

**CAPACITY DEVELOPMENT OF WATER USER ASSOCIATIONS
IN THE KYRGYZ REPUBLIC**

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AWS	Agricultural Water Strategy
CD	Capacity Development
DWR	Department of Water Resources of the Kyrgyz Republic
FAO	Food and Agriculture Organization of the United Nations
GKR	Government of the Kyrgyz Republic
IA	Irrigation Associations
IMT	Irrigation Management Transfer
ISF	Irrigation Service Fees
IWMI	International Water Management Institute
MAM	Ministry of Agriculture and Melioration of the Kyrgyz Republic
M&O	Maintenance and Operation
NGO	Non-governmental organization
NIA	National Irrigation Administration of the Philippines
NSC	National Statistics Committee of the Kyrgyz Republic
OFIP	On-Farm Irrigation Project
PIM	Participatory Irrigation Management
RDF	Rural Development Fund
RDWR	Regional Department of Water Resources
SAEPF	State Agency on Environmental Protection and Forestry
SWOT	Strengths, Weaknesses, Opportunities and Threats

UNECE United Nations Economic Commission for Europe

WUA Water User Association

ABSTRACT

This research is directed to enhance the capacity of Water User Associations (WUA) in the Kyrgyz Republic. Firstly, the study aims to analyze the current condition and policy of WUAs in the Kyrgyz Republic since its establishment. Moreover, this research focuses on the evaluation of WUA's functional tasks, responsibilities and activities with the example of one pilot WUA. Several factors such as water user's awareness about WUA's activity, quality of irrigation facilities, WUA services, irrigation water, water supply system, irrigation service fees (ISF) and water user's knowledge about advanced irrigation methods have been used in order to evaluate the functional responsibilities of WUA. This research also helps to define the level of water user's understanding about WUA unions and federations and their willingness to be members.

Both quantitative and qualitative approaches are used in this research to collect primary and secondary data. The research participants for this investigation were farmers-water users and staff of WUA "Omur-Bulak" located in Chuy region, Kyrgyz Republic. Thirty-six people participated in the survey.

The research findings revealed that the current policy and condition of WUAs in the Kyrgyz Republic are located in different positions depending on financial, social and technical aspects and many WUAs have disadvantages in institutional development. The result of this survey shows that WUA "Omur-Bulak" has the following disadvantages in its activity: water users are not fully aware about activities of WUA; lack of finance of WUA for properly operation and maintenance; poor technical condition of irrigation facilities in on-farm level,

which led to water losses, conflicts and failure of water priority; weak logistical base; weak capacity of WUA's staff; and others. This survey also found that the unsatisfactory condition of irrigation infrastructure is one of the major destructive factors, which is negatively influenced to efficiency and effectiveness of a water supply system and timely distribution of irrigation water to farmers – water users. The findings also revealed that water users have a weak understanding about WUA unions, but in order to improve the quality of distributed water, farmers showed a huge willingness to create and combine with other WUAs into unions and federations as well as to be its members.

Finally, based on revealed findings this research provides the main mechanisms on the improvement of efficiency and effectiveness of WUA's activity, as well as recommendations on capacity development of WUAs in the Kyrgyz Republic.

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the study

Water is an essential component of human life, and as a renewable, its single source and presence can only be regulated by nature. People can only control aspects such as access, preservation and distribution of water between different users. However, human influence can significantly reduce water flows due to poor management and use of land resources, lack of knowledge about agriculture, including land reclamation and irrigation of crops, as well as inefficient use of management skills and distribution of water (RDF, 2013).

The Kyrgyz Republic is a small and mountainously country, which does not have an access to the sea, where around 65,3% of population lives in rural areas (NSC, 2013) and one of the main incomes of the rural population comes from agricultural activities. Due to geographical conditions, topography and agro-climatic condition, the country's agriculture is heavily dependent on irrigation water. Irrigation systems play an important role in crop production.

Demand for irrigation water in the Kyrgyz Republic grows due to an increasing population, the establishment of new settlements and an extension of crop areas. Besides this, in relation to climate change in the Kyrgyz Republic there has been an increase in air temperature in the range of 2,39 degrees from 1950 to 2005, and taking into account the higher temperatures and subsequent

intensive melting glaciers in the country (in the amount of 0.2 - 1.0% per year since 1950), the volume of glaciers has decreased by an average of 15% (Stucker, Kazbekov, Yakubov, & Wegerich, 2012).

Water shortages arise only in the vegetation season, in particular from April until October, and are largely caused by ineffective irrigation infrastructure and irrational water resource management (Alymbaeva, 2004).

After the collapse of Soviet Union, due to land and agrarian reform in agriculture, irrigated areas were fragmented into small parts and on-farm irrigation infrastructure was ownerless and rapidly deteriorated, which caused a decrease in the quantity and quality of irrigation water. In order to solve that kind of problem the Government of the Kyrgyz Republic (GKR) decided to implement an institutional reform in the irrigation sector in order to improve the efficiency and effectiveness of distributed water through the decentralization of water resource management in the country (more detailed information is provided in Chapter IV).

Institutional reforms in the irrigation sector were conducted in more than 50 countries in the world, where the management of on-farm irrigation systems policy was decentralized and fully transferred to the performance of new institution named as water user association (WUA) (Vermillion & Sagardoy, 1999).

WUAs in the Kyrgyz Republic were created in order to solve the problems of water supply in rural areas, promote the efficient use of water resources and reduce rural poverty. WUA is a non-governmental organization (NGO) where the

initiative to create and manage belongs to groups of water users and, which have one or more distribution canal (IWMI, 2003). In order to jointly control the maintenance and operation (M&O) of irrigation facilities, these organizations promote fair and equitable distribution of irrigation water, prevention of water pollution, regular training courses for water users in advanced irrigation methods, as well as controlling and providing irrigation services among water users (Djailoobaev, Kojoev, & Baibosunov, 2006).

Currently, water resources are used improperly and inefficiently. Specifically, irrigation systems in on-farm irrigation level are faced with problems of poor technical conditions of irrigation facilities and a loss of irrigation water due to the issues of economical, social, technical and political aspects (Batykova, 2014). One factor is that almost 90% of irrigation facilities were built 30-40 years ago and no improvements have been conducted since that time. Other negative contributing factors are the poor organizational performance of WUA's functional tasks and its institutional weaknesses (more detailed information is provided in Chapter II).

1.2. Significance of the study

Considering the above facts and problems in the area of WUA, the researcher considers that the significance of this study will be to enhance the capacity of WUA in the Kyrgyz Republic. First of all, it is necessary to study the role of WUA in the Kyrgyz Republic, as well as more precisely analyse the current condition and policy of WUAs since its establishment in the country. Likewise, it is important to evaluate the functional responsibilities and activities

such as providing irrigation services for water users, preventing water disputes and conflicts among water users, and improvement of access to quality use of irrigation water. Furthermore, this study proposes recommendations to strengthen the capacity of WUAs in the Kyrgyz Republic, as well as set an alarm for water conservancy workers and farmers about importance of the WUA's role in agriculture by assessing the functional tasks of the WUA. A study of the WUA's capacity will also require a precise definition of how water users understand the unions and federations of WUAs and their willingness to join them.

In addition, this study will help to understand the administrative issues of WUA's tasks and integrated water resources management in general through the survey study for farmers-water users and gain experience from other international organizations in the field of participatory irrigation management.

1.3. Research question

This study is directed in order to respond to the following question: ***How to enhance and improve the Capacity of WUAs in the Kyrgyz Republic?***

Specifically, the research attempts to address the following sub-questions:

- What are the current policy and conditions of WUAs in the Kyrgyz Republic since its establishment?
- What is the assessment of the performance of WUA's functional responsibilities, tasks and activities? (A case study of WUA "Omur-Bulak" in the Kyrgyz Republic)

- What are the main mechanisms on the improvement of efficiency and effectiveness of WUA's activity? (A case study of WUA "Omur-Bulak" in the Kyrgyz Republic)

1.4. Research objectives

The aim of this study is to enhance the capacity of WUAs by analysing the current situation and policy with an estimation of its functional tasks, especially in the example of WUA "Omur-Bulak" in Alamedin district.

In particular, this research aims at achieving the following objectives:

- To describe the current policy and condition of WUAs in the Kyrgyz Republic since its establishment;
- To evaluate the functional responsibilities and activities of WUAs;
- To identify the main mechanisms on the improvement of efficiency and effectiveness of WUA's activity.

1.5. Organization of the research

This research consists of six chapters. Chapter one presents a background of the study, the main research question with several following objectives in order to reach the defined goals and a common overview of the research organization.

Chapter two provides a literature review. Specifically, chapter two examines the literature explaining the theoretical definition of capacity development, implementation of participatory irrigation management in several countries and the nature of institutional reforms in irrigation sector such as public participation through the creation of WUAs and irrigation management transfer. It also

describes the efficiency and effectiveness of WUAs as well as the investigations on evaluation of WUAs activities in the Kyrgyz Republic used in this research.

Chapter three describes the methodology, which is used in this research as a tool in order to reveal the problematical issues in this area.

Chapter four analyses the irrigation management in the Kyrgyz Republic. Specifically, this chapter includes general information about irrigation infrastructure, the situation after the collapse of the Soviet Union in the irrigation sector in on-farm level, the necessity of institutional reforms in water management through the creation of WUAs and its initial problems and difficulties. Moreover, the chapter describes about the assistance of international donor organizations in the formation of advanced WUAs through the rehabilitation projects and current issues and SWOT analysis of WUA's activities since its establishment in the country. In addition, this chapter presents the main responsibilities, principles and functional tasks of WUAs and its organizational structure.

Chapter five presents findings during the field trip in order to evaluate the functional responsibilities and activities of WUA "Omur-Bulak" in Chuy region of the Kyrgyz Republic. Specifically, in the evaluation the researcher used factors such as: determination the awareness of water users about WUA activity; evaluation the quality of irrigation facilities, services, water and water supply system; determination of water users opinion about current tariffs for irrigation water; main problems in the use of distributed water, which water users face at the moment; water user's skills in advanced irrigation technologies; and the role of

WUA in the development of agriculture. In addition, this chapter provides the determination of water users' understanding about WUA unions and federations and their willingness to be members.

Chapter six provides conclusions of the research and further recommendations on the improvement of the capacity of WUAs in the Kyrgyz Republic.

CHAPTER TWO

2. LITERATURE REVIEW

This chapter presents the literature review relevant for this study. Especially, the chapter examines the literature explaining the following: the theoretical definition of capacity development; the implementation of participatory irrigation management in several countries; and the nature of institutional reforms in the irrigation sector - such as public participation through the creation of WUAs and irrigation management transfer. It also describes the efficiency and effectiveness of WUAs as well as the investigations on evaluations of WUA activities in the Kyrgyz Republic used in this research.

2.1. What is Capacity Development?

2.1.1. Definition

There are several descriptions of Capacity Development (CD). In some cases it is a means, used as an approach or process (Hope Sr, 2011); on the other hand, it is directed to the development of objectives, an individual or an organizational capacity (Bolger, 2000; Hope Sr, 2011).

First of all, there is an understanding of an organizational capacity that is directed to the improvement of skills and ability of goals. Horton et al. (2003) said, “An organizational capacity is its potential to perform – its ability to successfully apply its skills and resources to accomplish its goals and satisfy its stakeholders expectations” (p. 19). Furthermore, the author commented, “The aim

of capacity development is to improve the potential performance of the organization as reflected in its resources and its management” (p.19).

Under this understanding, organizational capacity can be understood as a form of CD. As such, a long-term process CD needs advanced organizational skills, procedures and good governance at all level (Krishnaveni & Sujatha, 2013). The individual and organizational levels have to create the effective functioning systems (Hope Sr, 2011; Krishnaveni & Sujatha, 2013).

2.1.2. Organizational performance and assessment framework

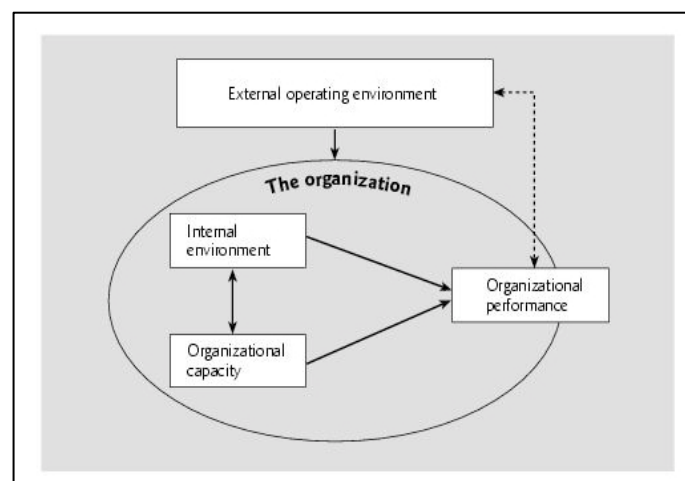
In order to meet defined goals and reach its mission the organizational ability is determined by an organizational performance. From one side an organizational performance is divided into 4 parts (Horton, et al., 2003): (1) Effectiveness; (2) Efficiency; (3) Relevance - this is the level or degree where the objectives and activities of the organization reflect the needs and priorities of key stakeholders in order to achieve certain results; and (4) Financial sustainability.

On the other hand, organizational performance is one of the elements of the organizational assessment framework, which was created by Lusthaus, Anderson and Murphy (1995) and Lusthaus et al (2002), as cited in Horton et al. (2003). It consists of the followings (Figure 2.1.):

- Organizational performance, which consists of effectiveness, efficiency, relevance and financial sustainability,
- Organizational Capacity, consisting of knowledge, resources and the process of organizations including program, strategy, management, technology, infrastructure, networks and staffing,

- External operating environment, where the organization creates its administrative and legal system, policy and political environment, social and cultural activities, technology available and economic trends,
- Internal environment, which includes following: internal factor and activities; an incentive system; an organizational climate and culture; history and tradition; clarity and acceptance of the organizational mission; leadership and management style; and the extent of shared norms and organizational structure.

Figure 2. 1. *Organizational assessment framework*



Source: Horton et al. (2003).

Horton et al. (2003) also pointed out that “monitoring and evaluating organizational capacity development is of critical importance to ensuring that capacity development initiatives actually lead to improved performance” (p.32).

2.1.3. Concept of Capacity Development

In this study, Morgan (1998) explains that the concept of CD can be divided into 3 parts:

- CD refers to the methodologies, strategies and approaches that are used by some sort of participants in order to improve their effectiveness (e.g., seminars or training programs on organizational change efforts).
- Organizational and technical abilities of organizations in a group or individual level are also identified as potential or capacity. The potential consists from institutional, organizational and behavioral outcomes. Power numbers are usually focused on the implementation of some organizational functions or activities, such as decision-making, management, service delivery, financial management, the ability to learn how to implement adaptation, motivation and organizational integrity.
- Determined by the impact or development of benefits and results.

2.1.4. Objectives and principles of Capacity Development

The main objective of CD consists of aspects such as an increasingly effective use of skills, abilities and resources, which are directed to strengthen understanding and relations, to address issues of attitudes, values, motives and conditions, and to boost sustainable development (Bolger, 2000) and strengthen institutional reforms (Hope Sr, 2011).

Principles of CD also develop on the basis of broad participation, enhancing local capacity to continue learning and adaptation, long-term financial investments, and integrated activities at different levels to solve complex problems (Bolger, 2000).

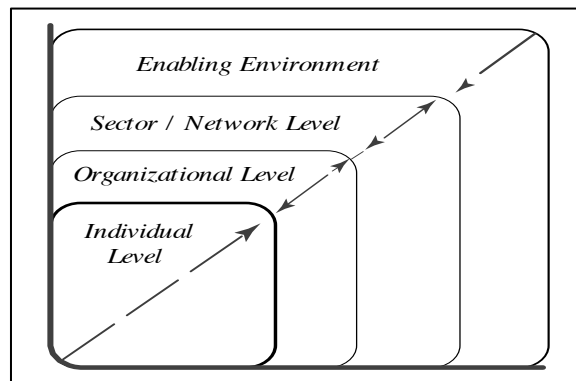
2.1.5. Conceptual Framework

Conceptual Framework of CD consists of the followings levels (Morgan, cited in Bolger, 2000):

- Individual level, where the direction belongs to social or organizational objectives and individuals, which can enhance ability in order to achieve the development goals.
- Organizational level, where the capacity is targeted to the issues of management resources, processes and organizational structures.
- Sector/Network level, which plays an important role in creating a coherent environment, policy reform, strategies, programs and effective monitoring and coordination between internal and external sectors.
- Enabling environment, which, in a broad context means all processes of development that can be implemented, including policy, efficiency, effectiveness and the sustainability of environment.

A more detailed structure can be seen in Figure 2.2.

Figure 2. 2. *Conceptual framework of CD*



Source: Bolger (2000).

2.1.6. Agricultural Water Strategy

In the case of integrated water resource management and CD of WUAs, we must first understand Agricultural Water Strategy (AWS), because agriculture is a huge sector in the world economy that consumes more water. According to the World Bank (2005), AWS has the following aspects: (1) National objectives; (2) Resource assessment (i.e., assessment of agricultural water use system and quality); (3) Information system (i.e., monitoring and quality of data); (4) Technical aspects that will improve the efficiency of water use, (5) Economic aspects (i.e., calculation of efficiency); (6) Human aspects; (7) Institutional and Governance problems (e.g., governance issues, conflict resolutions, water rights, responsibilities of public-private areas, WUA, rules of water users groups in local level and participation); (8) Financial aspects; (9) Investment issues; (10) Public health; (11) Environmental aspects (i.e., all problems related to environmental water resources); and (12) International issues.

First of all, a good water strategy must be oriented and directed on institutional issues, especially on the improvement of WUA's capacity, because

WUA is only a single organization that plays a huge role from the most basic cooperation to managing irrigation schemes (World Bank, 2005). Water rights and management questions at the local level are also decided by WUA (World Bank, 2005).

