Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Faculty of Natural Resources and Agricultural Sciences

Can Institutions be Designed?

– Analysing the Challenges to Implementation of IWRM in Kyrgyzstan from Post-Institutional Perspective

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Abbreviations & Glossary

ADB	Asian Development Bank
BWMO	Basin Water Management Organization
CPRM	Common Pool Resource Management
DWMD	District Water Management Department
IFI	International Financial Institution
ISF	Irrigation Service Fee
IWRM	Integrated Water Resource Management
Kyrgyz SSR	Kyrgyz Soviet Socialist Republic
LRF	Agricultural Land Redistribution Fund
NGO	Nongovernmental Organization
NIE	New Institutional Economics
NRM	Natural Resource Management
O&M	Operation and Maintenance
SDC	Swiss Agency for Development and Cooperation
USAID	United States Agency for International Development
USSR	Union of Soviet Socialist Republics
WUA	Water Users Associations
aksakal	elder, respected member of the community
aksakaldar sotu	court of elders
ashar	voluntary public work
ayil bashy	head of the village
ayil okrug	local self-government body
kolkhoz	collective farm
murab/ mirab	‘water master’ or irrigator
sovkhoz	state farm

Abstract

The concept of Integrated Water Resources Management (IWRM) was developed in response to the growing concerns over water use worldwide. In Kyrgyzstan environmental changes, glacial melt, a growing population and increasing industrial needs for water call for the development of sustainable ways of water use. Water governance in Kyrgyzstan has undergone radical institutional redesign since the country gained its independence in 1991. Centrally driven water organizations were replaced by a locally governed institution of Water Users Associations (WUA) across much of the country. The operation of WUAs was to be funded through irrigation service fees levied from water users. The progress of implementing such reforms in the water sector has however been limited.

In order to understand the challenges faced during the reforms this study is based on a case study in the village of Arka situated in the southern part of Kyrgyzstan. It focuses on the qualitative study of local level water management. With an aim of bringing historical and cultural factors into the discussion of institutional development, the study draws on the concept of institutional bricolage.

The study results demonstrate that the existing institutional arrangement incorporates elements of previous institutions along with the new concepts introduced through reforms. Thus interactions in water management today are equally influenced by the new WUA policies, such as payment of water fees, as well as the long-standing institutions of kinship and respecting of elders and authorities. Because the prevailing understanding of WUA as a government structure contradicts the new notion of 'participation', people seem to tend towards familiar ways of organization. Moreover new institutions have a risk of reinforcing existing power patterns and inequity in communities. Therefore the study concludes that any institutional interventions should be preceded by research of the existing institutional setup in water management. Building on existing successful experiences of collective action in communities is suggested as an effective way of institutional development in water governance.

Keywords: *Integrated Water Resource Management, Post-Institutional Theory, Institutional Bricolage, Water Governance, Kyrgyzstan*

Introduction

The concept of Integrated Water Resources Management (IWRM) was developed in response to growing concerns over water use worldwide. In Kyrgyzstan environmental changes, glacial melt, a growing population and increasing industrial needs for water call for the development of sustainable ways of water use. The biggest consumer of fresh water in the country – 94% -- is irrigated agriculture. Its share in the economy is close to 30%, employing 40% of the total population. Agriculture plays even greater role in the rural areas, presenting one of the major sources of livelihoods alongside animal husbandry and migration. In order to ensure a better balance between social, economic and environmental needs in fresh water use, the Kyrgyz Government adopted extensive reforms towards implementing IWRM principles in its water management policy.

The reforms in the water sector of Kyrgyzstan followed the general transition of the country towards democratic governance and a market-oriented economy. Water governance in Kyrgyzstan has undergone radical institutional redesign since the country gained its independence in 1991 after the Soviet Union collapsed: from centrally driven to decentralized management and user participation, from state financing to cost-recovery, from free access to water to introduction of irrigation service fees. With the assistance of major donor organizations the Kyrgyz Government introduced the model of Water Users Associations (WUA) throughout the country to manage irrigation water use at the local level. WUAs are intended as membership based local organizations governed by the water users. Through the collection of water fees from users they can finance the operation of the user organization and maintain irrigation infrastructure within their constituency. In addition, the mechanism for participation of water users in decision-making built into the WUA structure, presumes that resources will be distributed equally.

The progress of implementing the reforms in the water sector has however been limited. While regulatory principles of decentralization and introduction of water fees have seen good progress, advances in sectorial and ecological integration are estimated as very moderate (Herrfahrdt 2006). Many WUAs are facing difficulties both in reaching democratic management, and in achieving financial sustainability of their operations. This study aims at exploring local arrangements of water management in order to understand the problems of WUA operation.

The reforms in water governance have been inspired by the mainstream theories of New Institutional Economics and Common Pool Resource Management, which will be discussed below. While these theories have elaborated the importance of establishing formal institutions with the capacity of regulating collective action in natural resource management through incentives and sanctions, they often fail to account for the unique local institutional context. The major donor organizations, which have assisted the country in launching legislative reforms, have to a large extent been informed by the central assumption of these theories, i.e. that institutions can be designed to be effective. This in turn resulted in an ambition of finding and introducing the 'right' institutions at the local level.

In order to analyze the challenges faced during the implementation of the reforms I decided to analyze the process using a perspective inspired by post-institutional theory. Post-institutional theory contests the idea of 'designing' institutions. Instead the concept of *institutional bricolage* is suggested as a framework for describing and understanding a management system. The process of bricolage is defined as the "patching together of institutional arrangements" (Chase-Smith *et al*. (2001) cited in Cleaver and Franks, 2005, p.4) from the various parts of the concerned society. Institutional arrangements might extend "from the cultural resources available to people in response to changing conditions, based on the logic of dynamic adaptation" (ibid). Thus it brings historical, social and cultural factors into the discussion of institutional development in any water governance system.

The main objective of this study is to use post-institutional theory for analyzing the institutional challenges involved in implementing IWRM principles in local water management in Kyrgyzstan. The case study is based on fieldwork undertaken in March 2011, in the village of Arka situated in the southern part of Kyrgyzstan. Through the study I aim to understand how a newly introduced WUA is influenced by the already existing institutional environment. By first analyzing institutional arrangements in irrigation from the pre-Soviet and Soviet periods, I then explore how these arrangements were adapted and incorporated into today's water management institutions. Drawing on the concept of institutional bricolage I argue that the current institutional setup is formed of the elements of both old and new institutions. Further I discuss the existing institutions in water management in Arka to see in which ways they enable or constrain implementation of reforms under the IWRM framework. Post-institutionalists emphasize the importance of the social embeddedness of institutions. They stress that to be practiced these institutions should be integrated into the existing

institutional setup and value system of the community. A question to ask therefore will be, are these newly introduced institutions of water management in Arka embedded in the pre-existing institutional environment? Finally, I intend to investigate whether the institutionalization of new arrangements perpetuates or reproduces social inequities in the community in accessing irrigation water resources.

This thesis includes eight chapters organized as follows. In Chapter 1 I begin with outlining the background information about the country, and a discussion concerned with the land and water reform implemented by the Kyrgyz Government. A review of the mainstream theories informing the reforms in the water sector is undertaken in Chapter 2. I then continue by discussing post-institutional theory in Chapter 3, where I suggest it to be the central theoretical perspective for this study. The objective of the research and research questions that guided my work is presented in Chapter 4. My next step in Chapter 5 is to discuss the methodology and methods used during the fieldwork to seek answers to the research questions. The main findings of the case study on institutions regulating local water management in Arka village are discussed in Chapter 6. Further I analyze the institutional arrangement of water resource management in Arka in Chapter 7 using post-institutional theory. Lastly I summarize the conclusions of this study in Chapter 8.

1 Background

In this chapter I introduce the economic, political, and social background of Kyrgyzstan, since these conditions shape institutions in the water sector. A brief presentation of facts about the country's agricultural and irrigation sectors will be followed by an overview of the historical changes and reforms that took place in the related sectors of agriculture and irrigation. Furthermore I will outline the development of the central institution regulating relationships in irrigation water use at the local level, namely Water Users Associations (WUA).

Country profile

Kyrgyzstan is a mountainous country located in Central Asia with a total population of approximately 5.5 million people. Arable land makes up only 7% of its total land area of about 199,000 sq.km. Even so, agriculture is the second most important sector of the economy accounting for about 30% of GDP and 40% of the total employment (World Bank 2007). Irrigated agriculture plays an even bigger role in the livelihoods of rural population of Kyrgyzstan (60% of employment) and provides more than 90% of the total agricultural produce of the country (CAIConsulting 2010).

Table 1. Brief facts about Kyrgyz Republic

Kyrgyz Republic	
Capital	Bishkek
Population	5.5 million
Total Area	199,000 sq km
Government	Parliamentary republic
GNI per capita	US $870
Major languages	Kyrgyz, Russian
Major religions	Islam, Christianity
Main exports	Fruit, vegetables, gold, tobacco
HDI	0.598 (medium)
Gini (2003)	30.3 (medium)
Currency	Som (KGS)

Source: Adapted from BBC 2011

Due to climatic conditions, agricultural activities in the lowlands of the country are only possible with irrigation. Of 1.35 million hectares of cultivated land, 80% or 1.07 million hectares are under irrigation (FAO AQUASTAT 2004). During the Soviet times a complex water management system was established to serve the centrally planned agricultural production on the expanding territories. Irrigation was organized primarily through the diversion of rivers via an extended network of near surface, gravity-driven distribution canals.

The multiple rivers which originate in the snowfields and glaciers of the mountains, supply water to the extensive irrigation system. This irrigation system includes distribution networks at primary, secondary

and tertiary levels. At the primary level the irrigation system is composed of the major canals and water reservoirs. These are often part of the strategic industrial objects such as large hydro-electric stations operated by state companies. Secondary or inter-farm level networks used to deliver water to former *kolkhozes* and *sovkhozes,* during the Soviet period. After the abolishment of the collective farms, the irrigation infrastructure at the inter-farm level was transferred to district water departments. Their maintenance has since been funded primarily from the state budget with a minor contribution from water fees paid by water users. Finally, on-farm or tertiary canals serving the fields of a former *kolkhoz* or *sovkhoz* have been handed over to WUAs. The changes in water management have mostly affected this level of irrigation practice, because the governance of irrigation systems at the local level was transferred to the water users. Infrastructure maintenance became the responsibility of the WUAs, to be covered through collection of the newly introduced water fees. In this study I focus my attention on the local level of irrigation water management, in order to understand how a local population adapted to institutional changes over time.

Fig. 1. Map of Caucasus and Central Asia showing the location of Kyrgyzstan and neighbouring countries. Source: *http://fs.huntingdon.edu/jlewis/syl/ircomp/MapsCaucasus.htm#Regional* (2011-06)

Due to the lack of finance following Kyrgyzstan's independence, the water distribution system of the country suffered major deterioration. Particularly, this holds true for the inter-farm and tertiary level canals, majority of which are earthen and not lined with concrete (CAIConsulting 2010; Koshmatov 2004 cited in Herrfahrdt *et al.* 2005). According to Ul Hassan *et al.* (2004), water losses at the primary and inter-farm networks constitute between 26-45%, and losses at the tertiary level reach up to 50% of irrigation water. These losses lead to regular water shortages in rural areas during the irrigation season, and are considered as one of the primary causes of conflicts over water resources (Allouche 2007, ICG 2002).

