The northern and eastern coasts of the Caspian Sea (Kazakhstan and Turkmenistan) belong to the Central Asian region. The eastern coast of the Caspian Sea has practically no river runoff. Moreover, this region's possibilities for irrigated agriculture are limited by poor soils. Fluctuation of the Caspian sea level and the development of oil and gas industries along the coast are the region's main problems.

During the past 50 years, the natural resources of the Aral Sea Basin have suffered considerably from human influence and the progressive development of desertification processes. In 1960, the Aral Sea, located in the Turanian Depression, was the world's fourth largest sea in terms of surface area, with an area of approximately 68,000 km^2. In the past 40 years, it has shrunk considerably, losing 80 percent of its original volume and over 60 percent of its surface area. In addition, the redistribution of water resources in the region has had many other unexpected environmental consequences. The change in balance between water and land resources is leading to regional climatic changes such as the sharpening of continental climate, and shifting of vegetation seasons. The construction of a large-scale network of canals and levees together with "over-irrigation", have depleted water resources through infiltration and evaporation, degrading soils and vegetation, expanding secondary salinization, and reducing agricultural efficiency in oases. The Karakalpakstan, Khorezm and Bukhara regions in Uzbekistan, the Tashauz region in northern Turkmenistan, and the Kzyl-Orda region in southern Kazakhstan have suffered most from the

adverse environmental changes. Soil salinization and water pollution are reducing agricultural production, reducing drinking water quality and affecting human health.

Table 1. Land Resources of Central Asia

Country	Area	Arable land	Irrigated land
	Ha	ha	ha
Kazakhstan	271,730,000	22,499,244	3,556,000
Kyrgyzstan	19,850,000	1,300,175	1,072,000
Tajikistan	14,310,000	933,012	722,000
Turkmenistan	48,810,000	2,2013,310	1,800,000
Uzbekistan	44,740,000	4,702,174	4,281,000
Central Asia	399,440,000	51,447,915	11,431,000

Source: CIA World Factbook, 2006

Table 2. Water Resources of Central Asia
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2.2.2 UNCCD in Central Asia

All the countries of the Central Asian subregion, which includes Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan, are Parties to the UNCCD and they have all prepared national action programs (NAPs) to combat desertification. They have also developed a Subregional Action Program within the UNCCD context. The Central Asian Subregional Action Plan to Combat Desertification (SRAP/CD) includes the following areas of cooperation (UNCCD, 2003):

- Monitoring and evaluation of desertification processes;
- establishment of an early warning system for drought and drought mitigation
- Improvement of water use in agriculture; and
- combating erosion, salinization, and swamp formation

Joint actions to improve water use in agriculture are aimed at improving the efficiency of water use per unit area, cultivating plants with lower water consumption, growing salt-resistant plants, changing land use in unproductive areas, and restoring drainage systems.

Subregional cooperation in this area will be organized through:

- Studying possibilities for the application of water-saving technologies to agriculture;
- Developing projects to prevent water and wind erosion;
- Creating a network of pilot agricultural enterprises where the key agricultural and reclamation technologies are developed and tested;
- Developing methodology and technology to measure the chemistry and salt content of soils and ground water, as well as for draining and flushing saline soils;
- Developing principles for organization and development of farmers' and water users' associations and agricultural services;
- Disseminating best practices of farmers and family-owned plant-growing and livestock farms; and
- Developing principles of free-market-oriented agricultural systems.

Each Central Asian country has prepared a National Action Plan (NAP) with the principal aim to combat desertification, as a prerequisite for sustainable development and improving the welfare of the people by preventing land degradation, improving its productivity, while preserving biological diversity and reproductive capacity. The principal aims of the NAPs are listed in Annex 3.

3. Kyrgyzstan Water Resources and Irrigation

The Kyrgyz Republic is a mountainous country with an average elevation above sea level of 2,750 m and a maximum height of 7,439 m. The wide range of elevations, complex relief, protracted geologic development of the country and other factors result in a variety of natural conditions and a richness of water resources. The Naryn River, one of the main tributaries of the Syr Darya, rises in the mountains of Kyrgyzstan. The population of Kyrgyzstan is about 5 million people and it is predicted to increase to about 6 million by 2020 (FAO, 2005). Approximately 39% of Kyrgyzstan's GDP is derived from agriculture with about 55% of the population working in that sector. The annual agricultural water withdrawal averages about 9.4 billion m3, while domestic and industrial withdrawals each average about 0.3 billion m^3 (FAO, 2005).

Figure 1. Map of Kyrgyzstan
(Source: http://www.askasia.org/teachers/maps/)

3.1 Kyrgyzstan Economy and Agricultural Production

After independence in 1991, the Kyrgyz economy was transformed from centrally planned public sector industries to smaller, market-oriented private sector industries. The Kyrgyz Republic is a low-income country with a per capita GDP of US$421 in 2005 (NSC, 2006). The rural population comprises almost 65% of the total population with poverty being higher in the rural areas, 55%, than in the urban areas, 28% (CIA, 2006; NSC, 2006). The total land area of Kyrgyzstan is 19.85 million ha, with 1.3 million ha of arable land and 1.072 million ha irrigated land (CIA, 2006). Agriculture makes up a significant portion of the Kyrgyz economy - 34% of GDP in 2005 (NSC, 2006) - and exceeds that of any other sector of the economy and employs 43% of the country's labor force (ADB, 2006e). The Kyrgyz agricultural sector has accounted for about 35% of the country's GDP, generating 36.8% in 2000, 37.3% in 2001 and 38.6% in 2002 (World Bank, 2003). Agriculture is one of the country's key export sectors, contributing 20.45% of all exports from 1995 to 2002 (Alymbaeva, 2004). Following a significant decline in agricultural output in the first half of the 1990s resulting from a decline in subsidies and shift in relative prices for inputs and outputs, agricultural output recovered during the second half of the decade with double digit growth recorded during 1996 and 1997 and growth of around 4% from 1997 to 2000. By 1999 agricultural production levels exceeded 1990 levels. In 2003 with favorable rains and prices, the country was able to export wheat (Johnson, 2005).

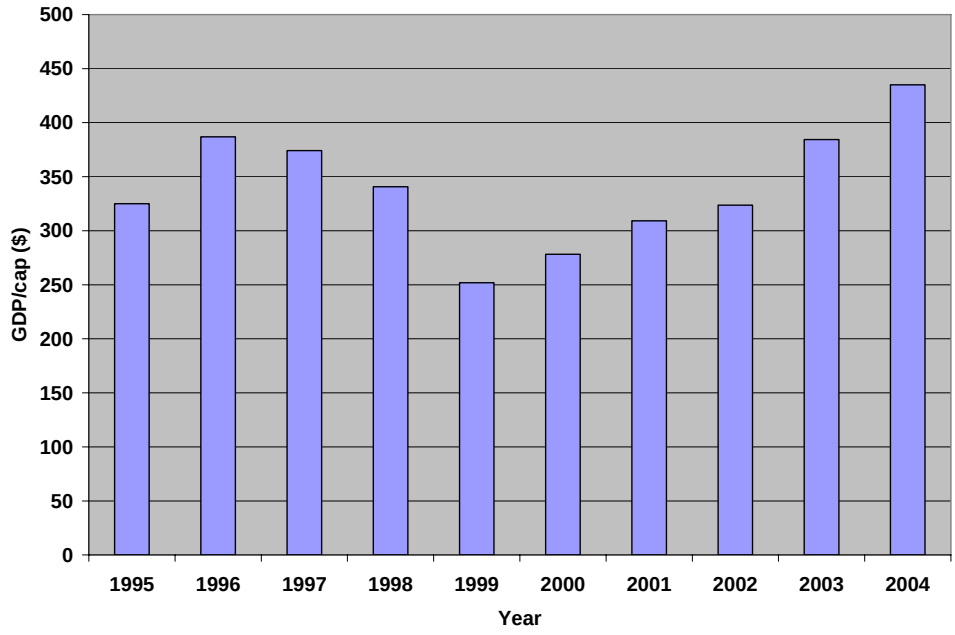

Figure 2. Kyrgyz GDP per capita 1995-2004 (Source: UNDP, 2003)

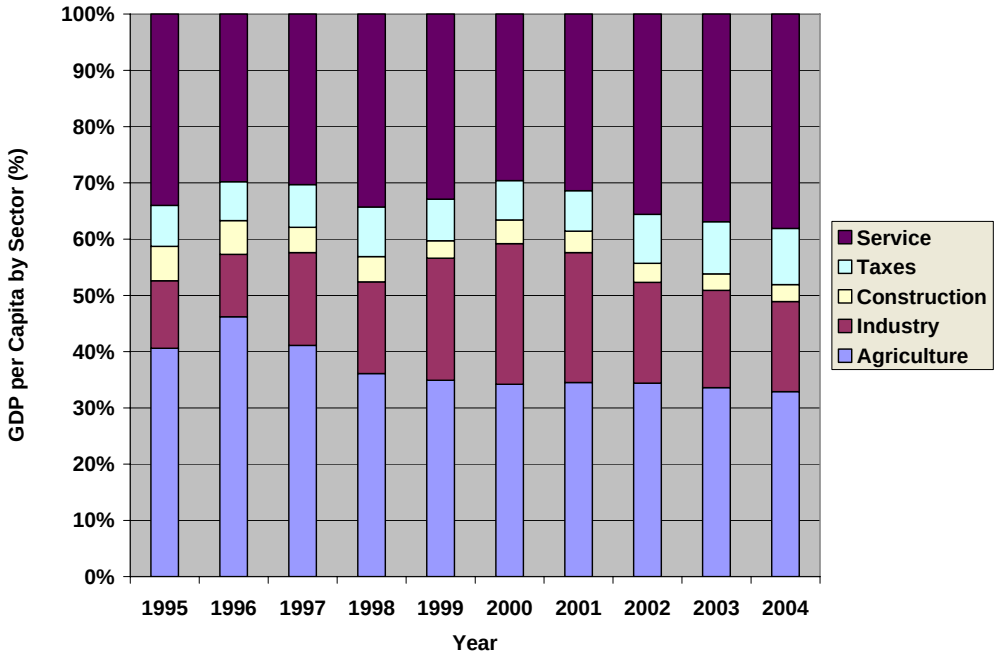

Figure 3. Structure of Kyrgyz GDP per capita 1995-2004 (Source: UNDP, 2003)

Kyrgyzstan has been at the forefront of post-Soviet agrarian restructuring land reforms, contributing significantly to agricultural growth in the second half of the 1990s and into the 2000s (ADB, 2006b). Since 1991, the Kyrgyz agricultural sector has undergone a major transformation from large, collective and state farms (known as Kolkhozes and Sovkhozes, respectively) operating in a centrally planned economy to one of many small-scale producers operating in a market economy (ADB, 2006a). The result has been that 53% of the total population of Kyrgyzstan received privately-owned land shares and the creation of over 296,000 small farms (See Table 3). Previously, about 60% of gross agricultural product had been produced in the state enterprises, and at the end of 2004 this had dropped to 3.9% and the private farmer share had risen to 55% (see Figure 4; NSC, 2006). The volume of production increased by 3.1%; however, productivity of labor decreased by 37.0% due to the rapid increase in the number of people engaged in agriculture (see Figure 5; NSC, 2006).

Agricultural reform in Kyrgyzstan has been rapid and comprehensive, and most agricultural land has been privatized or leased to private land users. The markets are, however, weakly developed, and constraints on the availability of money have led to the operation of a barter system, which involves both the private and the government sectors. The restructuring has not only caused an increasing inequity of land distribution but created an institutional vacuum for the secondary canal-level water-distribution system (ADB, 2006a). Approximately 70% of arable land is now privately owned, and the economy is relatively open with a liberalized foreign trade regime and full currency convertibility (ADB, 2006b).