Finally, to improve and enhance the capacity of WUAs, investments in technical assistance should include the following methods (World Bank, 2005):

- Capacity Building – for sectorial management and farmers or WUAs.
- Participatory irrigation management, institutional development and legislation support, water rights and water markets.

2.1.7. Capacity development of organizations

In order to develop the capacity of institutions, organizations or companies, Morgan (1998) also considers that it is important to improve the organizational and technical capacity of the organization and create the technical, personal or organizational ability of the organization to improve performance and it usually includes activities such as:

- Technical assistance in both short-term and long-term development
- Training of the organization
- Improvement of the system (e.g., improving the financial or personnel management).

In order to achieve to the improved capacity and institutional performance it is necessary to implement the following steps (Hope Sr, 2011):

- Clarification of objectives and principles
- Assessment of the weaknesses

- Creation of the Investment Plan and Strategy for development of the capacity.

2.2. Participatory Irrigation Management

2.2.1. What is participatory irrigation management?

The definition of participatory irrigation management (PIM) means that the farmers' participation in the joint M&O of irrigation infrastructure through WUAs (Peter, 2004). PIM also defines water user's involvement and participation in all aspects of irrigation management (Groenfeldt, 2007; Narain, 2008; Vermillion & Sagardoy, 1999), especially in planning, construction, financing, monitoring and evaluation of irrigation system in the primary or secondary level (Peter, 2004). The main tool in the implementation of PIM is WUA (Groenfeldt, 2007).

There are two meanings of PIM (Groenfeldt, 2007):

- Traditionally public participation in irrigation management
- Irrigation Management Transfer (IMT)

Most countries in the world that created WUAs used the aforementioned two aspects. For example, the Philippines, Nepal, Indonesia, Sri Lanka, Mexico and other countries established WUAs on the basis of small farmers or agricultural communities without transfer of irrigation infrastructure to farmers, while the countries such as China, Turkey, India and the former states of the Soviet Union - including the Kyrgyz Republic, WUAs had been established on the fundamentals of large collective farms and agricultural holdings with the transfer

of all irrigation infrastructures in on-farm level from the state to the ownership of WUAs (Restrepo & Vermillion, 2007) (more detailed information is provided in subchapter 2.2.4.).

2.2.2. The benefits and risks of PIM

The PIM system has many benefits and risks for water users and private communities which consists of the following:

Benefits

- PIM gives an opportunity for water users to jointly participate in irrigation management (Peter, 2004);
- Water users can combine their efforts in effective water resource management (Peter, 2004; World Bank, 2005);
- Farmers can take a part in the approval of the Irrigation Service Fees (ISF), formation of water policy through WUAs (Peter, 2004);
- Water users can take full control on irrigation infrastructure, M&O, rehabilitation and modernization of irrigation systems (Peter, 2004; World Bank, 2005);
- Water users have an opportunity to identify and achieve their own strategies and policies in irrigation management (Peter, 2004);
- Water users can reduce water conflicts inside the community (World Bank, 2005);
- Government can reduce finance from state budget for M&O of irrigation infrastructure in on-farm level (World Bank, 2005).

Risks

The World Bank (2005) argued that, in the realizing the PIM system, there are some risks, which include the following:

- Possibility to increase the cost of irrigation services for water users;
- Irrigation infrastructure and water productivity cannot be immediately developed;
- Local governments may create some administrative barriers for WUAs;
- Government can cut the state support for WUAs too much;
- Rehabilitation program cannot be achieved properly.

2.2.3. Concept of institutional reform in irrigation management

The first negative emotion of farmers in many countries began in 1970s when the irrigation infrastructure was used ineffectively due to various aspects, which caused both the deterioration of irrigation infrastructure and degradation of water (Restrepo & Vermillion, 2007). In the 1980s the world economic crisis forced governments of many countries to change their policies regarding the support of irrigation infrastructure at the local level. One of the main policies was to transfer responsibilities and functions on M&O of on-farm irrigation systems from the state authorities to the responsibilities of farmers (Restrepo & Vermillion, 2007; Vermillion & Sagardoy, 1999). The main tasks of PIM and IMT are the followings:

- Discontinuation or reduction of financial support from the state budget on the M&O of irrigation infrastructure (Restrepo & Vermillion, 2007; World Bank, 2005);

- Creation of the self-financing organizations as WUAs on the M&O of irrigation systems, which was able to be implemented instead of via the government (Restrepo & Vermillion, 2007);
- Prevention of the deterioration and improvement of irrigation infrastructure (Restrepo & Vermillion, 2007).

At the present time, the institutional reforms in the irrigation sector and implementation of the PIM system were conducted in around 50 countries since 1980. Here, the management of on-farm irrigation systems policy was decentralized and fully transferred to the performance of the local community or WUAs (Vermillion & Sagardoy, 1999; World Bank, 2005). Especially in the 1990s, many countries facilitated the participation of farmers in order to improve the accountability of irrigation services (Xie, 2007).

In many countries WUAs act in a role of protector of water users and farmers interests by providing irrigation water, approving water tariff system, making decisions and preventing disputes and conflicts between water users and water organizations.

Johnson III, Svendsen and Gonzales (2004) researched the problems in the institutional reform of irrigation management systems in China, Mexico, the Philippines, Turkey, Pakistan and India. They found that the institutional reform in the irrigation sector depends on the active participation of water users and the reform of agencies in the development of water resources that can cooperate with each other and farmers. They concluded that without implementation of necessary

reforms of some institutions in the irrigation sector, only simply the creation of WUAs could not solve the problem of governance.

Vermillion (1997) studied the process of the transfer of control over irrigation systems from state to WUAs or other local communities and synthesized evidence from 29 separate studies worldwide. He found that participation in irrigation management systems at the local level (WUA) could improve water-use efficiency, prevent its deterioration, and help reduce the financial burden for the government.

Restrepo and Vermillion (2010) conducted a study of IMT and WUAs in 33 countries regarding the processes of deep reforms in the irrigation sector. They found that the transfer of control systems in the irrigation sector was carried out in accordance with the different needs of reform, ranging from pilot areas and huge farms that have up to one hundred thousand acres, up to the national level, covering millions of hectares.

2.2.4. World experience of WUA creation as a new institution

Many reforms in the irrigation management system were carried out depending on the political and economic conditions (Xie, 2007). The following are examples.

In the late of 1980s, Mexico was in an economic crisis that served as a sharp impulse in the transfer of infrastructure and irrigation management system to farmers - water users through WUAs (World Bank, 2006; Xie, 2007).

In the Philippines, according to the National Irrigation Administration (NIA) there are around 1,705 million ha of irrigated areas, from them 43,87%

controlled by the national irrigation systems, 34,9% by communal irrigation schemes, where the cost for M&O is implemented by farmers, 11,41% by private irrigation systems and the remaining 9,81% located under the jurisdiction of other government assisted irrigation systems. In order to create an enabling environment for irrigation management, the Philippines approved a decision to partially transfer responsibilities on irrigation systems from NIA to irrigation associations (IA). The institutional development process is realized in following steps¹:

- 1) NIA as a highest body in the implementation, coordination, construction, and M&O of irrigation systems organizes farmers – beneficiaries into IA, conducts capacity-building and training programs providing for IA necessary knowledge and skills in order to properly perform their tasks, duties and responsibilities and provides an assistance and support program for IA;
- 2) More successful, cohesive, self-reliant and viable IA will be ready to achieve an M&O of the irrigation management systems.

In Sri Lanka, institutional reform and PIM/IMT policy started in 1988 in order to increase agricultural productivity of farmers' production, and due to that M&O of minor irrigation facilities and infrastructure was transferred to farmer's organizations (Peter, 2004). After the successful implementation, the collection of water fees had been rapidly improved (Peter, 2004).

¹ Information has been taken in National Irrigation Administration of the Philippines during the field trip from 6 till 13 February 2015.

In Turkey, it was the need to decentralize the water management system to local authorities and to reform public institutions as well as the need to expand the irrigated area in Eastern Turkey. Studying the experience of Mexico, the Government of Turkey started to implement reforms in the irrigation sector by establishing WUAs (Xie, 2007; Peter, 2004).

In Andhra Pradesh state in India, one of the reasons for the establishment of WUA was the reforming of the State irrigation department (Xie, 2007).

In China, low-level and tertiary canals were located in the jurisdiction of the authorities through the rural communes. In terms of economic opening and reform since 1980, these levels of governance were reorganized and irrigation management at these low levels largely remained ownerless (Xie, 2007). In order to avoid the institutional "vacuum" in China, WUAs were established for further development of irrigation services. Over the past 15 years there has been a strong tendency to establish WUAs, so at the present time around 20000 WUAs are established in China, which have an average of 700 - 1000 hectares of irrigated areas and 14 to 20 million members (Xie, 2007).

In Albania, after the destruction of the communist system, the government carried out the establishment of enhanced reform of small family farms, which created space for the creation of WUAs (Xie, 2007).

Stacey (1999) studied the structure of water resource management and PIM and IMP process in Vietnam and Romania, which were occupied by the communist system in previous times. He concluded that the concept of the organization and support of water users is managed well in Vietnam, but in some

levels requires modification in the institutional development and legal systems. In respect to Romania, he concluded that the irrigation infrastructure requires significant changes in the legal and institutional environment. Furthermore, tariff policy, subsidies and farmers' ability to pay should be studied carefully.

In other countries of Central Asia - including the Kyrgyz Republic - WUAs as new institutions were created on the basement of former collective farms (Alymbaeva, 2004) using foreign investment donors through rehabilitation projects (Peter, 2004; Xie, 2007).

2.2.5. The investigations about PIM system in other countries

PIM has been successfully implemented in many developed countries. For example, in USA, New Zealand, Australia and Eastern Europe this program has been fully adopted (Uysal & Atis, 2010).

In Japan the role of PIM in agriculture plays through the achievement and implementation of Japanese irrigation projects in every land improvement districts (Kono, Ounvichit, Ishii, & Satoh, 2012).

Peter (2004) conducted research about the creation and implementation of PIM in countries such as Sri Lanka, the Philippines, Mexico, Turkey, India, Japan, USA, and Central Asian and Eastern European countries. He concluded that one of the key resources to the success of PIM is a sustainable condition of WUAs that gives more possibilities to the reforms in irrigation system, and he suggested the following factors: (1) Capacity building for PIM, (2) Rebuilding of incentives for participation, (3) CD of WUAs, (4) Water rights, (5) New strategies

for water management, (6) Improvement the service in delivery of irrigation water, (7) Regional cooperation, and (8) The promotion of farmer's network.

Yercan (2003) researched the difficulties and issues in the implementation of a PIM system in Turkey. He found that water users commonly were willing to move the irrigation management to within farmer's control. Besides, a number of problems regarding legalization and institutionalization in the creation of WUAs were identified by Yercan (2003) - especially the lack of suitable capital for successful M&O in irrigation infrastructure.

Qiao, Zhao and Klein (2009) studied the basic needs and factors of farmers being members of WUAs. They interviewed farmers from 3 different areas in Inner Mongolia (China) in order to determine water user's level of understanding about what are the WUAs and the factors that affected their members. They found that the services of WUAs are very useful for farmers and have been successfully formed to protect the interests of farmers in Inner Mongolia. As a result, they concluded that the most important factors include human resources, a small proportion of household members in the labor force, a high percentage of family income from cropping, good health, and a high degree of understanding about WUAs can increase profitability and reduce conflict in these situations.

Khalkheili and Zamani (2009) conducted research in order to study economical and organizational factors, which influenced farmers in public participation in irrigation management in Fars province, Iran. They found that the family incomes, decision problems, and farmer's educational background in

irrigation management highly impacted the farmer's participation in irrigation management. Moreover, the main problems in the direction of the participation of farmers in irrigation management are formed from an unequal water allocation among water users, high water charges and the poor operation of water authority (Khalkheili & Zamani, 2009).

Ricks and Arif (2012) studied the implementation of the PIM system in Indonesia. They revealed that the public participation policy among the farmers had been successfully achieved through the creation of WUAs.

Sayin, Karaman, Yilmaz and Celikyurt (2013) examined a productivity of irrigation systems through the criteria of sustainability, efficiency and farmer's satisfaction in 29 WUAs in Antalya province (Turkey). Their investigation showed that the goals of state policy in irrigation performance that were implemented in irrigation infrastructure had not been logically reached. They suggested that in order to improve water productivity it is necessary to create monitoring systems, regularly assess water allocation and increase irrigation performance.

2.2.6. The investigations and implementation of PIM/IMT in the Kyrgyz Republic

After the changing of political system of the Kyrgyz Republic in 1991, the reorganization of agriculture and the transition to new economic conditions led to an increase in the amount of water users in agriculture, especially at the on-farm irrigation system level. Reorganization of large farms and the creation of small farms at their place has led to the fact that on-farm irrigation systems were left unattended, thus it was difficult to provide them with irrigation water (Ul

Hassan, Starkloff, & Nizamedinkhodjaeva, 2004) (more detailed information is provided in Chapter IV).

The Kyrgyz Republic was a leader in Central Asia in the creation of those organizations. It first started the creation of WUAs and implemented a PIM system and recognized by regional and international experts (Mamataliev, 2010).

But WUA creation developed slowly due to technical, social, economic and political aspects. Alymbaeva (2004) in her research showed that the WUAs in the Kyrgyz Republic as independent organizations had been financially unstable since their creation, which is mirrored in the long-term sustainability of irrigation structures within the economy and the distribution of water. This explains that improvements are needed in the following aspects such as: the rule of law, funding and management of WUAs, water users awareness about WUAs and their credentials, as well as more active participation of farmers. She suggested that for the improvement of WUA, five major functional components and indicators should be used:

1. Creating the principle of legislations vertical
2. Financial management
3. M&O of irrigation structures
4. Internal organizational and structural control
5. External communication

Sehring (2005) conducted the case study in Sokuluk district in the Kyrgyz Republic in order to analyse the role of institutions and activities in the reform of water management system at the local level. She concluded that the

main argument in WUA development is hindering economic goals of institutional barriers. This faced two main directions (Sehring, 2007): (1) Lack of necessary conditions to irrigation reform that are provided by state institutional governance, and (2) Current challenges in the process of institutional barriers as new organizations.

Bekbolotov (2007) listed a number of benefits received by the transfer of water controlling systems in irrigation management to WUAs in the Kyrgyz Republic, which consist of: (1) participation in governance, (2) implementation efforts and technology for joint action, (3) participation in determining the amount of payment for the use of irrigation systems, (4) participation in the formation of water policy, (5) controlling irrigation infrastructure and ownership, (6) financial controlling, M&O of irrigation infrastructure and conflict resolution, (7) taking responsibility for finance, M&O, rehabilitation and upgrading, and (8) the development of policies and regulations.

Later in 2009, Sehring (2009) examined the program of institutional reform in the countries of Central Asia (Kyrgyz Republic and Tajikistan) that focus on irrigation management reform as achieving more efficient water use in agriculture (example on WUAs). She clarified that the coordination with the competing demands is one of the most urgent tasks. In this study, she determined the following development goals:

- Comparative in-depth case studies to identify the factors influencing water policy reforms that have broad interest to the general debate on water management and institutional reform of the water sector.

- The creation of a signal analysis of the current state of integrated water resources management in the Kyrgyz Republic and Tajikistan.

2.3. The efficiency and effectiveness of WUAs in the Kyrgyz Republic

One of the main causes of poverty in the world was the lack of access to irrigated water. After that, many farmers started to combine their efforts into WUAs and thus reduce the competition due to increasing the total amount of irrigation water. Water supply planning improved, as was the noticeable increase in annual productivity of farmers, regardless of weather conditions (Restrepo & Vermillion, 2007).

One of the main tasks of the WUA is a precise planning requirement of irrigation water for vegetation and ensuring the plan as Murray-Rust and Snellen said, is implemented in the way to review the successes and challenges of WUA (cited in Kazbekov, Abdullaev, Manthrithilake, Qureshi & Jumaboev, 2009).

Yakubov and Matyakubov (2004) conducted a survey in the southern regions of the Kyrgyz Republic (WUA “Kerme Too” in Osh region) in order to establish a baseline to determine the efficiency and effectiveness of irrigation management systems in Ferghana Valley. The results showed that 37% of interviewed farmers reported no unprofitable gains. This is almost twice as high (37%) as in Tajikistan surveyed - (18%) and Uzbekistan - (24%) of the WUA. In the on-time delivery of irrigation water, it was found that 70% of interviewed farmers received irrigation water on time in the scheduled dates of irrigation and only 12% of respondents reported that there are frequent problems with water level.

Furthermore, Ul Hassan, Starkloff, and Nizamedinkhodjaeva (2004) conducted a study on irrigation systems in the Kyrgyz Republic in order to identify the efficiency of institutional reforms in water and land sectors.

Johnson and Stoutjesdijk (2008) noted that the success of the WUA development in the Kyrgyz Republic might be associated with the four elements, such as:

- Comprehensive change in the law touching the WUAs, support from GKR,
- An intensive program of training and positive reinforcement for WUAs,
- Improve the water resource management through capacity building program for WUAs,
- Further strengthening of WUAs and formation of WUA federations, support and M&O.

Kazbekov, Abdullaev, Manthrithilake, Qureshi and Jumaboev (2009) conducted a research to assess the effectiveness of irrigation in 4 WUAs that are located in Osh province of Kyrgyz Republic, where the performance was evaluated in terms of efficiency, effectiveness, reliability and fairness. They proposed the followings:

- Implementation of more efforts to improve the temporal consistency and fairness in the water distribution,
- Irrigation requirements of the WUA staff need to be improved with support mechanisms and justice through WUAs and between water

users,

- Building the capacity of WUAs in order to improve water distribution among water users, especially during less optimal water supply periods.