Today, the agricultural sector is estimated to consume up to 94% of the total water use in the country, leaving 3% each for industrial use and domestic needs (FAO AQUASTAT 2004). Snowfields and glaciers represent the main source of the extensive water resources of the country. Annual runoff totals

about 47 km^3/year (Johnson III *et al* 2002). However under current international agreements Kyrgyzstan is entitled to the withdrawal of only up to 25% of the total annual runoff while the remaining resources flow to the downstream countries (see Annex 1 Distribution of water in CA). These agreements are legacies of the Soviet agricultural policies according to which downstream countries, namely Uzbekistan and Kazakhstan, were the main producers of cotton for the USSR. After the collapse of the Soviet Union and declaration of independence in 1991, Kyrgyzstan faced the need to reform both the agricultural and water sectors of the economy to meet the requirements of the new reality.

Land and water reforms in Kyrgyzstan

To place the current water management in its historical context I will briefly discuss how irrigation water was managed in pre-Soviet and Soviet times. O'Hara's (2000) study on pre-Soviet irrigation practices in Central Asia provides evidence of successful irrigation systems that had the capacity of supporting good agricultural production and maintaining soil quality. This system was based on the cultivation of small land plots and the constant regulation of irrigation in accordance with the recorded water inflows. According to O'Hara (2000) the irrigation systems were labour intensive and so demanded the work of several key persons, who were rewarded on the basis of their performance. She explains that *mirab bashi*, always a man, held the key function in any irrigation management system. He was responsible for making decisions of water allocation and distribution. Moreover he was elected by the farmers and rewarded according to how satisfied farmers were with his work. Similarly *mirabs*, in charge of the secondary canals, were elected and paid by the local farmers. O'Hara (2010) also describes the practice of annual maintenance of irrigation networks. These works were carried out by water users on a voluntary basis and organized by the *ketman*, which was a water users association comprising 3-4 villages (ibid). The same practice – *ketman* – continues to exist in the rural communities of Kyrgyzstan today. In the village of Arka, community members come together every spring, before the start of the irrigation season, to plan, then clean and repair the canals.

The institutional arrangement of water management in pre-Soviet times is portrayed to have been effective in balancing social and ecological needs. It was built upon locally elected institutions and small scale agriculture, the features currently promoted by IWRM and sustainability studies. Some aspects of the institutional arrangements of pre-Soviet times can still be seen in the current water

management system. WUA Council members are elected locally, and the staff members remunerated with the water fees paid by water users. The institution of *murabs* was adapted within the Soviet irrigation system, and later incorporated into the WUA structure. This suggests that some elements of pre-Soviet irrigation institutions continue to influence the current system.

Soviet irrigation reform brought radical changes to the "traditional" forms of water management in Kyrgyzstan and the entire Central Asia. Locally elected decision-making institutions and small scale farming were replaced by formal government organizations responsible for the irrigation sector and the collectivization of land under collective and state farms. While pre-Soviet irrigated agriculture was limited in size, land reclamation and virgin land campaigns resulted in a rapid increase of irrigated areas in Central Asia. O'Hara (2000, p.370) estimates that "the Soviets opened an additional 5 million ha of land for irrigation in Central Asia, bringing the total area of irrigated land to 7.5 million ha altogether" (O'Hara 2000, p.370). Large scale infrastructural developments accompanied this process, seen through huge reservoirs, extensive irrigation networks, and pumping installations for regulating the water flows and transporting water over long distances (O'Hara 2000). However, the maintenance of the network lagged behind the construction, and reportedly by 1985 a major part of infrastructure needed repair works (Thurman 1999, p.236 cited in Bichsel 2008).

The hierarchical management structures that were coupled with the central production planning contributed to inefficient decision making and the undermining of local knowledge and expertise in irrigation management. Water management in the Kyrgyz SSR was seen as an engineering task, where irrigation officials were mainly concerned with the supply of the required volumes to the sites. The supply management approach to water use in this period failed to build the responsibility for rational use of the resource. Instead it promoted a perception that water resources were unlimited and available free of charge (Herrfahrdt *et al*. 2005). Such a management approach resulted in the over-exploitation of water resources of Central Asia, causing the renowned Aral Sea disaster.

The command driven water management system set up by the USSR proved to be inefficient and unsustainable. Therefore, following the collapse of the Soviet Union international financial institutions (IFIs) offered the newly independent state of Kyrgyzstan assistance to reform its economy towards democratic development and market economy. In the absence of the possession of its own internal funds and other development alternatives, Kyrgyzstan undertook radical reforms through implementing

development strategies agreed upon with the providers of aid. According to the neoliberal concept of "shock therapy" rapid liberalization of all sectors of the economy and privatization were seen to lead to economic stabilization and to allow for the "invisible hand" of the market to solve the problems of efficiency and financial sustainability.

The land reform process in Kyrgyzstan began in 1991 first with the development of peasant farms, followed by legalization of land use rights in 1994 through the Presidential Decree "On measures to enhance the land and agrarian reform in the Kyrgyz Republic" (LD 1). State and collective farms were liquidated and their land areas distributed as shares to the rural residents. The Land Code enacted in 1999 furthered the reform process by introducing private ownership titles to land shares, thus giving owners of land the right to purchase, sell and rent in or out agricultural land plots. Seventy five percent of all agricultural land was distributed as land shares, with an average share (at the national level) constituting 0.37 ha per person[1] (Chemonics 2008). However family members usually pooled their land shares and cultivated them together, thus the size of a cultivated plot reached 1 ha and more. The remaining 25% of land was transferred to the state-owned Agricultural Land Redistribution Fund (LRF) for future needs. LRF is managed by the local self-government – *aiyl okrugs* – and is available for leasing by farmers.

Land reform resulted in an enormous increase in the number of individual farms. This created a great challenge for the irrigation sector to organize water supply in accordance with the differing water requirements of these farms. Before land distribution, a tertiary level irrigation network used to supply water to large-size monoculture *kolkhoz* fields. After distribution, it had to cater for the water needs of up to 2,000 individual farms in lieu of a single state farm. The challenge for water management was not only in the increased number of water users, but also that each water user demanded water in different volumes and at different times depending on the cultivated crops. Abolishment of the institution (i.e. kolkhoz) responsible for on-farm networks, and lack of funds for the operation and maintenance (O&M) of infrastructure, left the management of water at the farm-level neglected. This further exacerbated the already deteriorating state of irrigation infrastructure.

[1] This figure varies in different regions depending on the density of population. Land share size was calculated by dividing the total land available for distribution to the number of people entitled to receive a share in the given region. Thus land share size in the southern provinces is smaller compared to the northern part of the country.

Water management reform also came after the country's development strategy towards establishing a market economy and a political system of democratic governance. The "Law on Water of the Kyrgyz Republic" (LD 2) adopted in 1994, regulating all aspects of water use, was the first step in the institutional reform of this sector. Introduction of irrigation service fees (ISFs) in 1995 aimed at providing funds for O&M costs. However, the low amount of ISF[2] requested, and the novelty of the ISF concept to farmers who before had not had to pay for irrigation water, resulted in very low collection rates. In addition wide-spread economic hardships experienced in rural areas at the launch of reforms, due to the afore-mentioned collapse of the Soviet Union and thus reduction in subsidies to local economies, explained the general inability of farmers to pay the irrigation fees. The initial arrangement was that the District Water Management Departments (DWMDs) were responsible for signing water supply contracts with individual water users, and to collect the fees. This proved ineffective both in management logistics and in administration costs.

Establishment of Water User Associations

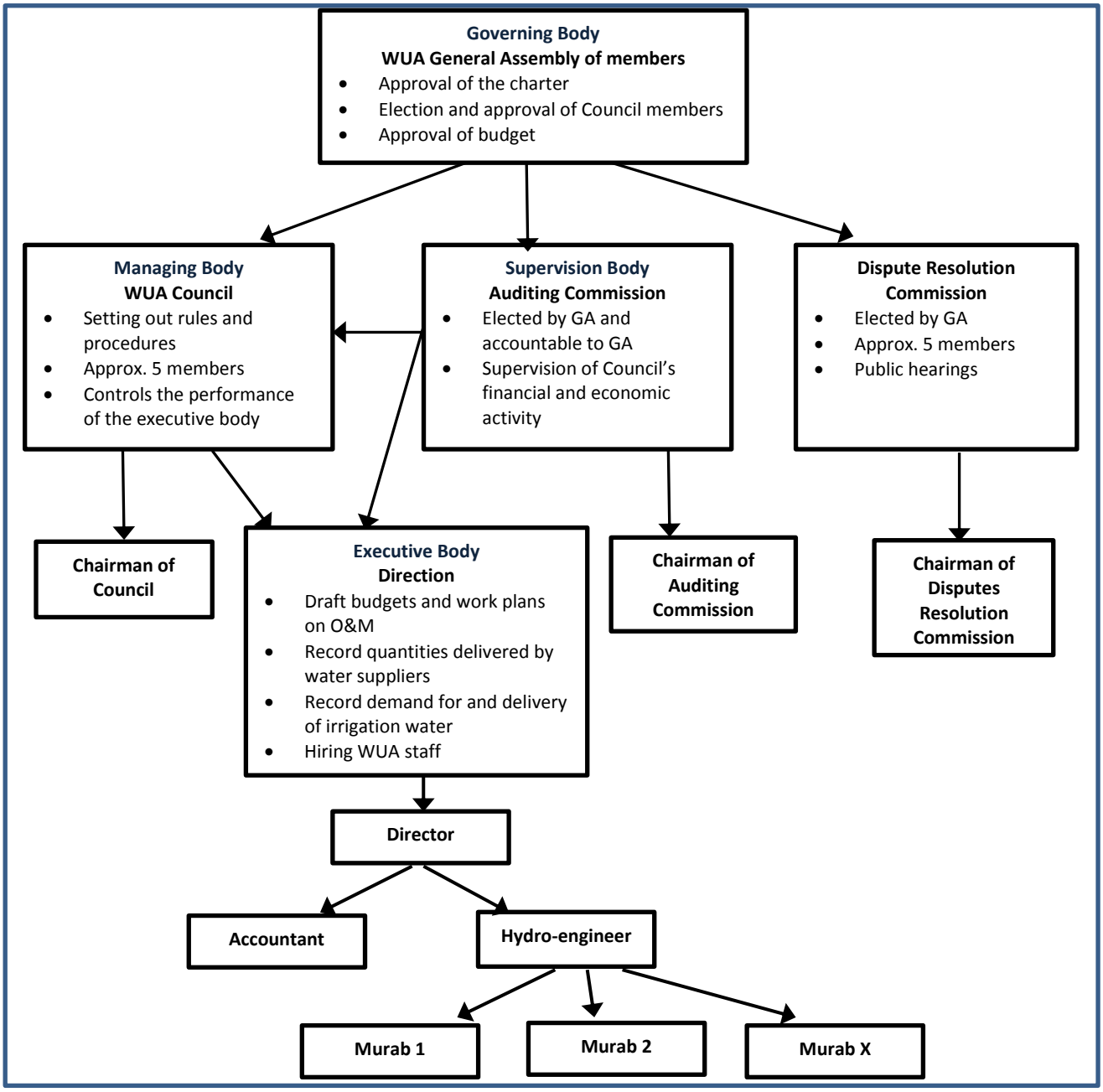
In 1997 the Kyrgyz Government passed a Decree "On Adoption of the Resolution on Associations of Water Users in the rural areas" providing a legal basis for establishment and operation of WUAs (LD 3). Later in 2002 the Kyrgyz Parliament enacted the Law "On Associations of Water Users" (LD 4). The introduction of WUAs in Kyrgyzstan was originally initiated in 1996 within the ADB funded project 'Building Capacity for WUA Formation and Management and Agricultural Sector Programme'. The first eight pilot WUAs were established with an aim to distribute water to its members, resolve arising disputes, collect water fees, and maintain on-farm irrigation infrastructure. The concept of WUAs was strongly backed both by the Government of Kyrgyzstan and international donors. The WUA model corresponded to both ideals promoted in the country – establishing democratic institutions that facilitate transition to a market economy. Governance of irrigation systems was transferred to water users and operational costs were to be covered through water fees. A number of donor organizations financed projects aimed at the development of WUAs. Interventions included assistance in establishment of WUAs, building capacities of WUAs, and rehabilitating tertiary irrigation infrastructure (see Annex 2: List of the major projects supporting WUAs in Kyrgyzstan). In order to

