Institutional change in transition: Review of conditions for sustainable water consumers associations in semi-arid Uzbekistan

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Summary of the paper

After the dissolution of the Soviet Union in 1991, the republic of Uzbekistan has undergone major institutional change (i.e. adoption of rules and change in governance structures) in the area of irrigated agriculture with the aim to attain sustainable resource use[1]. In particular, the government has experienced difficulties in meeting the costs of adequately operating and maintaining the *irrigation and drainage* (hereafter referred as *irrigation* only) systems without involving actual resource users. Therefore, the management of irrigation systems at the farm level was transferred from government agencies to local water users. Starting from 2000, the government initiated the establishment of Water Consumer Associations (WCAs) with the idea that the members would act collectively to manage and maintain the irrigation systems, which they all depend on and cannot do for themselves individually. As of 2010, about 1640 WCAs have been established throughout Uzbekistan.

In spite of the fact that these new *institutions* (e.g. establishment of WCAs and introduction of irrigation service fees) have been introduced about a decade ago through top-down approach, these formal institutions are undermined by informal institutions (e.g. local traditions, culture) and are still in weak conditions. In accordance with the new formal institution, a WCA is in charge of *operating, maintaining, rehabilitating*, and *upgrading* (hereafter referred as *maintenance* only) on-farm water infrastructure through irrigation service fee (ISF) collection. However, most WCAs are still not able to take full responsibility and generate sufficient investment for the infrastructure maintenance.

Although this is true for most WCAs functioning across the country, there are few WCAs that have better outcome on performance. The example includes "Sayram-Suvi" WCA that has benefited from the ADB's loan to carry out infrastructure maintenance. Financing for system rehabilitation to make irrigation networks reasonably functional has played a key role in increasing farm productivity and thus, farmer income. However, long-term existence and survival of WCA is rather questionable once the loan ends.

The main aim of this paper is to understand key problems of the Uzbek WCAs associated with poor conditions of irrigation systems and assess the role of institutions to overcome the problems of collective action in managing the irrigation systems. The Institutions of Sustainability (IoS) framework is employed for understanding the interdependencies between ecological and social systems of common pool resources (e.g. irrigation systems), taking into account properties of transactions in irrigation system, different types of actors, policies, institutions and governance structures, and displaying their relevance in action arena, which is being as "decision on irrigation canal maintenance at WCA". The theory of common pool resources and collective action is used for understanding the classification of institutions that are conducive for successful common pool resources management.

Key words: Collective action, common pool resources, infrastructure maintenance, institutional analysis, irrigation service fee, water consumers associations.

[1] *Sustainability* refers to the ways social systems interact with ecological systems through their institutions. Sustainable socio-ecological systems are systems that can function overtime and are able to co-adapt to changes (Gatzweiler and Hagedorn, 2001).

1. Background

The Republic of Uzbekistan (hereafter referred as Uzbekistan) is a landlocked country, with an area of 447,400 square km, larger than most European countries[2], and comprised largely of desert or semi-desert. The population is about 28 million in 2009, of which over 60 percent live in densely populated rural communities (ADB, 2009). The country is rich in natural resources (coal, copper, gold, natural gas, silver, uranium, etc.). With an educated population and a growing young labor force, it has significant economic potential in the Central Asian republics (United Nations, 2008).

Since the collapse of the Soviet Union in 1991, Uzbekistan has undergone substantial reforms in all sectors of its economy and followed a gradual approach to economic reform to minimize the transaction costs of transition. Market-based reforms have been slow and have focused on a few areas, particularly current account convertibility, adjustment of energy services, and privatization through lease-holding of collective farms (World Bank, 2009). The Uzbek government now seeks to lessen its dependence on primary agriculture while developing its mineral and hydrocarbon potentials, further diversifying its economy, and addressing serious environmental challenges (*ibid*).

Agriculture is an important sector for Uzbek economy, which constitutes 32 percent of GDP and is the country's major source of employment and income (World Bank, 2009). As a result of the country's arid climate almost all agriculture depends on irrigation. About 97% of crop production is carried out on irrigated land. There is an estimated 4.3 million hectares of land suitable for irrigation, significantly larger than in other four Central Asian republics (0.77 million ha in Kazakhstan; 0.42 million ha in Kyrgyzstan; 0.72 million ha in Tajikistan; and 1.73 million ha in Turkmenistan).

Cotton is the main cultivated crop in the country, contributing to around 25 percent of foreign exchange revenues, and a significant source of tax revenue (Guadagni et al., 2005). Aside from cotton, wheat is considered to be essential to achieve food security. Other significant irrigated crops include grains (primarily corn, barley, rice and oats), fodder crops, and fruits (grapes, apples) and vegetables (potatoes, tomatoes). Around 35% of cultivated land is devoted to cotton, about 30% for grains (including wheat), about 24% for fodder crops (e.g. alfalfa, barley, maize), and the remaining for fruits and vegetables[3].

Historical dimension in irrigated agriculture

The evolution of institutional change in the irrigated agriculture can be described in three-fold: pre-Soviet occupation, during the Soviets, and the status quo (after the collapse). Before the Soviet occupation (19th century), irrigation distribution was based on Islamic Shar'ia law where water was regarded as a common good (Abdullaev et al., 2006). About 1.3 million hectares were irrigated, and all canals and ditches were

[2] Only France, Spain and Sweden are larger in terms of the size than Uzbekistan. Germany with about 357,000 km^2 area is considerably small.

[3] Data was obtained from the Ministry of Agriculture and Water Resources of Uzbekistan and is given for 2010 vegetation period.

controlled collectively and owned by the public. The main principle for water sharing was that the landowners would receive sufficient amounts of water to fill their agricultural fields (*ibid*).

During the Soviet era, an additional three million hectares of land was developed for irrigation. Management of water was carried out under strong state regulation. The centralized water allocation system was run by the former USSR Ministry of Land Reclamation and Water Management (USSR Minvodkhoz), who consulted with the five Central Asian republics. Two basin water management organizations (Amudarya BVO & Syrdarya BVO) were set up in 1986 by the USSR Minvodkhoz to manage resources in accordance with regulations and schedules agreed by the Central Asian republics. Water management authorities, based on administrative districts, were responsible for the delivery of water to the farm borders and managed the main (*magistralniy* in Russian) and secondary (*khozyastvenniy* in Russian) canals. Water in tertiary (*vnutri-khozyastvenniy* in Russian) canals within farms was managed by the farm authorities. Irrigation system maintenance was managed with the same accordance.