Stucker, Kazbekov, Yakubov and Wegerich (2012) conducted research in order to identify the influences of local communities, WUAs, and district and province managers' cooperation to the climate change in extreme events that impact the basin and determine the role of adaptation strategies in the improvement of natural capital and living standards. Analysis of studies have shown that in order to improve the environmental condition at the river basin level, and due to the climate of the tight community, WUAs, districts, provinces and national water organizations at the local level should cooperate in case of water scarcity, droughts and flash floods across national and ethnic boundaries (Stucker, Kazbekov, Yakubov, & Wegerich, 2012).

2.4. The investigation on evaluation of WUA activities

Johnson (2005) conducted an assessment of WUA's in all three countries of Central Asia including Kyrgyz Republic, where work was underway to support the project of WUAs. He noted that since the time when WUAs have been formed in the country, equitable water distribution and equitable access to the benefits had been improved.

The World Bank (2008a) investigated WUA formation in the Kyrgyz Republic, conducted assistance under the "On-Farm Irrigation Project", evaluated its development and concluded that the rehabilitation and modernization of

irrigation infrastructure on the farms, which belonged to former large farms that supplied water that could be used more efficiently.

McKinney and Jooshev (2007) conducted research in order to identify and assess the influences to investments in sustainable water and land management in the Kyrgyz Republic through the case study of WUAs in Orok village, Sokuluk district. They found several problems associated with agriculture and water resources in general:

- Shortage of funds in the WUA for disaster management, repairs and M&O of irrigation systems, as well as on the implementation of large-scale land reclamation works,
- Complete lack of knowledge of the majority of farmers on the efficient use of water for irrigation,
- Lack of necessary funds for capital repairs of irrigation systems and waterworks.

Abdullaev, Kazbekov, Manthritilake and Jumaboev (2010) considered and explored the education user groups in water management in order to strengthen the potential of weak WUAs, which were founded on the fundamentals of former collective farms in the Ferghana Valley. They focused on investigating how successfully educated water user groups in collective action could potentially be related to the structure of WUAs to improve its performance. They found that small water user groups would be very effective and useful institutional target to WUAs.

CAIConsulting (2010) evaluated WUA's activities in the southern part of the Kyrgyz Republic in order to identify and analyse the causes of water disputes and conflicts between WUA and water organizations. They found and identified the following key problematic areas and barriers faced by WUAs in water management:

1. Institutional problems (lack of official status, not all WUAs are registered in accordance with the requirements of the current legislation of the Kyrgyz Republic, not all WUAs in southern regions have technical papers on irrigation facilities and in good condition, not all WUAs have the financial means to complete the procedure of registration in the State Register and property right on the irrigation system).

2. Financial and technical problems of WUAs.

3. Problems of the agricultural sector as a whole (lack of agricultural cooperatives, poor knowledge of farmers in agribusiness skills).

Rural Development Fund (RDF) (2013) conducted a study on the conflict at WUA level in the southern regions of the Kyrgyz Republic in order to identify the causes and driving forces to disputes and conflicts on the use of irrigation water. They found the following problems:

1. Agriculture engaged, especially without thinking about the selection of crops, water availability and soil quality,

2. In agriculture modern technologies have not been used that not allowed to achieve successful investment,

3. Low level of knowledge in principles of agriculture leads to a large demand for irrigation water and irrigation infrastructure available hardly in a position to provide it,

4. Land management is ineffective. Farms were created on very small land plots, which dominated the farming system in the country. In southern regions, the average size of land allocated per household in the reform of land privatization in the mid 1990s was about 0.2 ha (maximum 0.5 ha). Such a strong fragmentation of the land does not allow agriculture to become the main source of income and largely determines its living character.

2.5. Conclusion

Institutional reform in irrigation sector around the world has been conducted in more than 50 countries, realizing the PIM system in order to improve water productivity and allocation in on-farm irrigation system through decentralization of water management from state regulation to local communities or WUAs and reduce the financial burdens from state budget.

After the breakdown of the Soviet Union, the irrigation infrastructure in local levels was rapidly deteriorated, and the Kyrgyz Republic first started to implement the PIM system through the creation of WUAs among all Central Asian countries. Many WUAs had been established through rehabilitation projects of international donor organizations.

Since 1995 in the Kyrgyz Republic, many investigations were conducted to determine the efficiency and effectiveness of water management systems, conduct rehabilitation and modernization in most WUAs, identify benefits of

farmers in public participation on irrigation management, and conduct an evaluation on WUA activity in order to find some factors influencing water disputes and conflicts.

Very little research has been conducted on evaluating the WUA's functional tasks in providing irrigation services for water users on the example of one WUA in the Kyrgyz Republic. This study will give a wide understanding on the estimation of functional responsibilities and performance of WUA's tasks such as conducting training of WUA members in progressive methods of irrigation and providing the use of new methods and technologies, in the distribution and delivering of irrigation water to farmers, in the prevention of water pollution, the implementation of measures to improve land quality among others. In addition, this study presents opportunities to determine the level of water users understanding about the importance of WUA unions and federations in agriculture and their willingness to join it. Finally, the research presents main strategy and mechanisms on the improvement of efficiency and effectiveness of WUA's activity.

CHAPTER THREE

3. METHODOLOGY

In order to develop and find out possible ways to analyze the current policy and condition of WUAs since their establishment in the Kyrgyz Republic – as well as to evaluate the functional tasks and activities of WUA and to identify the main mechanisms on the improvement of efficiency and effectiveness of WUA's activity - the methodology will describe the methods of research that will be used in order to achieve the defined goal. The methodology includes sections such as research design, explanation of study area, population and sampling techniques and data collection techniques and analysis.

3.1. Research design

In general, quantitative and qualitative methods were used in order to develop the research design. These approaches have been used based on survey research design and a review of related literature to collect relevant primary and secondary data. Creswell (2014) said, “Qualitative research is an approach for exploring and understanding the meaning individuals or group ascribe to a social or human problem” (p.4).

The quantitative and qualitative methods based on survey research design and in-depth interview are used to understand the nature of PIM in the Kyrgyz Republic, analyze the current policy and condition of WUAs, and evaluate the functional responsibilities, tasks and activities of WUA in pilot area. More specifically, the analysis will help determine water user's awareness about

WUA's activity, farmer's evaluation about quality of irrigation infrastructure, WUA's services, irrigation water, current water tariff, use of irrigation water; the trainings for water user conducted by WUA, to determine the level of water users understanding about importance of establishing WUA unions and federations and their willingness to join them. These approaches also provide to identify the main mechanisms on the improvement of efficiency and effectiveness of WUA's activity.

The basic strategy of a survey is to identify and analyze the characteristics of population opinion and estimation through collecting data from a sample of that population (Thomas, 2004). The survey is a non-experimental, descriptive research method that has been used in order to analyze collected data. The survey research design was chosen because there is a current lack of common guidelines on the evaluation of WUA's functional tasks and activity in the Kyrgyz Republic.

3.2. The selection of research area

In order to conduct research, the researcher selected Chuy region in the Kyrgyz Republic as a research area. The area of irrigated land in this region is the largest in the country, which consists of 320,23 thousand ha, or 30% of the total irrigated area in the country (WUA Support Unit, 2014). Chuy region has 8 administrative districts. Alamedin district, which is typical by its terms for Chuy region, was selected. There are 12 WUAs in this district.

During 5 days (4-9 August 2014) the research selected one medium WUA in Alamedin district, which does not have financial debt to the Regional

department of water resources (RDWR). Table 3.1 presents information about WUAs in Alamedin district:

Table 3. 1. *Information about WUAs in Alamedin district, Chuy region*

Rural administration	Name of WUA	Irrigated area covered by WUA, ha	Approved water tariff, m³/som²
Tash-Dobo	Voronsovka	992	0,057
Baitik	Kalkagar	1835	0,07
Oktyabrskiy	Chui-1	3336	0,07
Ala-Archa	Ak-Bulak-Suu	1816	0,07
Maevskiy	Tamchy-Ha	1434	0,07
Kara-Jygach	Ta-Bek	1670	0,07
Vasilievskiy	Vasilievka	2406	0,07
Kok-Jar	Ta-Ta	1180	0,07
Lebedinovka	Le Woste	1463	0,082
Grodnenskiy	Orositel-AJU	1614	0,07
Tash-Moinok	Omur-Bulak	773	0,07
Prigorodniy	Ak-Chiy	2172	0,12

Source: WUA SU (2014).

Table 3.1 shows that irrigated areas, which are serviced by WUAs in Alamedin district located from 773 ha to 3336 ha. The researcher decided to select WUA “Omur-Bulak” with the lowest irrigated area – 773 ha, which belongs to Tash-Moinok village administration. This is the main point of why this WUA became a pilot WUA for further research.

3.3. Population and Sampling techniques

Water users of WUA “Omur-Bulak” were selected as target populations for this research. The survey was conducted in Besh-Kungey, Tash-Moinok, Koi-

² Som – is the national currency of the Kyrgyz Republic.

Tash, Prohladnoe, Kyzyl-Birlik and Gornaya-Maevka villages, which are located in the administrative authority of Tash-Moinok rural administration.

De Vaus (2002) mentioned, “A sample is obtained by collecting information about only some members of the population” (p.70). The researcher selected 40 respondents among 343 water users (every tenth name) of WUA “Omur-Bulak” as the sample size with the method of simple random sampling technique. Furthermore, this group was surveyed through the use of a questionnaire.

3.4. Data collection techniques

In this research the data collection techniques consists of primary data, namely a questionnaire survey of farmers - water users, as well as interviews of staff of WUA “Omur-Bulak” in Tash-Moinok rural administration, Alamedin region.

This study also collected the secondary data - official reports, research studies, statistics, research works from governmental agencies and analysis of materials, reports, and studies of various international projects of WUA development in the Kyrgyz Republic.

The researcher conducted the survey with the help of a questionnaire, which was constituted from the standard and structured questions and was implemented among farmers – water users of WUA “Omur-Bulak” in Alamedin district. According to Thomas (2004) the questionnaire should be visually attractive, look short and interesting and must consist of easy and simple questions for better understanding by respondents. In connection with, the

researcher carried out special lists of questionnaires that range from simple and short questions that are understandable and accessible for farmers – water users.

The researcher had developed the questionnaires based on previous studies and literature review and discussed with Professor LI Yan, consultants and representatives of Department of Water Resources of the Kyrgyz Republic (DWR). Furthermore, the questionnaire was tested, adjusted and translated into Kyrgyz and Russian languages.

3.5. Analysis of collected data

In order to analyze, summarize and interpret the collected data from the questionnaire, a descriptive research method was used in this research with statistical techniques such as total score and simple percentage. The findings are presented in the form of figures and tables.

CHAPTER FOUR

4. IRRIGATION MANAGEMENT IN THE KYRGYZ REPUBLIC

This chapter describes how PIM/IMT had been implemented in the Kyrgyz Republic. Especially, this chapter includes general information about irrigation infrastructure, the situation after the collapse of the Soviet Union in the irrigation sector in on-farm level, the necessity of institutional reform in water management systems through the creation of WUAs and its initial problems and difficulties, the assistance of international donor organizations in the formation of advanced WUAs through rehabilitation projects, and finally current issues and SWOT analysis of WUA's activities since its establishment in the country. In addition, this chapter presents the main responsibilities, principles and functional tasks of WUA and its organizational structure.

4.1. Irrigation in the Kyrgyz Republic

The Kyrgyz Republic is characterized as a mountainous country, because almost 94% of the total territorial areas are mountains³. Furthermore, it has huge potential for water resources. The country has more than 3500 rivers and streams that belong to the main river basins - the Syr Darya River, Amu Darya, Chu, Talas, Ili, Tarim and Lake Issyk-Kul (Mamataliev, 2010; SAEPF, 2012; UNECE,

³ According to NSC (2013) the territory of the Kyrgyz Republic constitutes 199,9 km².

2009). Water resources of these rivers flow through the territory of the Kyrgyz Republic to downstream countries of Central Asia.

Map 4. 1. *Map of river basin of the Kyrgyz Republic*



Source: UNECE (2009).

The natural long-term average of total annual runoff is 47.2 km^3 - 35 km^3 (74%), the growing season and 12.2 km^3 (26%) in the autumn, winter and early spring periods. The source is from small mountain rivers that irrigate 806 000 hectares, or 76% of the total irrigated land, and the large rivers that irrigate 262 000 hectares (24% of total land area) (Mamataliev, 2010).

The Kyrgyz Republic is located in Central Asia and is characterized by its arid zone and dry climate from other regions of the world. Agriculture is highly dependent on irrigation water to maintain the required amount of moisture in the soil to meet the irrigation standards (Bucknall, Klytchnikova, Lampietti, Lundell, Scatasta, & Thurman, 2003; Alymbaeva, 2004).

According to the Food and Agriculture Organization (FAO) (2013), the distribution pattern of the amount of annual precipitation in the Kyrgyz Republic

in average is 533 mm very volatile and generally insufficient to support growing crops (except for certain types of drought crops for domestic consumption). For example, during the main growing season from April to October, the shortage of water resources in the southern part of the country and in Chuy region ranges from 70 % of the overall water demand for wheat and 90 % - for certain vegetable crops (CAIConsulting, 2010). The same water shortages can be seen in most parts of the country. On the world as a whole, 80% of water is usually used in agriculture and 20% for industry and for domestic needs (Shiklomanov, 1998). In the Kyrgyz Republic, however, more than 90% is used for agricultural irrigation. Therefore, the irrigation sector is one of the key resources in crop production and plays an important role in the country (MAM, 2007; Mamataliev, 2010).

The Kyrgyz Republic has more than 1 million hectares of irrigated land, which provides more than 90% of all agricultural production field crops (MAM, 2009; Mamataliev, 2010). Irrigation provides a guaranteed yield of crops in arid climates. Scientists have proved that each irrigated hectare yields products five times more than rain-fed areas, so the development of agriculture and irrigation systems in the country during the Soviet Union was given serious consideration.

Map 4. 2. *Map of irrigation in the Kyrgyz Republic*



Source: FAO (2013).

The irrigation infrastructure is divided into two parts: off-farm and on-farm irrigation systems. Off-farm irrigation system is always in the governmental jurisdiction and its activity is controlled and monitored by DWR under MAM including M&O of the main distribution canals, dams and artificial reservoirs. DWR is the central state authority, which has an overall responsibility on the carrying out of state policy on sustainable irrigation management, including regulating funds of water use and the construction of irrigation facilities in off-farm level that consist from 7 regional and 40 district departments of water management (GKR, 2012). On-farm irrigation systems consist of the secondary distribution canals and irrigation drainage systems that are the responsibility of WUAs and local communities. This kind of operation system had also been implemented in the Kyrgyz Republic since the time of Soviet Union existence 60 years earlier.

4.2. The situation after the collapse of the Soviet system in irrigation sector

After the breakdown of the Soviet Union GKR started to realize land and agrarian reform with the main objectives being the liquidation of large collective farms and the creation of an enabling environment for private agriculture (President of the Kyrgyz Republic, 1994; Wegerich, 2000).

In whole parts of the country, approximately 2000 small private farms were created instead of one large collective farm⁴, which used a common irrigation network (Ul Hassan, Starkloff, & Nizamedinkhodjaeva, 2004; Johnson III & Stoutjesdijk, 2008; Gunchinmaa & Yakubov, 2010). The economic difficulties of the transition period, followed by a serious shortage of state funds as well as the disbanding of the collective and state farms in the mid-1990s, led to an institutional vacuum in the management of local irrigation infrastructure and its rapid deterioration (Lerman & Sedik, 2009; Ul Hassan, Starkloff, & Nizamedinkhodjaeva, 2004; Gunchinmaa & Yakubov, 2010). This contributed to the following problems:

- Water systems of the former collective farms were left without owners, without the care of the technical condition of irrigation facilities, which led to the deterioration of facilities and reduction of efficiency (Johnson III & Stoutjesdijk, 2008; ADB, 2013; Sehring, 2005).
- Water use had been unsystematic, a violation of priorities (Sehring, 2005),

⁴ In the time of Soviet Union existed large collective farms that had approximately 2000-3500 ha of irrigated lands. All farms were property of the state. They controlled on-farm irrigation system totally in that time, provided M&O of irrigation infrastructure, allocated an irrigation water between some kind of brigades, also organized watering of agricultural crops.

disputes and conflicts due to water allocation, irrigation-timing failures, and wasted, running water (Gunchinmaa & Yakubov, 2010; Ul Hassan, Starkloff, & Nizamedinkhodjaeva, 2004).

- The deterioration of the environmental condition and water pollution, especially the impact of water erosion (Ul Hassan, Starkloff, & Nizamedinkhodjaeva, 2004),
- Lack of legislation, absence of clearness concerning the rights to land and water, a lack of financial resources for M&O of irrigation infrastructure, and the absence of water price policy (CAIConsulting, 2010; Johnson III & Stoutjesdijk, 2008);
- Problems with water allocation, because during the Soviet Union time all irrigation facilities were built and directed to the service of large state-collective farmers;
- Almost all on-farm irrigation system consisted of 22700 km of irrigation canals, 4300 km of drainage network, more than 250 water storages of daily and decade regulation, about 20000 hydro-engineering facilities were ownerless (CAIConsulting, 2010).

Bucknall, Klytchnikova, Lampietti, Lundell, Scatasta and Thurman (2003) showed that water users in the Kyrgyz Republic were not in the condition of servicing irrigation system by themselves, thus the result that most of those modern concrete canals became unusable, not convergent at the joints, and less structurally sustainable. The deterioration of canals and irrigation facilities led to

lower efficiency of water transportation and a high water loss of around 30% (Bucknall, Klychnikova, Lampietti, Lundell, Scatasta, & Thurman, 2003).

4.3. The necessity of institutional reform, establishment of WUAs and its initial difficulties

Since 1991 the on-farm irrigation system was rapidly deteriorated, leading to decreases in the quantity and quality of distributed water. In 1994, ownership of all on-farm irrigation infrastructures was transferred to rural administrations, but it has not brought positive results due to the lack of rural administration skills and a lack of financial resources (Gunchinmaa & Yakubov, 2010). In 1995, in respect to water users, the government introduced ISF, but the amount of the payment was low, which did not allow the water organizations to produce the normal M&O of irrigation systems (Gunchinmaa & Yakubov, 2010; ADB, 2013).