Table 3: Kyrgyz Farming Enterprises, 1991 – 2005.

Year	Kolkhozes (collective farms)	Sovkhozes (state farms)	Independent farms	Private collective farms	Private cooperative farms	Joint-stock companies	All Farms
1991	195	323	4,567	-	-	-	5,085
1995	37	49	23,180	227	608	74	24,175
2000	-	61	71,163	236	292	45	71,797
2001	-	59	84,692	212	463	43	85,469
2002	-	94	251,526	63	624	39	252,346
2003	-	68	255,882	124	772	75	256,921
2004	-	68	259,701	200	832	79	260,880
2005		-	296,299	-	-	-	296,299

(Source: ADB 2006a, Table 3.1)

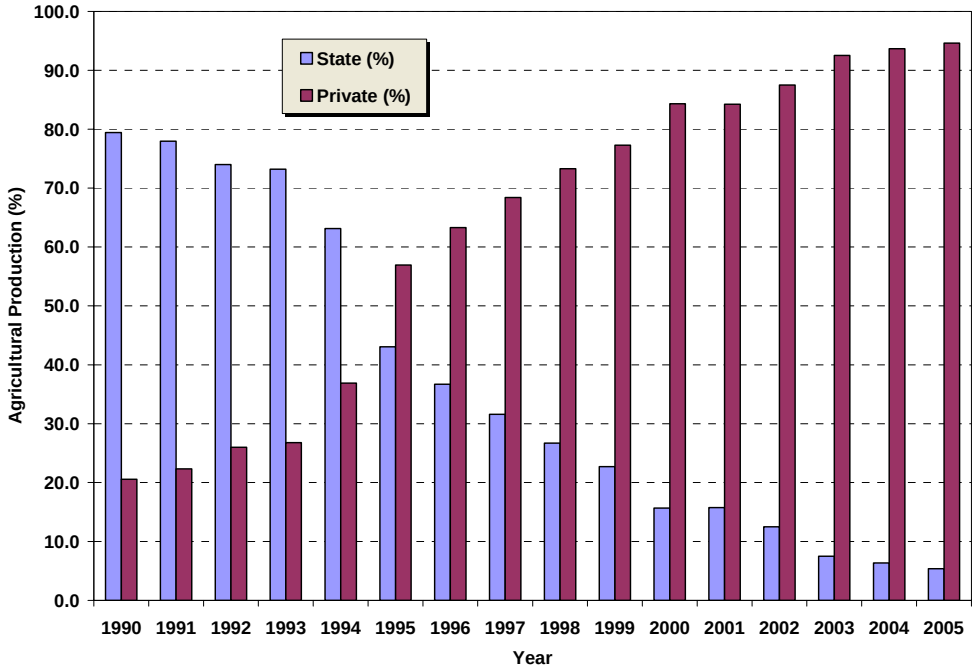

Figure 4: Kyrgyz Agricultural Output, 1990 – 2005. (Source: NSC, 2006)

The cost of agricultural inputs has increased during the period 2000 – 2005 with the cost of inputs per ha at least doubling for most crops while these inputs also were being supplied in small volumes and in limited diversity (ADB, 2006a). In 2005,, farmers received substantial state support for seeds, fuel, bread-grain and fertilizers for spring sowing. In 2005 the Kyrgyz government adopted more favorable conditions for agriculture: the VAT on agriculture production was eliminated, the land tax rate was not raised and business debts from 1992-1996 were forgiven. A new Tax Code has been drafted that will eliminate VAT on the main inputs to agriculture. Agricultural yields have rebounded from a low in the early – mid 1990s to levels last reached around 1990 (see Figure 5). The "Tulip Revolution" (March 2005) affected the country's economic performance during the year significantly, such that several key macroeconomic variables deteriorated from their recent trends. This was mainly due to disruption in economic activity and political uncertainty, as well as a fall in gold production (ADB, 2006d).

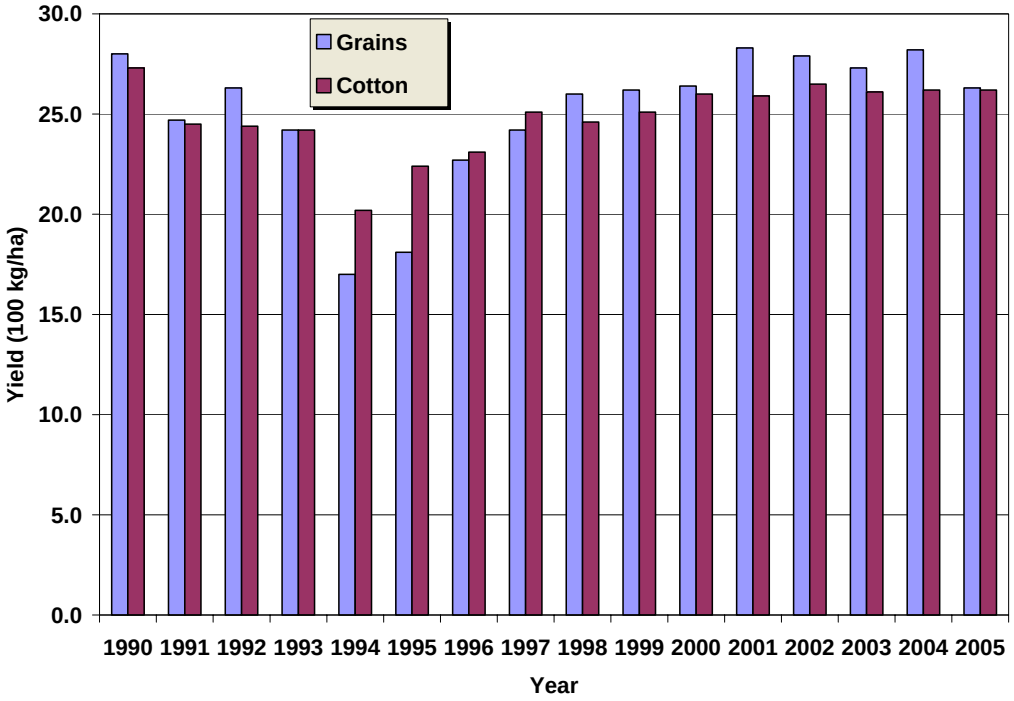

Figure 5: Kyrgyz Agricultural Yields, 1990 – 2005. (Source: NSC, 2006)

Notwithstanding the aggressive economic, land and agrarian reforms undertaken by the government in the 1990s, major environmental and administrative issues affect the agricultural sector. Land privatization and ownership reforms have given farmers a stake in improved management of their land; however, farmers are still plagued by a lack of agricultural support services, microfinance, timely input supplies at affordable prices, physical rural infrastructure, and marketing outlets (ADB, 2006b). Environmental issues associated with irrigated agriculture include waterlogging, salinization and pollution from the misuse of agricultural chemicals (ADB, 2004c). Environmental constraints to farm productivity are compounded by the country's fragile mountain topography, growing waterlogging and salinization of irrigated lands, soil erosion on sloping lands, depletion of forest cover and deforestation pressures, loss of biodiversity and genetic resources, deteriorating fertility of pastureland conditions, and a legacy of inappropriate land use practices, and inefficient use of water resources (ADB, 2006b).

The small size of farm units resulting from land distribution under the privatization policies resulted in many farms which are essentially un-economic as business operations and so have adversely affected the development of a viable commercial and export oriented agricultural sector. In addition, inadequate attention has been given to the provision of agricultural support services, timely supply of inputs, and improved access to marketing (ADB, 2006b).

During the period of 1995 – 2006, the agricultural and irrigation sectors were largely supported by international financial institutions and development agencies of donor countries, including: the Asian Development Bank, World Bank, United States Agency for International Development (USAID), Japanese International Cooperation Agency (JICA), Canadian International Development Agency (CIDA), Commission of European Union (CEU) and others. See Annex A for a listing of relevant projects of this nature.

3.2 Land Degradation in Kyrgyzstan

Land degradation and desertification in Kyrgyzstan are severe challenges to increasing agricultural productivity. Major land degradation processes encountered in Kyrgyzstan include soil erosion, salinization, under-flooding, chemical pollution, and deteriorating vegetation. The intensity of erosion is primarily due to water-runoff, soil sedimentation, and farming practices on steeply sloping land that cause soil erosion.

Kyrgyzstan has 1.3 million ha of arable land (CIA, 2006) and almost 60% of that land subject is prone to erosion and other land degradation processes (ADB, 2006b; ADB 2004a). Since independence, Kyrgyzstan has been unable to address land degradation problems effectively due to lack of a coherent SLM strategy, weak management capacity and severe funding constraints. Recently, the Kyrgyz government has placed a high priority on solving these problems – especially waterlogging and salinization – which put major constraints on agricultural production and rural development. Policy, legislative, institutional and incentive frameworks have the most potential to function as the main drivers for reversing the underlying causes of land degradation.

Some of the primary causes of land degradation in Kyrgyzstan are related to agricultural activities and deteriorating infrastructure – irrigation and drainage, roads etc. ADB summarized the relationship between Kyrgyz land degradation problems and irrigated agriculture and described their respective causes (ADB, 2006b):

- **Problems related to soil degradation of arable lands**: Soil erosion, fertility depletion, salinity, waterlogging, loss of vegetative cover, and cover with weeds. These are often caused by: unsustainable agricultural practices, weak linkage between land users and state agencies and private sector, abandonment of farms, decreased land reclamation, poverty of rural population.

- **Problems related to deteriorated irrigation systems**: Secondary salinization, decreased reclamation of irrigated lands, waterlogging, and erosion. These are often caused by: low efficiency of irrigation networks due to poor maintenance, low efficiency of water use at the farm level, deterioration of drainage network, lack of financial and technical resources.

Priority activities noted by ADB that would be effective at dealing with these issues include:

- rehabilitating and maintaining irrigation and drainage infrastructure and distribution systems;
- addressing associated issues of water use inefficiencies,
- forming and consolidating Water Users Associations (WUAs) and
- strengthening WUAs' financial viability and management capacity.

As previously noted, land salinization and waterlogging are major land degradation problems in Kyrgyzstan. The most affected districts are in Aravan and Kara-Suu Districts in Osh Region, Batken District in Batken Region, Kara-Buura District in Talas Region, and many districts in Chuy Region (Alymbaeva, 2004). As of January 2003, around 14,900 ha were considered highly saline, 31,600 ha moderately saline, and 65,200 ha slightly saline (Only in the Chuy region is there less than 20% of the irrigated land salinized). Overall, 750,000 ha of the irrigated land should have drainage systems, but only 136,000 ha (18% of the required area) is covered.

Waterlogged land is another major land degradation problem. Approximately 114,100 ha are estimated to be waterlogged in the country.

3.3 Water Resources of Kyrgyzstan

Koshmatov (2004) has reported that the Kyrgyz Republic possesses plentiful water resources in rivers, glaciers, and the snowpack. Kyrgyzstan has 3,500 large and small rivers in seven main basins: Syr Darya, Amu Darya, Chu, Talas, Ili, Tarim, and Issyk-Kul. The average annual flow of these rivers is 44.5 billion m3. Many of the rivers are transboundary, passing out of the Kyrgyz Republic to Kazakhstan, Tajikistan, Uzbekistan, and Turkmenistan as well as to the People's Republic of China. Kyrgyz consumption of water from transboundary rivers is limited by international agreements.

Annual renewable groundwater resources have been estimated at 13.6 km^3 per year, of which about 11.2 km^3 per year replenishes surface water resources. Groundwater resources are estimated to be about 3.4 km^3 per year; mainly in the Chu River basin, the Syr Darya River basin, and the Issyk-Kul depression (FAO, 2005).