After the collapse of the Soviet Union, integrated large-scale irrigation systems had to be shared across the newly established independent Central Asian states. Each nation undertook its own agricultural, land and water reforms to subdivide large state farms into smaller farmer-owned units. In the water sector, a mechanism for regional cooperation in water resource management was initiated. The first agreement was on cooperation regarding joint management of water resources in inter-state water sources. It established the inter-state commission for water coordination (ICWC), represented the five Central Asian countries on 18 February 1992. ICWC has five members appointed by the governments and its main tasks are to release water by schedule to five Central Asian republics and to protect water resources. Upon decisions of ICWC on water delivery, the Ministry of Agriculture and Water Resources of Uzbekistan (MAWR) takes a key role in distributing water to users.

Institutional change in agricultural sector

Uzbekistan, as the other four socialistic Central Asian republics, declared its independence from the Soviet Union in 1991. This has left the newly independent states with the task of developing their own market economies. The distribution of property rights for agricultural land took place in 1998, when Parliament adopted a number of land reform laws (such as on Land Code, State Land Cadastre, Agricultural Cooperatives, Individual and *Dehkan*[4] Farms).

These reforms were mainly targeted at privatizing large collective farms (or *kolkhozes*)[5] and state farms (or *sovkhozes*)[6] that were established during the Soviet era. While some Central Asian countries directly pursued a land privatization policy (e.g. Kazakhstan and

[4] *Dehkan farms:* Garden plots that occupy an area of between one-tenth and one hectare (the standard dimension in Uzbekistan is one-fourth hectare). They are exempt from production quotas.

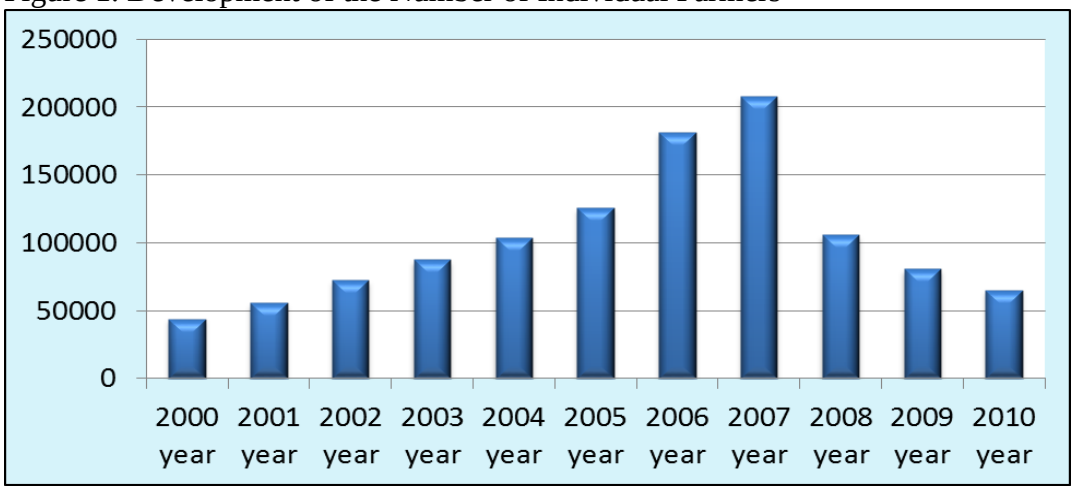
[5] *Kolkhoz* (Russian): A large collective farm comprising several agricultural experts and farm laborers responsible for the collective management of the production system and delivery of targeted outputs to the state. They had their own budget and were able to sell at the market.

[6] *Sovkhoz* (Russian): State-owned farms. They were financed by the state and their entire output had to be delivered to the state.

Kyrgyzstan), Uzbekistan has followed a cautious approach, by first sub-dividing the large collective farms into smaller cooperative farms called *shirkats*[7]. The main idea behind this stepwise strategy was the President's five step quote on free market entrance, where the fifth quote highlights the importance of a gradual approach to enter the market, thereby minimize the transaction cost of transition. However, *shirkats* were still accountable to the state, which fixed low prices for cotton and wheat, while the costs of their production increased. Thus, these made many *shirkats* depended on state subsidies and were even less efficient than the old *kolkhozes* (Noble et al., 2005). As a result, instead of earning profits, many *shirkat* members have fallen into debt, when state budget subsidies declined, even in areas with favorable soil fertility and climatic conditions. There were about 1733 *shirkats* in Uzbekistan, of which 600 were broken up during 1999-2004 (Yalcin and Mollinga, 2007). The break-up continued in 2005, 2006 and by late 2007 the remaining *shirkats* were abolished.

The establishment of individual farms[8] within each *shirkat* was essential to improve the efficiency and equity of production farms. Today, about 65 000 individual farmers have been involved in the agricultural sector in Uzbekistan[9] (Fig. 1). It is noted that sharp decline in number of individual farmers after 2007 is due to the Presidential Decree (on 20 October 2008) that was issued to merge individual farms so that in average individual farm would have 50-60 hectares (about 3 times of previous average) of land to benefit from an economies of scale to increase farm incomes. Further decree titled "on measures to observe legality in reorganization and optimization of the sizes of land parcels of farmers' associations" signed on 18 April 2011 is the latest land reform (individual farmers have now between 80 and 120 hectares land on average).

Figure 1. Development of the Number of Individual Farmers



Source: Ministry of Agriculture and Water Resources of Uzbekistan

[7] *Shirkat* (Russian): A typical *shirkat* (production cooperative) contained 1-5 thousand hectares of irrigated land and it was family-based production. The *shirkat's* production output had to be delivered to the state.

[8] *Individual farms*: Long-term leaseholdings (50 years) cover an area between 80 and 120 hectares, depending on which region of Uzbekistan they are located, and employed 10-15 permanent workers.