[2] The amount of ISF in 1995 was 15 Som (approximately 0.4 Euro) per 1000 m^3, increased to 30 Som per 1000 m^3 in 1999 (Herrfahrdt *et al*. 2005)

access the funding for rehabilitation, WUAs had to fulfil certain requirements on organizational and financial development. For instance, to receive a loan for rehabilitation of the canals provided by the World Bank or ADB, WUAs were assessed against seven milestones. These included establishment and legal registration of the WUA, training of staff, introduction of ISF and its collection, preparation of rehabilitation plan and its approval by the members. If WUAs could not achieve the required milestones, their rehabilitation projects would be postponed or the WUA would be excluded from the potential list of recipients of the funding (Johnson III *et al*. 2002). Under this project about 455 WUAs were established across the country. Additionally 40 WUA Support Units at all administrative levels of state water departments were set up and trained to support institutional development of the WUAs (World Bank 2008). The organizational chart below (see Figure2) describes the model structure prescribed for WUAs and the prescribed functions of each of its bodies.

As voluntary non-commercial associations, WUAs are supposedly set up at the initiative of their members. In practice however, WUAs in Kyrgyzstan have been formed either under the instruction of the Government or under the control/motivation of international projects. The top-down establishment of WUAs is often blamed for their inefficiency (Abdullaev *et al*. 2009, Wegerich 2000). A total of 475 WUAs were registered in Kyrgyzstan as of 2010 covering 736,000 ha or 73.7% of the total irrigated land of the country (CAIConsulting 2010). However not all of the registered WUAs are operational.High indebtedness and inactivity are mentioned as the main reasons for non-functioning of WUAs (Sehring 2005). Many still face problems with collection of fees, consequently influencing the quality of services for the O&M of infrastructure, and ability to attract professional employees. WUAs have also faced challenges on the part of participatory management.

Fig. 2 Model organizational structure of WUAs



Source: Adapted from Herrfarhdt *et al* 2005 and Sehring 2005

During field research in Arka, one of my informants stated that the mobilization and information efforts to popularize local water governance in the community were insufficient (SE 2011). Institutions that developed during the Soviet period remain unchallenged and continue to regulate people's actions. Thus the persistent top-down management style in water organizations hinders decentralization of the

decision-making in the WUAs. Predominance of the Soviet period elite in management structures contributes to the problem, by resisting the changes towards participatory and transparent water management. However the failing performance of the WUAs is not only caused by the Soviet period institutional arrangements that continue to exist. Some elements of today's local water management can be seen from studies on pre-Soviet arrangements of irrigation water use. The institution of *murabs* presents such an example. It allows the assumption that the current institutional setup of local water management incorporates elements from different historical arrangements of water use. The strong influence of kinship relations on interactions in water management discovered in the case study of Arka confirms the assumption of importance of historical factors in institution building. Therefore I suggest that post-institutional theory could be a useful tool in understanding institutions in local water management.

In summary, water governance in Kyrgyzstan has undergone repeated radical institutional redesigns. First, there was a transformation from locally elected institutions in irrigation to centrally driven hierarchical Soviet management institutions. Small scale agricultural practices were replaced by large-scale state farms with intensive use of machinery and monocultural production. Skilful regulation of water use in accordance with natural inflows in the pre-Soviet period laid the basis for a balanced resource use and the maintenance of good soil quality. The Soviet water management system relied on qualified engineers and agronomists who had the task of maximizing agricultural output often at the expense of maintaining an environmental balance. After the end of the Soviet Union, the reforms in the water sector aimed at decentralization of water management at the local level. Mechanisms for participatory management of water resources were introduced through the model of WUAs. Land privatization and land distribution led to the return of agricultural production to small scale diversified farming. Thus we can see how water management moved from local level to central and then back to the local level. However the current water management practices at the local level cannot be called effective, neither from an economic nor from an environmental perspective. In this view, the question arises of what can be learned from the water management arrangements of the pre-Soviet period.

Inspired by neo-liberal studies, institutional reforms in the water sector were strongly backed and funded by powerful international donor organizations, if not presented conditionality for accessing

funds. In the next chapter I present an overview of the main theoretical approaches to natural resources management that laid the basis for the water sector reform in Kyrgyzstan.

2 Mainstream views on institutional reform in NRM

The changes of the institutional environment of water management in Kyrgyzstan can be attributed to two mainstream theories. In this chapter I will present a brief overview of the New Institutional Economics (NIE) and Common Pool Resource Management (CRRM) theories. In continuation another strand that is currently gaining a wide support of international organizations, including those in Kyrgyzstan, namely, the Integrated Water Resource Management (IWRM) framework will be discussed in detail. IWRM presents a management framework informed by mainstream theories of NIE and CPRM as well as sustainability studies. Its principles laid basis for the Water Code of Kyrgyzstan adopted in 2005.

New Institutional Economics emphasize the role of formal institutions in regulation of natural resource use. Its theories are based on the assumption that people are rational choice agents, meaning that they choose to act in a way maximizing economic benefit for them. Therefore market forces are offered as the best regulating institutions for effective use of natural resources. Institutions according to the followers of NIE shall provide incentives to promote the desired behavior and sanctions to punish free riders and cheaters (Del Callejo & Cossio 2009, Shah *et al*. 2002). This belief in market forces in natural resources management is shared by the major international donor organizations. NIE principles were manifested in the famous Structural Adjustment Programmes implemented in developing countries. However natural resource management systems based on private property relations lead to marginalization of the poor and raising inequalities in those communities. Therefore recent policies stress that water resources should not be seen only as an "economic" good, but also as a "social" good to provide for an equal access to water resources for basic human needs.

Irrigation Management Transfer programmes implemented worldwide, including in Kyrgyzstan, are also inspired by NIE theories. The aim of these programmes is to decentralize irrigation management. NIE theories underline the importance of formal institutions such as enabling legislative framework, service fees and participation in decision-making. Nevertheless institutions introduced in accordance with these programmes do not perform as expected by NIE theories. The major cause of their failure is negligence of the local historical, cultural and social context and informal institutional context where these reforms are taking place. Human action in NRM cannot be explained purely as "rational

economic choice" because it is influenced by the variety of institutions, values and beliefs rooted in the community.

Common Pool Resource Management theory evolved as an alternative view to the state managed and private property systems of natural resource management. CPRM equally stresses the importance of institutions in the management of common resources. Moreover the theorists distinguish between "weak" and "robust" institutions. They call for 'crafting' the right institutions in order to improve natural resource management practices. According to Ostrom (1990) individuals interested in a common pool resource can develop robust institutions based on the following "design principles":

Table 2. Institutional Design Principles

• There should be clearly defined boundaries of jurisdiction over the resource.
• A clearly defined user group or community should manage the resource.
• Locally appropriate rules must be devised.
• There should be clear identification of rights to resources and rules about them.
• Those involved in resource use take part in decision making about the resources.
• Decision making should take place in public, in arenas to which all resource users have access.
• Accountable monitoring and effective authority structures are required.
• Graduated sanctions should be devised for non-compliance with collective rules. Such sanctions must be applied consistently, rapidly and impersonally.
• Conflict resolution mechanisms should be clear, accessible and rapid.
• The 'nesting' of local institutions with other levels of decision-making and governance allows multi-layered management of resources in large and complex systems.

Source: Ostrom 1990, p.90

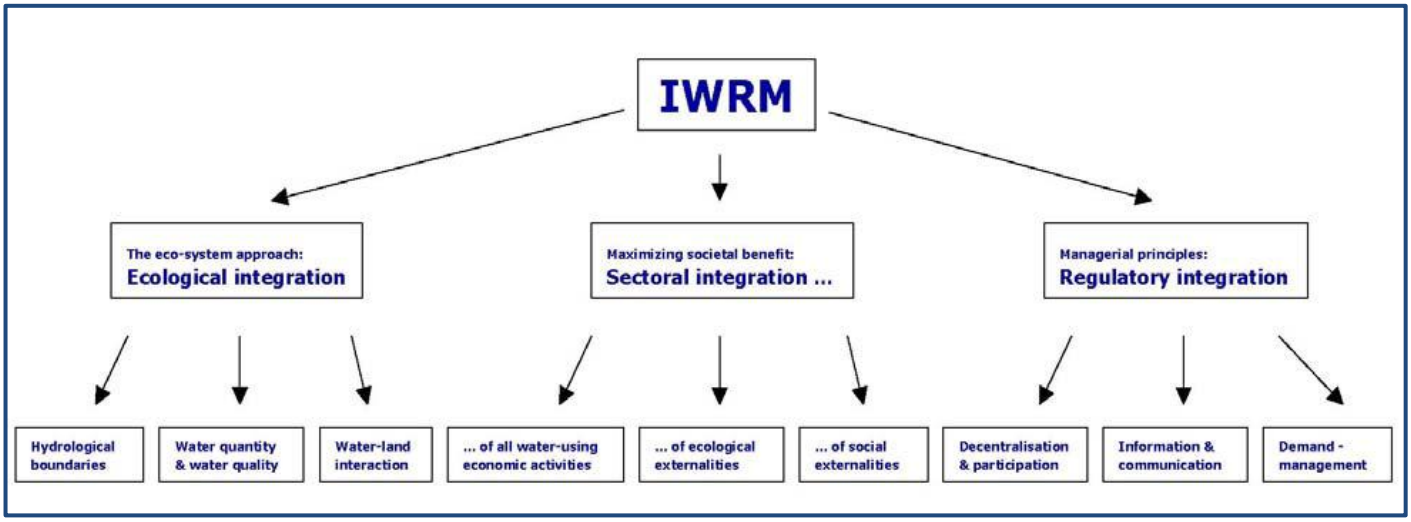
CPRM studies have shown that institutional arrangements for sustainable natural resource management can be developed locally. There is no one-size-fit-all solution to the diverse NRM situations. They highlight the role of informal institutions in these practices. However, recommendations presented by these studies mainly concern designing of effective formal institutions. The notion of effective or "robust" institutions is criticized for functionalist perspective on institutions. Local meanings of the

institutions therefore become neglected. For instance, an institution presumed by an outsider as ineffective in performing its function can have other cultural meanings for the collectivity. In contrast to the widely accepted understanding of the social and ecological systems as open, dynamic and uncertain, the approaches of both CPRM and NIE assume these systems to be closed with defined boundaries.