A large portion of Kyrgyz irrigated lands are supplied with water from smaller rivers (806,000 ha or 76% of irrigated area); of this, 89% are fed from by unregulated flow. Large rivers irrigate 262,000 ha (24% of irrigated area), of which 59% are irrigated from regulated water sources. Thus, out of 1,068 million ha of irrigated lands, only 196,000 ha (18.4%) are fed from regulated sources. Thus, water availability is difficult to guarantee.

Irrigated cropland is developed mainly in the Jalal-Abad, Osh and Naryn oblasts of the Syr Darya basin, in the Talas and Chui oblasts of the Talas and Chu River basins, and in Issyk-Kul oblast around Issyk-Kul Lake.

Table 4. Kyrgyz Republic Water Use and Discharge: 1990-1999.

Parameter	**1990**	**1995**	**1999**
	Million m3	Million m3	Million m3
Total withdrawals	***11,122***	***9,308***	***9,179***
Surface water	10,032	8,614	8,750
Groundwater	1,090	694	429
Total consumption	***8,993***	***6,942***	***5,251***
Industrial	623	254	61
Agricultural	8,076	6,410	4,960
Domestic	294	279	208
Surface evaporation losses	1,729	1,850	2,035

(Source: ADB, 2004c citing Ministry of Environment and Emergency Situations. 2001)

3.3.1 Administration of Water Resources in Kyrgyzstan

During the Soviet times, the irrigation sector was fully subsidized by the Ministry of Water Resources (*Minvodkhoz*) that had departments in each province (Oblast) and district (Rayon).

Irrigation systems in the country were operated to deliver water to the large *sovkhozes* and *kolkhozes* that managed irrigation and drainage schemes at the farm level. For this purpose, irrigation units were established in every collective farm. A farm director together with a district executive committee of the Communist Party and District Water Department (*raivodkhoz)* were the key decision-makers for on-farm water management to meet the mandated production quotas (Alymbaeva, 2004).

Water sector reforms in Kyrgyzstan are focused on water allocation, decentralized and private arrangements, and employing an economic approach. This has resulted in improved governance efficiency and efficacy at all levels (ADB, 2006a). The Ministry of Agriculture and Water Resources and Processing Industry (MAWRPI) is in charge of water research, planning, development and distribution and undertakes the construction, operation and maintenance of the irrigation and drainage networks at the inter-farm level of the country. The Department of Water Resources (DWR), under the MAWRPI is the main water resources management agency. The DWR is responsible for administering all agricultural water resources.

Each oblast (province) has a regional DWR; whose service area corresponds to administrative boundaries of the oblast, not a river basin (although this is now changing to hydrologic boundaries ("basin" principle) under the new, 2005 Water Code). The rayon (regional subdivision of the oblast) DWR has a comprehensive role in the management water delivery, including operation of the main systems and reservoirs, design, construction, and rehabilitation of canals and structures; drainage and land reclamation, establishment and administration of water quotas; control of the irrigation system; and selling of water to farms (ADB 2006a).

The management of water resources for agricultural uses is under the authority of an extensive system of smaller Water Management Organizations (WMOs), formerly structured along administrative boundaries; this is now changing to hydrologic boundaries. Kyrgyzstan has implemented a moderate transition to market oriented water management accompanied by government support of water operation and rehabilitation, particularly at inter-rayon and inter-oblast levels. Water User Associations (WUAs) are responsible for water management at the farm level.

A surprising number of irrigation rehabilitation schemes seem to be economically viable (Bucknall et al., 2003). The World Bank has analyzed agriculture at the district level in the Kyrgyz Republic over a period of ten years and found that the net present value of costs of rehabilitation of the on-farm infrastructure was substantially less than the net present value of farmers' income attributable to irrigation. Incorporating a value for environmental damage did not change this result. Further, where irrigation schemes are not economically viable, it may be cheaper to subsidize the irrigation scheme, in combination with economic reform, than to use financial incentives to reduce the negative social impacts.

Some of the main problems of water resources management in Kyrgyzstan are (ADB, 2006b):

- wasteful and inefficient water use practices;
- slow pace of organizing water user associations (WUAs);
- weak water distribution management; and
- weak management and financial capacity of WUAs to maintain secondary and tertiary water distribution systems.

The World Bank has found that it has had to abandon the whole-scheme reconstruction approach of the 1970s and 1980s, typically costing well over $1000/ha, for cheaper approaches of about $500/ha in Kyrgyzstan (Goldberg, 2004). In addition, they have strong commitment to developing water user associations. With low rehabilitation investments, farmers' money, shovels, and labor are needed in addition to having local participation in policing the system, performing oversight of contractors and managing irrigation systems. This approach has been demonstrated and found not to be as hard as anticipated. It requires a different approach and timetable than designing new weirs or canal resectioning.

Kyrgyz farmers pay the rayon level water management organization (Raivodkhoz) for water delivered. At present the rate is $0.75/1000 m^3. This rate is recognized as being too low, but Parliament has been reluctant to increase the rate to $2.50/1000 m^3 which the DWR claims is required (Johnson, 2005). The costs of sustaining irrigation infrastructure and services have been estimated to be $58/ha - almost 6 times higher than the actual expenditures in recent years - including both on- and off-farm systems (ADB 2006a). Government expenditures on irrigation O&M are listed in Table 6 (Alymbaeva, 2004). Irrigation fees for the various regions of Kyrgyzstan are shown in Table 5 (see also Figure 6). The fee needs to be about three times the present rate in Osh, Jalal-Abad and Batken and around six times the rate in the other provinces (Johnson and Stoutjesdijk, 2004).

In some regions of Kyrgyzstan, former collective and state farms as well as WUAs have accumulated large debts to the DWR for irrigation service. A sign of improvements in the situation, as well as a reflection in the maturation of WUAs, is the reduction in these debts in recent years. In January 1998 debts were around $1.55 million; debts in January 2004 were $0.54 million (Johnson and Stoutjesdijk, 2004).

Table 5. Irrigation Fee Changes-2000, 2001, 2002, 2003 ($/1,000$m^3$)

Province	2000	2001	2002	2003
	($/1000$m^3$)	($/1000$m^3$)	($/1000$m^3$)	($/1000$m^3$)
Osh	0.70	0.86	0.90	0.97
Jalal-Abad	0.86	0.87	0.87	0.94
Naryn		0.22	0.26	0.27
Talas		0.77	0.78	0.80
Batken		0.53	0.60	0.73
Isyk-kul		0.48	0.54	0.86
Chui		0.86	0.90	1.03
AVERAGE	NA	0.66	0.70	0.80

(Source: Johnson and Stoutjesdijk, 2004)

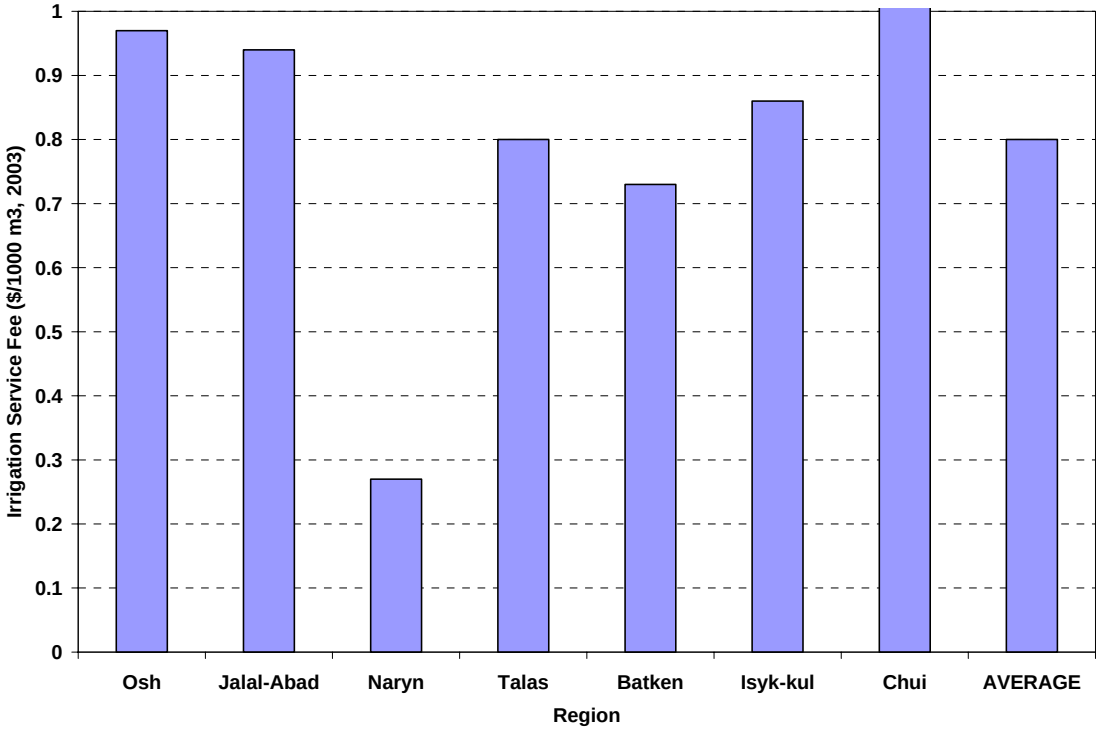

Figure 6. Irrigation fee for different regions of Kyrgyzstan
(Source: Johnson and Stoutjesdijk, 2004)

Table 6. Government Funds Provided for O&M of Irrigation Infrastructure.

	Actual	Required	% of req'd
	Million $	Million $	%
Off-farm systems			
1999	3	6	50.0
2002	7.8	13.6	57.4
On-farm systems			
1999			
2002	4.7	10.6	44.3

(Source: Alymbaeva, 2004)

3.3.2 Water User Associations in Kyrgyzstan

After independence in 1991, the Kyrgyz government embarked on an ambitious program of privatization, including land privatization. Land tenure, an important aspect of sustainable agriculture, is somewhat ambiguous in Central Asia where land is effectively leased from the state for a period of time (99 years in the case of Kyrgyzstan, 49 years for Kazakhstan, and up to 50 years in Uzbekistan though much shorter periods are more prevalent). In Kyrgyzstan land "ownership" can be used as collateral, in Kazakhstan this is also true, though in practice it is nevertheless difficult to obtain credit. Currently it is not possible to use land as collateral in Uzbekistan (Schaap et al., 2003).

The legal bases for land privatization in Kyrgyzstan are the "Land Code of the Kyrgyz Republic" and the "Law on Farming," both enacted in 1999. The former establishes private property rights in land and the latter makes general provisions for the legal status of farms as independent economic entities. Through the privatization process several new forms of farms and property relations emerged (IWMI, 2004c). The "peasant" farm has been the main instrument for achieving full privatization of land distributed among the rural population. Every working-age member of a former Sovkhoz was entitled to 0.13 ha of irrigated land to which they received title with full rights of sale, inheritance and renting. The second form of farm is the "private" farm, which operates as a legal entrepreneurial entity. Land for private farms is leased from the state through the local government, initially for 5 years and thereafter extended for up to 50 years (and now to 99 years). There is no rental charge for these lands and their extent is generally 15 to 30 ha but may be more than 100 ha.