[9] Face to face conversation with the Head of Water Resources Department of the Ministry of Agriculture and Water Resources of Uzbekistan on Nov 25, 2010 confirmed that the reorganization of individual farmers is the ongoing reforms and by late 2011, a number of farmers will further decrease.

It is noted that Uzbekistan has retained the system of state planning for main agricultural products - cotton and wheat. Local governments regulate the production outputs and in the beginning of each vegetation period calculate a threshold limit that farmers need to produce. In the case of cotton, the state regulates the market and has a monopoly control over the price. The state is a sole buyer of entire cotton production and sells in the international market as fiber. In the example of wheat, farmers should provide certain quota to the state and the remaining they are free to sell in the market[10]. The main drive behind this strategy is that cotton is served as "cash crop" and wheat to achieve "food security".

Institutional change in irrigation sector

The formal law on *Water and Water Use* was adopted in 1993 and is a legal basis for water allocation and consumption in Uzbekistan. In accordance with the law, water is the state owned resource – the national wealth – and is subject to rational use and government protection. Article 30 of this law reiterates that the use of water shall be subject to payment in order to ensure the maintenance of water systems. This payment should be measured as the payment of staff in charge of services to make the water available.

Contrasting to agricultural land reforms, the main reform in the irrigation sector began a bit later with the Decree #8 of Cabinet Ministers, in 2002 on "Measures for the reorganization of agricultural enterprises into individual farms", the Presidential Decree #3226 in March 2003, which set out "Directions for intensification of agricultural reforms", and Decree #320 of the Cabinet Ministries in July 21, 2003 "Improvement in the organization of water resources management".

A key element of the change was to create a two-level system for managing waters – the establishment of basin administration of irrigation systems (BAIS) and the development of water consumers associations (WCAs)[11] to replace the *shirkats*. The department of water resources was established in MAWR as the top authority for water management in the country (Annex 1). Under it, 10 BAIS were established, and under each BAIS, irrigation system administrations (ISAs) were set up. There are several ISAs in each region and each basin, and in total there are 63 ISA. As a result, water management organizations were reduced from the previous 260 to 73, which operate and maintain all large-scale water infrastructures under the state budget. Each BAIS is responsible for water allocation within the basin, implementation of water allocation; whilst the ISAs are responsible for maintaining main canals and water delivery to WCAs.

Farmer oriented reforms – Creation of water consumers associations

Upto the mid-1990s, there was a significant deterioration of the secondary and tertiary canal systems because the *shirkats* could not regularly maintain them as mentioned earlier. This resulted in low yields and subsequently low incomes for farmers. Meanwhile, the distribution of irrigation water became severely unequal, especially for

[10] Although wheat is mainly produced for internal consumption

[11] On 29 December 2009, "Water and Water Use" Law was revised and previously used water users association concept was renamed into the water consumers association. Distinctions between them were clarified as: water users (not affecting the actual amount of available water, such as fisheries and hydropower) and water consumers (reducing the actual amount of available water, such as irrigation).

downstream farmers. Disputes among farmers over water increased. These became a main driving force behind the irrigation reform and forced the government to develop new organization and institutions for local water management.

Participatory irrigation management was introduced in this reform as leased farming became the predominant system for agricultural production. It became essential to introduce farmer organizations, reflected as WCAs in place of the collapsing *shirkats*. In 1996, the MAWR contracted the Central Asian Research Institute of Irrigation (SANIIRI) to study the experience of other countries with WCAs and to set up a framework for the establishment of WCAs. In 1999, SANIIRI completed its study and presented its recommendations to MAWR.

As a result, the first WCA was born in Uzbekistan in February 2000 in the Khorezm Region, based on six liquidated *shirkats*. Initially, WCA was regulated by civil code on voluntary membership. Later on, they were regulated by the Decree #8. Box 1 below provides a definition of WCA and their responsibilities, which was developed by MAWR.

Farmer reaction to this new initiative has been positive, as they understood that this new entity was important to maintain their secondary and tertiary canals in good shape (Hamidov, 2007). In most cases, MAWR led the *shirkat* committees, local governments, BAIS and ISA directorates in the mobilization of farmers into WCAs. The basic idea behind such devolution-oriented reform was that WCAs would maintain *on-farm irrigation facilities*[12] through their own funds. By end 2010, 1640 WCAs have been established, which serve nearly 65 000 farmers, covering 3.9 million ha.

Box 1: WCA function and its aims

WCA created by a group of farmers and other water users along one or more hydrological subsystems or watercourses to collectively manage, operate, maintain, and develop an irrigation and drainage system. Membership is based on contracts and/or agreements between the members and the WCA. The main responsibilities of the WCAs include:

- Ensuring the reliable distribution of water among water users;
- Determining and collecting Irrigation Service Fees (ISF);
- Resolving disputes that concern water use and management of the irrigation system in an appropriate, transparent, and democratic manner;
- Maintaining, rehabilitating and improving the irrigation system in the WCA operational area.

The members of the association should manage the activities of the WCA directly or through their representatives (Annex 2). The General Assembly is the primary decision making body. All WCA members or their representatives participate in the meetings of the Assembly and have a vote each. The members of WCA Council meet at least once a month. The Audit Commission monitors the financial activity of WCA. It reports to the General Assembly. The main task of the Management team is to manage WCA's activity on a daily basis. This team consists of a WCA manager, an accountant and technical staff, and is paid for its activities.

[12] On-farm irrigation facilities – infrastructure within the WCA territory, such as irrigation and drainage networks, hydro-technical structures, pump stations and associated facilities, irrigation and drainage wells together with associated electrical transmission lines and additional transformer stations.