In order to solve those kinds of problems in water management at the local level, in 1995 GKR decided to make a reform in the irrigation sector to decentralize the system of on-farm irrigation level through establishing WUAs (Ghazouani, Molle, & Rap, 2012; Johnson III & Stoutjesdijk, 2008) and transferring all controlling systems of irrigation infrastructure to newly created WUAs (Ghazouani, Molle, & Rap, 2012). Here, the regulations of ISF were created, and later in 2002 the state law that approved water users' combining into WUAs (Schaap, Kirby, & Haigh, 2003; Sehring, 2005; Kazbekov, Abdullaev, Manthrithilake, Qureshi, & Jumaboev, 2009; Alymbaeva, 2004; ADB, 2013).

However, due to the fact that Kyrgyz Republic had not previous kind of organizations such as WUAs, the beginning of the process of WUA's

establishment was delayed, but the process of creation is being developed slowly (ADB, 2013; Johnson III & Stoutjesdijk, 2008).

In 1997, the government prepared legislative guidance documents and main regulations for the creation and sustainability of WUAs (Schaap, Kirby, & Haigh, 2003; GKR, 1997). The policy of WUA's establishment was aimed at strengthening on-farm irrigation systems and the realization of farmer's rights to sustainable water use and concentration of water user's efforts in order to conduct concerted actions, which was targeted to effective use of water resources. However, experience has shown that to achieve this level a radical change was necessary, but instead of that, the control scheme of many WUAs were created on the basis of former state farms without use of hydrographical principles (Wegerich, 2000; Alymbaeva, 2004). Likewise, WUA executives appointed as same people who worked on collective farms during the Soviet Union (Alymbaeva, 2004). Other problems are considered that WUAs have no stable financial resources for M&O of irrigation and drainage infrastructure (Alymbaeva, 2004; Johnson III, 2005; ADB, 2013). Specifically, local governments and departments were opposed in the transferring of irrigation infrastructure to the jurisdiction of WUAs.

WUAs should be developed in order to create a democratic society at the local level with the system of checks and balances to guide for local authorities (McGee, 2011).

The institutional reform and establishment of WUAs was a new approach for the Kyrgyz Republic in that time. In order to develop the sustainability in

water management, GKR was necessary to acquire knowledge and experience for the further development of WUAs from international donor organizations (Johnson III & Stoutjesdijk, 2008).

4.4. Assistance of donor organizations in the creation and formation of WUAs

The Kyrgyz Republic first started to create WUAs by implementing a PIM system, which was recognized by regional and international experts as a leader in Central Asia in the creation of those organizations (Mamataliev, 2010). In order to further enhance this institutional structure to the sustainable and logical condition and rehabilitate on-farm irrigation infrastructure, it is necessary to attract foreign investments of international organizations.

In the Kyrgyz Republic, one of the first attempts to educate and introduce the idea of the formation of WUAs was launched in the framework of a small project entitled “Building Capacity for the Formation and Management of Water Users Associations” funded by ADB (Kitamura, 2008). In 1995 the first pilot WUAs were created as an example for water users within the Kyrgyz Republic. In addition, since 1995, the rehabilitation of irrigation infrastructure – as well as the establishment and training of WUAs for further M&O - has been provided by ADB, World Bank and other donors (Kitamura, 2008).

Furthermore, the World Bank (2008a) investigated WUA formation in the Kyrgyz Republic and conducted assistance under the “On-Farm Irrigation Project” (OFIP) since 2001 through the rehabilitation and modernization of irrigation infrastructure in on-farm level. The objectives of OFIP were to increase

crop production by providing sustainable and reliable water distribution to about 160000 ha of irrigated areas, which were located under the responsibilities of 80 WUAs in 7 regions of the country (World Bank, 2008a; World Bank, 2008b; Johnson III & Stoutjesdijk, 2008). These included several indicators (World Bank, 2008b):

- Increase crop yields in the project farms by 10% within two years after rehabilitation works complete,
- Proper completion of rehabilitation works on M&O in on-farm irrigation systems,
- Strengthen WUA services, implementation of adequate irrigation water system in a timely manner in line with irrigation water requirements.

Subsequently, at the request of GKR, the World Bank has been awarded a grant for the preparation of the national project in on-farm irrigation aimed at the adoption of the Concept of formation and development of WUAs as the organization most appropriate in view of the current situation at the time (World Bank, 2008b; World Bank, 2008a).

Bekbolotov (2007) noted that the long-term strategy of WUA development in the Kyrgyz Republic consists of the following:

- Completion of the process of IMT,
- Completion of the process of WUA formation and active participation in irrigation management,
- Final delineation of functions and powers of the subjects of water

relations,

- Limited participation of state water organizations in the content of M&O in on-farm level, except of strategically important water systems and facilities.

Within the national projects the concept of development and formation of WUAs was adopted and approved the Law of the Kyrgyz Republic “On Associations of Water Users and Water User Associations unions” in 2002 (approved in March 15, 2002, Law #38). This gave a power impulse in the establishment and development of WUAs (Schaap, Kirby, & Haigh, 2003) and in general 1138 km of on-farm irrigation networks, 142 km of irrigation and drainage networks, 527 hydroposts, 32 night storage reservoirs and many primary and secondary irrigation facilities were rehabilitated. Furthermore, they conducted many activities on the creation of WUA support units in every district, prepared an educational database and conducted training courses in the establishment of WUAs under the OFIP, which could completely take over the M&O of on-farm irrigation infrastructure (World Bank, 2008b; World Bank, 2008a).

The formation of sustainable WUAs is a long-term process, and the rehabilitation of on-farm irrigation system that was implemented by OFIP could cover only 15-16% of irrigated areas. However, in order to continue the rehabilitation works the World Bank provided the second financial support through the OFIP-2 and OFIP-2 – “Additional Financing” since 2008 until the end of 2015. This project is also directed to the further development of WUAs in the Kyrgyz Republic, which aims to provide sustainable support of irrigation services

and rehabilitation and modernization of irrigation and drainage infrastructure in 51 000 ha of irrigated areas in 29 WUAs (DWR, 2014; World Bank, 2008a). Due to all projects on the rehabilitation of irrigation infrastructure, funded by the World Bank, in total 113 WUAs rehabilitation works have been conducted in order to increase the efficiency and effectiveness of water distribution (WUA Support Unit, 2014).

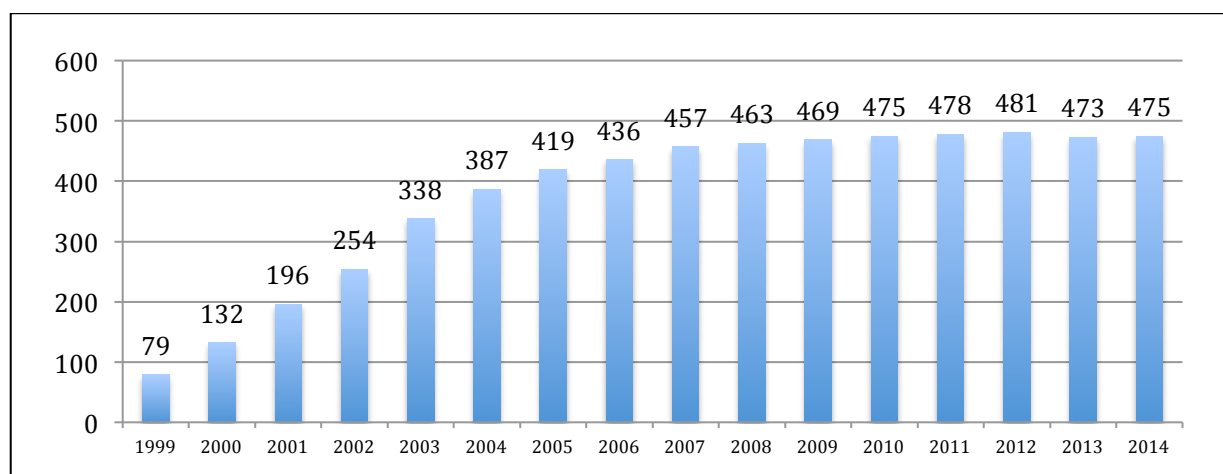
Finally, for the 20 years of state policy in the creation and formation of WUAs, at the present time 475 WUAs and 12 WUA federations were created and operated that could take ownership of 72% of irrigated areas in the country. In the ownership of WUAs, presently there are 17504 km of irrigation canals, 1427 km of drainage network, 20818 irrigation facilities, 857 hydrological stations, 230 unit of reservoirs, 3730 bridges, 56 springs for irrigation and 16 piece of pumping stations (WUA Support Unit, 2014). More detailed information about formation of WUAs can see in Table 4.1. and in Figure 4.1.

Table 4. 1. *Total number of WUAs in the Kyrgyz Republic*

Regions	Number of WUAs	Total number of irrigated areas, 000 ha	Irrigated areas, covered by WUAs, 000 ha	Coverage by WUAs in %
Batken	32	57,5	48,1	84
Jalal-Abad	67	125,6	96,0	76
Issyk-Kul	63	156,4	111,9	72
Naryn	48	120,5	68,2	57
Osh	89	129,6	100,5	78
Talas	69	112,6	92,3	82
Chuy	107	320,2	216,0	67
In total	475	1022,2	732,9	72

Source: WUA SU (2014).

Figure 4. 1. *Historical formation of WUAs in the Kyrgyz Republic*



Source: WUA SU (2014).

4.5. Structure of Water User Association in the Kyrgyz Republic

This part provides the organizational structure of WUA according to the law, especially the main functions, tasks, responsibilities and principles of WUAs and WUA management bodies. These range from General meeting of water users, WUA Council and Audit committee to Dispute resolution committee.

4.5.1. Main functions and tasks of WUAs

Article 3 of the Law of the Kyrgyz Republic “On Associations of Water Users and Water User Associations unions” (Djailoobaev, Kojoev, & Baibosunov, 2006) reflects the following functions and tasks of the WUA, which includes:

- M&O of irrigation systems within the service area of WUAs and water distribution among the members of WUAs on the basis of annual agreements,
- WUAs must deal with the distribution of water on the contractual terms of the persons owning or using irrigated land within WUA’s service area who

are not members of the associations. Besides, WUA should carry out the improvement, rehabilitation and modernization of irrigation systems within the service area of WUAs, as well as implement of construction works as required,

- They should receive irrigation water from the water supplier on the basis of a contract for the supply of water and exercise in the prescribed manner of self- diversion of water from natural water bodies (rivers, lakes and groundwater) in accordance with the licensing and regulation of the use and distribution of water within WUA's service area,
- Acquire, replace, operate and maintain hydraulic equipment,
- In most cases they prevent water pollution and implement measures to improve land quality,
- Training of members of WUAs for progressive methods of irrigations systems and the use of new methods and technologies.

4.5.2. Principles of WUAs

Article 4 of the Law about WUAs (Djailoobaev, Kojoev, & Baibosunov, 2006) reflects the notion that the activity of WUAs should be based on the following principles:

- Ensure the full participation of all members of WUA in establishing and managing the WUA;
- Adoption of fair and democratic solutions to the WUA;
- Guaranteeing free access to information on the activities of the WUA for its members;

- Guaranteeing fair and equitable distribution of water for all members of the WUA;
- Ensuring the rational and economical use of water, reduce unnecessary loss, prevention of erosion and salinization, waterlogging prevention of land;
- Environmental security, the rights and legitimate interests of landowners and land users.

4.5.3. WUA management bodies

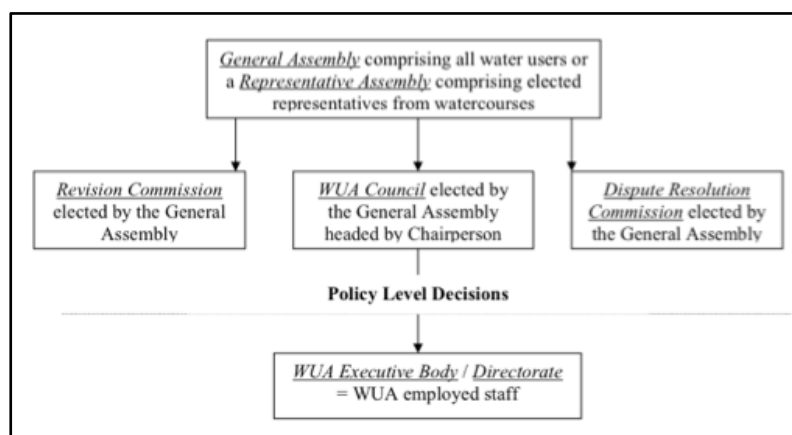
Article 12 of the Law (Djailoobaev, Kojoev, & Baibosunov, 2006) shows that WUA management bodies consist of: the General meeting of the WUA, WUA Council, and an Audit Commission. In most cases, the WUA Charter may be provided for the further establishment and management of the WUA commission to resolve disputes.

As shown in Figure 4.2, the management bodies of WUA are: (1) the General meeting of the WUA, which consist of all water users or Representative bodies consisting of elected representatives; (2) WUA council, elected by the General meeting; (3) The Audit Commission, elected by the General meeting; (4) The Dispute Resolution Commission; and (5) The Executive Authority of WUA, which consist of: the director of WUA, accountant, specialist in irrigation and seasonal workers. The quantity of the seasonal workers can be different from the size of the areas, which are under the jurisdiction of WUAs.

The General meeting or Representative bodies, the WUA council, Audit Commission and Dispute Resolution Commission (if its necessary) accept all

decisions and send their recommendations to the Executive Authority for the implementation of WUA.

Figure 4. 2. *Organizational structure of WUA*



Source: IWMI (2003).

4.5.4. General Meeting of WUA

Article 13 of the Law (Djailoobaev, Kojoev, & Baibosunov, 2006) determined that the highest governing body is the general meeting of WUA. The exclusive competencies of the general meeting are:

- (1) Determination of the main activities of WUA;
- (2) Changing and additions to the Charter of WUA;
- (3) Approval of the Regulations on the Board of WUA;
- (4) Approval of the Regulations on the Audit Commission;
- (5) Election and discharge of its duties as member of the Council;
- (6) Election of the Audit Commission and the dismissal of its activities;
- (7) Election of commission to resolve disputes;
- (8) Determination the amount of annual contributions from members and persons who are not members of WUA;

- (9) Approval the annual accounts and balance sheet;
- (10) Approval of the annual budget of WUA;
- (11) Approval the annual work plan of WUA and irrigation scheduling;
- (12) Approving the internal regulations of WUA;
- (13) Setting the size of the fine payable by the WUA members, in violation of the provisions of the Charter of WUA and other internal acts;
- (14) Decision on reorganization or liquidation of WUA, the appointment of the liquidation commission approval of interim and final balance.

4.5.5. WUA Council

The Governing Body of a WUA is the WUA Council, which is determined in Article 15 of Law (Djailoobaev, Kojev, & Baibosunov, 2006) and is responsible for general management of the WUA, supervises the activities of the executive body of the WUA, elects from its members a chairman of the WUA Council, convenes a general meeting of the WUA, prepares balance sheets and submits them for approval to the general meeting of the WUA. The WUA Council consists of not less than five persons who shall be members of the WUA. The charter of the WUA establishes the number of members of the WUA Council. Council members are elected by the WUA at the general meeting for a term not exceeding three years.

4.5.6. Executive authority

Article 16 of the Law (Djailoobaev, Kojev, & Baibosunov, 2006) determined that Executive authority is the Directorate of WUA.

The WUA executive body drafts the budget, carries out the work plan for M&O of irrigation systems and other required documents for submission to the Board of WUA, maintains a register of members, which should be reviewed and updated each year and contain a description of the size and location of the land of each member within the coverage area. Furthermore, they make requests for irrigation water supply members and non-members of the WUA and quantity of irrigations, provides the content and maintenance of irrigation systems, prepares and concludes after consultation with the Council of WUA contracts on behalf of the WUA, in accordance with the approved budget and work plan for M&O of irrigation systems in the service area of the WUA, negotiates volume and delivery schedule of water with water supplier and its distribution among the members of the WUA, creates its staff and makes oversight of its activities.

4.5.7. Audit Committee of WUA

Article 17 of the Law (Djailoobaev, Kojoev, & Baibosunov, 2006) determined that the Audit Committee implements the financial and economic activities of the WUA Council, its leader and the management of WUAs executive authority.

4.5.8. Dispute Resolution Commission of WUA

Article 18 of the Law about WUAs (Djailoobaev, Kojoev, & Baibosunov, 2006) describes the Dispute Resolution Commission of WUA, which considers disputes regarding water use and distribution among the members of the WUA.

4.6. Current issues of WUA development and SWOT analysis of its establishment

As practice has shown, during the period of WUA formation and development, water users are facing several kinds of problems and weaknesses, especially from the qualitative side. The factors that hinder a stable supply of agricultural water resources in the Kyrgyz Republic (MAM, 2012) are: (1) water resources are unevenly distributed by seasons and territory, and (2) difficulties for the development of water conservancy create volatility hydrographical characteristics of rivers, as construction of water facilities is needed mainly in mountain and foothills. All of these problems lead to high costs of the creation of an extensive irrigation system.

Due to lack of funding after 1991, the current repairs and restoration carried out is extremely limited in quantity and reduced on average by 6-8 times in terms of volume and universally observed the deterioration of irrigation systems. In connection with these issues, the on-farm irrigation and drainage networks partially or completely destroyed up to 50% of regulatory structures and rate of farmer's payment of repair of irrigation systems is not more than 30% (Zakirov, 2009). Over 55 - 60% of on-farm irrigation systems cannot provide the necessary level of irrigation water for irrigated lands and lack financial and other resources, which leads to a deterioration of the capacity of WUAs. Furthermore, a lack of funding and technical ability of WUAs leads to considerable losses and leaks in water distribution system, whereby the delivery rate and efficiency of the distribution of water is estimated as only 55% (FAO, 2013).