At independence in 1991, irrigation systems were well developed across Central Asia. The disruption to the farming and irrigation systems that followed independence is well documented[1]. Once the State farms ceased to function there was no institutional entity responsible for operating and maintaining the on-farm systems (Johnson, 2005). This vacuum meant that even though the local DWR could bring water to the gate of the former State and collective farms there was no group to distribute the water to the gates of the newly emerging private farms. Given the small holdings and large numbers of individual farmers, with limited budget and lack of staff it proved impossible for local DWR to manage such a large number of individual deliveries. Realization that the State cannot operate and manage on-farm systems led the government to pass Government Resolution #226 "Water User Associations" (June 1995) and Resolution #473 "Water Users' Associations in Rural Areas" (August 1997) establishing a basis for the formation of WUAs. These resolutions allow for the legal establishment of water users' associations (WUAs) - non-profit organizations that are initiated and managed by water users along one or more hydrological sub-systems (distributory canals) regardless of the type of farms involved (IWMI, 2003). Further, the decrees stipulated the procedures for creating them, their membership, activities, rights and duties, etc. Based on the 1997 resolution, on-farm irrigation infrastructure could be transferred to legally established WUAs. However, on-farm system users were uncertain how to form and operate a sustainable WUA and with a history of receiving irrigation water free they were reluctant to pay to support irrigation water service as well as maintain the on-farm system. With a lack of legal rights as well as no leadership and support service for WUAs, many of the WUAs ended up being controlled by the former State and collective farm leaders and were not participatory (Johnson, 2005; Alymbaeva, 2004).

Recognizing additional legal reforms were necessary to remove barriers to effective water management, operation and maintenance, and cost recovery, in 2005 the country passed a new national Water Code. Under the new Water Code, water users have clearer water rights and responsibilities to more efficiently utilize water resources. Water rights are also established based on hydrological basins as opposed to political boundaries. In addition, a new system of water tariffs reflects true costs of operating and maintaining irrigation and drainage systems. As a result, it is possible for WUAs to charge more realistic cost-recovery fees for services provided.

[1] The disruption happened to a lesser degree in Uzbekistan and Turkmenistan, but in Kyrgyzstan, Tajikistan, and to some extent Kazakhstan, it was pervasive.

Kyrgyzstan was the first country in Central Asia to enact specific legislation for Water Users' Associations (WUAs)[2]; first in 1997, then updated in 2002, and further refined in the new Water Code of 2005. WUAs were initially established and formally recognized under a 1995 government decree #226 on the "Regulations on WUAs in Rural Areas." The more comprehensive 1997 government decree #473 "Statute for WUAs in Rural Areas" promoted establishment of WUAs within basin boundaries to minimize water conflicts. Farmers were expected to pay fees to the MAWRPI for delivery of water, and to the WUA for maintenance of on-farm irrigation infrastructure. The 1997 decree, which allowed the transfer of infrastructure and water trades, requires operational record keeping and enables WUAs to sanction the violation of rules and regulations (IWMI, 2004c).

Bekboltov (2005) has noted many benefits to water users of irrigation management transfer IMT) to WUAs, such as:

- participate in management;
- combine efforts and facilities for concerted actions;
- participate in setting ISF;
- participate in making water policies;
- control of irrigation infrastructure and have the right of possession;
- control of O&M, financing and conflict resolution;
- bear responsibility for financing, O&M, rehabilitation and modernization; and
- develop strategies and rules.

Transfer of irrigation management from the government to WUAs has been pursued in Kyrgyzstan for about a decade, but the results have been mixed. Alymbaeva (2004) has shown that Kyrgyz WUAs are institutionally and financially fragile and that this impairs the long-term sustainability of on-farm irrigation structures and reliable water distribution. Areas where improvements are needed and may be expected to emerge include: the rule of law, financial and management of WUAs, awareness of water users about WUAs and their mandate, more active participation of farmers and increased commitment to contribute to organizational initiatives.

Prior to land reform in the Kyrgyz Republic, in 1991 there were 504 on-farm irrigation systems in the seven Oblasts. With slightly more than 1 million irrigated ha, the average on-farm irrigation system in Kyrgyzstan was just less than 2,000 ha. By 2005 there were 430 WUAs operating in Kyrgyzstan (ADB, 2006b; Johnson, 2005) covering 708.1 thousand ha of irrigated area or 68% of the total irrigated area (see Table 9, the World Bank OFIP expects this number to rise to 77% by 2007). Irrigation management transfer to WUAs has been most successful where cash crops are grown and hence economic conditions are more favorable and where a degree of co-operation between water users is evident – such as in water-short areas of the country (Schaap et al., 2003). Given the difficulties faced by other Central Asian Republics, the speed of formation of WUAs in the Kyrgyz Republic is a positive sign as it clearly indicates farmers have recognized the need for farm-level water users associations.

[2] In Kazakhstan specific WUA legislation was adopted in 2003. In Tajikistan there is no specific legislation, though a WUA law is under preparation.

Table 7. WUA in Kyrgyzstan in 2005.

No. of WUAs	430
Service Area (ha)	708,000
No. Members	129,487
Average Size (ha)	1,735
Avg Membership	317
Average ha/member	5.5

(Source: Johnson, 2005)

Table 8. Trend of WUA Establishment in Kyrgyzstan, 1999 to early 2005

Oblast	1999	2000	2001	2002	2003	Mar 2005
Osh	26	26	26	46	63	76
Batken	16	16	17	21	23	31
Jalal-A.	11	18	27	41	50	57
Talas	5	13	30	47	52	59
Issyk-K.	7	10	11	21	28	42
Naryn	1	3	5	20	42	42
Chui	9	24	53	68	79	90
Totals	75	115	169	264	337	397

(Source: Johnson, 2005, citing USAID Central WUA Support Unit Report)

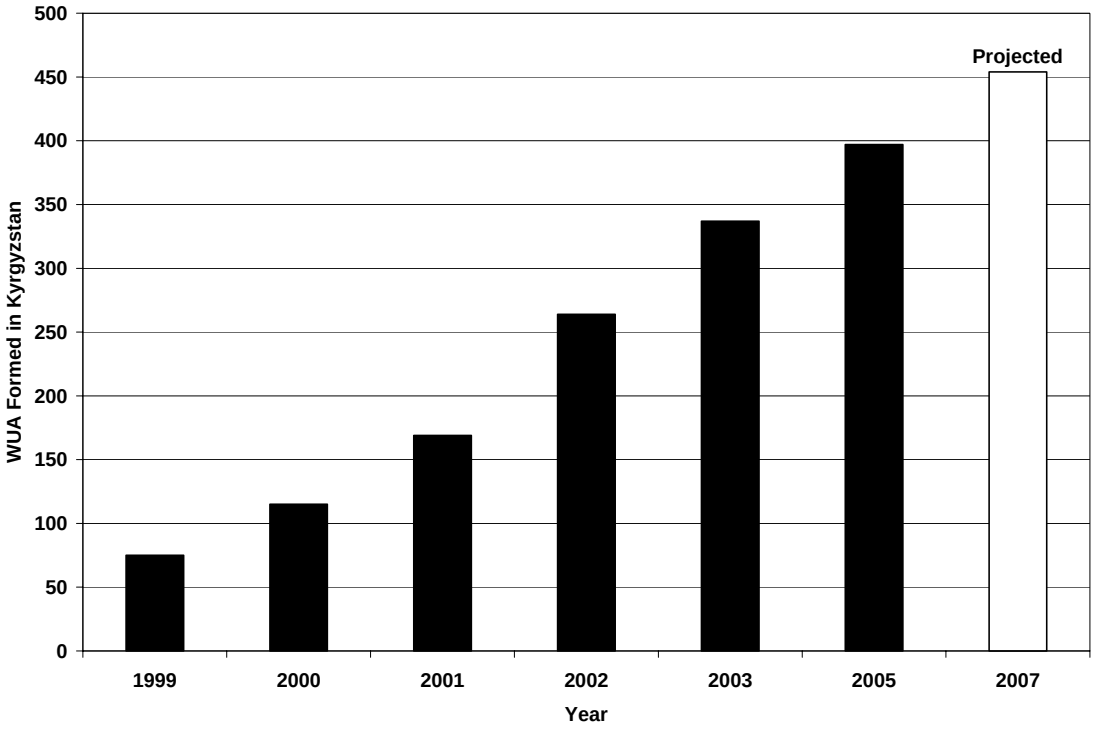

Figure 7. Development of WUAs in Kyrgyzstan 1999 – 2007
(Source: Johnson, 2005)

Table 9. Irrigated Land Under WUAs in Kyrgyzstan by Region

	Mar-05				Mar-07 (projected)			
Oblast	**WUAs**	**Irrigated Area (1000 ha)**	**Irrigated Area Under WUA (1000 ha)**	**% under WUA**	**WUAs Formed**	**WUAs**	**Irrigated Area Under WUA (1000 ha)**	**% under WUA**
Osh	76	134.4	95.1	71	7	83	-	73
Batken	31	57.5	47.4	83	-	31	47.4	83
Jalal-A.	57	123.7	96.2	78	8	65	107.9	87
Talas	59	114.9	93	81	5	64	104.7	91
Issyk-K.	42	163.4	81.7	50	9	51	101	62
Naryn	42	118.4	63.4	54	13	55	77.2	65
Chui	90	328.6	233.3	71	15	105	262.9	80
Total	**397**	**1,040.90**	**710.1**	**68**	**57**	454	**799.3**	**77**

(Source: Johnson, 2005)

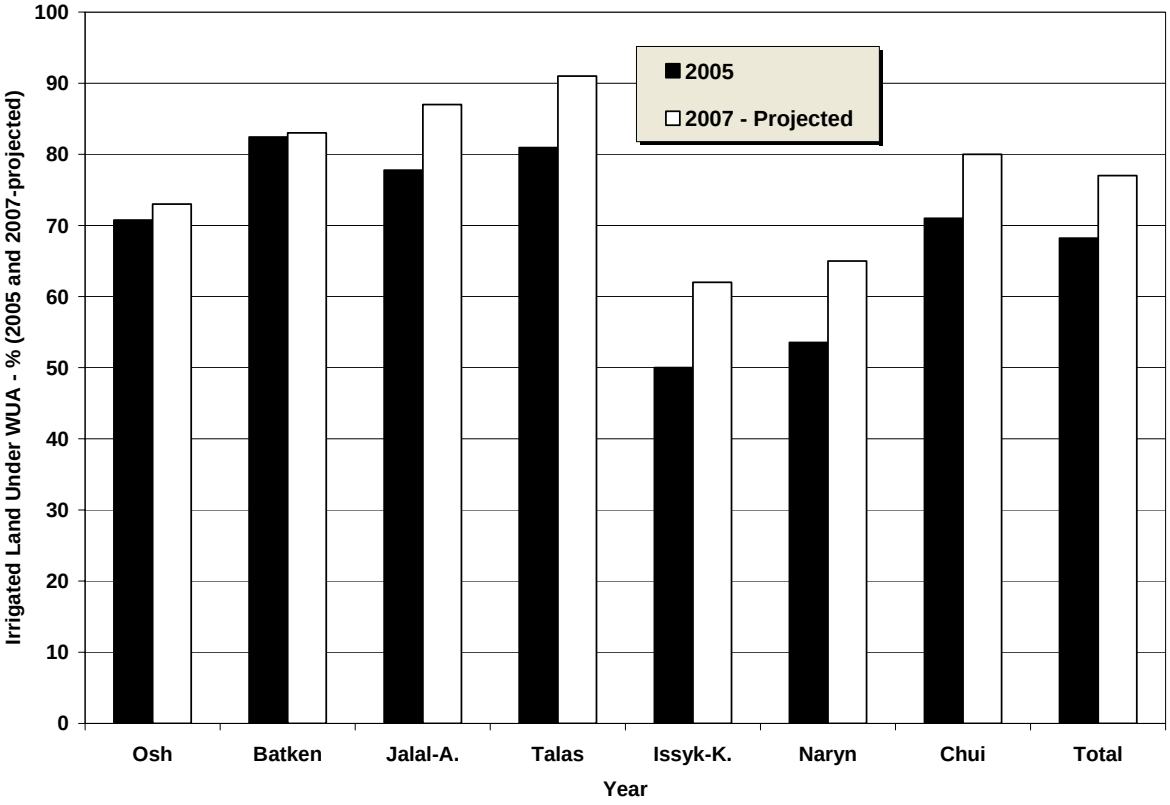

Figure 8. Irrigated land under WUAs in Kyrgyzstan by region
(Source: Johnson, 2005)

Due to economic conditions in Kyrgyzstan, WUAs have been unable to achieve a high rate of recovery of the costs of water delivery and O&M from farmers. Typically, the allocation of WUA collected fees for on-farm repair is based on residual funds not used for WUA administrative costs rather than on the level of O&M required. These residual funds are often inadequate to sustain the on-farm irrigation systems. This often happens when WUAs are established using a

top-down approach rather that a bottom-up consultative approach, working with farmers to establish WUA so that they understand what it is and how they will benefit from it (IWMI, 2003). WUAs should take responsibility for water distribution and O&M of on-farm irrigation systems within the WUA jurisdiction, develop sufficient institutional capacity and possess a clear mandate to increase the ISF to a fiscally appropriate level and tap other revenue generation options (ADB, 2006b). Even with all of this in place, WUAs still face the challenge of improving the irrigation and drainage infrastructure to suit the changing ownership and structure of farms (ADB 2006a).