Legal framework of the WCAs

The Cabinet Ministers Decree #8 on the establishment of WCAs on the territory of liquidated *shirkats* is the main legal basis for WCA. This decree contains WCA's objectives, rights and responsibilities. It states that WCAs should be managed through irrigation service fees (ISF, rather than water fees), paid in cash or in kind by WCA members. ISF can be paid on the basis of either per hectare, per crop cultivated or the volume of water provided. ISF is determined by each WCA through its General Assembly. In practice, due to the lack of water measuring devices, most WCAs levy ISF on per hectare basis, calculated simply by dividing total expenses by the total hectares to be irrigated. It should be noted that the term ISF is new, as during the *shirkat* era, fees were collected as part of water tax. In accordance with the president's decree, declared on 27 October 2003, WCAs are exempted from income tax, value added tax, and property tax for three years from the date of registration. In addition to Decree #8, the revision of "Water and Water Use" law on 29 December 2009 also put some emphasize on WCA[13].

2. Research problems

Despite the fact that new *institutions* (e.g. creation of WCAs, introduction of irrigation service fees, and decentralization of water management) have been introduced about a decade ago through top-down approach, these formal institutions are still not well accepted by the resource users (e.g. individual farmers), they are undermined by informal institutions (e.g. local traditions, culture, habits) and are still in weak conditions[14]. In accordance with the new regulation, for instance, a WCA is in charge of maintaining on-farm water infrastructure. However, most WCAs are still not able to take full responsibility, organize collective action, and generate sufficient investment for the infrastructure maintenance[15] (Fig. 2). Schlueter et al. (2010) notes that most of the irrigation infrastructure is in poor condition due mainly to insufficient maintenance and replacement caused by a lack of finances and clear responsibilities.

Figure 2. Typical on-farm (secondary) irrigation system in Uzbekistan

The poor infrastructure has an impact on productivity, timely allocation of water to users, farmers' ability and willingness to pay for irrigation service fee, and thus contribute to WCA income. This in turn renders WCA's inability to maintain the infrastructure and leave them as weak organization with lack of effective rules and regulations.

[13] According to article 2.1, for instance, WCA should be treated as legal entity to deal with internal conflicts related to water distribution among water consumers. They are non-commercial and non-governmental organizations established voluntarily. Furthermore, article 10 reiterates that WCA should cooperate with state agencies in the protection and conservation of water resources.

[14] Informal institutions, for instance, included social *khashars* (collectively clean drainage systems or fix irrigation scheme. It was a free labor and voluntarily initiated activity). With the adoption of new rules, these activities are less practiced.

[15] In 2009, only 67 percent of ISF was collected by WCAs. Some regions have ISF collection rates as low as 20-30% (MAWR, 2010).

Furthermore, outdated infrastructure causes some farmers to abandon their agricultural fields that eventually may lead to the increase of rural poverty.

The main aim of this paper is to understand key problems of the Uzbek WCAs associated with poor conditions of irrigation systems and assess the role of institutions to overcome the problems of collective action in the management of irrigation systems. This aim is attempted to address by means of the Institutions of Sustainability (IoS) framework.

3. WCA experiences – A literature review

A number of scientists in the area of natural resources have studied the transformation process in Uzbekistan after the collapse of the Soviet Union. For instance, Swinnen (1999) observed that while Eastern European countries chose to restitute land to former owners, most of the former Soviet Union (FSU), except Baltic States, gone for distributing land among former employees of *kolkhozes* and *sovkhozes*. Although this is true for Kyrgyzstan and Kazakhstan, Uzbekistan selected totally different and in a way unique approach of land reform and transition to market economy in general. Bloch (2002) argued that Uzbekistan developed its model of transition to market economy with little consideration about what other countries were doing. However, Uzbekistan was more analytical as well as critical about common transition policies in the FSU countries which, more or less, followed "Washington Consensus" (Kotz, 2004).

Abdullaev et al. (2010) highlighted that during the land reforms, the organizational structures regulating the water management in the *kolkhoz* system had been abolished. While inter-farm irrigation infrastructure remained under the state management, on-farm water assets, formerly managed and maintained by *kolkhozes* were abandoned and no further responsibility was delegated. As a result, on-farm water allocation became an issue of social interaction, a place of contestation and competition (Wegerich, 2006; Veldwisch, 2008; Abdullaev et al. 2008). Due to growing problems on irrigation water management at the former *kolkhoz* level and strong influence by international donors, all Central Asian countries (including Uzbekistan) have started establishment of WCAs with the main aim of water resources management and maintenance of irrigation systems at the former *kolkhoz* territories. This change in the irrigation sector took place through top-down, bureaucratic manners (Abdullaev et al. 2010). As a result, existing WCAs are in the stage of collapse, if appropriate measures are not taken (*ibid*).

Holm-Mueller et al. (2004) pointed out that the idea of acting collectively in managing the natural resources (e.g. land and water) has been a known concept in Uzbekistan for a long time. But only in 2000, management of the irrigation systems was handed over to farmers within the framework of structural adjustment. The idea behind this reform was to handover system management to actors in the civil society (in this case, to farmers) that give actors a stake in the creation of an efficient system. It is argued that user-managed water organizations hold the potential to become more efficient than state-managed water organizations (*ibid*).

In her dissertation, Zavgorodnyaya (2007) carried out research on WCAs in Uzbekistan, focusing on factors influencing the success or failure of the emerging local WCAs. She compared four pilot WCAs supported by different international donors across the country with four unsupported WCAs located in the northwest (i.e. Khorezm region). Based on the study, her findings included conflict resolution mechanism, leadership, and user's fee

payments to be important factors to achieve long-term existence of WCAs in Uzbekistan. Agrawal's (2001) framework about successful self-organised common-pool resources systems was basis for determining the success factors.

In the meantime, Theesfeld (2005) investigated the transformation process of irrigation facilities from the government to local users in the context of another post-socialist country (i.e. Bulgaria). She identified that strong government and the World Bank push to form sustainable water users groups, thereby acting collectively to manage irrigation systems, did not produce expected results. Her research findings showed that the established groups did neither provide a functioning of local irrigation sector management nor did they involve local water users in their establishments. Instead, they were enforced by individual actors who were striving for personal benefits or political influence. Most of the water users groups terminated after one irrigation season (*ibid*). Thus, one of her main suggestions included that "instead of imposing irrigation management models, let water users to design their own institutions", which was also supported by Ostrom (1992a).