I think that this emphasis on designing effective institutions is misleading for understanding the process of institutional formation. Firstly, the effectiveness of an institution cannot be assessed within the limits of natural resource use practices. Institutions in the communities have multiple purposes and can be practiced in different spheres of community life. Secondly, the institutions designed to be effective for natural resource management may contradict others practices in the community. In such case these institutions will probably not function regardless of all principles adhered to. This also implies that informal institutions including cultural norms, beliefs and worldviews often have a greater influence on people's behavior in the community producing practices assumed as "irrational or ineffective" by the outsider.

Integrated Water Resource Management framework was developed in view of the growing concerns over sustainability of water resource use. It recognizes an interdependence of social and natural processes as well as complexity and uncertainty inherent in them.

Figure 3. IWRM Pyramid



Source: Herrfahrdt *et al*. 2005

Having incorporated the concepts of mainstream NRM theories and sustainability studies the IWRM provides a practical management framework to organize water governance in a way that balances social and economic needs and ensures sustainable development of ecosystems. It promotes participatory decision-making across all sectors to include the needs of all water users – domestic users, agriculture, industries and the environment.

IWRM incorporates all four dimensions of **good water governance** together: social, environmental, economic and political dimensions. The main principles of the framework can be summarized as: i) integrated management of all water sources at the basin level, ii) local decision-making that integrates the needs of all sectors using water, iii) ensuring equitable access, iv) managing demand via cost recovery policies, and v) setting up enabling institutional framework (see Figure 3. IWRM Pyramid).

Major international actors promote application of IWRM principles across the world. Elaboration of the Water Code of Kyrgyzstan was also guided by IWRM framework. The Swiss Agency for Development and Cooperation (SDC) is actively promoting introduction of IWRM in the irrigation sector across in the Ferghana Valley. In Kyrgyzstan these principles are being streamlined into operation of pilot WUAs. Practical implementation of IWRM in pilot WUAs includes organizing them along hydrographic boundaries. Project builds the capacity of pilot WUAs to promote transparency and accountability of their operation and improve user participation. An increase of the ISF amount is encouraged so that WUAs can better maintain their infrastructure, attract professional staff and organize better water supply (Johnson III *et al*. 2002, Sehring 2005, Sehring 2006, CAIConsulting 2010).

The progress towards the ideal is however still limited. Formal institutional environment, i.e. relevant legislation, is in place but its implementation is far from satisfactory (Herrfahrdt 2006). While regulatory principles of decentralization and introduction of water fees have seen good progress, advances on sectorial and ecological integration are estimated as very moderate (Herrfahrdt 2006). Limited success of IWRM implementation is attributed to its vague definition, lack of a practical guidance for implementation and ignorance of social, cultural and political context (Chikozho 2007, van der Zaag 2005, Saravanan *et al*. 2009). Being based on the mainstream theories of NRM institutions IWRM similarly underestimates the importance of the local context. Although IWRM presents a useful theoretical framework to understand the social and environmental processes, in

practice it often transforms into a checklist for projects. Main issues in implementation of IWRM are faced at the local level, which is the focus of this study. Formal institutions promoted in the communities of Kyrgyzstan under IWRM projects, such as WUAs, water fees, participation and collective responsibility, need to go through the process of institutionalization. Success or failure of institutionalization depends on both the existing institutional setup that may clash with new institutions and the human agency. The latter holds a potential for institutional changes. But this potential is limited because the existing institutional arrangements in the communities, mostly of informal character, greatly influence human actions in institutional building.

Summarizing the discussion above, the challenges in introducing IWRM principles in Kyrgyzstan are seemingly rooted in the theories informing this approach, namely NIE and CPRM theories. Both theories focus on the formal institutions required for effective natural resource use practices. The standardized institutional setup that is offered under these theories for replication as good water governance across all communities of the country fails to consider the specific local historical and cultural context. This failure results in widespread difficulties faced by WUAs in their operation. Therefore central assumption that institutions of good water governance can be designed is highly contested. Post-institutional approach discussed in the following chapter provides an alternative perspective to institutional building process. According to this approach local resource management arrangements are combined of the elements of existing formal and informal institutions and the new concepts that are often imposed on the local communities (Cleaver 2002).

3 Theoretical approach of this study

In this chapter I will lay down the main ideas of post-institutional theory on the process of institution building in NRM practices. Discussion of its central concepts will be followed by the formulation of research objective and research questions of this study. The post-institutional theory will be used in the following Chapter 7 to analyze the findings of the case study.

The central concept of post-institutionalism is **institutional bricolage**. It is used to describe the process of institutional formation. The term "bricolage" implies that elements of already existing institutions are used in the process of producing new ones (Sehring 2009, Cleaver 2002). Institutional bricolage is defined as a process of "patching together of institutional arrangements from the cultural resources available to people in response to changing conditions, based on the logic of dynamic adaptation" (Chase-Smith *et al*. (2001) cited in Cleaver and Franks, 2005, p.4). Thus historical and cultural factors come into play influencing institutionalization of new concepts. It can be concluded that the evolving institutional arrangements of natural resource management are never completely new, but rather a combination of elements of existing and new institutions. Drawing on this concept I intend to analyze the existing water-related institutions in Arka village in Kyrgyzstan to identify how previous institutional arrangements influence institutionalization of the new concepts introduced during the reforms.

Institutionalization of new concepts requires them being embedded in the social fabric of the community. This process can be influenced by the logic of another institution. In this way bricoleurs may apply the community logic in water institutional arrangement (Sehring 2009, Cleaver 2002). To understand if water-related institutions are socially embedded, institutions regulating other aspects of livelihoods and their role in irrigation water use have been equally scrutinized during the fieldwork.

In this study I use the definition of institutions proposed by post-institutional studies. According to post-institutionalism institutions are not necessarily visible bureaucratic structures, they are "what people do, and institutions by their nature are not necessarily robust, solid, and enduring, but must be continually reproduced or re-enacted to exist" (Lund 2001 cited in Cleaver & Franks 2005, p.4). The interaction between human agency and structure is central to this definition implying that institutions enable and constrain agents' actions in natural resource management. At the same time institutions

exist through agents' practice in social interactions, during which they can be changed or adapted to the circumstances. In this process individuals are guided by conscious decisions and unconscious practice equally, which contradicts the view of individual as a rational actor maximizing economic benefit (Cleaver 2002). Through the process of less conscious use and adaptation of existing rules and practices to new purposes, the new institutional arrangement so produced becomes a legitimate custom or tradition or "the right way of doing things" (Cleaver 2002). Being embedded in the cultural environment institutions also reflect the prevailing values, norms and beliefs of the community practicing them.

Widespread classification of institutions into formal and informal or traditional and modern is highly contested by post-institutionalism. Instead the terms bureaucratic and socially embedded institutions are proposed. Bureaucratic institutions are defined as formalized structures, regulations and rights, which are often the focus of governments and development agencies. Whereas socially embedded institutions are those based on culture, social organization and daily practice, which are often missed out by NIE and CPRM studies as discussed above. It is also stressed that this differentiation is not clear-cut and institutions may be changed in both directions (Cleaver 2002, p.13). However while the change towards bureaucratization can be achieved through top-down intervention, the change towards social embeddedness of the institution is only possible through the process of bricolage, from bottom up.

The process of institutional building or bricolage takes place during social interactions. Social interactions are also influenced by power relations, which can influence the process of shaping institutions. Interventions aimed at bringing more equity in access to natural resources will have to challenge the existing institutions favouring some of the members. Institutionalization of new concepts, particularly establishment of formal institutions, therefore risks resulting in reinforcement of inequities. Case study analysis intends to identify if the newly introduced institutions in water resource use are successful in achieving equal access to water resources in the community or not.

Post-institutional approach in my view can provide a valid explanation to the challenges faced in the process of institutional reform in Kyrgyzstan along the lines of IWRM principles. This theory was applied by Sehring (2009) in her study of water reforms in Tajikistan and Kyrgyzstan. Her findings confirm the importance of historical context in the process of implementing reforms in the water sector.

According to her path dependency in institutional formation leads to creation of a hybrid regime, in which former patrimonial relations and power of local elite prevails over deliberative democratic processes promoted by new institutions of water use (Sehring 2009).

Thus I intend to base my analysis of the case study on post-institutional theory. The central concept of institutional bricolage will allow me to incorporate into analysis the historical development of institutional setup in water use practice in Arka. By focusing on the institutions rooted in the social fabric of the community I intend to see the influence of the institutions organizing community life on water use practice. It will also demonstrate how the newly introduced institutions relate to the prevailing institutional context, values and beliefs in the community. This theoretical framework will help to identify the challenges in implementation of IWRM principles in Kyrgyzstan, which is the objective of my study.

4 Research objective

The objective of this study is to analyze institutional challenges to implementing IWRM principles in irrigation water management in Arka village of Kyrgyzstan from the perspective of post-institutional theory. Using the post-institutional theory I intend to analyze the existing water-related institutions in Arka village in order to identify how previous institutional arrangements influence institutionalization of the new concepts introduced during the reforms.

The research subject is the process of institutional formation in irrigation water management in Arka village in Kyrgyzstan.

To fulfill the objective of the study I intend to apply the concept of institutional bricolage to understand the process of the partly conscious and partly unconscious formation of new arrangements using elements of existing institutions. By analyzing pre-Soviet and Soviet time institutional arrangement of irrigation I will explore how these were adapted and incorporated into today's water management institutions. I will also discuss how they enable or constrain implementation of reforms under IWRM framework. Further I intend to analyze embeddedness of new concepts promoted by IWRM in the institutions regulating diverse aspects of community livelihoods. Finally, I will seek how institutionalization of new arrangements perpetuate or reproduce social inequities in the access to irrigation water resources.

The following **research questions** were formulated based on the above tasks and guided the process of data collection during literature review and field research:

1. What are the institutions regulating social interactions in irrigation water management?
2. How previous institutional arrangements in the community influence the current water management practice?
3. What is the role of power relations in institutionalization of the new institutions? How they influence equality in access to resources?
4. In which way does the current institutional arrangement support or constrain implementation of IWRM principles in irrigation water management in Arka village of Kyrgyzstan?

5 Methodology

I chose qualitative research methodology for this study to enhance the understanding of institutional aspects of irrigation water management. I first started with an overview of the literature available on my research focus. And then conducted a fieldwork in the village of Arka located in the southern part of Kyrgyzstan.

Review of policy documents, donor publications and academic literature provided information for the theoretical framework of the study. Legislative documents referred to in this study are numbered consecutively under the abbreviation LD (LD 1, LD2 …). The list of the legislative documents is provided in the references section. Review of the academic literature revealed a relatively low level of interest in empirical studies of the institutional arrangement of irrigation at the local level. Most of the available literature, in particular concerning implementation of IWRM in this region, is produced by International Water Management Institute – implementing partner of IWRM Ferghana project funded by SDC. Therefore it is mainly concerned with normative aspects of the theories.