One of the most critical indicators of WUA performance and sustainability is the ability to establish and collect a fee that will cover all the necessary O&M costs, administrative costs and pay the required water service fees to the DWR (Johnson and Stoup, 2004). In general, the ability of farms to pay for irrigation is a factor of the yields achieved, and many of farms have low yields, and correspondingly low ability to pay. Net returns to water for Kyrgyz WUA members range from less than $100 in poor conditions to over $600 in good conditions (ADB 2006a). Surveyed farmers say that they are ready to pay for improved irrigation services, if: (1) the issues of cost and supply of main agricultural inputs are resolved, and (2) the quality of water supply service is improved.

A typical criticism of past WUA development in Central Asian countries is that they are too entrenched within the government services and not embedded within the communities they serve (ADB, 2006a, Alymbaeva, 2004; Thurman, 2001). In Kyrgyzstan this resulted in a lack of participatory structures and values and a perception that WUAs are a mechanism for accessing system-rehabilitation funds (Johnson, 2005). However, much of this difficulty has been eliminated by the new WUA law passed in 2002 and the re-registration or creation of WUAs under the new law according to more representative conditions (ADB, 2006a; Johnson, 2005).

Progress has been made in implementing IMT and integrated water resources management (IWRM) in Kyrgyzstan (Herrfahrdt et al., 2006), especially since the passage of the new Water Code in December 2005. The most progress is noted in the managerial aspects of water management, in particular, decentralization of irrigation management which was helped considerably by the 2002 Law on Water User Associations and the transfer of tertiary irrigation infrastructure to WUAs. Demand management has improved as many WUAs have implemented a progressive pricing system setting fees based on the volume of water supplied as opposed to the area irrigated. New WUAs and the creation of WUA federations are allowing water to be managed on the “basin” principle which is more efficient than administrative or political area management.

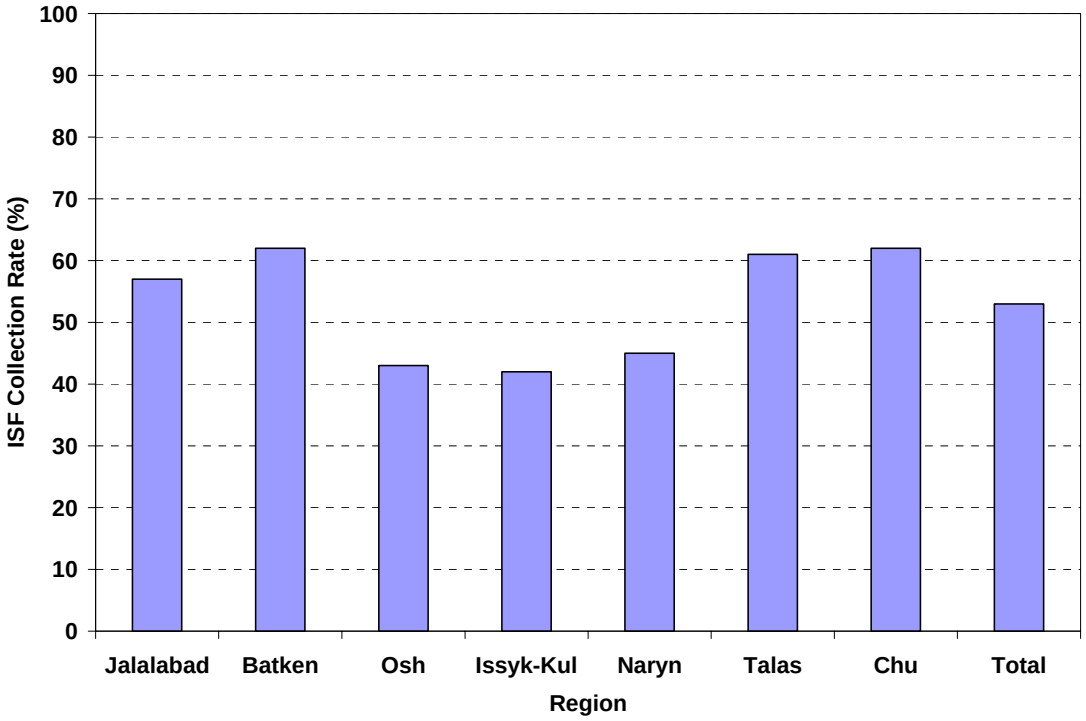

Figure 9. ISF Collection Rates in Different Regions of Kyrgyzstan
(Source: Alymbaeva, 2004)

Due to general poverty, wide-spread subsistence production and state's taxation policy, the Kyrgyz agricultural economy is mainly a barter economy with little cash transfer (Sehring, 2005). Given the general low economic condition in rural Kyrgyzstan, irrigation service fees are often paid to the local DWR agencies "in kind" and in labor by participating in the repair of off-farm infrastructure. WUA members are allowed by law to pay up to 30% of the ISF in kind (crops). However, in many WUAs the in kind payments are between 50% and 80%. This results in limited cash-flow for the WUA, increases the transaction costs, and creates additional costs (storage, transportation, etc). This barter trade is continued in the payments of the WUA to the local DWR as they repair and clean channels of the district in exchange for water (Sehring, 2005).

4. Water User Associations Studied in Various Reports

4.1 USAID Studied WUAs

The USAID Water User Associations Support Project (WUASP) operates in Uzbekistan, Kyrgyzstan and Tajikistan. The major WUASP objectives are to (www.wuasp.uz):

- Develop WUA capacity to manage local irrigation systems and use sound business practices and democratic principles in its management;
- Support WUA implementation of institutional and technical improvements through training program and limited financial support;

- Promote an improved legal and regulatory environment to support the development of WUAs and their long-term sustainability;
- Increase WUA capabilities to carry out ancillary functions such as providing information and other agricultural related services to their members;

Johnson (2005) undertook as assessment of WUAs in all three countries in which WUASP was operating. He notes that improved governance ensuring equitable distribution of water and all equitable access to benefits were consistently emphasized by WUA members as one of the most positive changes since WUAs have been formed in Kyrgyzstan. Of significant note is the fact that WUAs in the Ferghana Valley in Kyrgyzstan have no debt to the local WMO (Raivodkhoz). Farmers in Kyrgyzstan have to pay the Raivodkhoz for water delivered. At present the rate is \$0.75/1000 m^3 which means farmers must pay the Government \$7.50 if they use 10,000 m^3. Prompt and complete payment for irrigation O&M by WUA membership is happening there and it is a clear indicator that WUA members are satisfied with their association's service. While increases in economic returns are important, willingness to pay for WUA water fees is an equally good indicator of the value members place on services provided by their WUA (Johnson, 2005). The water service fee is recognized as being too low but is established by Parliament and for political reasons the politicians have been reluctant to increase the rate to \$2.50/1000 m^3 that the Department of Water Resources claims is required.

Returns and production costs from WUAs visited by Johnson were analyzed to provide insight into the present level of production in the WUAs. In general profits are very low. The problem is that land holdings are very small and access to credit is almost non-existent which means that there is a limit on their ability to increase their farm income (Johnson, 2005).

Table 10. Sample of WUASP WUAs Visited in Kyrgyzstan

WUA Facts	Taimonku	Kara-Dobo	Isa-Mayram	Sakhi-Darya	Kyzyrabad
Oblast	Jalal-abad	Batken	Batken	Osh	Osh
Raion	Nooken	Kadamjai	Kadamjai	Aravan	Aravan
Registered	2002	2003	2004	2002	2002
Irrigated Area (ha)	1,317	1,830	865	1,092	434
Members	1,200	1,500	1,384	1,552	436
Water (million m^3)	7.3	10	3.5	10.9	3
Water/ha (m^3/ha)	5,543	5,464	4,046	9,982	6,912
Cotton (ha)	870			600	186
($/ha)*	415 - 537			659	427
Wheat (ha)	200	650	430	400	62
($/ha)	195 - 220	293	185	459	195
Maize (ha)		280	50	300	35
($/ha		549 - 683	317	634	390
Sunflower (ha)		170	20	50	18
($/ha)		229	732	756	293
Tobacco (ha)		20	20		
($/ha)		1073 - 1732	1256		
Rice (ha)				60	
($/ha)				2293	
Vegetables (ha)		130	330	20-30	6-8
Budget (KRS)	214,500	545,000	228,000	469,000	164,000
Paid (KRS) 8/05	32,543	354,250	153,382	166,000	112,000

* Gross margin (2005 data) (Source: Johnson, 2005)

The USAID WUASP will be working with 21 WUAs in Kyrgyzstan studying improvements in agricultural production (e.g., crop yields) for members of WUAs adopting recommended practices. Crop production and yield data and changes in production practices from farmers who have received training in the recommended practices will be surveyed (Johnson, 2005).

Table 11. WUASP Project Pilot WUAs in Kyrgyzstan

WUA Name	Oblast	Raion	Irrigated Area (ha)	No. Members	Area for Member (ha)
Kyryrabad	Osh	Aravan	434	480	0.90
Tal-Bulak	Osh	Aravan	1,150	229	5.02
Tytty-Bulak	Osh	Aravan	920	280	3.29
Sakhi-Darya	Osh	Aravan	1,092	1,552	0.70
Asantay	Osh	Aravan	1,700	276	6.16
Jashoo	Osh	Uzgen	1,206	1,425	0.85
Jylandy-Uzgen	Osh	Uzgen	1,037	290	3.58
Nur Bulak-Bashat	Osh	Uzgen	1,617	340	4.76
Shaydan-Kara Unkur	Jalal-abad	Nooken	1,041	460	2.26
Taimonku	Jalal-abad	Nooken	1,150	1,200	0.96
Tash-Bulak-Suu	Jalal-abad	Suzak	1,420	1,126	1.26
Changet-Say	Jalal-abad	Suzak	2,200	876	2.51
Altyn-Suu	Jalal-abad	Suzak	1,900	1,840	1.03
Tamchy-Bulak	Jalal-abad	Bazar-Korgon	1,209	1,125	1.07
Isa-Mayram	Batken	Kadamjay	865	1,384	0.63
Kara-Dobo-Kara-D.	Batken	Kadamjay	1,830	1,500	1.22
	Totals		19,491	14,383	1.36
	Averages		**1,218**	**899**	**1.36**

(Source: Johnson, 2005)

4.2 ADB Studied WUAs

ADB (2006a) Surveyed farmers in four study areas in Kyrgyzstan in order to: (1) gather information on crop yields, prices and input costs, and (2) estimate farmers' ability and willingness to pay for irrigation and drainage services. The study relied on the use of farm crop enterprise budgets (not surveys), level and use of government and WUA irrigation fees, increases in irrigation service fees, and alternative water charging mechanisms.