4. The example of Sayram-Suvi WCA[16]

Although most WCAs in Uzbekistan are still in the development stage and experience multiple problems as mentioned earlier, the "Sayram-Suvi" WCA has benefited from ADB project (2003-2009, US$ 26 million loan) and modernized its major physical assets. Under the project, the WCA purchased agricultural machineries, which are now fully utilized. Unlike other WCAs, this association has a newly decorated office, expensive chairs, sofas, computer tables, two new computers, a fax machine, a printer, a scanner, a digital camera and several walkie-talkies. The chairman has an agricultural background with extended management experience. Election of the chairman was considered as fair.

The "Sayram-suvi" irrigation system is located in the Tashkent region, 100 km south from the capital (Fig. 3). It draws water from Chirchik and Angren rivers. The *Parkent-Karasu* ISA is a main supplier of irrigation water to WCA. The WCA was established in February 2005 on the territory of former Pakhtachi and Ulugbek *shirkats*, covering 4,900 ha. The basic crops are cotton and wheat (about 40% each crop) with the remaining 20% are rice, orchards, and vegetables. The land is fertile and does not suffer the salinity problems that plague other parts of Uzbekistan.

Prior to the establishment of WCA, irrigation systems were managed and owned by the state. A chief hydro-technician was responsible for keeping irrigation networks. In mid-1990s, the state reduced its central budget funding for rehabilitation of secondary and tertiary systems, although main canals still received enough funding. The *shirkat* farms fell into debts. Farmers located at heads of canals often took water illegally by punching holes to divert water to their fields. Farmers in the tail-ends of canals suffered from inadequate water supplies and often complained to the local authorities. There was a

[16] The author – Ahmad Hamidov - visited the Sayram-suvi WCA in June 2007, together with Mr. Fahriddin Khaydarov from the Parkent-Karasu Irrigation System Administration (ISA), who works with this WCA. Together, they interviewed the WCA chairman (Holmihon Chinnibekov), hydro-technician (Murat Khashimov), accountant (Feruza Ganieva) and farmers (Nozim Kurbanov and Adham Mavlanov). The example here was based on the interview.

pressing need for the government to transfer the deteriorating on-farm irrigation systems from the *shirkats* to new entities.

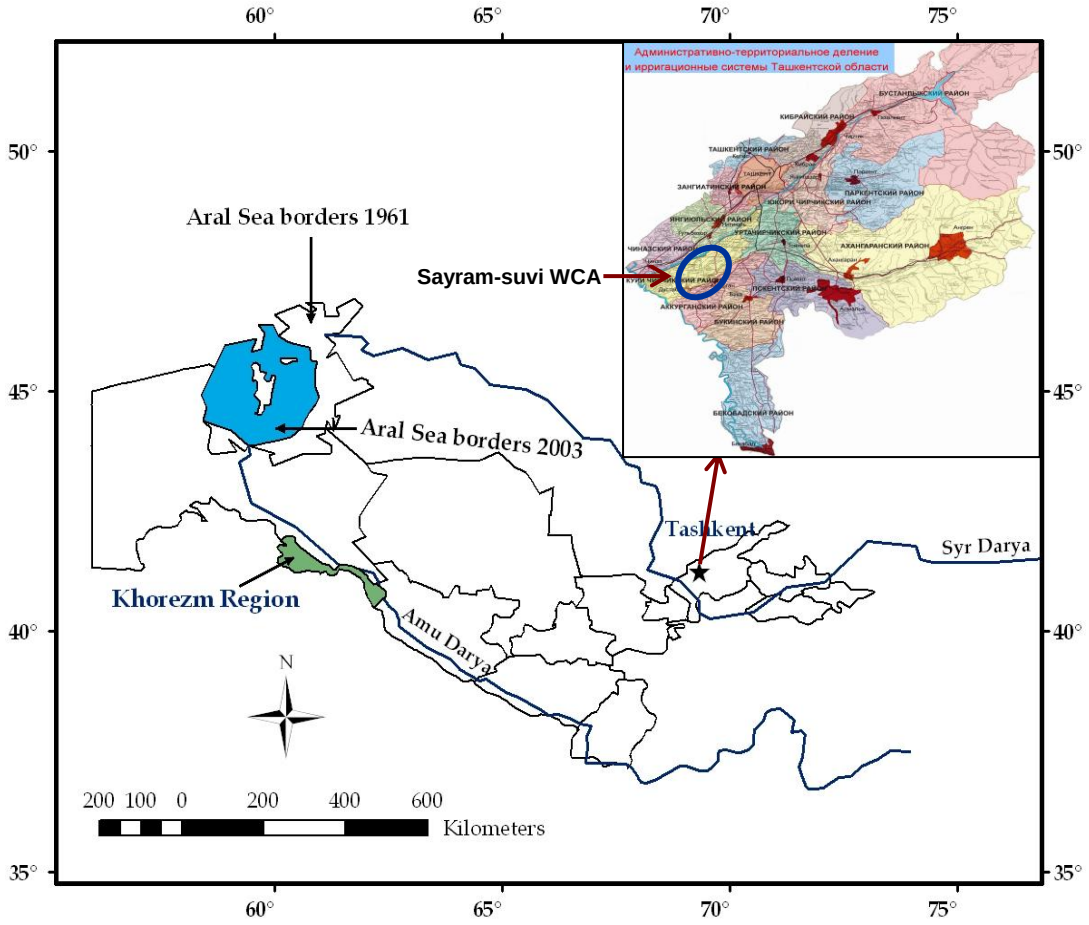


Fig. 3 - Location of the study WCA

Irrigation water is supplied from the Angren and Chirchik rivers to the WCA by gravity through concrete-lined canals (Fig. 4), and is adequate and dependable. The Sayram-suvi WCA is responsible for 153 km of secondary and tertiary canals and 88 km of the drainage systems, which were poorly equipped.

The current conditions of irrigation systems at the Sayram-suvi WCA is assessed as satisfactory. The author observed bulldozers and excavators that were cleaning canals in the area of the WCA. The chairman stated that "farmers located at the tail of the canals used to have inadequate water supplies and obtained lower yield. With the canal clearance, many farmers at the tail-end of canals are now receiving adequate amounts of water, and yields have increased noticeably".