Nowadays, many established WUA's logistical base (office and staffing, earthmoving machinery, motor vehicles, motorcycles, bicycles) are absent or require a major overhaul. Also, the available material-technical basis does not allow providing the minimum required level of M&O of irrigation systems and drainage infrastructure. It is also difficult to rent the necessary equipment of WUA due to the lack of finance and high cost (MAM, 2012). Negative impact also has the problem of poor water accounting that does not allow the flow of financial resources (ADB, 2013).

Significant portions of created WUAs are not able to contain the required level of maintenance in on-farm irrigation network, due to the low solvency by water users. As a consequence, the maintenance of separate hydraulic structures of on-farm irrigation network (such as pumping stations) has led the GKR to allocate a budget provision (Batykova, 2014). The other reason is a strong fragmentation of irrigated areas after the state agrarian reform, which is negatively impacted to the activities of WUAs (RDF, 2013). Presently, optimal economic conditions require the creation and development of WUA federations and unions.

The investigations of RDF (2013), CAIConsulting (2010), McKinney and Jooshev (2007) have shown that currently the irrigation system is not able to manage with the task of ensuring the full-recommended irrigation regimes. A more precise WUAs have difficulties in a weak condition of material-technical base, lack of finance, low capacity of WUAs staff, inefficient system of payment collection and water consumption, lack of professionals for providing quality

water among water users, problems with disputes and conflicts between WUA's and water users, WUA's and water organizations, problem with water allocation, due to operation time large amount of water are lost because of poor condition of irrigation facilities⁵.

A more detailed result has been provided by research conducted by ADB (2013) with a method of SWOT analysis of WUA activities since its establishment. On the completion of investigation they found the following:

Strengths

- Already formed throughout the country, covering 72% of irrigated areas in the country,
- Based on the law and related legislations WUA is organized in satisfactory level and officially registered,
- In whole part of country, WUAs are recognized as an administrative body which can take responsibilities in M&O of irrigation system in on-farm level,
- Management board and election representatives by water users and governance system are developed separately,
- Able to achieve a payment for water fees on 92% to water organizations, identified as self-financing over 15 years.

Weaknesses

- After the breakdown of the Soviet Union the on-farm irrigation system

⁵ Most of irrigation facilities were built during the time of Soviet Union 30-40 years ago. Until 1990 every year, rehabilitation works and activities in the maintenance and operation of hydro engineering and irrigation facilities were conducted.

was not properly maintained, which provided difficulties in the water allocation to water users,

- Public participation or PIM system is not fully implemented or in the stage of learning, farmers still do not know their rights as member of WUA,
- Poor logistical base (lack of machinery, transportation) due to lack of finance and modern equipment,
- Weak capacity of WUA staffs in technical skills, difficult to recruit new graduates,
- Water tariff is quite low and still approved by the Parliament, which negatively affects WUAs,
- “Top-down” experience still exists in the understanding of many water users.

Opportunities

- Donor assistance is still supporting the development of WUAs, which focuses on rehabilitation works,
- WUA can create good relationship with state water organizations along the WUA support units,
- Agricultural system and marketing can be improved along the good irrigation infrastructure,
- WUA federations can take part of the responsibilities on off-farm irrigation system,
- IMT can invest in the improvement of irrigation infrastructure,
- WUAs have some benefits in tax protection through the law and can

generate other sources of incomes,

- Farming community can be improved.

Threats

- Low amount of governmental budget can continue to degrade the off-farm irrigation system which is negatively influenced to water allocation into on-farm system,
- The hydro-power system as a main governmental sector that gives high incomes can impact the reduction in water supply at critical periods,
- GKR can not increase ISF to realistic levels for sustainable development,
- GKR continues to implement tax policy to irrigation service provided by WUAs,
- GKR continues to tax the saving accounts of WUA, which is needed to pay for future investment.

CHAPTER FIVE

5. CASE STUDY AND FINDINGS

This chapter presents the research findings through the survey method and use of a questionnaire in order to evaluate the functional tasks and activities of WUA “Omur-Bulak” that located in Tash-Moinok village administration. Specifically, the evaluation of WUA’s activities consists of the following objectives:

- To determine the awareness of water users about WUA activity and functions;
- To evaluate the quality of irrigation facilities;
- To evaluate the quality of WUA services;
- To evaluate the quality of irrigation water;
- To evaluate the water supply system;
- To identify water users opinion about current tariffs for irrigation water and ISF;
- To determine the main problems in the use of distributed water, which water users face at the moment;
- To evaluate the water user’s skills in advanced irrigation technologies;
- To determine the role of WUA in the development of agriculture.

In addition, this research provides a determination of the water user’s understanding about WUA unions and federations and their willingness to be members.

5.1. The survey of water users in WUA “Omur-Bulak”

The survey of water users was conducted in Besh-Kungey, Tash-Moinok, Koi-Tash, Prohladnoe, Kyzyl-Birlik and Gornaya-Maevka villages, which are located in the administrative authority of Tash-Moinok village administration. As described in Chapter 3, the respondents (water users themselves) were selected with the method of simple random selection from the number of all water users from those villages. First of all, the researcher created the general list of all water users from this village administration. The total number of water users in WUA “Omur-Bulak” is 343 people and they are all owners of small and medium farms. In this research, every tenth water users - approximately 40 water users in total - was randomly selected as sample population.

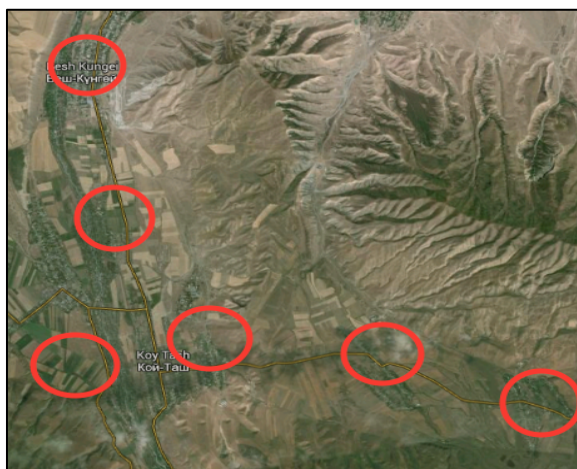
The survey was conducted during 33 days, starting from August 18 until September 19, 2014. It was conducted in WUA office, houses and streets of village administration. Unfortunately, the researcher could not complete the survey-interview with 4 respondents due to unknown reason. Thus, the total number of respondents was 36 people. In order to create an enabling environment for conducting the survey, the researcher worked out special lists of questionnaires that range from simple and short questions that are understandable and accessible for farmers.

Besides the survey of water users, the researcher conducted an interview with staff members of WUA on the questions: “What is the current situation in this WUA – General information and brief characteristics”, “Current problems and needs faced by WUA” and others.

5.2. Brief information about Tash-Moinok village administration

Tash-Moinok village administration is located in Koi-Tash village 16 km from the capital city of the Kyrgyz Republic – Bishkek. There are 6 villages, which belong to this village administration: Besh-Kungey, Tash-Moinok, Koi-Tash, Prohladnoe, Kyzyl-Birlik and Gornaya-Maevka.

Map 5. 1. *Tash-Moinok rural administration*



Source: www.google.com

Note: The red marks were done for this research

Picture 5. 1. *Tash-Moinok rural administration*



Source: Picture was taken during the field survey in August-September, 2014

The territory of the village administration is located in an area of moderate hot continental climate. The average annual long-term air temperature is + 9,2 C, maximum + 40 C and the minimum -20 C. Annual rainfall varies from 400 mm up.

Farmers of the village administration usually cultivate cereals crops such as wheat, barley, clover and perennial plants for the preparation of fodder for animals.

Picture 5. 2. *Perennial plants*



Source: Picture was taken during the field survey in August-September, 2014

Groundwater is fresh and located at a minimum depth of 100 meters. After the collapse of the Soviet Union and the independence of the country, the inhabitants of the village administration acquired the land for the private reasons. They began to cultivate it, and some of them joined together in groups (about 10-15 people), creating medium agricultural cooperatives or farms, while retaining ownership of their plot of land. Currently, several farms were created in this village administration.

5.3. Current condition and activities of WUA “Omur-Bulak”

5.3.1. General condition

In order to provide irrigation water to Tash-Moinok village administration WUA “Omur-Bulak” was created in 2005. This WUA was registered at the Ministry of justice in July 13, 2006 (registrations number - 02208200510109-ABII).

The highest management body of this WUA is the General meeting, which consists of all members – water users who are required to participate in this meeting. In the General meeting, the budget for the current year, tariff, ISF and other financial and organizational issues are approved. The meeting is usually conducted one time in a year.

The main staff consists of the WUA director and accountant. In order to properly control the process of water distribution in the summer time, this WUA additionally hires several seasonal workers.

WUA “Omur-Bulak” services 773 irrigated areas of farms in 6 zones of Tash-Moinok village administration (see Map 5.2), including 343 water users, which have farming fields from 0,1 ha to 18,0 ha.

Map 5. 2. *Irrigated area, serviced by WUA "Omur-Bulak."*



Source: WUA "Omur-Bulak"

5.3.2. Ownership

In the jurisdiction of WUA there are irrigation networks of a total length of 6 km including daily regulation reservoir, R-1 canal with a length of about 4 km (Picture 5.3.), Edilbek canal with a length of 2 km, as well as small parts of unlined canals. This WUA is located in upstream level and there is no drainage network. Every year the administration allocates 40000 – 45000 som for M&O of the irrigation network.

Picture 5. 3. *Irrigation canal "R-1"*



Source: Picture was taken during the field survey in August-September, 2014

5.3.3. The main source of irrigation water and condition of irrigation infrastructure

Irrigation in this study area is provided by the off-farm irrigation system of Alamedin River and the main canal - Karaga. The needs for water in canal Karaga constitutes 1500 liters per second. Most irrigation canals that belong to this WUA are in bad condition. Some of the irrigation trays and earthen canals were destroyed, so however many small canals are not able to allocate the required amount of water.

Picture 5. 4. *Main irrigation canal “Karaga”*



Source: Picture was taken during the field survey in August-September, 2014

According to staff of WUA “Omur-Bulak”, the water users of this WUA addressed to DWR in order to obtain credit through OFIP funded by World Bank on the rehabilitation of irrigation systems in on-farm level in 2012. However, due

to the mismatch of WUA and the requirements of the World Bank, the request was rejected.

The rating of the World Bank for the selection of the WUA is determined by the following criteria (Marchenko, 2009):

- Current condition of irrigation network in on-farm system,
- The overall level of collection services for the supply of irrigation water,
- WUA annual budget,
- The size of irrigated area.

After assessment, a concrete WUA will be selected and included in the list for the rehabilitation works based on the maximum score on the assessment criteria, in presence of cross-border issues, in presence of water in the spring, as well as in presence of complex technical problems and high unit costs. The list does not include WUAs that implement irrigation from wells or through a pumping station (Marchenko, 2009).

5.3.4. Relationship with RDWR

According to staff of WUA “Omur-Bulak” in 2014, this WUA and RDWR signed an agreement that provides 3362000 m³ of water for irrigation. In 2014 the total cost of service in the allocation of irrigation water constituted 260000 som. From that, 60000 som was transferred to the RDWR, so only 200000 remained for WUA’s own need. The average payment amount per 1 hectare is 319 soms. The cost for 1 m³ of provided irrigation water is estimated as 0,07 som, including 0,03 som deducted to RDWM and 0,04 som remaining in the WUA. This rate is valid since its establishment.

5.3.5. Practice on water allocation

WUA “Omur-Bulak” services 6 villages in Tash-Moinok village administration, providing water for irrigation. The water to the WUA “Omur-Bulak” is provided from R-1 and Edilbek canals with a total consumption of around 700 liters per second. Irrigation water is usually provided 7 days per week to water users according to an approved schedule of irrigation among water users, from them, 5 days are provided for medium or large agricultural farms and cooperatives and 2 days (Saturday and Sunday) for irrigating small plots. The consumption of provided water is counted every 10 days and in average constitutes about 215000 – 220000 m³.

Sometimes in a dry season, the irrigation of agricultural fields is implemented in the nighttime, because in the daytime the water in canals becomes bad quality. This method is highly connected due to the irrigation facilities in this WUA being in bad or unsatisfactory conditions. In connection with the evaporation and clogging of canals, water transmission usually sharply decreases in the daytime.

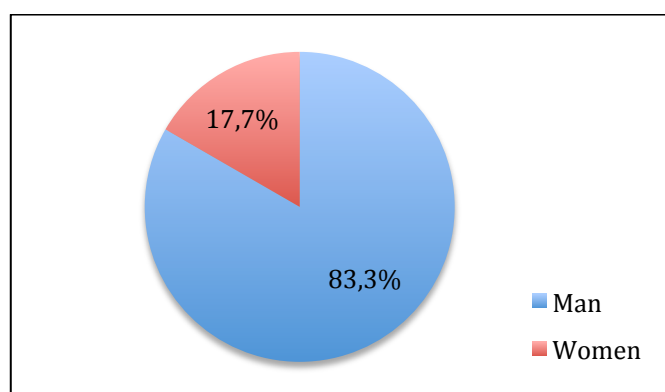
The water is distributed to the water users on the basis of a farmer’s statement. The statement should be directed to the WUA three days before the beginning of the planned irrigation time. According to the date and time that the farmer specified in the application, hydraulic workers of WUA provide water for irrigation after payment for the supplied water volume. During the processing time, hydraulic workers control canals and irrigation facilities that do not allow unauthorized withdrawal of supplied water. In order to account for the volume of

supplied water, they used hydrometric structures, fixed canals and shield-gates. In the absence of water flow measuring devices, the water allocation is determined "by eye". This leads to disputes and conflicts between hydraulic workers and water users-farmers.

5.4. General information about questioned water users

During the research, 36 people from the representatives of WUA “Omur-Bulak” were questioned. Among the people whom had taken a part in survey 30 (83,3%) respondents were man and only 6 (16,7%) were women. The age of respondents ranged from 27 to 62 years old. A more detailed picture is shown in Figure 5.1.

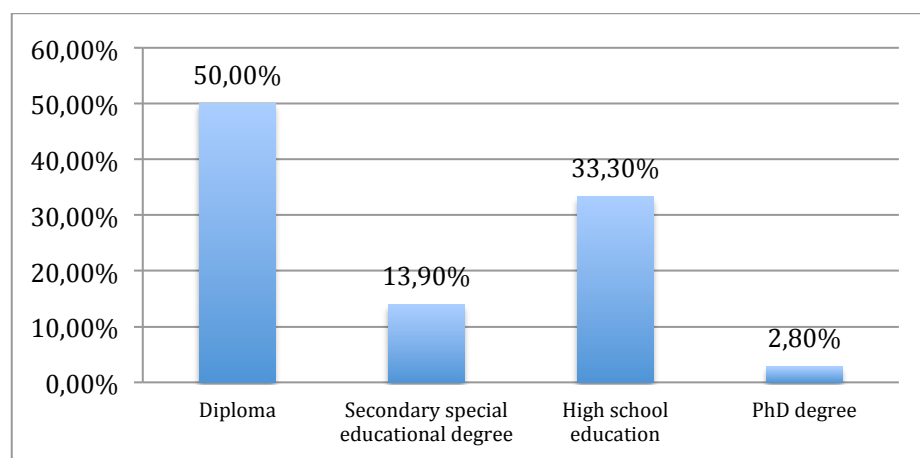
Figure 5. 1. *Sex ration of respondents*



Source: Primary data was collected from the field survey in August-September, 2014

From 36 water users, 18 (50%) of respondents have a high educational degree or Diploma, 5 (13,9%) respondents have a secondary special educational degree, 12 (33,3%) respondents have a high school educational degree, and only 1 (2,8%) water user has a PhD degree (Figure 5.2.).

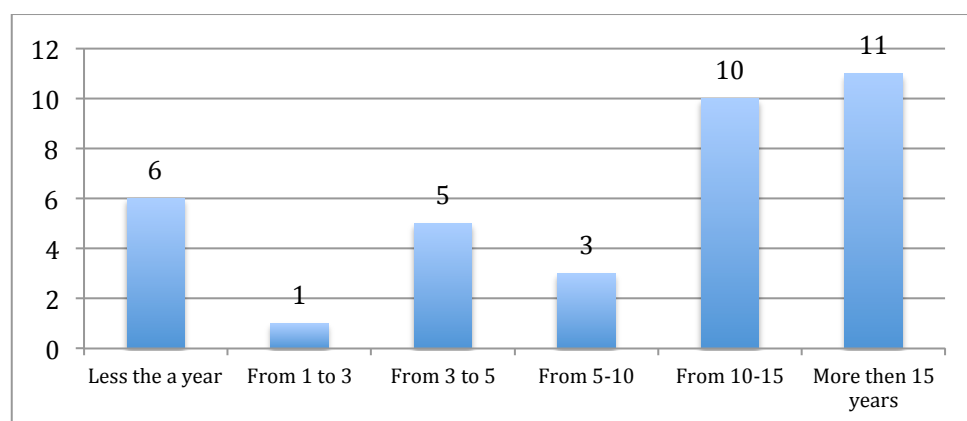
Figure 5. 2. *Educational level of respondents*



Source: Primary data was collected from the field survey in August-September, 2014

Among 36 respondents, 11 people have an experience in agriculture for more than 15 years, and 10 people reported that they have from 10 to 15 years experience. Among the respondents were 6 young farmers, whom have an experience of less than 1 year, 5 respondents from 3 to 5 years, 3 from 5 to 10 years, and only 1 questioned respondent reported that he has an experience in farming from 1 to 3 years. More detailed data can see in Figure 5.3.

Figure 5. 3. *Working experience in farming*



Source: Primary data was collected from the field survey in August-September, 2014

When being asked about what kind of irrigation method they usually use, all 36 water users (100%) answered that they implement a furrow surface irrigation method.

