

Exploring
Integrated Water Resource Management (IWRM)
in the Naryn River, the Kyrgyz Republic

by

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どうもありがとうございました!

Thank you very much!

STATEMENT OF AUTHENTICITY

I, KYDYRMYSHEV Timur, declare that this thesis I have written under the supervision of Dr. Francisco P. Fellizar, Jr. entitled *Exploring Integrated Water Resource Management in the Naryn River, Kyrgyz Republic* is truly my original work. All information in this document have been obtained and presented in accordance with academic rules and ethical conduct.

This master thesis is carried out to fulfill the requirement for the Master's degree in International Cooperation Policy, Graduate School of Asia Pacific Studies, Ritsumeikan Asia Pacific University. I certify that I did not submit this thesis anywhere before for awarding any degree, diploma and certificate.

KYDYRMYSHEV Timur

July 22th, 2016

Signature

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List of Abbreviation and Symbols

ADB	Asian Development Bank
BCM	Billion Cubic Meters
BWO	Basin Water Organization
DWM	Department of Water Management
EUWI	European Union Water Initiative
FAO	Food and Agriculture Organization
GIS	Geographic Information Systems
HPP	Hydropower Plant
ICWC	Interstate Coordinating Water Management Commission
IDA	Institutional Decomposition and Analysis
IWRM	Integrated Water Resource Management
KGS	Kyrgyz Som
kV	Kilovolt
MAM	Ministry of Agriculture and Melioration
MES	Ministry of Emergency Situation
MEES	Ministry of Ecology and Emergency Situation
NDWM	Naryn District Water Management
O&M	Operation and Maintenance
OECD	Organization for Economic Cooperation and Development
RBO	River Basin Organization
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
USAID	United States Agency for International Development
USSR	Union of Soviet Socialist Republics
WB	World Bank
WSU	WUA Support Unit
WUA	Water Users Association

ABSTRACT

Kyrgyz Republic is rich in water resources in the form of glaciers coming from Tien-Shan and Pamir mountains, as well as fresh waters in rivers and lakes. Water as a resource is vital and inherent part of economic development of the Kyrgyz Republic. However, the Republic has become aware that the process of global warming that facilitates the glacier melting, lack of water that escalates tension among involved states of Central Asia and improper water resource management are leading to the necessity of seeking sustainable way of water management in the Kyrgyz Republic. First and foremost it relates to the Naryn River, the biggest Kyrgyz river, which possesses a huge influence on hydro energy generation within Kyrgyzstan and agricultural development of the Fergana Valley of Central Asian region.

Since sustainable water resource management in the Naryn River is very crucial, this study is carried out to explore Integrated Water Resource Management (IWRM) in the Naryn River of the Kyrgyz Republic.

First the study seeks to give an answer to the role of the Naryn River in the Kyrgyz Republic, explaining its significance within formation and operation of the Syr Darya River, identifying its employment in hydropower energy production and irrigation as well as main problems of their performance.

Second it discusses current implementation and challenges of Integrated Water Resource Management in the Naryn River through ecological, sectoral and regulatory integrations of the IWRM framework. Finally it gives recommendations how to enhance integrated water resource management in the River.

The researcher uses a Basic Interpretive and Descriptive Qualitative Study with a conventional data collection and analysis. Methods of an in-depth interview with purposive respondents and secondary materials are used for data collection, which are supposed to yield the best information for answering the research questions. Data analysis is made by means of the conceptual framework of IWRM with its predefined indicators.

As a result, this study finds the Naryn River as a vital economic resource in the Kyrgyz Republic and Central Asian region on the whole. It covers energy demand of the entire Kyrgyzstan and facilitates agricultural development of Uzbekistan and Kazakhstan. However, the analysis of the study reveals a very weak performance of Integrated Water Resource Management in the Naryn River. Despite the improvement of Kyrgyz water legislation, in many cases there are duplications of regulation functions among involved ministries and agencies within all administrative levels, mutual interference with activities of different organs and a lack of principle of subsidiarity. The creation of the State Water Administration as a central official body being responsible for water resource management of the Republic has not been yet fulfilled. Water User Associations turned out to be highly dependent on external financial resources.

Current water allocation of water resources of the Naryn River is not in the interest of the Kyrgyz Republic. Lacks of adapted mechanism of water distribution among the Parties and payment for water services are the main difficulties for sustainable management in the River. On the other hand poor condition of Kyrgyz hydro-technical facilities and inadequate financing O&M worsen the existing lie of matters.