The case study with a focus on qualitative research methods supplied important information for the study. It was conducted between March 10 and March 26 with a repeated two-day visit in the beginning of April. I used the method of participant observation throughout the fieldwork. In this process I could see how people interact with each other when working on their fields, how they interact with the local irrigation officials and observe physical elements of irrigation system. It was particularly useful to verify the statements made assessing the interaction of people with WUA representatives. For example, I participated in the public works on cleaning the irrigation canal in the village. Observations on how the WUA head manages the process and gives instructions to people helped me see his management style in practice. The advantage of it was that my intervention in the social interactions was kept to a minimum. In order to get clarifications or opinion of the people on the situation I used interviews. Although I could get the perception of my informant on the situation, the answers risked to be distorted by his/her expectations and understandings of what I expected to hear from them. Key informant interviews aimed at gaining in-depth information about the issues, on which the informants held expert knowledge. For example to in order to get details of how the WUA operated I held key informant interviews with the head of the local WUA. When I needed clarifications on how current agricultural

production is organized I turned to a young successful farmer, whereas for information on how it was organized in Soviet times I chose to address a former *sovkhoz* agronomist. While with the government officials, representatives of donor organizations mainly semi-structured interviews were conducted, informal conversations proved to be effective with the community members. Throughout this study I refer to the interviewees using their initials and the year of the interview. An example of reference to an interview is "SE 2011". This was done in order to avoid disclosing the identities of the interviewees. Because I was not able to present my research findings to the interviewees I could not ask for their consent to publish their names.

In order to verify the data collected I used a combination of several methods or several sources on the same issue. Note taking was preferred over voice recording during interviews to avoid intimidation and time consuming transcription process. Methodological approach of the research did not require it either.

Participation in the community events and unrelated talks in informal settings contributed to more open dialogues, especially with younger age females. This approach also improved acceptance of my assignment in the village as compared to the initial disappointment of interviewees that my stay in the village did not produce any direct practical benefits for them. As the majority of formal positions in irrigation were held by middle-aged men, the first contact was organized by a male acquaintance, who assisted me in the field study. After I introduced myself and the aim of my study, I could establish further contacts directly without the help of a middleman.

The facts that I originated from the southern region and spoke the language of donors were probably the reasons why my role in the community was often perceived as their 'voice' to international decision-makers. I could recognize this assumption after noticing that some facts were exaggerated. Additionally, some interviewees openly asked me to deliver their message to those in Bishkek (capital city) so that they make necessary decisions. This situation did not seriously distort collection of the data and could be easily corrected through triangulation. This is why I decided to continue accepting this role.

The major challenge in conducting this research was related to the ability to identify and recognize those institutions deeply rooted in the society. I attempted to question my assumptions and interpretation of the findings with the use of reflexivity principles.

Site selection

Arka village in the southern part of Kyrgyzstan was selected for conducting a field research for this study. The criterion of representativeness was not the primary one in the decision of site selection as the purpose of case study was to gain an understanding of the institutional arrangements of irrigation water use. The choice area was restricted to the south of the country, particularly Ferghana Valley, as it was the site for piloting IWRM and other water related projects. Important condition was the size of the community to enable an adequate coverage of the subject within the limited time. And final choice was made in favour of an existing contact and previous knowledge of the community.

Limitations of the study

Field research only covered one community in the south of the country. Therefore the results of this study cannot be generalized for all parts of Kyrgyzstan. Considerable differences in informal institutional settings between southern and northern parts of the country could lead to less relevance of study findings for the north. However most of the historical and political factors influencing institution building were similar throughout the country. Finally, such studies on the development of institutional setting in natural resource management would gain from longer-term ethnographic studies than one possible under the timeframe of MSc programme.

6 Results

In this chapter I will present findings of the case study about the institutions regulating irrigation water management. First I will provide a description of the current administrative arrangement of water resource management in Kyrgyzstan at different levels. A brief summary of the donor-driven institutional arrangements in the water sector will complete the picture of the external environment influencing local water management in Arka village. After the background information on Arka village I intend to present a detailed discussion of the main institutions in local water management discovered during the field study.

Administrative arrangement of the water resource management in Kyrgyzstan

The current institutional arrangement of the water sector of Kyrgyzstan has been largely inherited from the Soviet times administration. Headed by the newly established State Committee of Water Resources and Melioration[3] its regional structures are organized along administrative-territorial units of the country (see Annex 3. Institutional arrangement of water sector in Kyrgyzstan). Although the names of the territorial departments have changed to Basin Water Management Department, water allocation is still implemented within the administrative boundaries. Water demands are communicated to the district level agency, which then sends a cumulative amount further up for approval by the State Committee. However implementation of the decisions on allocation of resources is the responsibility of lower level Basin water management organizations (BWMO). Water sector along with other sectors of Kyrgyz economy suffer from lack of implementation of a consistent national strategy. This can be seen from frequent reorganizations of government ministries and agencies and replacement of key positions[4] leading subsequently to a loss of institutional capacity/memory. This coupled with frequent political disturbances in the country add to the challenges of institutional development in the water sector. Thus, despite considerable progress in the legislative framework (Water Code), water management system of the country is criticized for its centralized decision-making, lack of coordination and cooperation

[3] Until 2009 national level management was carried out by the Department of Water Resources under the Ministry of Agriculture, Water Resources and Processing industry.

[4] Change of the political leadership of the country is as a rule accompanied by reorganization of government structure and replacement of the top management of government agencies. This in turn entails changes of professional personnel

between different government agencies with often duplicating functions within the water sector, and low level of transparency and accountability (Herrfahrdt *et al*. 2005).

National water policies of Kyrgyzstan are set by the Parliament of the country. These policies are executed by the national level management bodies together with its subordinate 7 province and 40 district level water management organizations. The tasks of the State Committee of Water Resources and Melioration include regulation of all water uses including domestic and industrial needs. It oversees implementation of international water allocation agreements and supervises overall performance of BWMO. Rehabilitation of state-owned irrigation infrastructure is also one of the key functions of the Committee. Provincial level and district level basin water management departments are responsible for organization of water supply within their territories. They are in charge of O&M of irrigation infrastructure and organization of ISF collection. Leilek DWMD is accordingly responsible for the water supply in the territory of the district. It signs water supply contracts with the WUAs and organizes the delivery of water volumes as per these contracts. Maintenance of inter-farm irrigation network is the responsibility of the DWMD. Additionally, the Leilek DWMD oversees adherence of water allocation on transboundary rivers to the quotas agreed between neighbouring countries.

WUA Support Units are set up to provide advisory, training services, and methodological support to the WUAs and are often the focal point for donor projects working with WUAs. According to the Leilek WUA Support Unit staff they conducted trainings on technical, financial and managerial issues of water governance for all WUA specialists in the district. These trainings are usually financed by donor projects and their content reflects the donor-supported ideas of good water governance. The trainings thus cover the issues of financial efficiency, participatory decision-making, transparency and accountability of operation, equitable distribution of water and its efficient use.

Arka village

The village of Arka is situated in the westernmost Leilek district of Kyrgyzstan at the border with the Republic of Tajikistan (see map below). It was founded in 1967 as a separate brigade of the Soviet *sovkhoz* Comintern simultaneously with the neighbouring Borborduk village with a purpose of

within the agency with a few exceptions. Such practice is attributed to the corruption in the recruitment process and strong prevalence and commitment to patronage networks based on kinship.

reclaiming the lands of Arka valley (approximately 14000 ha). Today its population reaches 2886 people in 574 families (IA 2011). The first houses in the village and its social and productive infrastructure was built by the *sovkhoz*. Young families from the villages at the mountain foothills, namely Margun, Dargaz, Darhum, moved to this new site. The name "Arka" means "the backside" or the other side of the hill. The task of these brigades in Arka village was to provide fodder for the animal husbandry of *sovkhoz* in the upper villages, as well as to grow grain crops, grapes, tobacco and some cotton. According to the former hydro-engineer cotton production did not prove high yields due to the specific sandy soil requiring considerably more watering of the fields, this is why the cotton production plans were lifted from this *sovkhoz* (AS 2011). Due to its arid conditions and sharp continental climate the arable land can only be cultivated with irrigation. Irrigation was organized by the *sovkhoz* management through hydro-engineers and irrigators (*murabs*).

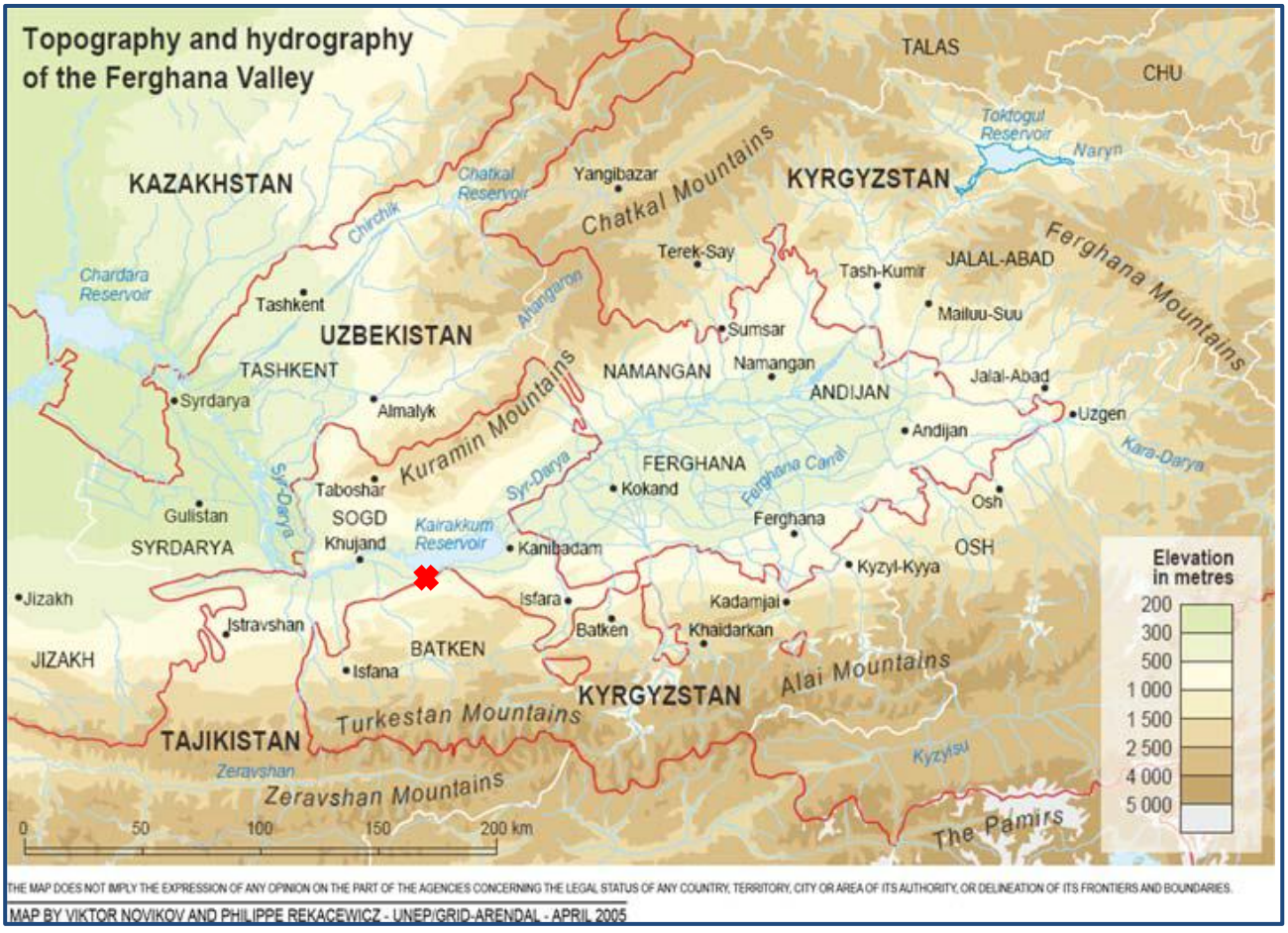


Fig. 2 Map of the Ferghana Valley. Approximate location of Arka village is marked with a red cross.