Table 12. Characteristics of the 4 ADB Pilot Study Areas

Oblast	Chuy	Talas	Osh	Batken
Canal system	Sovhozhyi (main canal from Ala-Archa river)	Levoberejnii (main canal from Talas river)	Ujznyii (main canal from Ak-Buura river)	Kulunda (canal from Hodja-Bakirgan river)
Development of WUA: Low and High	6-High	2-High 2-Medium	2-High 3-Low	2-High
O&M cost: High and Low	Less than aver-age O&M cost	High O&M (floods; cleaning and repair)	Average O&M cost	Low O&M cost High Repair
Irrigable area (ha)	4965 ha	7461 ha	8051 ha	2,687ha

(Source: ADB 2006a)

Kulunda system (Batken oblast) - 2,687 ha (100%) of WUA irrigated lands, all of which were in satisfactory condition and 43% of on-farm system was in satisfactory condition (January 1, 2006). A progressive pricing system is used with the ISF rate depending on volume of water supplied.

Levoberejnii system (Talas oblast) – 7461 ha (87%) of WUA irrigated lands were in good to satisfactory condition and 40% of on-farm system was in satisfactory condition (January 1, 2006). ISF rate is based on the volume of delivered water.

Sovhozhyi system (Chui oblast) – 4965 ha (90%) of WUA irrigated lands were in good to satisfactory condition and 53% of on-farm system was in satisfactory condition (January 1, 2006). ISF based on the volume of supplied water.

Ujznyii system (Osh oblast) – 8051 ha (100%) of WUA irrigated lands were in good to satisfactory condition and 42% of on-farm system was in satisfactory condition (January 1, 2006). ISF is assessed on the basis of irrigated area.

4.3 DFID Studied WUAs

A DFID study looked at the process of irrigation management transfer (IMT) from the state to farmers with a view to identifying the extent to which the processes will result in a sustainable arrangement that can provide the basis for sound and developing crop production in Central Asia (Schaap et al., 2003).

Altyn Kol Bakhmal WUA (Osh Oblast) - The WUA was officially registered in April 1999, it serves an area of 1,549 ha, the command area covers the irrigated territory of 3 villages, and it has 2000 members. Because of the large number of members there is a Representative Assembly consisting of 250 delegates, instead of a General Assembly. The WUA staff consists of 6 persons: a director, deputy director, accountant and three ditch riders. The cropping pattern for the irrigated area is Wheat (859 ha), Maize (350 ha), Tobacco (200 ha), Rice (100 ha), Vegetables (65 ha). The annual budget of the WUA is 130,000 Som ($2,900: or 1.4 $/ha per year), water from the bulk water supplier costs 230,000 Som ($5,100: or 2.6 $/ha per year).

Toru-Aigyr WUA (Issyk Kul Oblast) - The WUA was established in July 1998, it serves an area of 1,249 ha. This used to be a pilot WUA and office facilities, including a computer were supplied. Also funds have been allocated to allow for the backlog of maintenance of the water

system. The WUA takes water directly from the river and does not pay a fee to the raionvodkhoz. The WUA owns the infrastructure. The staff includes 5 persons: a director, an accountant, and 3 ditch riders. The cropping pattern is Wheat (575 ha), Potato (30 ha), Perennials (229 ha), Vegetables (34 ha). The budget of the WUA is 57,000 Som (1,267 US$: 1US$/ha/y). The staff cost is 24,000 Som ($533: 0.43 $/ha per year), 13,500 Som for maintenance ($300: 0.24 $/ha per year) and repayment of the loan 19,500 Som ($433: 0.35 $/ha per year). The WUA works well and is well managed. It has an organized bookkeeping system, there is a plan for O&M, and the WUA members pay the ISF that is approved by the General Assembly

4.4 IWMI Studied WUAs

IWMI carried out a survey of WUAs in Kyrgyzstan in order to establish a baseline for determining effectiveness and efficiency of water management and irrigation in the region (IWMI, 2004a, 2004b).

Kerme-Too Akburasi WUA (Osh Oblast) - IWMI (2004a) conducted a survey of the WUA "Kerme-Too Akburasi" in the Osh Oblast. The survey was designed and administered to target farmer water users and collect baseline data to be used for benchmarking on-farm irrigation and other measures over time, identify farmers' concerns, perceptions and attitudes on a whole range of issues related to irrigation water use and management. The farms in the WUA tend to be small with 50% of the surveyed farmers with less than 1 ha, 40% with 1 to 2 ha and 10% with 5 to10 ha. Corn was the main crop (61% for 2002), with vegetables second (22%). A considerable number of farmers reported yields decreasing or stabilizing at current levels. Thirty-seven percent of surveyed farmers reported breaking even, almost twice as high (37%) as in surveyed Tajikistan (18%) and Uzbekistan (24%) WUAs. Timely delivery of water was reported, with 70% of all the farmers receiving their scheduled irrigations on time. Only 12% of respondents in WUA "Kerme-Too" reported having frequent problems with the water level.

Reported problems in the baseline survey (2003, priority ranked) include:

- Water management:
  (1) shortage of water for farms;
  (2) shortage of water for kitchen gardens,
  (3) shortage of drinking and domestic water; and
  (4) poor quality of water for drinking and household use.

- Irrigation system management:
  (1) poor maintenance of watercourse;
  (2) inadequate funds for irrigation operation and maintenance;
  (3) poor maintenance of distributary canals; and
  (4) poor water distribution.

- Water delivery:
  (1) lack of knowledge about how much water to use;
  (2) wastage of water;
  (3) inadequacy and untimeliness of water delivery to the farm;
  (4) unfair water distribution between watercourse canals; and
  (5) inability to predict when water will be available.

In 2004 IWMI resurveyed the same WUA and noted some improvements (IWMI, 2004b)

- Water Management Problems
  (5) shortage of water for farms (down from 1st)

- Management Problems
  (3) poor maintenance of canals (down from 1st)

Maintenance and repairs improved considerably between the surveys for both watercourse and canal levels resulting in a more than 2-fold decrease in failures.

Crop yields improved between the surveys: 19% higher for wheat, by 50% for corn and sunflower, by 12% for tomato, by 87% for capsicum.

Table 13. Crop yields in IWMI Kerme-Too Akburasy Study Area

Yield (tons / ha)	Kerme-Too Akburasy	
	2004	2003
Wheat	3.8	3.2
Corn	6.0	4.0
Tomato	19	17
Capsicum	11.2	6.0
Sunflower	2.7	1.8

IWMI (2004c) studied irrigation systems in Kyrgyzstan in order to determine if the effectiveness of water and land reforms in the Kyrgyz agricultural sector (IWMI, 2004c).

Akbura River System (Osh Oblast) - a former tributary of the Kara Darya now terminating at the South Ferghana Canal. The Aravan-Akbur Sai WUA is responsible for serving the entire territory of the former Sovkhoze “Kerma-To” and manages an on-farm irrigation system with a command area of 2,078 hectares.

Karaungur River System (Jalalabad Oblast) - manages the canal system offtake from the Karaungur river’s right and left banks. The Karaungur is a tributary of the Kara Darya. The Aral Sai WUA manages the on-farm irrigation system (about 2,240 ha).

With the introduction of Irrigation Service Fee (ISF) in 1999, the state began a process of reducing its financial responsibilities for irrigation management. Now the state has assumed responsibility for the cost of the MAWM and the provinces and for 50 percent of the O&M costs of the districts. The remaining 50 percent and the entire cost for Off-Farm Canal (OFC) systems are to be borne by water users through ISF. The present rate for ISF is not determined by the actual cost of the respective systems, but by an across-the-board volumetric fee of KZS 0.03/m3 of water supplied to OFCs. The on-farm O&M costs are determined by the WUAs or respective villages, and thus in WUAs by the water users.

The Kyrgyz economy is extremely cash-poor and an extensive barter economy has emerged. This has significant adverse consequences for resource mobilization by Water Management Organizations (WMOs) and their ability to provide an effective service. WUAs depend entirely, and the WMOs in part, on IFS paid by water users whose ability to pay in cash is highly

constrained. Therefore, the government permits water users to pay a part of the IFS in kind (cash/in-kind ratio of 70/30). The typical cash/in-kind ratio was anywhere from 50/50 to 20/80 compared with the prescribed 70/30. The barter economy and in-kind payment of ISF decrease the efficiency and effectiveness of water management. Members of staff waste time with marketing goods, and procurement of necessary O&M inputs has become more expensive as a result of receiving low prices for their goods.

ISF and budget remittances are mainly spent on salaries and consumables, while capital repairs are often neglected, unless donor funds are secured. A comparison of actual O&M expenditures and the gross value of production (GVP) suggest that to cover the present WUA O&M costs only 0.1 percent of the GVP is required, while at the district level 0.7 to 1 percent is needed. The current ISF cannot cover the present O&M costs of the WUA and district levels, it amounts only to a very small fraction of the gross value of production (GVP) in the sample sites.

4.5 World Bank Studied WUAs

The World Bank On-farm Irrigation Project (OFIP) is spending more than $125/ha to rehabilitate 160,000 ha in Kyrgyzstan. The project has two main components: (1) rehabilitation of on-farm irrigation infrastructure; and (2) development and strengthening of WUAs to ensure the on-farm system is operated properly and maintained. WUAs are expected to repay 25% of the rehabilitation costs, spread over 7 years with interest not to exceed inflation as well as a four year grace period (Johnson and Stoutjesdijk, 2004).

The OFIP has established a system of “milestones” which measure the performance of WUAs in various stages of development. These seven milestones are:

1. WUA established;
2. WUA staffed and trained;
3. WUA approved plan of O&M (including ISF);
4. WUA members paid O&M costs and ISF;
5. WUA developed rehabilitation alternatives;
6. WUA rehabilitation alternative selected; and
7. WUA members agree to borrow funds for rehabilitation alternatives.

The results of meeting or exceeding the milestones for the WUAs studied in the OFIP are shown in Figure 10. The result illustrates that a small percentage (around 10%) of the WUAs are fully prepared to undertake water user financed rehabilitation projects, but that a good percentage (about 50% and up to 80% in some regions) of the WUAs are well organized and collecting adequate fees for ISF and O&M.