In conclusion the research recommends the Government of the Kyrgyz Republic to strengthen support and control over WUA's activities; initiate projecting an institute of the Water State Administration within current financial budget; promote the Chu-Talas River Basin Agreement between Kyrgyzstan and Kazakhstan as a successful model for sustainable water management; to continue construction of Kambarata HPP-1 and Kambarata HPP-2 in the upper Naryn River for assuring stable water supply for energy and irrigation; further adaptation of IWRM approach to transboundary water management of rivers. Such recommendations are considered by the study to enhance Integrated Water Resource Management in the Naryn River of the Kyrgyz Republic.

CHAPTER ONE

INTRODUCTION

Introduction

Water is a crucial natural resource that forms regional landscapes and a vital resource for human environment and human prosperity. In the meantime water resources are exposed to significant stresses. Conversions of the hydrographical condition because of worldwide climatic change, economic and demographic alterations result in serious consequences for human beings and the ecosystem. The international community has begun to realize that already existing scarcity of water and escalation of tensions over possession of water, agricultural development, increasing water demand for irrigation and population growth, as well as environmental depletion of natural resources have become challenges that must be faced today.

Water resources play an overwhelmingly significant role in Central Asia. The former Soviet Union republics - Kyrgyzstan, Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan, occupying the area of over 4 million km³, which exceeds the aggregate land areas of India, Pakistan, Bangladesh together, are in possession of approximately 60 million people (Mosello, 2008). The bulk of water stems from stream flows, originating in mountain chains of Tien Shan and Pamir on the territories of the Kyrgyz Republic and the Republic of Tajikistan, which constitute

two main rivers in the Central Asian region – Syr Darya and Amu Darya –, finally running into the Aral Sea (Mosello, 2008).

Central Asia is located within an arid vegetation zone, where agriculture could be cultivated only by means of irrigation, requiring a complicated water allocation arrangement. In 1960 water resources in the region began declining once a sharp growth of needs for water resources provoked a considerable exhaustion of both stream flows, storages of ground water, and the degradation of water land resources. The drying-out of the Aral Sea, posing one of the large-scale anthropogenic environmental effects in the region, can serve as an obvious example of inadequate water resource management. (Mosello, 2008)

After the dissolution of the Soviet Union and the independence of the Central Asian republics, rivalry over water resources continued to intensify. Agricultural activities of the downstream countries such as Kazakhstan and Uzbekistan occupy one of the leading economic directions where agricultural products such as cotton demand high seasonal irrigation water. However, Kyrgyzstan and Tajikistan, the upstream states, make use of water resources as the main hydro-energy sources of electricity, which require permanent water collection and its releases. Inefficient regulation and allocation of water resources among the upstream and downstream republics raises difficulties for meeting interests of irrigation and hydropower generation. The growth of national independence along with competitive economic and political relations among the republics has complicated ways of resolving such difficulties in the region.

Water resource management of the Syr Darya River has become a key subject for consideration by the states in the region. Since the Syr Darya River crosses state

boundaries of the Kyrgyz Republic, the Republic of Uzbekistan and the Republic of Kazakhstan, it is essential to approach water management of the river within each country. From this perspective, the Naryn River of the Kyrgyz Republic requires a careful consideration for the following reasons.

The Naryn River, the biggest river in Kyrgyzstan, originates in the mountains of Tien Shan on the territory of the Republic and forms the Syr Darya River when it unites with the Karadarya River. Water resources of the Naryn River serve as main sources for hydropower generation in Kyrgyzstan and agricultural irrigation of Uzbekistan and Kazakhstan. Adequate water resource management of the Naryn River plays a crucial role in development of the Kyrgyz Republic and the region as a whole.

This study aims to determine how Integrated Water Resource Management in the Naryn River of the Kyrgyz Republic is being practiced, and to identify possible ways how it can be enhanced in the River.

Research question

The work intends to answer the following main question:

Is Integrated Water Resource Management being practiced in the Naryn River of the Kyrgyz Republic?

In order to answer the main question there are several sub-questions:

- What role does the Naryn River play in the Kyrgyz Republic?
- How are the Naryn River and its watershed being managed?

- How can Integrated Water Resource Management in the Naryn River be enhanced?

Research objectives

The main general objectives of the research are to find out of how Integrated Water Resource Management in the Naryn River is being practiced, and to find possible ways to enhance it.

Specific objectives of the research are as follows:

- To describe the background of formation and operation of the Naryn River and major purposes of using it in the Kyrgyz Republic;
- To describe institutions and organizations of water resource management of the Kyrgyz Republic and possible factors that influence their performance;
- To identify the status of water resource management of Naryn River, using the framework of Integrated Water Resource Management;
- To recommend measures or strategies for enhancing integrated water resource management in the Naryn River.