The water to the fields was supplied from Kairakkum water reservoir in the territory of Tajikistan with the help of a powerful pump. In exchange for the land of the former Kyrgyz SSR that was used for building irrigation canal taking water further to the fields of Tajik SSR, Tajik SSR committed to provide water to the two settlements of Kyrgyz SSR – Arka and Borborduk -- free of charge.

Although allegedly the agreement stipulates an annual volume of 25 million m^3 per annum, according to the WUA staff only 11-12 million m^3 reach their fields. Moreover the period during which pump station operates is restricted to the end of April until the end of September each year. This is related to the huge costs of running pump station. Also this schedule is suited to the vegetation period of cotton and rice, which are main crops in the fields of Tajikistan downstream of the canal. Repeated requests of the farmers to the local government authorities to negotiate prolongation of the irrigation period with Tajik authorities did not change the situation. According to the unpublished conflict potential report prepared by a local NGO, Tajik authorities suggested the Kyrgyz side to pay 60,000 US dollars per a prolonged month of operating the pump station (FTI 2003). Neither Kyrgyz Government nor local farmers are able to afford paying this amount. Total income from agricultural production in these villages was estimated to reach approximately 255,000 US dollars per season (SE 2011). This suggests that the costs of providing irrigation to the fields of Arka and Borborduk villages are not justified from the economic viewpoint. However the local population expects the Government of Kyrgyzstan to protect their interests in front of the Government of Tajikistan and take all required measures to ensure the flow of water to their villages. Their main argument and suggestion to the local authorities is to influence the decisions of the neighbouring country through decreasing water quotas from Kozu-Baglan river. The river originates in the mountains of Kyrgyzstan and flows into Tajikistan. However the policy of both countries so far has been to leave the inter-governmental agreements on water allocation of transboundary rivers from Soviet times in force until new agreements are made. Because agriculture represents key source of livelihoods for the majority of the population in both countries, disagreements over their allocation have been assumed to be the biggest threat for inter-ethnic conflicts (FTI 2003). However all disputes so far could be settled at the local level.

The farmers in Arka have adapted to the restricted period of irrigation by growing crops that require less watering within the period when water is available. Apart from the more traditional crops such as wheat for food, maize and barley for fodder, the most profitable agricultural activity during the last few

years has been growing beans. It requires irrigation only three times during the vegetation period, requires less labour and can be marketed well and catches a good price at the neighbouring food market in Tajikistan's Kostakoz village (HA 2011). Another tendency dictated by the restricted access to water and marketing possibilities has been turning fields into orchards. Fruit trees similarly do not require frequent watering and dry fruit is easily marketed in Tajikistan. Admittedly, Arka villagers have closer economic ties with neighbouring Tajik settlements as compared to Kyrgyz settlements. They prefer Tajik markets for both buying and selling of their produce due to the shorter and more convenient transportation and better demand and supply.

Agricultural income makes up a considerable part of household income. There are very few paid jobs available in the village apart from self-employment. These are mostly small businesses trading consumption goods, food products and services. Vast majority of the villagers directly depend on their land for livelihoods. As a result of privatization all citizens residing in the village at the time of the reform received their land shares formerly owned by the *sovkhoz*. While for some families agricultural activities are a primary source of income, for those with salaries from official positions in the village, such as teachers, nurses, post officials, or those with small businesses, agricultural income provides a bulk of money for life-cycle celebrations (*toi*) or other investments. A local teacher estimated her income from agriculture (apricot trees) to constitute 60% of her annual income, which she uses to pay the costs for university studies of her children (UA 2011). Especially in view of the growing food prices, irrigated agriculture in Arka therefore represents the key source of livelihoods for the local population.

Migration flows present another external factor influencing the livelihoods and institutional changes in the local communities. According to the head of the village more than 250 people are currently working in the Russian Federation with some more in Kazakhstan and the capital city of Bishkek. Remittances from migrants support the local economy through increased consumption and savings, mainly in the form of livestock. In some cases income from remittances undermines the willingness of people to invest their labour in agriculture. "It is easier to ask to send 200 US dollars every month for food and other expenditure than to cultivate land. So they just lease their land plots out to the locals or Tajiks" (SE 2011). Migration also removes the required labour resources from the village, leaving behind families headed by women or elder parents. At the same time one returning migrant noted that it

is possible to earn the same income at home if one works as hard on the land. According to him migration is only a temporary solution and young people will return to their homes sooner or later (AH 2011).

From the discussion above it can be concluded that the local population recognizes that the amount of available water is limited. Farmers started adapting to these circumstances by changing their crop patterns. However they tend to view in rather a technical perspective of running the pump or negotiating with the Tajik authorities. Recognition of environmental change implications is largely absent. It is also clear that irrigated agriculture is central to livelihoods of Arka. Therefore policies influencing agricultural sector have a big influence on the livelihoods of the people. In the next section I will describe and discuss how the people of Arka have adapted different institutions to regulate the precious water resources in the community.

Institutions of irrigation water management in Arka village

Water Users Association is the main formal institution of water use management in the village. It was founded in 2004 soon after the adoption of the Law "On water users associations" and named "Aikol". The total service area includes the fields attached to two villages of Arka and Borbodruk and equals 1111 ha, of which 620 ha are land shares of Arka residents. Water users are organized into Water User Groups of 20-25 people, and the leader of each group signs a contract of water delivery with WUA. Currently the price for 100 liters of water is set at 12 Kyrgyz Som per hour. Out of this amount 33% is paid to the DWMD and the remaining is used for salaries, administrative expenditure and O&M of the canals. However the persisting problem with collection of the fees means that the budget line for O&M[5] remains unfunded. Currently WUA "Aikol" employs 9 staff members including the director, accountant, hydro-engineer, and 6 *murabs*[6]. The director, accountant and the members of the audit commission are appointed annually by the WUA Council members. The current director and accountant have been in service since 2007.

Because WUA was founded under the instructions of the Government by the staff of DWMD with no consultations with the water users, it is seen as part of local government organizations. "They are

[5] In 2011 budget line for infrastructure O&M in Aikol WUA is allocated around 10% of the total budget.

[6] *Murab* from Arabic stands for water master.

middlemen, they have been set up to collect water fees from us for the RUVH (DWRMD) and earn by charging extra" (HA 2011). Due to the long-standing culture of respecting the 'master', which is still common in many rural areas of Central Asia, the authority of such formal institutions is rarely questioned. Taking its roots from feudal-type organization of the society in the pre-Soviet history, such attitude towards those in power continued under the central command driven system in the Soviet Kyrgyzstan. Furthermore it is practiced today despite being seriously damaged by the promotion of democratic values after independence. This example seems to demonstrate the process of bricolage. Along with adapting to the new formal institutional arrangements people continue practicing the old institutions, creating a combination of institutions.

It is believed that the repeated incidences of the Government of Kyrgyz Republic overthrown in 2005 and 2010 have contributed to the stronger belief in the peoples' power. WUA management perceives them as rather exercising power in water distribution than providing services to the members. The manager states "I need to be strict and I do shout at them (water users) when it is necessary to ensure discipline and collect the water fees" (AG 2011). This understanding of the WUA's role established in the interactions between water users and WUA management, which are informed by the existing norms, have led to the lack of progress in implementing the principles of participatory management of water resources. Participation takes form of a pure formality required every year. The annual report sheet, minutes of the annual meetings and decisions are typed in the computer before the meeting takes place leaving blank gaps for filling in the actual numbers in the financial report, amount of water fee and number of attendants. Thus because the prevailing understanding of the 'government structure' and 'participation' contradict each other, people seem to tend to the familiar ways of organization.

Water is delivered to the fields by ***murabs***. Once influential decision-makers in pre-Soviet times, they were re-qualified to merely implement the decisions and ensure water delivery to the *kolkhoz*/*sovkhoz* fields in the Soviet Union. Today *murabs* in Arka are hired staff of WUAs to deliver water as per farmer's/group leaders request. The job becomes quite challenging in the early season when water demands exceed the supply. During these days they have to deal with emotional farmers and water theft practices[7], which former *murab* finds "too much for the remuneration they get" (IA 2011). It is notable that *murab* can solve the dispute over water in favour of the one who pays him an additional

[7] Water theft here implies farmers driving water to their field in breach of the agreed schedule.

reward. General lack of transparency in water distribution is a contributing factor. Both water theft and this type of **corruption** are well-known and accepted practices in the community. The former is tolerated due to a general conflict avoidance attitude and the latter as a common mechanism, which any farmer in need can resort to. This is why they became established as social institutions in water use in the community. Such mechanisms are used not only in water resource management but also other spheres of community life.

The **kinship** system represents another influential institution regulating community life in general and water use practices in particular. In pre-Soviet period kinship provided an important social security system to its members. Although Soviet Government tried to provide such security, kinship ties were not suppressed and remained relatively enforced. They were employed when accepting relatives to the party membership, recruiting to *kolkhoz* jobs, distributing resources, etc. It regained its importance after independence and the collapse of the state-supported social security system. Today many political decisions at the local level are decided in accordance with belonging to certain kin/clan. Candidates to a leadership position, be that local governments, Parliament or presidency, actively employ kinship networks for gaining political support. In the absence of formal social security schemes maintaining kinship and friendship networks is of as big importance for ensuring future stability as investing in diverse livelihoods for the household. Also in Arka the decisions on electing WUA Council members, selecting WUA staff, and generally electing representatives in any kind of councils are guided by kinship relations. For example, the current head of WUA, who according to one local resident "does not even know how to measure the volume of water" (Anonymous 2011) originates from the same clan as 4 of the 5 members of the WUA Council, which could be the motivation for his appointment. This presents another example of institutional bricolage, when formal election procedures of WUA are combined with informally accepted ways of favouring the candidate with kinship ties.

The power of kinship also manifested in the process of distribution of land shares. Thus relatives and friends of the **local powerful group/elite** received better quality land shares located in the proximity to residential areas and with a good access to irrigation water (Sehring 2009). Similarly, in Arka those interviewees complaining about unprofitability of cultivating their lands located in a long distance and

without good access to water turned out to have no relations to the local elite[8]. Here ownership of a land plot in a good location and access to water receives a symbolic meaning of belonging to a powerful group and higher economic category of villagers. As marginalized people as a rule do not enjoy access to social capital provided by such networks it can be assumed that they are also excluded from distribution of valuable land plots located close to watergates. Introduction of WUA aimed at addressing fair distribution of water resources. However as appointment to the management positions at WUA is dependent on the kinship leaders and local elite, it ends up in favouring the same circle of influential people. In addition many donor projects tend to choose the head of the village – *aiyl bashy* – or other representatives of the community elite as their focal point for implementation of projects. Ensuring fair representation is often difficult due to the limited time of donor organizations and a pressure to produce results in an economically efficient ways. However it may have serious implications for the project results. In such cases the project focal point might use the information to influence institutional development efforts in his/her interests.