Nowadays in the world, the most widely used irrigation methods are sprinkler, furrow or surface and micro (drip) irrigation method. Furrow irrigation is used in the regions where water is available in sufficient quantities, but at the same time, without irrigation it is not possible to produce and cultivate agricultural crops. The second method is used in difficult places where irrigation water does not reach through the simple irrigational canal or it can be used for some crops that require uniform moisture. The drip irrigation method is used in arid and semi-arid zones where there is a water shortage or used in remote foothill areas with steep slopes.

The Kyrgyz Republic practiced the use of sprinkler irrigation method in 141 000 ha of irrigated areas and 12 ha of educational farm areas before 1990s, but due to sharply reduced financial support from state budget for irrigation infrastructure after 1990, the sprinkler irrigation method was disappeared (FAO, 2013). Considering that Chuy region, as another part of the country is located in an arid zone where the agricultural productivity is highly dependent on irrigation, traditionally Kyrgyz people have mostly used a surface irrigation method for many centuries. In connection with the high cost of equipment for drip and sprinklers irrigation, the most appropriate method of irrigation for the farmers of the Kyrgyz Republic is considered to be surface or furrow irrigation.

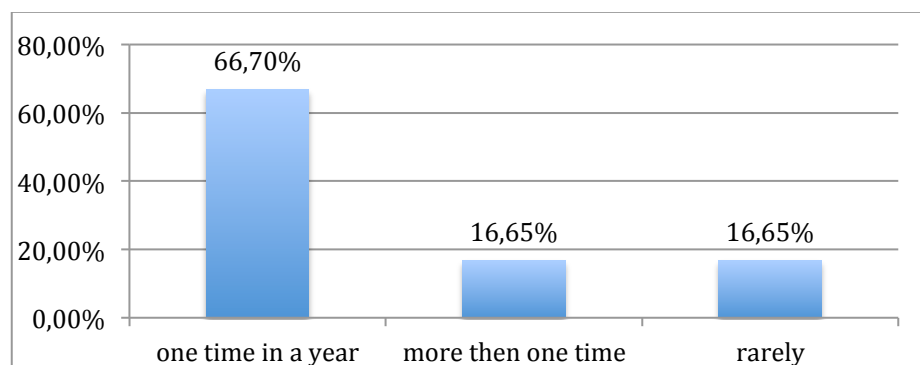
From 36 questioned people only 3 (8,3%) respondents noted that the amount of irrigation water is measured by using special water measuring devices. The remainder (33 people or 91.7%) believes that the measurement is carried out "by eye". In this way, the staff of WUA distributes the water among water users. This method is inefficient and constantly leads to disputes and conflicts among water users.

5.5. Awareness of water users about WUA activity.

When being asked about “Do you know when your WUA was established?” from 36 questioned water users 21 (57,8%) people answered “Yes”, 15 people answered “No”.

On the question “Do you join WUA since its establishment?” 18 (50%) questioned respondents answered that they join since establishment of their WUA and 50% answered “No”. From 18 people (Figure 5.4.) who joined since establishment, 12 (66,7%) respondents considered that they usually take a part in the General meeting that conducted by WUA, one time in a year, 3 (16,65%) respondents answered “more then one time” and 3 (16,65%) respondents – rarely.

Figure 5. 4. *Participation in the General meeting*

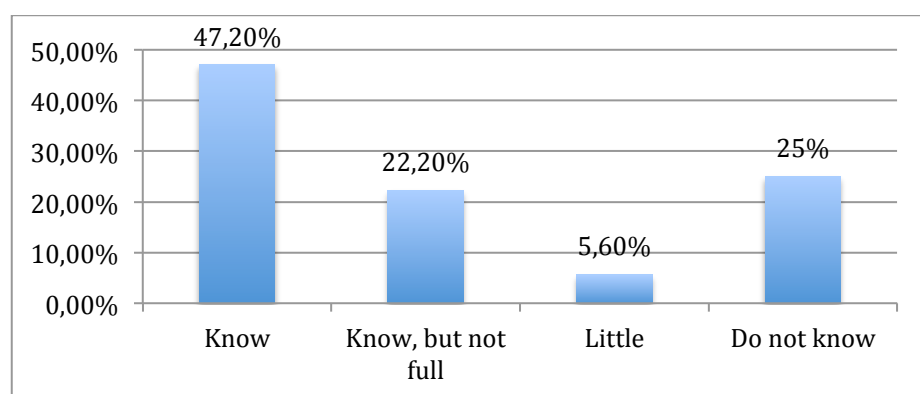


Source: Primary data was collected from the field survey in August-September, 2014

The above problems are related to the fact that during 20 years of WUA creation in the country, many water users in many WUAs do not yet fully understand the essence of the function of the WUA that are controlled independently by the water users as a voluntary and perspective organization (ADB, 2013; WUA Support Unit, 2014).

When being asked about “Do you know what services are provided by the WUA?” 17 (47,2%) respondents answered that they know, 8 (22,2%) people know, but not fully, 2 (5,6%) know a little, and the remaining 9 (25%) answered that they did not know what services were usually provided by WUA. Most questioned respondents understand that WUA is a single provider of irrigation water to farmers. At least they are informed that WUA is the organization, which takes a responsible for the delivery of irrigation water. More detailed data are shown in Figure 5.5.

Figure 5. 5. *Farmer`s knowledge about WUA services*

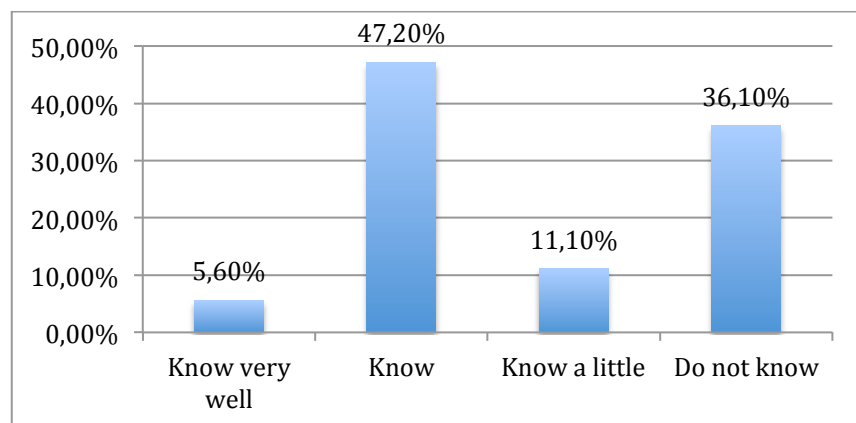


Source: Primary data was collected from the field survey in August-September, 2014

Almost less than half of the respondents (17 persons or 47.2%) know about rules and regulations of the WUA, only 2 (5.6%) people noted that they

know very well, 4 (11.1%) know a little, and 13 people (36.1%) said they do not know about the regulations and rules of WUA (Figure 5.6.).

Figure 5. 6. *Water user`s knowledge about WUA rules and regulations*



Source: Primary data was collected from the field survey in August-September, 2014

The above data has shown that water users are still not sufficiently informed about the structure and activities of the WUA and in this case WUA's staff work passively.

On the question "Did you sign an official contract with the WUA to obtain irrigation water?" 58,3% water users said that they have an agreement with this WUA.

From 26 water users whom have contracts with WUA, 76,2% of respondents answered that they obtain the service from WUA on the basis of individually written agreements and 23,8% of farmers work on the basis of oral contract.

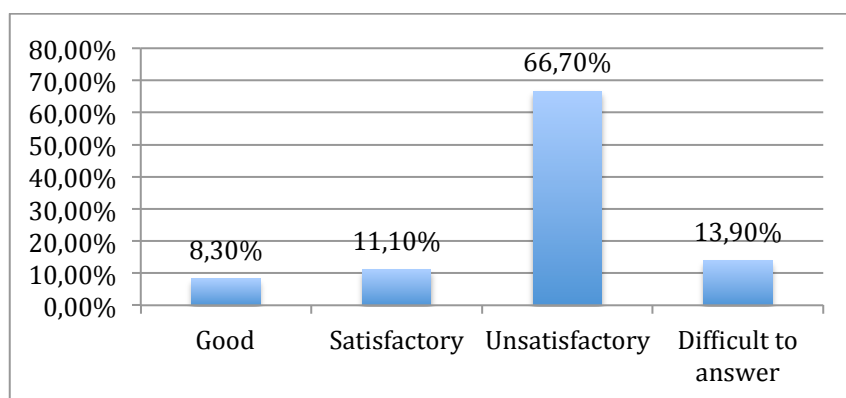
Relationships on the basis of oral agreements are not acceptable; such a situation leads to a lack of transparency and corruption. In order to prevent such

kind of consequences it is necessary to execute the contract on the basis of a written agreement with all water users.

5.6. Assessment the quality of irrigation facilities

As shown in Figure 5.7, 4 (11,1%) water users in WUA “Omur-Bulak” assess the condition of the main canals and irrigation facilities as satisfactory, 3 (8,3%) as a good, and 24 (66.7%) as unsatisfactory. Only 5 (13.9%) respondents noted this as “difficult to answer”.

Figure 5.7. *Assessment the quality of irrigation facilities*



Source: Primary data was collected from the field survey in August-September, 2014

Currently, many WUAs in the Kyrgyz Republic face with water shortage problems due to poor condition of irrigation canals and facilities. In many parts of canals, the water transporting is highly reduced by sedimentation, lack of width and height of canals, as well as in many WUAs there are no hydraulic units to measure the necessary volume and level of irrigation water.

As is known, the timely delivery of irrigation water in the necessary capacity and appropriate quality to the fields of water users depends on the

technical condition of irrigation infrastructure, which can be interpreted as follows (Segizbaev, 2013):

- If the infrastructure is maintained in good physical condition, the task of delivery of irrigation water to the water users can be solved very simply and farmers will be able to get the planned harvest crops.
- If the physical infrastructure is in poor condition, supply of irrigation water for water users will be difficult and impossible, and the result will be the reduction in productivity, which will lead to a decrease in the income of farmers that eventually affects ISF.

Therefore, any irrigation system functions as an indivisible whole and the poor or unsatisfactory condition of some parts of an irrigation system leads to the disruption of water supply.

Picture 5. 5. *Current condition of secondary irrigation canals in WUA “Omur-Bulak”*

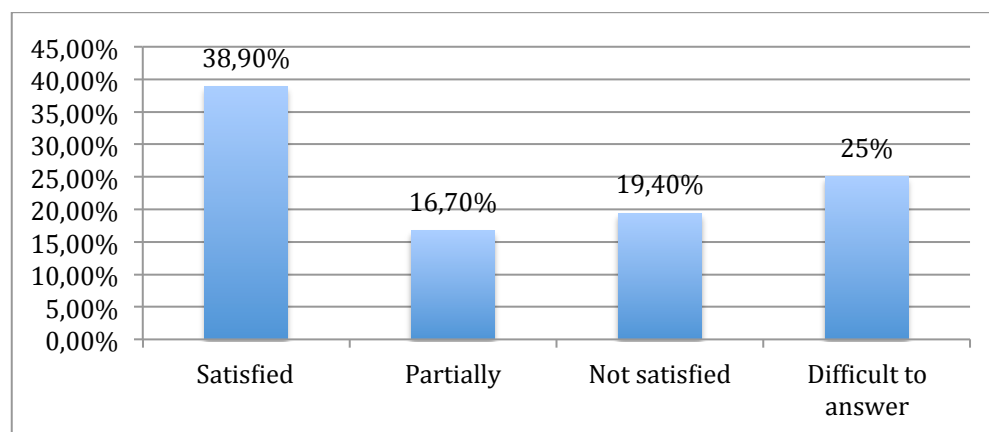


Source: Picture was taken during the field survey in August-September, 2014

5.7. Assessment the quality of WUA services by water users and influence to their family incomes.

From 36 questioned respondents, 14 (38,9%) people reported that they are satisfied with WUA services, 6 (16,7%) people responded as partially satisfied, 9 (25%) water users noted this as “difficult to answer” and only 7 (19,4%) water users answered as “not satisfied” (see Figure 5.8.).

Figure 5. 8. *Evaluation the quality of WUA services*



Source: Primary data was collected from the field survey in August-September, 2014

With all the existing shortcomings in the activities of the WUA, farmers (14 persons or 38.9%) have an understanding that, at the moment time, only such kinds of organization as WUA can solve existing problems by providing water for irrigation; as well, there is no other alternative organization yet.

19,4% of respondents who answered this as “not satisfied”, explained it in the following reasons:

- Untimely water allocation,
- Huge losses of irrigation water due to technical condition of irrigation

canals and facilities,

- Failure of irrigation priority.

During the time of the Soviet Union, all irrigation systems were projected and constructed, following with massive land and crop rotation, which is no longer implemented at the moment. In connection with this, all farmers require the already limited water at the same time.

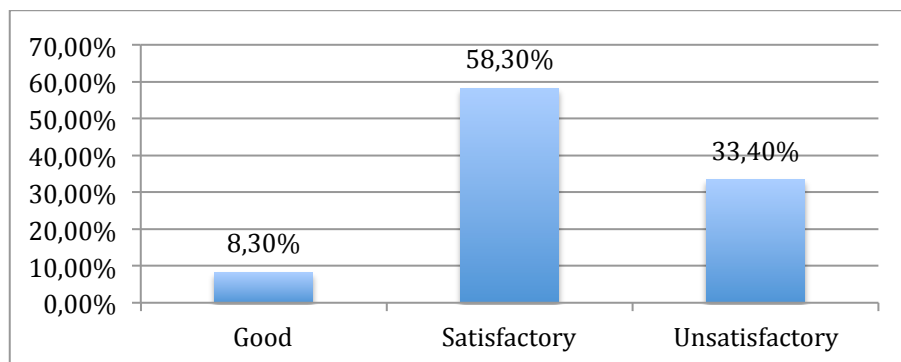
As for the second reason, which was considered above, due to the poor technical condition of irrigation canals and facilities, farmers cannot obtain the necessary amount of water. They usually make a payment for a certain volume of irrigation water, but actually they get less.

When being asked about “Do WUA services influence a farmer’s family income?” only 17 (47,3%) answered as “Yes”; the other respondents (52,7%) considered that WUAs services are not directly influenced.

5.8. Evaluation of the quality of irrigation water

According to specialists in the water sector, water resources in the Kyrgyz Republic have a low level of pollution, and many river systems have an adequate content of oxygen in the water (UNECE, 2000). However, 58,3% of questioned respondents considered that the quality of provided irrigation water is in a satisfactory condition and 8,3% people noted as “good”. Only one-third of respondents (33,4%) answered that the quality is in an unsatisfactory level. As shown in Figure 5.9, the unsatisfactory condition is indicated that the water has a huge amount of organically substances.

Figure 5. 9. *Evaluation the quality of irrigation water*



Source: Primary data was collected from the field survey in August-September, 2014

The presence of huge amount of micro substances can lead to the reduction of the chemical and biological quality of irrigation water, which can negatively be impacted to the quality of water. Organic pollution can contribute to the acceleration of an exchange process that requires oxygen. This can lead to an oxygen shortage (SAEPF, 2012).

5.9. Water supply in WUA “Omur-Bulak”

This part includes the questions regarding the knowledge of farmers about the water use plan in WUA. When being asked, “Do you know that your WUA has a water use plan?” more than half of questioned water users (72,2%) answered that they know; 27,8% respondents do not know. Furthermore, around 88,8% of questioned farmers do not know how often the approved water user plan is corrected.

This problem usually takes a technical character, as it is associated with a lack of knowledge of farmers on engineering fundamentals as well as principles of water distribution. In this regard, they believe more of WUA’s staffs.

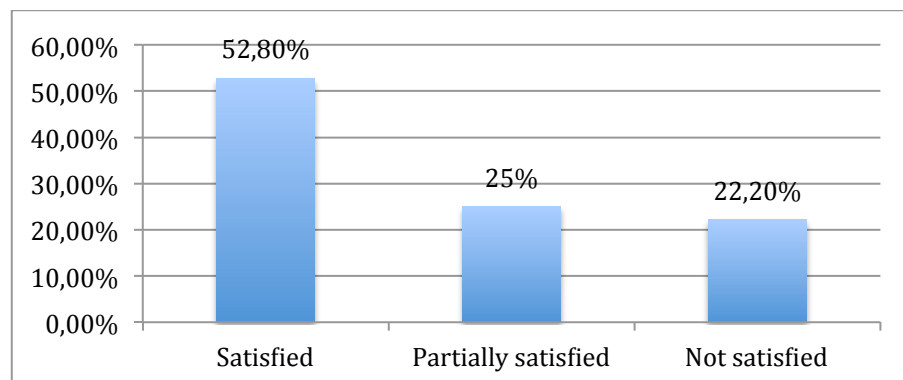
After the creation of WUA, members of WUA and their workers must be educated on special skills, which are necessary in the irrigation management and drainage infrastructure. The program of practical training of WUA should cover the questions on the progressive irrigation methods (IWMI, 2003).

Although, the majority of farmers in Central Asia are well educated concerning the controlling systems of irrigation facilities on the scale of their territory at the local level, they do not yet have any experience of the management of distribution of irrigation systems at the higher levels (IWMI, 2003). In this regard, one of the successful ways in the formation of the sureness of water users in taking the responsibility for M&O of irrigation infrastructure is to organize some visits for water users to the experienced and successfully managed WUAs (IWMI, 2003).

5.10. Water tariff

When farmers were asked the question “Are you satisfied with the tariff for irrigation water?” 52,8% of questioned water users noted that they are satisfied, 25% of farmers answered partially satisfied, and only 22,2% water users answered that they are not satisfied with current water tariffs (see Figure 5.10).

Figure 5. 10. *Water user's opinion about tariff for irrigation water*



Source: Primary data was collected from the field survey in August-September, 2014

Presently, according to the established rules and regulations of WUA, members of WUA pay for irrigation services that cover the costs of M&O of irrigation facilities, the payment for the delivered water from RDWR to WUAs, and costs for personnel staff, which is the best option for a successful existence of WUA (Johnson III & Stoutjesdijk, 2008).