Fig. 4 – Secondary canal belonging to the Sayram-suvi WCA

Financial situation of the WCA

The ISF is charged to each farmer on hectare basis irrespective of the number of irrigations. All agricultural crops, except rice, have a fixed ISF. Due to the huge water use by rice, the WCA council has set a new ISF for rice in 2007. The WCA chairman, who was former Pakhtachi *shirkat* director and now works at this WCA as a manager, informed that ISF collection rate ranges between 60-70 percent. The main reason for this low rate has been the delay of payment from the state which purchases agricultural crops (e.g. cotton and wheat) from farmers. Many farmers in this WCA have not received payments from the state for their previous year's products. It usually takes up to one year to receive full payments. Nonetheless, the chairman of WCA was confident that ISF will be fully collected by the end of crop season. This is because farmers by then will have received their crop payments from the state and will be able to pay off full ISF.

It is necessary to note that state mini-loan banks provide privileged loans to farmers. Interviewed farmers and WCA chairman confirmed this. Many farmers apply to the state banks to get credits in order to obtain agricultural machines for their farms.

Observations

The Sayram-suvi WCA is progressing well. Several critical accesses explain its status: (i) open-access to reliable water sources; (ii) fertile soil, which potentially gives farmers good production; (iii) sufficient funding from investment projects on new machines to ease WCA operations; and (iv) access to state's privileged credits for agriculture needs.

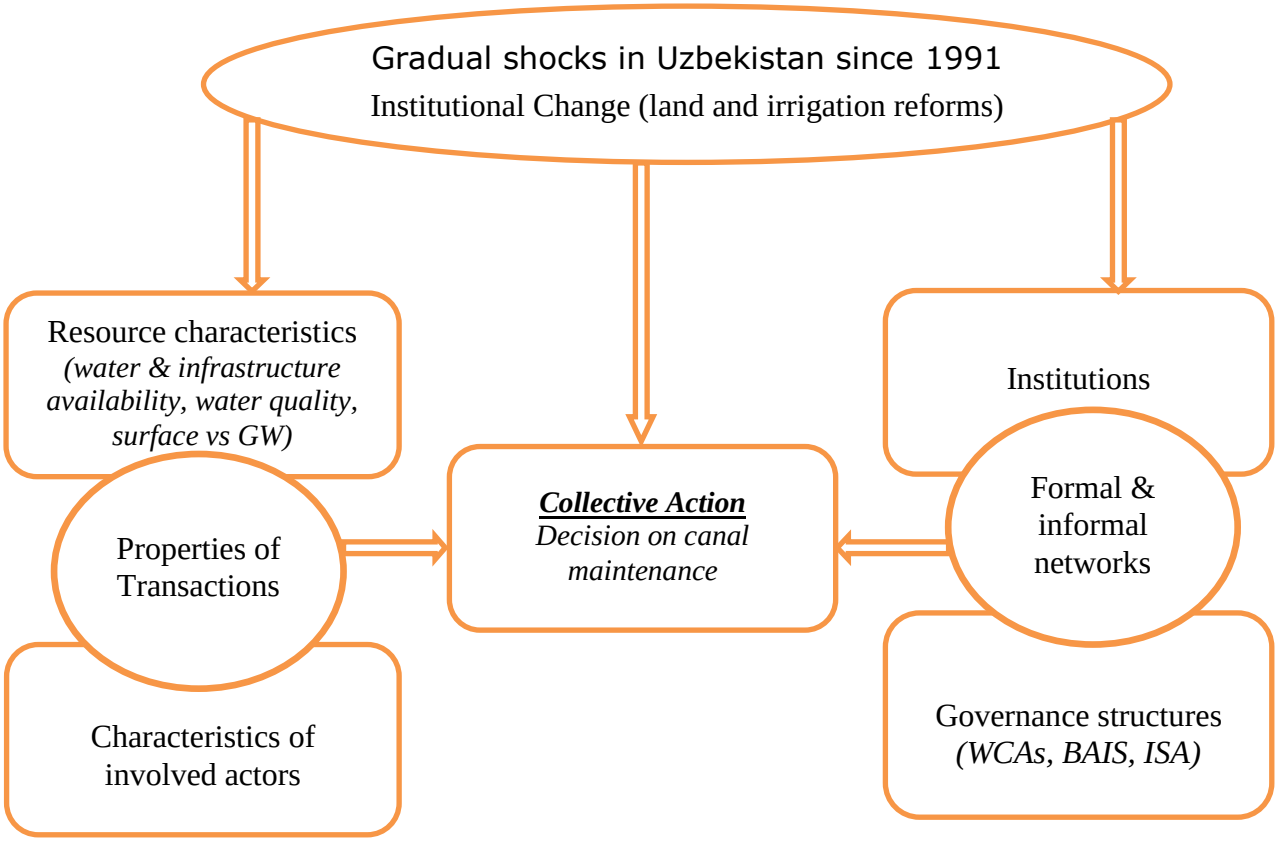
However, WCA's long-term sustainability is now difficult to assess since they recently benefited from the ADB loan for fixing their physical assets. Apart from sustaining their irrigation systems, the WCA is also responsible to pay off full loan. With the current state agricultural structure and delays of payment by the state, it is questionable whether the WCA is capable of surviving in longer-term. Further research is needed to assess its outcome.

5. Analytical framework – the Institutions of Sustainability (IoS)

The Institutions of Sustainability (IoS) framework developed by Hagedorn et al. (2002) provides a comprehensive analysis of the interdependencies between social and ecological systems of common pool resources. The framework integrates the properties of transactions, characteristics of actors, institutions and governance structures, and displays their relevance in action arenas. The basic understanding of the framework is such that the properties of transactions (physical and social) and the characteristics of the actors determine what institutions (i.e. sets of rules or property rights) emerge and through which governance structures these rules become rules-in-use.