Significance of the Study

There are a number of studies and papers concerning of water resource management in the Kyrgyz Republic and the Syr Darya River basin of Central Asia as a whole. This study is extremely important because water resources of the Naryn River act as a provider for energy needs for the entire Kyrgyz Republic by generating electricity. It also contributes to the economy by exporting excess

energy to Kazakhstan and Uzbekistan. The river provides water for irrigation for these two downstream countries. As a major tributary to the Syr Darya River, it contributes to maintaining the ecological and hydrological functions of the Syr Darya River.

This thesis attempts to contribute to the existing knowledge by exploring water management in the Naryn River, based on the conceptual framework of IWRM. It also aims to generate recommendations for enhancing sustainable water resource management of the river and its watershed area.

The knowledge derived from this study could be beneficial for researchers, practitioners and policy makers to get a better and broader understanding of the concept of IWRM. IWRM is globally recognized as an approach for sustainable water management taking into consideration both the supply and demand aspects of water management. It also provides framework by which responsive strategies and policies can be formulated and effectively implemented.

Findings of this study could become helpful for public officials taking part in policymaking and decision-making processes of water and energy policy of the Kyrgyz Republic, in terms of providing holistic perspective and understanding of the entire gamut of water resources management.

Research Methodology

This research is organized in compliance with a Basic Interpretive and Descriptive Qualitative Study. There are certain arguments why the method is considered to be appropriate in conducting this study.

Merriam (2002) emphasizes that despite a wide variety of qualitative research designs, there are key distinctive features that characterize the interpretive research design. Firstly, researchers endeavor to *gain insights* into what human beings have created concerning their world and their knowledge. M. Patton (1985) clarifies that qualitative research is an endeavor to comprehend settings in their exceptional nature within a definite situation and its interrelations. The comprehension is a final goal in itself therefore it does not attempt to forecast future developments. The study directs to the depth of comprehension.

Secondly, researchers serve as *a main instrument* for data collection and data analysis. In this context a researcher, aiming at gaining a deep comprehension of the issue and flexible, taking the opportunity to enlarge the understanding by means of communication, to handle data promptly, to explain and summarize evidence and to interact with respondents for validity of interpretation.

Thirdly, the process of qualitative research holds *an inductive* character. In cases where there is no theory or an existing theory does not give a complete understanding of the issue, a qualitative study has its advantage at this point. Researchers seek for collecting materials to form themes, categories, hypothesis, concepts and theories from examination and interpretation. Normally findings are derived from data.

At last, the nature of qualitative study is *abundantly descriptive*. Researchers deliver their understanding and findings preferably by means of words and pictures instead of numbers. Descriptions in the form of citations from papers, field study notes, interviews of respondents, electronic communication provide support to findings of research.

Data collection

This research uses two main conventional sources of data – *primary* (interview) and *secondary* documents.

The researcher held interviews with eight experts from the Ministry of Agriculture and Melioration of the Kyrgyz Republic, which is a main executive body of the Government of the Kyrgyz Republic for implementation of Kyrgyz water resource management. The Farming Policy Development Department and the Department of Water Management of the Ministry of Agriculture and Melioration of the Kyrgyz Republic were selected as structural subdivisions of the Ministry, being in charge of designing and implementing state policies of agricultural development and water resource management. The experts are public servants who hold the following positions of the Departments, which are coded with letters:

1. *Head of the Farming Policy Development Department* of the Ministry (Code F1);
2. *Head of Crop Production Division* of the Farming Policy Development Department of the Ministry (Code F2);
3. *National specialist on Water User Association Development* of the Farming Policy Development Department of the Ministry (Code F3);
4. *Leading specialist on crop production* of the Farming Policy Development Department of the Ministry (Code F4);
5. *Leading specialist on seed production* of the Farming Policy Development Department of the Ministry (Code F5);
6. *Leading specialist on river water use* of the Department of Water Management of the Ministry (Code W1);

7. *Leading specialist on water resource management* of the Department of Water Management of the Ministry (Code W2);
8. *Specialist on hydrological monitoring* of the Department of Water Management of the Ministry (Code W3).

The researcher conducted the on-line interviews with the respondents. Such method is considered to be effective covering a wide range of relevant issues from experts who are engaged in the water resource management process. The questions were relevant to the basic elements of IWRM framework (See Annex 1).

After holding the interviews and making notes, the obtained data was processed in accordance with the conceptual framework of IWRM and transcribed according to the sub-objectives of the topic (See Annex 2).

Secondary materials were gained from various reports of international organizations and official bodies of the Kyrgyz Republic, books, journals, articles and official documents.

Data analysis

Data analysis of this qualitative study is made *simultaneously* with data collection. Merriam (2002) highlights that such a data analysis serves as an *inductive strategy*, which allows to make corrections immediately in process, for instance, with regard to redirection of data collection or to exercise evolving concepts against following data.