World experience has shown that the farmers from the developing countries usually pay for the irrigation services with great difficulties (Kojoev, 2009). The payment for irrigation services by water users directly affects the WUA's capacity (Pluss, 2012), and, of course, the willingness of water users to implement payments for provided irrigation water depends on the level of service of WUA (Segizbaev, 2013).

Nowadays the water tariff in WUA "Omur-Bulak" is 319 som for 1 ha. According to world and national experts in sustainable water resource management, in order to properly conduct M&O of irrigation facilities, tariffs for

ISF should be increased, they must be more than 1000 som for 1 ha (Zakirov, 2009).

As shown in Figure 5.10, water users in this WUA have an understanding that it is always necessary to make a payment for irrigation services. Also, current tariffs coincide with farmer`s financial opportunities.

5.11. Use of irrigation water

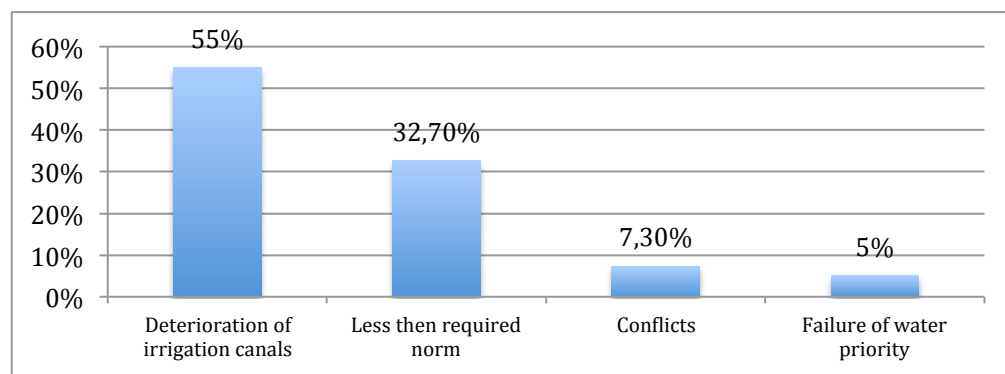
When being asked about “Do you experience any problems in the use of distributed water?” 72,2% of questioned water users noted that they have problems.

The main problems with which water users faced during the last irrigation season are the following:

- The deterioration of irrigation facilities and canals (55%),
- The irrigation water is delivered less then required norm (32,7%),
- The conflicts with other water users (7,3%),
- The failure of water priority (5%).

More detailed data is shown in Figure 5.11.

Figure 5. 11. *The main problems in the using of distributed water*



Source: Primary data was collected from the field survey in August-September, 2014

Deterioration of the irrigation system is closely related to the lack of WUA's own equipment for M&O of the irrigation network, which does not allow to do rehabilitation works, and it often leads to failures of water supply (or water supply is carried out less than the required norm). Purchase or lease equipment for this WUA is very expensive.

The irrigation network, which belongs to the jurisdiction of WUA, was without proper M&O for a long time, which eventually resulted in a technically unsatisfactory condition.

Picture 5. 6. Unsatisfactory condition of most small earthen canals in Tash-Moinok village administration



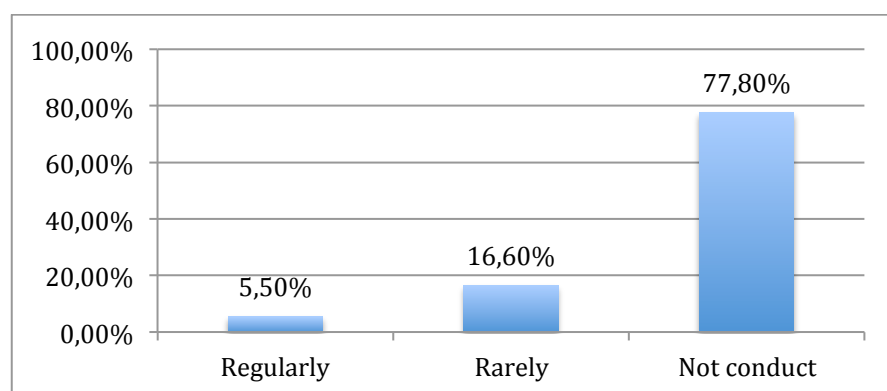
Source: Picture was taken during the field survey in August-September, 2014

5.12. The training courses for water users in progressive methods of irrigation

All water users did not take part in any training courses before creation of WUA “Omur-Bulak”. When being asked, “How often do WUA conduct training courses for water users in progressive methods of irrigation?” 77,8% respondents

answered – not conducted, but in order to improve the knowledge in sustainable water resource management all respondents have a willingness to participate in training courses, 16,6% of questioned water users noted – rarely and only 5,5% answered that WUA conducts trainings for water users regularly (Figure 5.12.).

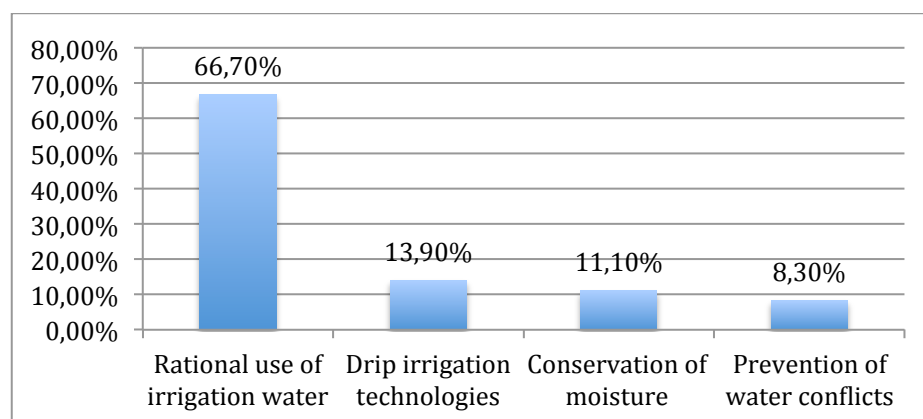
Figure 5. 12. *How often WUA conduct trainings for water user*



Source: Primary data was collected from the field survey in August-September, 2014

On the question “In the future in which courses would you like to attend more?” 66,7% questioned respondents considered that they want to participate in the courses of sustainable and rational use of irrigation water, 13,9% respondents noted the preference in drip irrigation technologies, 11,1% in technologies on the conservation of moisture in the soil, and 8,3% of water users preferred to participate in courses in the prevention of water disputes and conflicts (Figure 5.13.).

Figure 5. 13. *Preferred training courses for water users*



Source: Primary data was collected from the field survey in August-September, 2014

According to the Law regulating WUAs, the main tasks of WUAs are the responsibility for M&O of the irrigation and drainage systems, the fair distribution of irrigation water among water users of WUA, modernization, treatment and other actions to maintain a good condition of WUA's irrigation networks and its development, the prevention of water pollution, as well as assistance to promote professional skills of water users in proper farming (Djailoobaev, Kojoev, & Baibosunov, 2006).

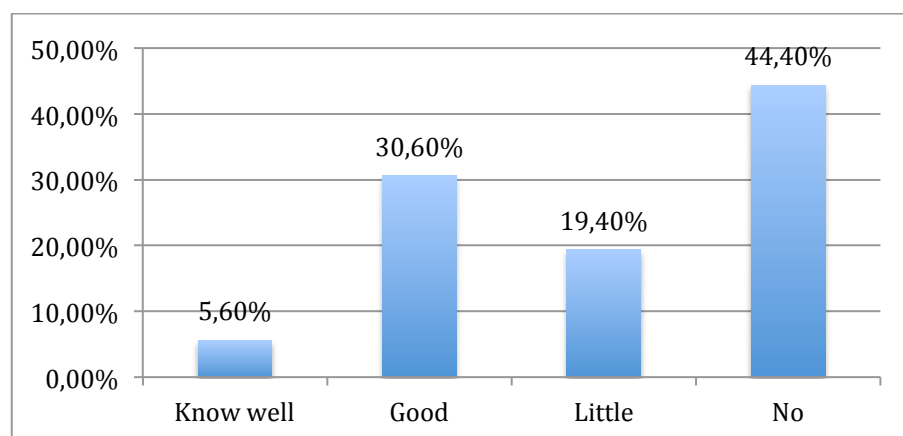
Lack of farmer's knowledge in cultivation and water norms, which are necessary for several kinds of crops in different periods of growing and irrigation methods, directly leads to regular disputes and conflicts among farmers as well as contributes to additional loads for water resources (RDF, 2013). These problems are directly related to the institutional weakness of WUA, which eventually threatens the ability to act as a regulatory body in the use of irrigation water.

5.13. About WUA unions and federations

This part includes the question on assessment of water user's understanding about perspective directions of WUA unions and federations and determining farmer's willingness to become members in cases when their WUA would be combined into unions or federations with other WUAs.

When being asked, "Do you know about WUA unions and federations?" 5,6% of questioned water users knew well about WUA unions and federations, 30,6% of people know, 19,4% of respondents reported that they know a little, and 44,4% of farmers do not have an understanding about unions (more detailed information in Figure 5.14.).

Figure 5. 14. *Water user's knowledge about WUA unions and federations*

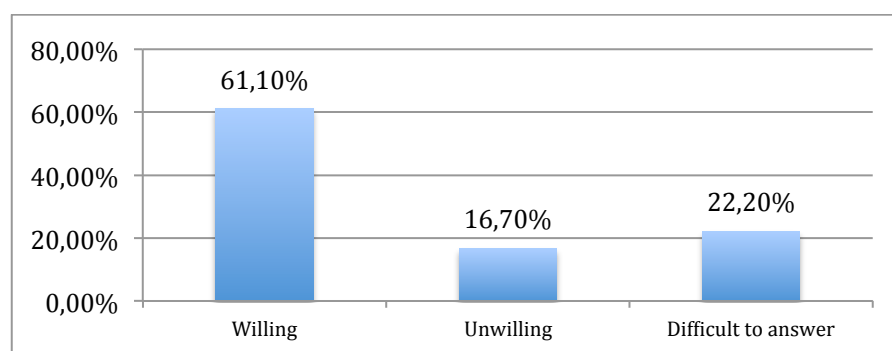


Source: Primary data was collected from the field survey in August-September, 2014

Despite the fact that the water users have a weak knowledge about WUA unions, 72.2% of respondents answered that in order to improve the quality of services they want that their WUA should combine into unions and federations with other WUAs in the region.

61,1% of questioned farmers reported about their willingness to be members of WUA in cases when the association would combine with other WUAs into federations, 16,7% of respondents refused, and 22,2% of water users noted as “Difficult to answer” (Figure 5.15.).

Figure 5. 15. *Water user`s willingness to be members of WUA unions*



Source: Primary data was collected from the field survey in August-September, 2014

Nowadays in the Kyrgyz Republic, many WUAs slowly but steadily have demonstrated the abilities to manage on-farm irrigation systems (Johnson III & Stoutjesdijk, 2008). Small and fragmented farms negatively affect the activities of WUAs and can not cope with difficulties in agriculture.

One of the perspective directions of GKR was to study the WUA for their integration into the union in order to establish joint M&O of canals in off-farm irrigation system within the service area of association by establishing pilot unions and federations across the country. According to WUA Support unit (2014), the country has started to operate 12 federations, including 10 federations that engage in M&O of irrigation infrastructure and 2 that function as a coordinating body. Table 5.1 shows the list of 10 functioning WUA unions in the Kyrgyz Republic.

Table 5. 1. *List of WUA unions and federations in the Kyrgyz Republic*

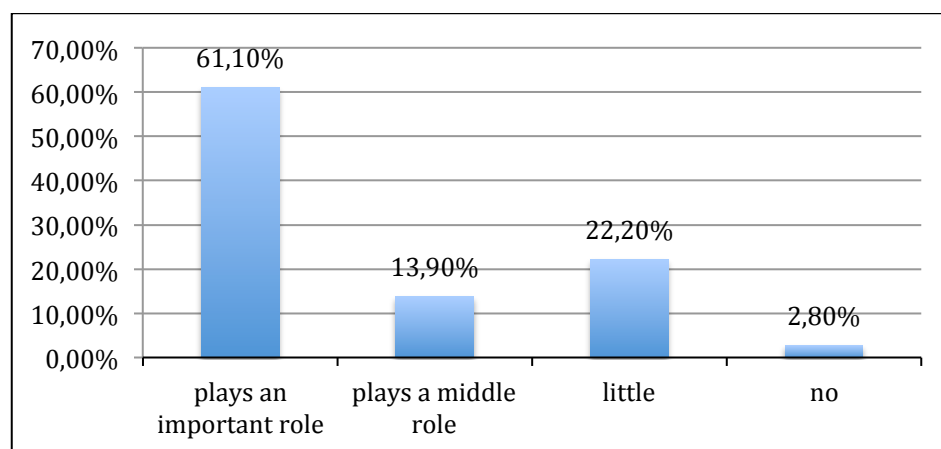
Name of WUA unions and federations	Name of region	Irrigated area in ha
Sulu-Arabek	Talas	11481
Saza-Baisuu	Talas	3582
Kumushtak	Talas	5202
Besh-Tash	Talas	5987
Ak-Suu	Osh	5663
Uvam	Osh	6408
Suu-Bashy	Issyk-Kul	5255
Karakol-Sook	Naryn	8400
Ala-Buka-Sugat-Suu	Jalal-Abad	6810
Kichi-Kemin-Suubashy	Chui	3501
Total		62289

Source: WUA SU (2014).

5.14. The role of WUA in the development of agriculture

When being asked about “What is the role of WUA in the development of agriculture?” 61,1% of questioned respondents considered that the WUA plays an important role in the agriculture, 13,9% of water users answered that it plays a role, 22,2% answered that it plays a little role, and only 2,8% reported that the WUA did not play any role. More detailed information is shown in Figure 5.16.

Figure 5. 16. *Water user's opinion about the role of WUA*



Source: Primary data was collected from the field survey in August-September, 2014

Sustainable management on irrigation systems in on-farm irrigation direction is fully dependent on the proper competence of WUA in the management of water resource and canals (Pluss, 2012). Analyzing Figure 5.16, and despite the facts, at present many WUAs experience problems in institutional weaknesses and financial difficulties (RDF, 2013; CAIConsulting, 2010; McKinney & Jooshev, 2007; Alymbaeva, 2004). Many water users have an understanding that only WUAs as NGOs can take responsibility in providing irrigation water for water users.

5.15. The measures to improve the WUA's activity

Water users of WUA “Omur-Bulak” pointed that in order to improve the WUA's work it is necessary to do the following activities:

- Rehabilitation and modernization of irrigation facilities,
- The improvement and enhancement of WUA's logistical base,
- Conducting the training courses on advanced irrigation methods,

- The presence of highly qualified specialists in the WUA's work,
- Combining into unions and federations,
- Transparency control.

According to research of Restrepo & Vermillion (2007) and the Department for International Development (DFID) (2006), the world experience has shown that successful implementation of PIM/IMT systems require the following steps:

- Rising the role of WUA on the controlling, accounting and effective use of water resources;
- Updating and upgrading irrigation services;
- Improvement in the collection of payment for irrigation services;
- Enhancement of agricultural productivity;
- Enhancement of connections between water users and staff of WUA;
- Improvement of technical skills in water management.

In order to sustainably enhance the activity of WUA on the equitable distribution of irrigation water and improve irrigation services, CAIConsulting (2010) suggested to create and conduct educational training courses on the strengthening of the potential of WUA on the direction such as: functions and tasks, conflict resolution, planning of water allocation, legislative relationship between WUA and RDWR, accounting of WUA, fundamentals of agricultural technologies and advanced irrigation methods. They also recommended enhancing the technical cooperation of WUAs with agricultural projects, increasing the financing of WUA and assistance in increasing the cost for water, strengthening the efficiency of a national monitoring system and the assessment

of WUA, as well as an introduction of special computer programs such as: accounting, monitoring of payment system, and planning of water allocation and water use.

In recent times, and in connection with appeared factors that are negatively influences on integrated water resource management such as the climate change and global warming, one of the main problems of WUA are the conflict situations around irrigation in connection with water shortages. RDF (2013) conducted an investigation in order to reveal conflict factors impacted to the irrigation management and suggested the following recommendations:

- Consolidation of institutional development of WUA, correction and simplifying the condition of organizational and financial accounting,
- Raise opportunities of WUA on the collection of payment for irrigation services,
- Improvement of fundamentals in the questions of financing, management, planning and M&O,
- Use of advanced technologies such as drip irrigation and sprinkling, creation of small water reservoirs in community level,
- Increase transparency of planning and use of irrigation water,
- Using systems of reinvestment from the side of GKR, because the support of international donor organizations only partially solved those needs.

CHAPTER SIX

6. CONCLUSION AND RECOMMENDATIONS

This chapter presents a structure of the explorations for the success or failure in the implementation of PIM/IMT in the Kyrgyz Republic. Especially, this chapter summarizes the main arguments in the research and provides the conclusion of the investigation regarding the research findings, which are presented in Chapters 4 and 5. Specifically, this chapter gives the answer to the main question "How to enhance the Capacity of WUAs in the Kyrgyz Republic?" and further recommendations on the improvement of the potential of WUA and its activity. This research follows several objectives:

- To describe the current policy and condition of WUAs in the Kyrgyz Republic since its establishment;
- To evaluate the functional responsibilities and activities of WUAs on the example of one pilot WUA “Omur-Bulak” in Chui region, Kyrgyz Republic;
- To identify the main mechanisms on the improvement the efficiency and effectiveness of WUA’s activity.

6.1. The current condition of WUAs

The current condition of many WUAs in the Kyrgyz Republic is in different positions depending on aspects of financial, social and political empowerment. Geographically, the Kyrgyz Republic is located in a moderate climate and an arid zone where the agricultural production is highly dependent on water for irrigation,

and that is why, the irrigation system plays an important role in crop production. Irrigation systems in country have been used since the 1940s, and irrigation areas were intensively increased until 1990; nowadays there are more than 1 million ha under crops, which provide food for the population.