In the context of this study, the IoS framework is proposed to analyse the properties of transactions and their interdependence with actors in collectively managing the irrigation systems that creates appropriate sets of rules and governance structures to achieve sustainable resource use (Fig. 5). This is an analytical framework that can provide a better understanding of why institutions may change and what conditions should be taken into account when designing sustainable institutions that govern common pool resources. This framework was chosen since it provides a holistic and systematic frame for analysing and understanding the diverse issues, relationships and captures the complexity of determinants affecting decision on canal maintenance at WCAs.

Figure 5. Institutions governing the sustainable WCAs (Adapted from Hagedorn *et al.* (2002)).



6. Theories for explaining the research problems

Since the study tackles with the problems of irrigation system management and the social dilemma (e.g. free riding), the theory of common pool resources and collective action is employed in order to better understand how these problems can be resolved in a conceptual level.

Common pool resources and collective action theory

In her seminal book "Governing the Commons", Ostrom (1990) stated that most natural resource systems used by multiple individuals are classified as common pool resources (CPRs). The CPRs (e.g. irrigation systems, groundwater basins, grazing lands, and forests) are natural or manmade resources where one person's use of the commons subtracts from its use by others but there is difficulty in excluding access. With another word, non-excludability and rivalry concepts are applied to gain a better understanding of the use of the CPR concept. Meanwhile, Hardin (1968) described how each user of the commons would act to maximize their benefits from the open access while the costs of their use were shared between all users. As a result the commons would be subject to overuse, overexploitation, and this would eventually lead to degradation of the resource. However, the CPRs are not always open access. There exists a common property regime where shared ownership and rules dictate about each resource user's access and use of the resource (Quinn et al., 2007). When rights and duties are adequately enforced through common property regimes, CPRs are not always subject to open access and degradation (Cousins, 2000; Dietz et al., 2002).

In the context of Uzbekistan, strong push by the government and donors to establish user groups and collectively manage the CPR (i.e. irrigation systems) took place soon after the dissolution of the Soviets. Growing problems with on-farm irrigation water management were considered to be a major reason for creating water consumers associations to manage the system through acting collectively (Abdullaev et al. 2010). However, despite the fact that most WCAs received initial support in the set-up of WCAs by various donors, they were not able to provide sufficient support to develop WCAs into effective organizations that can successfully manage the water for numerous members and generate sufficient budget to maintain the infrastructure. As a result, most WCAs at present are not able to mobilize sufficient cash for maintaining the system, have difficulties of managing water within their boundaries and suffering from weak management and governance structures, which are well-known issues attributed top down approach to collective action (Olson, 1965; Hardin, 1968).

Collective action theory

Srigiri (2010) highlights that the term collective action refers: "collective" more than one individual and "action" that is carried out by an individual or group of individuals. Thus, he pointed out that "collective action" refers to something that is done by more than one individual. Wade (1987, p.97) also states that collective action is an action by more than one individual directed towards the achievement of a common goal or the satisfaction of a common interest. Collective action is the formulation of formal and informal rules to restrain access to a CPR in order to achieve sustainable resource use (*ibid*). Ostrom (1990) illustrates that the need for collective action appears to be obvious especially when dealing with natural resources that provide high values and that can be used with

profit by a larger user community. Wade (1988) and other scholars concluded that when the users of a CPR organize themselves to devise and enforce some of their basic rules, they tend to manage local resources more sustainably than when rules are externally imposed on them (Tang, 1992; Baland and Platteau, 1996). Ostrom (2001) provides Nepalese example, where farmers with long-term irrigation system management through collective action, who can communicate, develop their own agreements, establish trust among, and sanction those who do not conform to their own rules, are more likely to distribute water more equitably, and keep their irrigation systems in better maintenance than is done on government systems.

After wide range of discourse that took place among scholars about the sustainable CPR management, each set out conditions and factors that they believed to be crucial in sustaining the CPR. Wade (1987) determined set of factors - *the resources, the technology, relationship between resources and user group, user group, noticeability, relationship between users and the state group size, clear boundaries, and ease in monitoring and enforcement* - that determine the effectiveness of rules in collective management of the resources.

Ostrom (1990) established eight design principles that help account for the success of self-governance and robust institutions in sustaining the CPR. They are *clearly defined boundaries, congruence, collective-choice arrangements, monitoring, graduated sanctions, conflict-resolving mechanisms, minimal recognition of rights to organize, and nested enterprises*.

Ostrom further suggests the attributes of the resource (i.e. *feasible improvement, indicators, predictability, and spatial extern*) and of the appropriators (i.e. *salience, common understanding, low discount rate, trust and reciprocity, autonomy, and prior organizational experience and local leadership*) that can increase the likelihood that self-governing associations will form and exist longer (1992b: 298f.). Achievement of sustainable resource use requires that one draws on cultural endowments and their knowledge of local resources to find innovative institutions that fit local conditions (*ibid*).

Agrawal (2001) summarized the work of Baland and Platteau, Wade and Ostrom, and supplemented by a number of factors for successful collective action in sustaining the CPRs: *resource system characteristics, group characteristics, relationship between resource system characteristics and group characteristics, institutional arrangements, relationship between resource system and institutional arrangements, and external environment.*

Constraints on collective action

Some scholars reveal pessimistic view towards the applicability of collective action and provide explanations why problems related to collective action exist in societies. They are: Prisoner's Dilemma, Hardin's "tragedy of the commons", and Olson's "logic of collective action". They assume that people are rational, self-interested individuals, try to maximize their utilities, will not act to achieve their common or group interests, and in case of large groups, there is a high probability of free riding, which results into a collective action problem.

In the *Prisoners of Dilemma,* for instance, the dilemma starts when two people are suspected over a crime they jointly committed and as a rational individual, both defect

instead of cooperating by staying silent and getting a light prison sentence. The argument is that if one stays silent and the other confesses (defects), the latter gets free and the first goes to prison. From the viewpoint of either one of them, staying silent while the other confesses would give the worst outcome, and confessing at least ensures that this outcome is avoided while it opens up the possibility that the confessor will go free if the other stays silent. In this single-period game the choice of best strategy is confessing. Due to these particularities, it is difficult to establish collective action that uses CPRs in a sustainable manner.