Despite of provisions for water dispute resolutions and sanctioning procedures stipulated in the WUA establishment documents, these are rarely enforced. All water disputes over distribution are usually dealt with at the site with the *murab* or with involvement of WUA leadership. In case of nonpayment of water fees WUA first turns to the court of the elders – ***aksakaldar sotu***. The notion of *aksakals* (literal translation "white beard") originates from pre-Soviet organization of community life and means the eldest leaders of the kin that maintain the traditions and history, make major decisions and resolve internal disputes. It is closely linked to the norm of respecting the elders. Later it was adapted

Fig. 4 Local aksakal telling about irrigation in Soviet times.
Source: Own photograph (2011)

[8] A woman of Tatar nationality obviously does not have kinship relations and small business owner with little attention to maintaining kinship relations received a land share at the tail-end of the canal 8 km away from the village. Both currently do not cultivate their plots since several years.

by the Soviet Government to suit the power structure of that time. Institution of *aksakals* changed to include besides the older kin representatives also young and respected bureaucrats working for the party (Bichsel 2008). Inspired by a new wave of reviving national ideology following the independence of the country, the court of elders – *aksakaldar sotu* – was formalized through relevant legislation as a local institution to arbitrate and mediate locally disputed affairs. In this process their decisions are legitimized through recognition of their authority in the community and the widely practiced norm of respecting the elders. In the case of Arka, *aksakaldar sotu* is formed under the local self-government – *aiyl okrug* – in the capital village Borborduk to serve all four villages in its territory. WUA informs the members of *aksakaldar sotu* in writing about the nonpayment of water fees. The persons mentioned in the letter are then invited to the meeting where the case is considered. Using their authority and calling to abide by the cultural norms of behavior, *aksakals* set a period within which the debt shall be settled. However this mechanism has not been productive yet. According to the WUA leadership they are considering turning to the official law enforcement bodies to help them resolve the problem, and are announcing this decision to the debtors (IA 2011). Removed from their support base within the smaller communities tied with kinship *aksakals* seemingly lose their legitimacy and power. Thus artificially supported and formalized institution cannot carry out its functions properly. But the growing acceptance of water fees and a possibility of 'real' sanctions from the government's side may result in better collection.

Ashar as a form of voluntary public work is widespread in this part of the country. Cleaning irrigation canals in the early spring before the start of irrigation season is a tradition since pre-Soviet times. The picture to the right shows the canal cleaning *ashar* that took place during the field work in Arka village. Mobilization of people for this

Fig. 5 Local people during canal cleaning in Arka. Source: Own photograph (2011)

work did not require much effort as this practice is rooted in history and community values. *Ashar* thus represents an institution based on the value of respecting the community.

A striking feature of irrigation institutions is its almost complete dominance by male members of the community. Although explained by the patriarchal culture it contradicts one of the main requirements of good governance – equity. Many scholars document that women carry out the majority of work in agriculture, however they cannot take part in the decisions of planning water use in the community.

In summary, the current institutional arrangement in Arka village combines institutions specifically regulating water use and those setting norms of general community life. Many of these institutions survived through a long history of changing government regimes and adapted to the new realities. Similarly concepts underlying operation of WUAs are going through the process of adaptation to the existing circumstances. However a contradiction is notable between the current culture based on the values of respect to the elders and community, and the deliberative democratic processes laying basis of WUAs. Market-oriented elements of WUA operation are slowly gaining public acceptance due to a general development of markets in this area, and not least due to incorporation of the economic interests of kinship network and local elites. This explains a relative progress on the part of economic sustainability of WUAs as compared to ensuring participatory management of WUA. In the next chapter I intend to analyze these findings from the perspective of post-institutional theory.

7 Discussion

This chapter discusses my main findings of the case study in Arka village presented above using post-institutional theory. I will start with the discussion of the process of institutional formation drawing on the concept of institutional bricolage. I will continue discussing importance of social embeddedness of new institutions introduced in Arka to ensure their successful operation. Finally I intend to raise the issue of power relations in the process of institutional formation. In addition current problems in the introduction of institutions aiming to provide equal access to water resources will be discussed to inform future work of researchers and practitioners.

Institutional bricolage in irrigation practice of Arka

In the chapter above we could see the examples of the process of bricolage in forming the existing water-related institutions in Arka village. From the case study it is clear that the previous institutional arrangements deeply rooted in the value system and social organization of the community tend to persist through changing government regimes. Thus kinship networks based on the values of kin relationship, respect to elders, community, and also providing the key social security for the households to address economic uncertainties, seem to have strong influence on institutional formation throughout pre-Soviet and Soviet times. Similarly the practice of institutions implied by WUA model, such as participatory decision-making, election of the governing bodies, etc., is regulated by the rules of the kinship institution among others. This confirms the conclusions of Sehring (2009) on institutions in water governance referring to the theory of path dependency.

Case study findings also demonstrate that people in the communities constantly reshape their institutions adapting to the changing external influences. In my understanding farmers do not only passively change their cropping patterns in response to the restricted water supply but also actively adapt mechanisms to improve their access to water. Using a bribe as an incentive to the murab for a preferential irrigation of his/her field is not only tolerated in the community but has become informally accepted as an institution. This is not only applicable to irrigation but also a wider community life. Whereas at the initial stage changes in the institutional arrangements may require a conscious action of a bricoleur, repeated practice turns it into a normal legitimate way of acting thus creating the so called "logic of practice" (Bourdieu 1990). Justification of the corruption in water distribution by a farmer

referring to it as a 'normal way of getting water urgently' (HA 2011) confirms that this institution has become seen legitimate. So understanding of the process of institutional formation as a combination of the existing and new institutions through conscious and unconscious actions of the people aimed at adapting to the changes seems to be valid for the selected case.

The situation in the water sector in Kyrgyzstan prior to launching reforms used to be pictured as a rule as one suffering from an institutional gap. Soviet institutions – *kolkhoz* and *sovkhozes* - have been abolished and no institution is existent that organizes water delivery to farmers' fields and to takes care of the on-farm irrigation infrastructure (Johnson III *et al*. 2002, ADB 2002). This way of picturing the situation as one requiring intervention and introduction of 'new' institutions justified launching of the extensive water projects financed by the World Bank and ADB. However the case study revealed that even in the transition period communities have numerous institutions regulating all aspects of community life. Moreover assumption of an 'institutional gap' leads to the expectation that the model being introduced will produce the intended results described. In my view project or government interventions introducing changes in the institutional setup of the communities should be guided by a thorough analysis of the actual situation in them.

Socially embedded or bureaucratic?

The above views on irrigation institutions can also be attributed to the focus of the government and donors on formalized institutions. The progress in implementing IWRM in Kyrgyzstan is estimated to achieve good progress on the part of regulatory institutional environment while lagging behind on the ecological dimension and sectorial integration. But despite the fact that all enabling legislation is in place performance of many WUAs at the local level remain low. This could be explained by the lack of social embeddedness of WUA-promoted institutions. Mere formalization of WUAs is not sufficient for its success because it relies on active participation of water users in governing it. The reasons why institutions of deliberative democracy underlying WUA model are not practiced to their full potential in Arka village include: i) top-down manner of WUA establishment, ii) perception of WUA as a 'traditional' management structure, part of the local self-government, iii) contradiction of the notions of participation to the more 'socially embedded' institutions of kinship, values of respecting the elder, and patriarchal beliefs, and iv) generally low awareness of the mechanism and benefits of such organization. These factors currently hinder the process of institutionalization of participatory

management of WUA in Arka. As discussed earlier changes towards democratic governance will initially require conscious actions of water users to be later accepted as a legitimate action reproduced unconsciously. Although reportedly awareness raising activities involving the public took place in Arka several times, water users still refrain from investing in strengthening this institution. It could also be related to the perceived prevalence of kinship rule, which has a long history of effective support. Thus the process of social embedding of the new institutions will require time and investment of efforts of the water users.

Importance of social embeddedness of institutions calls practitioners to look beyond formalized arrangements. Whereas bureaucratization of an institution can be executed top-down, institutionalization and intrusion of institution into community social fabric cannot. As we can see from the discussion of the changing status of the court of elders in Arka sadly resulted in the inability of the institution to perform its formally assigned tasks. These institutions are constantly changing over time and good intentions of reviving 'traditional' institutions may even turn harmful like in this case. Therefore government and project agents should equally focus on socially embedded institutions as on the bureaucratized ones.

It is necessary to note that the relationship between institutions and people is two-fold. Institutions exist through being practiced by people, during which they may be reshaped or adapted to specific situation. This happens in social interactions between community members, during which institutions are defined, their meaning made. Practice of institutions is informed by the current definition of the situation by the person, his/her values, as well as expectations from the interaction. In these interactions, where institutions come into play, new knowledge and understanding is created. Therefore social interactions represent a forum/venue for institutional changes. Further investigation into how communication in social interactions influences institutional setup in irrigation water management would be valuable both for scholars and practitioners equally.

Power and equality

One of the key principles of IWRM and WUA is equality of access to water resources and equality of participation. Post-institutional theory suggests that new institutional arrangements are practiced along the existing power structures and may result in reinforcing inequalities. New institutions are adapted

and reshaped to fit into the existing institutional setup of the community. Because many institutions in the community are universally applied to different spheres of life, the same values and norms influence the bricolage process. It is argued that those members of the community in a powerful position can influence this process in favour of their interests. As these people usually possess more information and enjoy respect and support of the community members they are not willing to promote practice of democratic institutions in water resource management. Moreover prevailing culture of respecting the people in power means that their authority and decisions are not questioned. The local elite thus has a greater power to influence the process of institutional bricolage.

Given that the existing institutions in Arka do not seem to actively promote equality in distribution of water resources, it can be concluded that the new institutions adapted to the local institutional context reinforce inequalities. It is visible from the example of preferential allocation of land shares with good access to water to those connected to powerful elite, leaving far away plots with poor access to water to the less privileged. This practice further exacerbates economic situation of the marginalized group by depriving them of agricultural income. Land and water in this situation becomes a symbolic representation of belonging to the privileged group in the community.

Whereas participation of female water users is restricted by the norms of a patriarchal society, the marginalized members of the community usually do not have information and time to fully participate in governing WUA and decision-making. This confirms that democratic principles of WUA operation currently are not able to address social exclusion patterns existing in the community. Additionally, government and donor agents as a rule choose representatives of the local elite as their focal point for carrying out reforms and projects empowering them further to influence institutional arrangement of resource distribution in the community. Recognition of power relations is therefore key in order to avoid such practice. Also a longer-term research on the implications of institutional reforms in irrigation on the marginalized population, including women, may provide further insights into challenges for their participation in governing the resources.