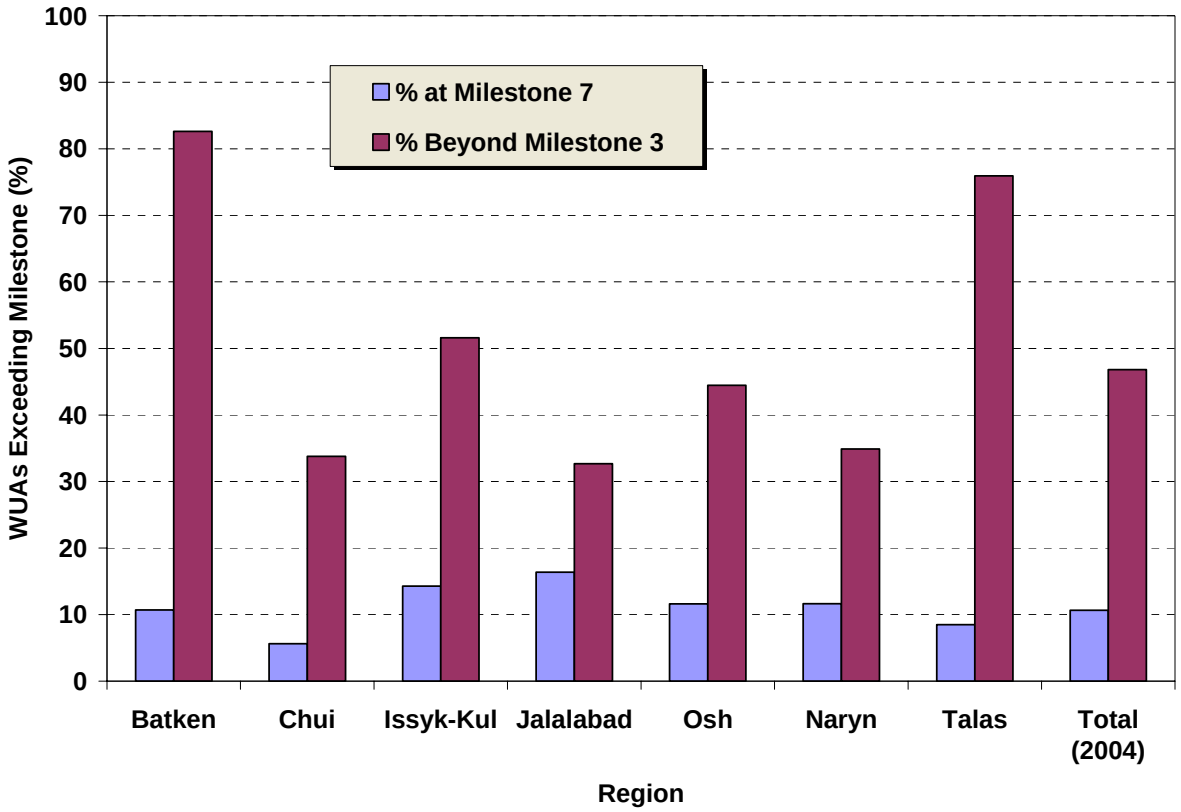

Figure 10. WUAs Exceeding OFIP Milestones 3 and 7 in 2004.
(Source: Johnson and Stoup, 2004)

4.6 Alymbaeva Studied WUAs

Alymbaeva (2004) suggests that there are five core functional components of WUAs that can be measured:

1. legal (rule of law),
2. financial (management of financial resources),
3. operational (operation and maintenance of irrigation structures),
4. organizational (internal organizational and structural management), and
5. inter-institutional (external communication)

Table 14. Description of Alymbaeva Studied WUAs

Advanced WUAs	Location	WB Stage of Development	Alymbaeva Performance*	
Japalak Milyanfan Uzyn-Kyr	Kara-Suu District, Osh Province Kant District, Chuy Province Issyk-Ata District, Chuy Province	Beyond 7th	Legal Performance	3.25
			Financial Performance	2.40
			Operational Performance	2.50
			Organizational Performance	3.25
			Inter-Institutional Performance	4.66
Poorly Developed WUAs				
Kerme-Too Ak-Buura Eldik Ak-Bar Suu	Aravan District, Osh Province Kemin District, Chuy Province Kant District, Chuy Province	4th stage	Legal Performance	2.00
			Financial Performance	2.20
			Operational Performance	2.25
			Organizational Performance	2.00
			Inter-Institutional Performance	4.66

(Source: Alymbaeva, 2004)

* Alymbaeva Performance Scores represent: 5 = excellent, 4 = good, 3 = satisfactory, 2 = poor, 1 = very poor

References

ADB (2006a). Study on Pricing Systems and Cost-Recovery Mechanisms For Irrigation, TA 4405-KGZ. Asian Development Bank (Draft). Asian Development Bank, Manila.

ADB (2006b). Central Asian Countries Initiative for Land Management (CACILM). Kyrgyzstan National Programming Framework. UNCCD National Working Group of the Kyrgyz Republic (draft). Asian Development Bank, Manila.

ADB (2006d). Asian Development Outlook 2006: Kyrgyz Republic.

ADB (2006e). Key Indicators: Kyrgyz Republic. Asian Development Bank, Manila. http://www.adb.org/KyrgyzRepublic/default.asp

ADB (2004a). Central Asian Countries Initiative for Land Management (CACILM). Program Concept Note. GEF Proposal. Asian Development Bank, Manila.

ADB (2004c). Kyrgyz Republic: Country Environmental Analysis. Asian Development Bank, Manila.

Alymbaeva, Aida (2004). Institutional Development of Water User Associations in Kyrgyzstan, Masters Thesis, University of Rochester, Rochester NY.

Bekbolotov, J.B. (2005). Public Participation in Water Resources Management (in terms of WUAs in Kyrgyzstan). Department of Water Management of the Ministry of Agriculture and Water Management and Processed Industry of the Kyrgyz Republic

Bucknall, J. et al. (2003). Irrigation in Central Asia: Social, Economic and Environmental Considerations. Europe and Central Asia Region. Environmentally and Socially Sustainable Development. The World Bank Washington DC

CIA (2006). The World Factbook, U.S. Central Intelligence Agency, Washington DC. https://www.cia.gov/cia/publications/factbook/geos/kg.html

Schaap, O., J. Pavey, A. Kirby. (2003). Privatisation/Transfer of Irrigation Management in Central Asia. Final Report. Department for International Development. Knowledge and Research Services Contract R8025. Mott MacDonald. Department for International Development (DFID)

FAO (2005). Aquastat: FAO's Information System on Water and Agriculture. UN Food and Agriculture Organization. Rome. http://www.fao.org/ag/agl/aglw/aquastat/dbase/index.stm

GEF (2003). Operational Program on Sustainable Land Management (OP 15). Global Environment Facility, http://www.gefweb.org/Operational_Policies/Operational_Programs/OP_15_English_Revised.pdf

Goldberg, Joseph (2004). Assisting Irrigation in Central Asia. ECA. World Bank

Herrfahrdt, Elke, Martin Kipping, Tanja Pickardt, Mathias Polak, Caroline Rohrer, Carl Felix Wolff (2006). Water Governance in the Kyrgyz Agricultural Sector: On its Way to Integrated Water Resource Management? DIE Studies No. 14. German Development Institute. Deutsches Institut für Entwicklungspolitik (DIE). Bonn

IWMI (2003). How to Establish a Water Users Association. International Water Management Institute (IWMI) and the Scientific Information Center of the Interstate Commission for Water Coordination (SIC ICWC)

IWMI (2004a). Yakubov, Murat and Bakhtiyar Matyakubov. The Baseline Survey of 3 Pilot Water User Associations in the Ferghana Valley. International Water Management Institute (IWMI).

IWMI (2004b). Yakubov, Murat. Follow-up Report to The Baseline Survey of 3 Pilot Water User Associations in the Ferghana Valley. International Water Management Institute (IWMI).

IWMI (2004c). Hassan. U. M., Starkloff R., Nizamedinkhojaeva N. Inadequacies in the Water Reforms in the Kyrgyz Republic. IWMI. Resarch Report #81. International Water Management Institute (IWMI).

Johnson, S. H. III (2005). Agricultural Economist Specialist Assignment. Uzbekistan, Kyrgyzstan and Tajikistan. Central Asia Water User Association Support Program (WUASP). Winrock International

Johnson Sam, H. III, and Joop Stoutjesdijk (2004). WUA Development and Strengthening in the Kyrgyz Republic. US Committee on Irrigation and Drainage (USCID). Denver.

Johnson, S. H. III, J. Stoutjesdijk, and N. Djailobayev (2002). Irrigation Reform in the Kyrgyz Republic. Sixth International Seminar on Participatory Irrigation Management. Institutional Options for User Participation. Beijing, China

Koshmatov, B. T. (2004.). Water Resources Management in the Kyrgyz Republic: Legal Base and Directions of Improvement. Past Experience and Future: Challenges Cooperation in Shared Water Resources in Central Asia. T. Bayarsaihan and D. McKinney (eds.). Asian Development Bank. Manila.

NSC (2006). National Statistical Committee of the Kyrgyz Republic http://www.stat.kg/English/index.html

Sehring J. (2005). Water User Associations (WUAs) in Kyrgyzstan: A Case Study on Institutional Reform in Local Irrigation Management. Discussion Paper No. 24. Zentrum für Internationale Entwicklungs und Umweltforschung der Justus-Liebig-Universität Gießen.

Thurman, Mike. (2001) Irrigation and Poverty in Central Asia: A Field Assessment, The World Bank, Washington DC.

UN (1994). United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, United Nations, New York.

UNDP (2003) Common Country Assessment. UN System in the Kyrgyz Republic. Bishkek.

UNCCD (2003). Subregional Action Programme for the Central Asian Countries on Combatting Desertification within the UNCCD Context. Secretariat, United Nations Convention to Combat Desertification. Havana

World Bank (2003). Key Macroeconomic Indicators: Economic and Social Data (2003). The World Bank, Washington, DC, USA. http://www.worldbank.org.kg/ECA/Kyrgyz.nsf/ECADocByUnid/902D861057313F4645256CE1004E5D0F?Opendocument

Annex A. Summary of Projects in Kyrgyzstan

To be added

Annex B. Selected Legal Instruments that Relate to Water, Land, Agriculture and Environment in Kyrgyzstan

Presidential Decree No.23, "Measures for land reform intensification" (22 February 1994)
According to the decree No.23 of the President of the Kyrgyz Republic, 22 February 1994, about the "Measures for land reform intensification", households earlier being governmental property were transferred to the ownership of peasants. Former collective and state farms were liquidated. Peasants received allotments. Instead of one water user, represented by collective or state farm with an average irrigated area of about 2,000 ha, 10 to 2000 water users exploiting a common irrigation network emerged. In such a situation, it was almost impossible to normally operate irrigation network and equitably allocate water.

Government Resolution #113 "Measures to Maintain and Finance Public Irrigation Infrastructure". (March 1994)
In 1994 the government issued a primary legal instrument, the decree "*Measures to Maintain and Finance Public Irrigation Infrastructure"*. This document instructed the Ministry of Water Resources to transfer the on-farm I&D schemes to the ownership and management of Village Councils, existing *kolkhozes* and *sovkohzes*, and newly established farming enterprises. It is necessary to note that water continued to be used by farmers free of charge as it was practiced during the entire Soviet era. This resulted in over-consumption of water by farmers and an increase of budget deficits for O&M of irrigation systems.

Government Resolution #284. Procedures on Water Distribution and Operation of Irrigation Structures. (1994)
In 1994, the government issued a second decree "*Regulations to Distribute Water and Operate Irrigation Systems"*. This decree spelled out that responsibility for maintenance of on-farm irrigation system should gradually be transferred from Village Councils to water users. For this purpose, the decree raised the need for farmers to establish water user organizations to deal with management of I&D structures and water distribution.

Government Resolution #113. Operation and Funding of the State Irrigation Systems. (January 1995)
In 1995, the President issued a revolutionary decree instituting a water transportation fee that was subsequently endorsed by the Parliament (pursuant to Articles 10 & 11 of the national Water Code, the Parliament has an exclusive right to set national water tariffs) (Water Law, 1995). Pursuant to this statute, farmers were no longer allowed to access water without payment. Thus, 'free-riding' in using water by farmers -- a practice that was exercised by farmers during the entire Soviet period -- was ceased. The Ministry of Agriculture and Water Resources (MAWR) was designated to manage the proceeds received from water transportation fee in order further finance the inter-farm irrigation programs.

Government Resolution #226. Water User Associations. (June 1995)
This comprehensive resolution on water users associations (WUAs) stipulated that WUAs would be legal entities, voluntarily established by individual households and farming organizations. WUAs were to be instituted either as a unitary water organization to deal solely with irrigation services or as a multifunctional association entitled both with agricultural production, processing and marketing as well as irrigation services. The statute authorized government agencies and commercial enterprises to join WUA.