Hardin's *tragedy of the commons* (1968) uses a pasture as an open access resource to provide an example why collective action may not work in this situation. He assumes that each herdsmen a rational utility maximiser who receives positive utility from selling his own animals and negative utility from overgrazing. His assumption includes that each man is locked into a system that compels him to increase his animal without limit – in a world that is limited. He further assumes that individual herder has no information about the resource availability, which might be in the point of collapse or degraded. Thus, his proposes "mutual coercion, mutually agreed upon", by which restrained access should be enforced. Without any distinctions between common property and no property situations, Hardin concludes that CPRs are bound to be depleted without state regulation or private property regime.

Logic of collective action proposed by Olson (1965) is a situation where voluntary collective action cannot and will not take place unless there is coercion that makes individuals act in their common interests. He proposes the term of *interest group membership* that offers inducements for being a member of the group. The punishments (sanctioning) and inducements (rewarding) must be "selective" so that those who do not contribute to a group objective can be treated differently from those who do. Without selective punishments or inducements, individuals free ride, and the public good will not be supplied (*ibid*). He further concludes that voluntary collective action (i.e. no punishments and inducements) is likely for small interest groups and less likely for large groups, and uncertain for intermediate groups. Wade (1987, p.103) argues and provide ample evidence that voluntary collective action is possible and this issue should be considered at two-fold: (1) at the constitutional level people can negotiate voluntarily a set of rules based on their prospective net collective benefits; (2) at the level of action, i.e. most of the compliance with the rules must also be voluntary based.

Wade (1987, p.105) remarks that collective action is likely to be much cheaper in terms of state resources than private property regimes or state control regimes. His findings reveal that collective action survives long when the government is able to help resource users by providing a legal framework and technical assistance (*ibid*).

7. Final remarks

This paper shows that WCA development is an integral step in the reforms of irrigation management transfer program that is currently underway in Uzbekistan. With a decade passed since the initial reforms which reorganized Uzbek irrigation structure, a number of lessons can be learned from the experience:

- Financing for system rehabilitation to make irrigation networks reasonably functional plays a critical role in increasing farm productivity and thus farmer income.
- Collecting adequate irrigation service fee to sustain on-farm irrigation systems is necessary for long-term existence of WCAs.
- Availability of important agricultural machineries and canal cleaning equipment, as a part of the rehabilitation effort, contribute to creating a good environment for profitable agriculture production.
- Delays in payments for agricultural crops by the state contribute to the low ISF collection rate, which eventually may lead to the poor performance of WCAs.

The paper also presented the IoS analytical framework as well as a theoretical background to better understand institutions (formal and informal) that are conducive for successful common pool resources (i.e. irrigation system management) and to emphasize the role of institutional factors to overcome the social dilemma (i.e. acting collectively to maintain irrigation systems). The IoS framework, in particular, was employed to facilitate an understanding of the complexity of irrigation system management and multidimensional issues, actors and stakeholders by integrating the properties of transactions, characteristics of actors, institutions and governance structures, and consequently, display their relevance in action arena, which is being as "decision on canal maintenance within WCAs". However, further research is needed to better understand applicability of the IoS in the context of Uzbekistan's irrigation system management.

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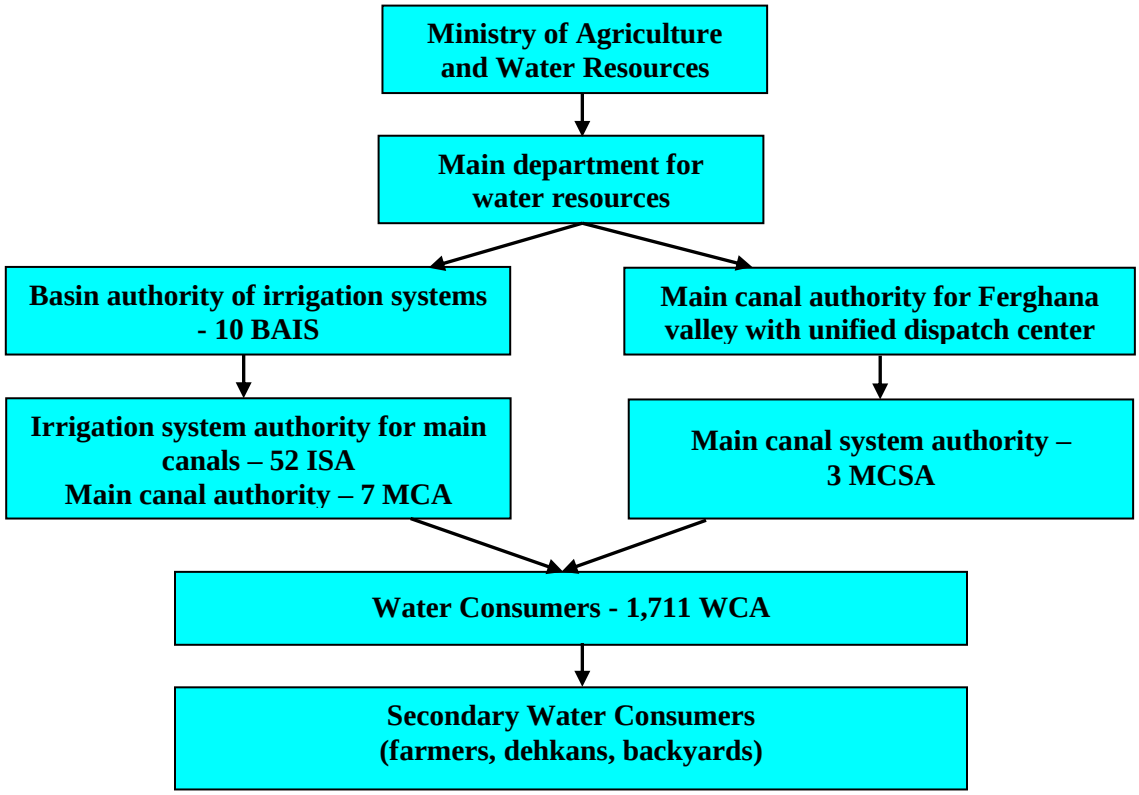
Annex 1. Water management hierarchy in Uzbekistan



Annex 2. WCA organizational structure in Uzbekistan