For the irrigation system, especially in on-farm level, the government of the Soviet system always provided huge investments and was properly controlled; in general it was often given a serious consideration in the time of the Soviet Union. When the Soviet Union collapsed, the on-farm irrigation system remained ownerless. Instead of one water user in the face of large collective farm, the government created around 2000 private farms, which used a common irrigation network. In this position the adequate M&O of the irrigation system was impossible, which led to a rapid deterioration in irrigation infrastructure in on-farm level.

In order to solve those kinds of problems in on-farm irrigation system, GKR studied an international experience in the implementation of PIM and IMT and, decided to create WUAs in whole part of country in order to improve an irrigation infrastructure at the local level through decentralization of water management system.

First of all, GKR did not have experience in implementing of PIM system, so this was a reason to attract foreign donors through several rehabilitation projects. The World Bank provided the main and important investments activities through OFIP and OFIP-2. The project conducted the rehabilitation works in 113 WUAs in the Kyrgyz Republic, and it still continues to work on uncompleted

facilities under the OFIP-2 – “Additional Financing”. Finally, 475 WUAs and 12 WUA Federations have been established, which together take responsibilities of 72% of irrigated areas in the Kyrgyz Republic.

During the 20 years of WUAs establishment, as practice has shown, WUAs face both positive factors and negative factors, the latter being several kinds of problems and weaknesses, especially from the qualitative side.

Positive aspects:

- Most WUAs have been created on the basis of law and related legislations that make them officially registered,
- In the whole country, WUAs recognized as administrative body, which are responsible for M&O of irrigation infrastructure,
- Created 475 WUAs and 12 WUA union and federation, which can take responsibilities on 72% of irrigated areas,
- Donor assistance is still supporting the development of WUAs, which focused on rehabilitation works,
- Started to create WUA federations, which can take partial responsibility on off-farm irrigation system.

Negative aspects:

- After the disintegration of the Soviet Union the on-farm irrigation system was not properly maintained, which provided difficulties in the water allocation to water users,

- The irrigation infrastructure and condition of facilities were located in unsatisfactory condition, which led to loss during the transportation of irrigation water,
- Most of the WUAs had been created on the basis of large collective farms without using hydrographical principles, which led to disputes and conflicts between upstream and downstream WUAs,
- In many WUAs the same people were appointed who worked previously in the large collective farms,
- Public participation or PIM system is not fully implemented or in the stage of learning, farmers still do not know their rights as member of WUA,
- Poor logistical bases (lack of machinery, transportation) due to lack of finance and modern equipment,
- Weak capacity of WUA staffs in technical skills, difficult to recruit new graduates,
- Water tariff is quite low and still approved by the Parliament, which is negatively affected to WUAs,
- “Top-down” experience still exists in the understanding of many water users.
- Small and fragmented irrigated areas are negatively impacted to the activities of many WUAs,
- Many WUAs have an inefficient system of payment collection and water consumption, especially in the southern part of country.

6.2. The evaluation of functional tasks and activities of WUA “Omur-Bulak”

Awareness of water users about WUA's activity

The awareness of water users in WUA “Omur-Bulak” in general is in low condition. Even though 57,8% of questioned people know when the WUA is established, only 50,0% respondents joined the general meeting (from them, a majority of respondents join only one time per year). At least a minority of people are informed that WUA is the organization, which takes responsibility for the delivery of irrigation water, because 47,2% know what kind of services are provided by WUA.

Only 47,2% of respondents informed that they know about rules and regulations of WUA. It means that water users are still not sufficiently informed about the structure and activities of the WUA.

The problems in transparency of water management remain open. 58,3% of water users sign a contract with WUA in order to obtain irrigation water, but from them 76,2% of respondents have a written agreement and only 23,8% of farmers work on the basis of oral contracts. The relationship on the basis of oral agreement is not accessible.

The quality of irrigation facilities

The irrigation facilities and infrastructure in this WUA are located in poor or unsatisfactory conditions. This kind of condition only brings more negatives, such as water shortage and losses in the transportation of irrigation water. In this WUA, some of irrigation trays and earthen canals destroyed so however many small canals are not able to allocate the required amount of water. This is

confirmed by the fact that 66,7% of respondents considers that the current irrigation infrastructure is in bad condition.

The quality of WUA's services

On the question “Do you satisfied with WUA's services?” only 38,9% - reported as satisfied; 16,7% - partially; 25,0% - difficult to answer; and 19,4% - not satisfied. With all the existing shortcomings in the activities of the WUA, farmers (14 persons or 38,9%) have an understanding that at the moment only such kind of organization as WUA can solve existing problems by providing water for irrigation. As well, there is no other alternative organization yet. 19,4% of respondents connects the reason with untimely water allocation, huge losses of irrigation water due to technical condition of irrigation canals and facilities, and the failure of irrigation priority.

The quality of irrigation water

Water resources in the Kyrgyz Republic have low levels of pollution, and river systems have an adequate content of oxygen in the water. However, a majority of respondents (58,3%) have considered that the quality of provided irrigation water is in a satisfactory condition (and a further, 8,3% in good condition).

Water supply system

The research identified that a majority of respondents (72,2%) know that WUA has a water use plan, but due to the technical character and lack of knowledge of farmers on engineering fundamentals and principles of water

distribution, 88,8% of questioned farmers do not know how often the approved water user plan is corrected.

Water tariff

Nowadays the water tariff in WUA “Omur-Bulak” is 319 som for 1 ha and due to that water users of this WUA have an understanding that it is always necessary to make a payment for irrigation services. Also, current tariffs coincide with farmer`s financial opportunities, because 52,8% of questioned water users confirmed they were satisfied, and 25% farmers answered – partially satisfied.

Use of irrigation water

The majority of respondents (72,2%) noted that they experienced many difficulties in using irrigation water - such as deterioration of irrigation facilities and canals, irrigation water is delivered less then required norm, conflicts with other water users and failure of water priority during irrigating time.

Deterioration of the irrigation system is closely related to the lack of WUA`s own equipment for M&O of the irrigation network, which does not allow rehabilitation works. This often leads to a failure of water supply, or the water supply is carried out less than the required norm. Purchase or lease equipment for this WUA is very expensive. The irrigation network, which belongs to the jurisdiction of WUA, was without proper M&O for so long a time, which eventually resulted in a technically unsatisfactory condition.

Water user`s skills in advanced irrigation technologies

One of the main tasks of every WUA in the Kyrgyz Republic is to educate farmers and conduct trainings regularly in advanced irrigation technologies.

Unfortunately, 77,8% of respondents noted that WUA “Omur-Bulak” did not conduct trainings for water users before, but in order to improve the knowledge in sustainable water resource management all respondents have a willingness to participate in training courses. Specifically, they prefer to take part in the training courses such as rational use of irrigation water (66,7%), drip irrigation technologies (13,9%), conservation of moisture (11,1%) and prevention of water conflicts (8,3%).

The role of WUA in the development of agriculture

Despite the facts that at present time many WUAs experience problems in institutional weaknesses and financial difficulties, analysis has shown that water users (61,1%) - consider that WUA plays an important role in agriculture. Respondents have an understanding that only WUA as an NGO can take responsibility in providing irrigation water for water users – farmers.

Farmers understanding about WUA unions and federations and their willingness to be a member

In the result of land and agrarian reform in the Kyrgyz Republic, the previous large collective farms were disbanded into small and very small private farms, which were further divided in average by 0,2 ha for every person. Small and fragmented areas are still negatively impacted to the activity of WUAs. One of the main state policies in water management is to establish more WUA federations by combining WUAs into unions in order to jointly operate not only in on-farm irrigation systems, but also in off-farm level.

Among the farmers, only 30,6% of questioned respondents know about WUA unions, 5,6% know well, and 19,4% - little. Despite the fact that the water

user has a weak knowledge about WUA unions, 72.2% of respondents answered that in order to improve the quality of services, they want their WUA to combine into unions and federations with other WUAs in the region. 61,1% of questioned farmers reported about their willingness of being members of WUA in case the association would be combined with other WUAs into federations.

6.3. The main mechanisms on the improvement of efficiency and effectiveness of WUA's activity

According to water users of WUA “Omur-Bulak” the main points in the improvement of WUA's activity are: (1) rehabilitation and modernization of irrigation facilities, (2) improvement and enhancement of WUA's logistical base, (3) conducting the training courses on advanced irrigation methods, (4) presence of highly qualified specialists in the WUA's work, (5) combining into unions and federations, and (6) transparency control.

As world experiences had shown that successful implementation of PIM/IMT approach comes from the rise in the role of WUA on aspects such as controlling, accounting and effective use of water resources, updating and upgrading of irrigation services, improvement in the collection of payment for irrigation services, enhancement of agricultural productivity, enhancement of connections between water users and staff of WUA and improvement of technical skills in water management (Restrepo & Vermillion, 2007; DFID,2006).

CAIConsulting (2010) suggested to create and conduct educational training courses on the strengthening of functions and tasks, conflict resolution, planning of water allocation, the legislative relationship between WUA and RDWR,

accounting of WUA, fundamentals of agricultural technologies and advanced irrigation methods. Furthermore, they proposed to enhance the technical cooperation of WUAs with agricultural projects, increase the financing of WUA and conduct assistance in increasing the cost for water. In addition, it is needed to strengthen the efficiency of national monitoring system and assessment of WUA, as well as an introduction of special computer programs such as: accounting, monitoring of payment system, planning of water allocation and water use.

RDF (2013) proposed to consolidate the institutional developments of WUA, correct and simplify the condition of organizational and financial accounting, raise opportunities of WUA on the collection of payment for irrigation services, improve fundamentals in the questions of financing, management, planning and M&O, use of advanced technologies such as drip irrigation and sprinkling. Besides, they recommended creating small water reservoirs in community level, increase transparency of planning and use of irrigation water, as well as using systems of reinvestment from the side of GKR, because the support of international donor organizations partially solved those needs.

Recommendations

Based on current problems and shortcomings, which were gathered in the result of related literature regarding irrigation management in the country and a field trip on the assessment of functional responsibilities, tasks and activities of WUA “Omur-Bulak”, as well as in order to enhance and improve the capacity of

WUAs in the Kyrgyz Republic, the research presents the main steps on the improvement of efficiency and effectiveness of activity of WUA “Omur-Bulak”:

1. In strengthening the work of WUAs in the operation and maintenance of irrigation infrastructure

- GKR should review and change the tariff policy and slowly increase ISF;
- WUAs need to activate some relationship with local governments in order to ensure proper M&O and management;
- DWR, which is responsible for coordination and monitoring of WUA development, needs to attract more investors and donor associations in order to rehabilitate and modernize irrigation infrastructure in on-farm level and provide necessary equipment for M&O and the modernization of WUA’s logistical base;
- Enhance the qualifications of WUA’s staff by organizing training courses in advanced water resource management;
- WUAs need to study and implement advanced and modern organizational forms in the M&O of irrigation and drainage systems;
- Improve the financing of irrigation systems due to the increase in the water payment collection from water users;
- GKR needs to carry out and amend current legislation on the release of tax payment, but its efforts must be forwarded to the M&O of irrigation infrastructure;

- If necessary, WUAs need to attract local and international investments themselves and take part in grant assistance programs to obtain financial supports in order to improve the irrigation and drainage systems;
- MAM should carry out the concessional loan programs for WUAs and submit to GKR for further revision;
- National Bank of the Kyrgyz Republic should create a new credit policy for water users and WUAs on the basis that commercial banks need to issue low-interest or preferential loans for WUAs in order to promote rehabilitation and modernization of irrigation infrastructure;
- In order to support WUAs, local governments are encouraged to allocate funds from the land tax for the improvement of irrigation infrastructure (rehabilitation, construction).

2. In strengthening the work of WUA in the fair and equitable distribution of irrigation water among water users

- Consolidate farms by creating agricultural cooperatives, which will positively impact the activity of WUAs in fair water distribution;
- Enhance the qualifications of WUA's staff by organizing training courses in advanced water resource management;
- DWR needs to continue the policy on the implementation of the creation of WUA unions and federations across the whole country;
- All WUAs have to be created on the basis of hydrographical principles. In this case, WUA Support Units in every district of the country should conduct explanatory work among WUA on the implementation of

hydrographical principles and its benefits in front of water users in order to prevent and avoid water conflicts between water users and WUA staff;

- GKR, in collaboration with MAM, DWR and other ministries and agencies, needs to carry out and develop the project of state law on amendments and additions to the Water Code of the Kyrgyz Republic regarding the use of irrigation water with hydrographical principles;
- In order to equitably distribute irrigation water among water users and prevent water conflicts between water users, WUAs need to use modern and advanced methods of determining the volume of provided water (hydro unit, spillway, fixed canal or shield gates);
- WUA Support Units in every district should improve and strengthen the quality of conducted training courses for water users and WUAs, exactly in the following areas:
 - Improvement of water management in WUA level;
 - Irrigation management, planning and assets management in WUA;
 - General administration in WUA;
 - Loan repayment;
 - Monitoring and evaluation of WUA;
 - WUA's partner relationship with local governments and water organizations;
 - Improvement of Water Council activities of irrigation systems;
 - Social aspects of WUA development;

- Gender policy and involvement of women in the WUA development;
- Legal basis of WUA.

3. In providing the full participation of all members of WUA in water management and free access to information about WUA's activity for water users

- Activating the tasks, responsibilities and works of WUA Council, which protects the water users interests;
- Strengthen the role and principles of WUAs in improving the quality of irrigation management and the effective use of water resources;
- Local governments in collaboration with WUAs should organize roundtables in order to increase the level of understanding and awareness of water users about WUA's functional responsibilities, tasks, principles and activities;
- WUAs need to study and implement advanced and modern organizational forms of water users participation in water management;

4. In providing the rational use of irrigation water and environmental security for water resources

- Water users in all WUAs of the country should use the irrigation water more efficiently and economically;
- Enhance the qualifications of WUA's staff by organizing training courses in advanced water resource management;

- GKR in collaboration with the MAM needs to develop and carry out a unified state program on the rational use of water resources and allocate from the state budget the necessary financial efforts for the modernization of irrigation infrastructure;
- WUAs should regularly conduct training courses and educate water users in rational use of water resources and agricultural engineering skills through media, NGOs, and projects of international donor organizations and associations;
- The Ministry of Education and Science needs to carry out a new educational standard on the preparation of specialists at the professional level for the development of WUAs;
- Kyrgyz National Agrarian University should allocate more quotas for specializations such as “Irrigation engineer” and “ Land improvement engineer”.

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APPENDIX

QUESTIONNAIRE

1. Gender:

Male _____
Female _____

2. Educational level:

PhD degree _____
Diploma _____
Secondary special educational degree _____
High school education _____

3. Working experience in farming:

Less than 1-year _____
1-3 _____
3-5 _____
5-10 _____
10-15 _____
More than 15 years _____

4. What kind of irrigation methods do you use in your field?

Furrow _____
Sprinkler _____
Drip _____

5. What kind of measurers do you use when determining the amount of irrigation water?

Hydraulic unit _____
Determined by eye _____

6. Do you know when your WUA was established?

Yes _____
No _____

7. Do you join WUA since it's establishment?

Yes _____
No _____

If "Yes", please answer, how often do you participate in General Meeting?

1 time in a year _____
More than 1 times _____
Rarely _____

None _____

8. Do you know what services are provided by the WUA?

Yes _____
Yes, but not full _____
Little _____
No _____

9. How do you think about the quality of provided services, are you satisfied with the services of the WUA at the moment?

Satisfied _____
Partially satisfied _____
Not satisfied _____
Difficult to answer _____

If “not satisfied”, please answer the reasons

Untimely water allocation _____
Huge losses of irrigation water due to technical condition of irrigation
canals and facilities _____
Failure of irrigation priority _____

10. What are the quality of irrigation facilities and canals in your WUA?

Good _____
Satisfactory _____
Unsatisfactory _____
Difficult to answer _____

11. How do you estimate the quality of irrigation water?

Good _____
Satisfactory _____
Unsatisfactory _____

12. Do you satisfied with current tariff for irrigation water?

Satisfied _____
Partially _____
Not satisfied _____

13. Does WUA service influences to your family incomes?

Yes _____
No _____

14. Do you experience any problems in the using of distributed water?

Yes _____
No _____

If “yes”, tell the reason of problems:

- The deterioration of irrigation facilities and canals _____
- The irrigation water is delivered less than required norm _____
- The conflicts with other water users _____
- The failure of water priority (5%) _____

15. Did you attend in any training courses related with advanced irrigation methods before?

- Yes _____
- No _____

If “Yes”, explain the name of obtained courses? _____

16. How often do WUA conduct training courses for water users in progressive methods of irrigation?

- Regularly _____
- Rarely _____
- Not conduct _____

17. In the future, in which training courses would you like to attend more?

- Rational use of irrigation water _____
- Drip irrigation technologies _____
- Conservation of moisture _____
- Prevention of water conflicts _____

18. Do you know about rules and regulations of WUA?

- Well know _____
- Know _____
- Little _____
- Do not know _____

19. Did you sign an official contract with WUA to obtain irrigation water?

- Yes _____
- No _____

If “yes”, which?

- Written agreement _____
- Oral agreement _____

20. Do you know that your WUA has a water use plan?

- Yes _____
- No _____

21. Do you know how often a water use plan is corrected?

- Yes _____
- No _____

22. Do you know about WUA unions and federations?

Excellent ____
Good ____
Little ____
None ____

23. Do you want that your WUA extend coverage of responsibilities by the way of combining into unions?

Yes ____
No ____

24. Do you want to join if your WUA would be combined with other WUA into unions or federations?

Willing to join ____
Unwilling ____
Difficult to answer ____

25. In your mind, what is the role of WUA in the development of agriculture?

Plays an important role ____
Middle ____
Little ____
No ____

26. In your mind, what's necessary to improve the activity of WUA?

Please, briefly explain _____