Government Resolution #455. Water Tariffs. (1995)

President Decree #UP-7. Urgent Measures to Improve Irrigation Systems in the Kyrgyz Republic. (1995)

Government Resolution #473. Water Users' Associations in Rural Areas'. (August 1997)

The second WUA resolution eliminated a number of drawbacks of the preceding law. One of the crucial changes in this statute was that it promoted establishment of WUAs within hydraulic boundaries irrespective of administrative borders. The intention of this clause was to minimize occurrences of water conflicts. Farmers were expected to pay fees consisting of two components: i) Water Transportation Fee payable to the MAWR, and ii) O&M fee retained with the WUA for maintenance of on-farm irrigation infrastructure.

Presidential decree "On foreign policy of the Kyrgyz Republic in the sphere of water resources generated in Kyrgyzstan and flowing into neighboring countries" (June 1997)

The Presidential decree "On foreign policy of the Kyrgyz Republic in the sphere of water resources generated in Kyrgyzstan and flowing into neighboring countries" mandates the solution of interstate water problems, water allocation and the use of economic instruments for promoting water conservation and efficient use of water and energy resources.

Land Code of the Kyrgyz Republic (1999) and Law on Farming (1999)

The legal basis for the privatization of land is the "Land Code of the Kyrgyz Republic" (1999) and the "Law on Farming" (1999). The former establishes private property rights in land and the latter makes general provisions for the legal status of farms as independent economic entities.

Law on Setting Payment Rates for Irrigation Water Supply Services (1999).

The law defines tariff policy, payment rates, payment procedures, controlling agencies and liability. Tariffs are set at the following rates:

a) for normal regions – 1 tyin per 1 m3 of water during the 1st and 4th quarters and 3 tyin per 1 m3 of water during 2nd and 3rd quarters.
b) for the regions with hard and unfavourable climatic conditions – 0.2 tyin per 1 m3 of water during the 1st and 4th quarters and 1 tyin per 1 m3 of water during 2nd and 3rd quarters.

Proceeds from charging for supply of water shall be used exclusively for maintenance and development of waterworks facility systems. Tariff rates shall be set by the parliament of the Kyrgyz Republic.

The new Water Code proscribes:

Article 40. Payment of services provided according to water supply contacts.
Proceeds from water supply contracts shall be used to cover annual costs of water supplier to exploit and maintain irrigation and drainage systems including payment for water use permit and tariff for using water as a natural resource set by the parliament of the Kyrgyz Republic.

Article 83. Subventions for irrigation and drainage. Parliament of the Kyrgyz Republic may set subventions for irrigation and drainage on the annual basis. Tariff rates for services of water supplier shall be subject for approval by the government of the Kyrgyz Republic.

Law on Environmental Protection (1999)

The basic environmental policies of the country are embodied in the Law on Environmental Protection of 1999, which includes provisions for environmental standards, protected areas status as well as rules regarding the management of natural resources and emergency situations. Interpreting the provisions of the constitution, this law emphasizes individual rights to environmental protection, provides for respecting the sustainable development principle, and establishes the structure of regulatory and economic incentives governing environmental policy and the involvement of civil society in environmental management.

Law "On interstate use of water objects, water resources and water facilities of the Kyrgyz Republic" (July 2001)

The Law "On interstate use of water objects, water resources and water facilities of the Kyrgyz Republic" confirmed the principles of cooperation of the Kyrgyz Republic with the other countries in the field of water resources

LAW OF THE KYRGYZ REPUBLIC "ON UNIONS (ASSOCIATIONS) OF WATER USERS" # 38 (March 2002)

Parliament passed a new law on WUAs in February 2002 that specified their purpose, tasks, establishment procedures, membership requirements, management, dispute resolution procedures, and financing arrangements. By improving and replacing earlier regulations (GR of 13 August 1997), this new law allows options for voluntary establishment, management, and operation of the WUAs. It governs the rights and responsibilities of WUAs, including rights to establish and collect water charges, retain revenues, and make decisions on operation and maintenance, distribution of water, and improvement of on-farm irrigation systems within their jurisdiction. These achievements comprise key steps for establishing a system for sustaining operation and maintenance as well as cost recovery. (ADB 2002)

In 2002, the President ratified a new law on WUAs. The law defines WUAs as non-commercial organizations composed of individual households and farming enterprises. The statute fosters a participatory approach, transparency, and equity in governing activities of WUAs. These elements are mainly targeted to be attained through full and active participation of farmers in a decision-making process, open financial management, free information sharing, assurance of equity in water distribution, and open election processes.

The Law requires that the establishment and activities of WUA to ensure exploitation and maintenance of internal irrigation systems in countryside are carried out for public benefit.

Article 25 states that a "WUA shall become an owner of duly transferred ownership including irrigation systems within the service zone and could be granted other proprietary interests for irrigation systems".

Article 22 states that "Rates of contributions for the water supply services to WUA members shall be set by the general meeting to cover costs of water supply by water supplier and costs for exploitation and maintenance of WUA's irrigation system".

The new Water Code further proscribes:

Article 2 provides that an “Association of water users is a public foundation established to supply irrigation water to agricultural producers”.

Article 84 “Irrigation, drainage systems or parts thereof (channels, absorbing wells, collector or water reservoir), as well as occupied water fund lands exploited by a state water management agency and serve on water users association can be transferred to ownership to this association in accordance with the procedures set by the Kyrgyz Republic government”.

The Code does not regulate the procedures for setting internal prices by WUA.

In Kazakhstan specific legislation has recently been adopted (2003). The lack of legislation has been causing bureaucratic difficulties. Legislation on Rural Co-operatives – non-profit organisations – is currently used for the establishment of WUAs. In Tajikistan there is no specific legislation, though a WUA law is under preparation.

WATER CODE OF THE KYRGYZ REPUBLIC (January 2005)
This Code shall regulate water relations in the field of use, protection and development of water resources for guaranteed, adequate and safe supply of water for the population of the Kyrgyz Republic, protection of the environment and promotion of the rational development of the water fund of the country. In fulfilment of its objective, this Code shall establish principles for the management of water resources; the base of the state water policy shall be identified; the competences of state bodies concerning water resources and water object management shall be established; the system of measures for development of National water strategy and plans on use of water resources shall be created; the use of surface, underground waters and payment for their use shall be regulated; the measures on protection of water resources from pollution and depletion shall be identified; the provisions on emergency situations that belong to water resources and dam safety shall be introduced; water economy and irrigation sectors shall be regulated; provisions on use and ownership of water fund lands shall be established; the establishment of the State Water Inspectorate and obligations of the state water inspectors shall be provided; violations of the law within water resource use shall be identified; the attitude of this Code to the obligations of the Kyrgyz Republic concerning international law shall be identified. The Law consists of 19 Chapters that contain 99 articles. Chapter 1 (arts. 1-6) lays down general provisions. Chapter 2 (arts. 7-16) establishes competence of state bodies in water resources management. Chapter 3 (arts. 17-20) deals with water resources monitoring and planning. Chapter 4 (arts. 21-32) concerns the abstraction and use of water resources. Chapter 5 (arts. 33-41) regards use of water on the base of water supply contracts. Chapter 6 (arts. 42-44) regards use and development of underground waters. Chapter 7 (arts. 45-46) regards drinking water supply. Chapter 8 (arts. 47 and 48) regards economic mechanisms of water use. Chapter 9 (arts. 49-64) regards protection of water resources from pollution and depletion. Chapter 10 (arts. 65-70) establishes protection zones. Chapter 11 (arts. 71-74) deals with emergency situations. Chapter 12 (arts. 75-78) regards dam safety. Chapter 13 (arts. 79-83) regards irrigation and other water economy activity. Chapter 14 (arts. 84-87) regards the ownership and use of water economy constructions and lands of the water fund. Chapter 15 (arts. 88 and 89) concerns state water inspectorate. Chapter 16 (arts. 90-92) establishes responsibility for violation of the water legislation in Kyrgyz Republic. Chapter 17 (arts. 93-97) regards single water information system. Chapter 18 (art. 98) regards interstate cooperation in sphere of water relations. Chapter 19 (art. 99) lays down final provisions.

The new new Water Code is based on seven principles:

1. **Participatory Principle** - All interested stakeholders should have the chance to participate in planning and *decisiondn*-making processes;
2. **Sustainability Principle** - Decision making on the use and protection of water resources should take into account the needs of both present and future generations;
3. **Principle of the Economic Value of Water Resources** - The economic value of water resources should be taken into account in the planning, decision making and realization of activity on the use and protection of water resources;
4. **Polluter Pays Principle** - A person who pollutes water resources should pay for the discharge;
5. **Precautionary Principle** - The absence of full scientific information must not be used as a reason for postponing or failing to take effective action where there are risks of serious harm to water resources, the environment or human life;
6. **Principles of Real Guarantees** - Real guarantees are provided that respect the rights of water users and their legal defense; and
7. **Principle of Accessibility** - Information on the condition and use of water bodies and water resources should be accessible to the public.

Annex C. Principal Aims of the Central Asian National Action Plans

Each Central Asian country has prepared a National Action Plan (NAP) with the principal aim to combat desertification, as a prerequisite for sustainable development and improving the welfare of the people by preventing land degradation, improving its productivity, while preserving biological diversity and reproductive capacity. The principal aims of the NAPs are:

Kazakhstan NAP National Action Plan (prepared in 1997, updated in 2002):

- Prevent or reduce desertification and the adverse impacts of drought;
- Take steps to reclaim degraded lands and restore soil productivity;
- Create favorable conditions at the national level for the balanced use, conservation and restoration of land resources;
- Develop and introduce economic mechanisms for sustainable land use which would ensure the conservation and/or restoration of the resource base and strengthen the ecological safety of the population;
- Raise awareness and involve all strata of society in decision-making on the problems of combating desertification;
- Integrate anti-desertification activities into national economic and social development programs, and ensure consolidated implementation of international environmental conventions and agreements;
- Develop scientific research in combating desertification;
- Involve local communities in combating desertification.

Kyrgyzstan NAP (prepared in 2000):

- Increase the role and potential of local communities in combating desertification and poverty alleviation;
- Conserve mountain ecosystems and biodiversity; develop ecotourism
- Optimize irrigated agriculture including control over erosion processes, salinization and waterlogging;
- Increase forest areas in order to conserve water resources and prevent processes of erosion and landslides;
- Integrate natural resources management in watershed areas;
- Improve rangeland management.

Tajikistan NAP (prepared in 2000):

- Improve ecological conditions in the irrigated area in order to raise the people's standard of living;
- Preserve biodiversity of mountain ecosystems;
- Create year-round pastures;
- Use alternative energy sources;
- Preserve and expand mountain forest areas;
- Introduce traditional (local) methods of agriculture in the dry-farming agriculture zone;
- Protect topsoil productivity;

- Raise awareness at the local communities level with regard to rational use of natural resources;
- Build capacity on combating desertification at the local community level.

Turkmenistan NAP (prepared in 1997):

- Develop a National Monitoring System;
- Create year-round pastures;
- Stabilize and afforest moving sands;
- Conserve and restore forests;
- Improve the ecological situation in the Turkmen part of the Aral Sea region;
- Develop and use wind and solar power generators for remote rural settlements;
- Involve a wide range of civil society in combating desertification;
- Support scientific research and regional and international cooperation.

Uzbekistan NAP (prepared in 1999):

- Mitigate the impact of droughts, especially in the lower reaches of rivers;
- Improve people's standard of living;
- Combat degradation of irrigated lands;
- Combat secondary salinization on irrigation lands;
- Afforest the dried bottom of the Aral sea;
- Improve ecological conditions in the Aral sea basin;
- Rational use of water resources.