Findings of the case study as well as widespread difficulties faced by the WUAs across the country raise a question whether this model can be universally applied. Although intended benefits of this organization on many dimensions of community life are acknowledged, specific cultural, historical and institutional contexts of communities are not considered. Introduction of WUAs substantially

intervenes in the institutional setup of the communities. However as post-institutional theory suggests it cannot become operational unless rooted in the existing institutions. Some progress has been achieved in the development of WUAs in Arka, nevertheless its key principle, which is equality, cannot be ensured unless democratic values are accepted by the entire community. The process of institutionalization is very hard to achieve from top down. It requires a long time and investment of a lot of resources. Therefore in my opinion it is 'easier' and more sustainable to turn this process around. Building on the existing successful experiences of collective action in the community will lift the necessity to institutionalize the externally imposed models. These experiences are rooted in the community institutions, value system, norms, beliefs, and worldview, which is difficult to achieve in the institutions brought in from outside of the community.

It can be concluded that post-institutional theory proved useful in analyzing the challenges of introducing IWRM principles in water resource management in Arka village of Kyrgyzstan. It allowed to bring historical and local cultural contexts into the discussion of water reform efforts. Thus conceptualization of institutional interventions at the grass roots level as planting 'ideal' models of collective action with incentives and sanctions incorporated in institutions did not produce the expected outcome. Instead this case study helped to discover a complex web of institutions developed through a long history of changing regimes that inform people's actions in various aspects of community life. The new institutions of water governance introduced in Arka during the reforms, such as WUA, ISF, participatory governance, are going through the process of institutionalization. In this process community members are partly consciously and partly unconsciously developing their own local 'hybrid' institutions, which contain elements of old and new institutions. Therefore institutions introduced through reforms are never completely new, but adapted and changed to fit the local ideology, culture and changing needs. Thus interventions without recognition of the local institutional context and power relations risk failure in achieving the intended results and in the worst case undermining local power balance or reinforcing the inequities. The question then remains can institutional reforms in NRM implemented in a top-down manner be successful.

8 Conclusion

With this study I set out to analyze the challenges faced in the process of introducing IWRM principles in the water resources governance in the communities of Kyrgyzstan. To accomplish this goal I chose to employ the concepts of post-institutional theory. In contrast to the mainstream theories informing IWRM framework post-institutional theory pays attention to the local historical, cultural and social contexts. The case study demonstrates that these factors play a key role in the process of institutionalization of new concepts introduced during the reform. Illustrations are the Water Users Association. It is intended to be managed by the users in a participatory, transparent manner, cover its costs through water fees and ensure equal distribution of resources to all users. Unsatisfactory progress of WUA principles of participatory management in Arka village is attributed to their contradiction with historically maintained institutions of kinship, respect to the elders, to local elite and perception of WUA as a governmental organization. Institutions are constantly shaped and readapted to the new circumstances in the community life. In the process of bricolage people select and combine elements of the previous and new institutions available at hand through conscious actions and unconscious practice of familiar institutions. Hence institutional reforms fail to deliver the expected results. Consequently it is crucial to get an understanding of the existing institutional setup in the water resource management before introducing new ones.

The case study analysis also confirmed an assumption of the post-institutional theory that newly introduced institutions might end up favouring the interests of the local elite and reinforcing inequality in the community. Election of the members of WUA's executive body mainly on the basis of belonging to a kinship network or the privileged group leads to further preferential treatment of members of this group and marginalization of others. Moreover, extremely low participation of women in water resource management due to patriarchal values results in underrepresentation of their interests. Therefore recognition of power relations in the community during interventions is important to avoid reinforcement of misbalances. Further research on implications of institutional reforms in irrigation on the marginalized population, including women, may provide further insights into challenges for their participation in governing the resources.

As social interactions play a central role in practicing institutions and serve as a venue for any institutional changes taking place in the community, it is important to investigate how communication in social interactions influences institutional setup in irrigation water management. Institutions exist through their practice by the community members in their interactions, and can be changed and adapted during the practice. Understanding of the role of communication in enforcing institutional changes would be valuable both for scholars and practitioners equally.

Lastly, given such importance of the local context in institutional reforms and uniqueness of institutional setup in NRM in different communities it is concluded that building on the existing successful experiences of collective action in the community could be a more effective way for improving NRM practices. This would lift the necessity to institutionalize the externally imposed models.

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List of the Legislative Documents

LD 1. The Decree of the President of the Kyrgyz Republic "On measures to enhance the land and agrarian reform in the Kyrgyz Republic" dated 22 February 1994, N VII-23

LD 2. The Law of the Kyrgyz Republic "On Water" dated 14 January 1994, N 1422-XII

LD 3. The Resolution of the Government of Kyrgyz Republic "On Associations of Water Users in the rural areas" dated 13 August 1997, N 473

LD 4. The Law of the Kyrgyz Republic "On Water Users Associations" dated 15 March 2002, N 38

Interviewees List

#	Initials	Sex	Role
1	BM	male	representative of donor organization
2	ST	male	representative of donor organization
3	NS	male	representative of agricultural extension service
4	BK	male	representative of the State Committee on Water Resources and Melioration
5	SM	male	representative of Leilek District WUA Support Unit
6	SA	male	representative of Leilek District WUA Support Unit
7	AN	male	representative of Leilek District Water Management Department
8	IA	male	head of Arka village
9	UA	female	local teacher
10	AG	male	head of WUA “Aikol” in Arka village
11	HA	male	local successful farmer
12	OG	male	accountant of WUA “Aikol” in Arka village
13	SE	male	local resident, who does not cultivate his land share, owns small business
14	AB	male	*aksakal*, respected person in the village, former *sovkhoz* worker
15	AH	male	young farmer, returning migrant
16	ES	female	local farmer, cultivates land on lease with the family
17	IA	male	former murab of Arka
18	JB	female	former hydro-engineer of *sovkhoz*, retires, leases out her land
19	TJ	male	head of drinking water users association, member of the local council
20	AS	male	former *sovkhoz* agronomist, retired
21	IH	female	former head of the women’s brigade of *sovkhoz*, does not cultivate land due to long distance and no water
22	JI	female	local resident, leases out her land share avoiding risk of crop failure

Annexes

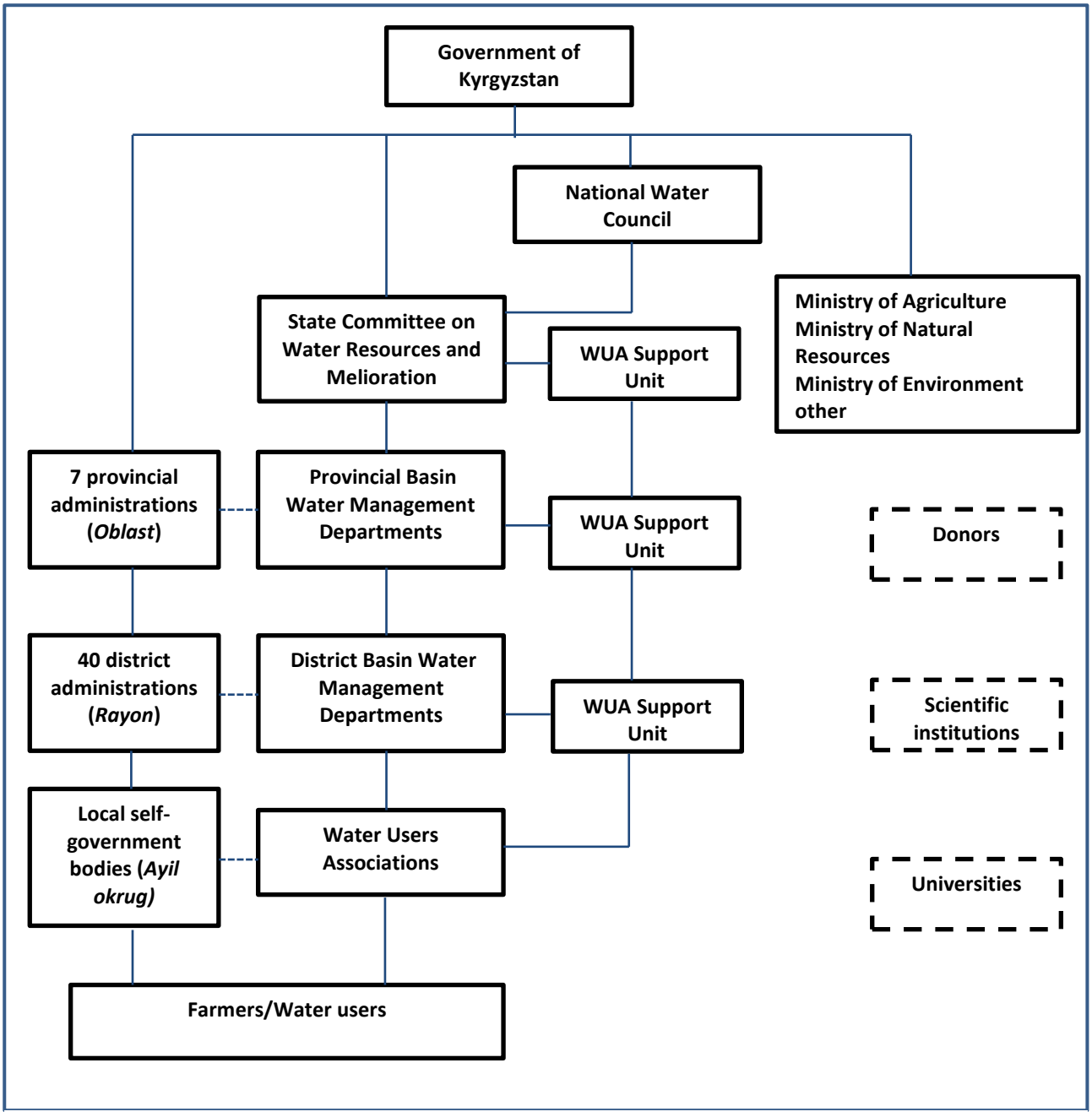
Annex 1. Distribution of water resources in Central Asia

	Uzbekistan	Turkmenistan	Kazakhstan	Kyrgyzstan	Tajikistan
Amu Darya	48.2%	35.8%	-	0.6%	15.6%
Syrdarya	50.5%	-	42.0%	0.5%	7.0%
Source: Sehring 2006					

Annex 2. List of major projects active in water reform in Kyrgyzstan

Project name	Financed by	Dates	Interventions
Rehabilitation of irrigation systems	World Bank	1998-2006	Institutional development, capacity building, infrastructure rehabilitation
On-Farm irrigation project	World Bank	ongoing	Establishment of WUAs, capacity building, infrastructure rehabilitation
Improving water resource management	Government of Japan	2006-2011	Capacity building
Agriculture development project in Chuy Oblast	Asian Development Bank	1999-2005	Rehabilitation of irrigation and drainage infrastructure
Water Users Associations Support Programme	USAID	2004-2011	Capacity building, small grants
Integrated Water Resources Management in Ferghana Valley	SDC	ongoing	Capacity building, small grants
Southern agricultural development project	Asian Development Bank	ongoing	Rehabilitation of irrigation and drainage infrastructure
Improving water resource management	World Bank	ongoing	Rehabilitation of irrigation infrastructure, capacity building activities
Efficient use of water	SDC	ongoing	Developing local innovations in water saving technologies
Source: Own compilation according to CAIConsulting 2010, various websites			

Annex 3. Institutional arrangement of water sector in Kyrgyzstan



Source: Own compilation according to Herrfahrdt *et al*. 2005 and official website of the State Committee on Water Resources and Melioration of the Kyrgyz Republic www.water.kg