The conceptual framework of IWRM is used to analyse primary and secondary data for answering the main question of the study.

Limitation of the study

The researcher faces several constraints in conducting the interview. First, due to lack of time and financial resources, it was impossible to conduct face-to-face interview with the respondents of the Ministry of Agriculture and Melioration of the Kyrgyz Republic. The researcher resorted to on-line interviews, instead. Second, because of limited time and resources, the researcher has not been able to take interviews with an extended list of state ministries and agencies of the Kyrgyz Republic, involved in Kyrgyz water resource management in order to obtain wider scope of information according to the conceptual framework of IWRM.

Organization of the study

The thesis comprises five consecutive chapters. Chapter One introduces the problem statement, specific research questions and objectives, significance of the study as well as research methodology. Chapter Two presents a review of related literature on the concept of sustainable development, the conceptual framework of IWRM, River Basin Organizations, institutions and organizations and how they are connected to the research. Chapter Three presents a background of the study, formation of the Naryn River, the Syr Darya River, institutions and organizations of water management of the Kyrgyz Republic. Chapter Four contains the interview findings and discussions. Chapter Five offers conclusion of the discussion and recommendations.

CHAPTER TWO

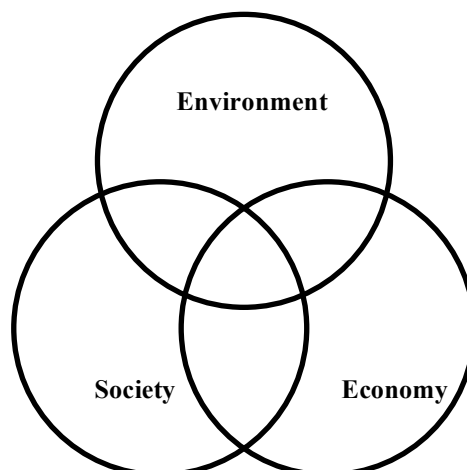
REVIEW OF RELATED LITERATURE

The Concept of Sustainable Development

To begin, it is noteworthy to emphasize that the term «sustainable development» was remarkably introduced in the Brundtland report «Our Common Future» and published by the World Commission on Environment and Development (WCED) in 1987. According to the Brundtland report “*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs*”. (“United Nations World Commission on Environment and Development”, 1987)

After accepting *Our Common Future*, by the United Nations General Assembly set out the principles of sustainable development within the UN Conference on Environment and Development (UNCED) in Brazil, also known as the Earth Summit, the concept of sustainable development became politically more significant. The concept represents three pillars of economic development, social equity and environmental protection, which are interrelated (Drexhage & Murphy, 2010).

Figure 2.1 “Three-ring sector” of Sustainable Development



Source: own compilation

The concept of sustainable development has been implemented mostly in framing approaches for further development, remaining as a conceptual framework. Due to its simplicity and flexibility, the concept has become attractive for various institutions, governmental sector, business and society as a guiding principle, which allows for application to their objectives. (Drexhage & Murphy, 2010)

Ciegis Remigijus, Ramanauskiene Jolita, Martinkus and Bronislovas (2009) within their Systematic Analysis of the main dimensions of sustainable development give interpretations of the three elements of sustainable development:

- Economic sustainability mainly aims at increasing income or capital supporting the reserve of assets, which are resources for benefits and income. The main purpose of economic sustainability is to keep and protect an optimal quantity of general capital for future.
- Ecological sustainability stands for conservation of biological and physical systems and health of the ecosystem. Thus it comes to preservation of biodiversity to guarantee stability and security of the ecosystem and its ability for adaptation to any changes in biosphere and nature. Most importantly biodiversity is almost impossible to replace with anything else.
- Social-cultural sustainability regards the stability of social system, maintaining activities between development and existing social norms. It seeks for minimizing weaknesses while maintaining social and cultural system and their abilities to adequately respond to any new changes in

social, economic and environmental spheres. (Ciegis, Ramanauskiene, & Martinkus., 2009)

Sustainable development is a multilevel concept with its different processes and stakeholders. To cope with all these factors of sustainable development, governance is regarded as a tool for ruling the processes of sustainable development. (Zeijl-Rozema, Cörvers, Kemp, & Martens, 2008)

Annemarie van Zeijl-Rozema et al. (2008) assume that governance is necessary in order sustainable development due tot he following factors:

- Within the content most issues of sustainability relate to *weak problems*, which need revising from different perspectives (tools, methods, way of thinking);
- Within the process due to *social complexity* that is characterized by interactivity of multiple actors and sustainability projects, policy have to deal with that;
- *Weak institutionalization*, which needs structural improvements, could become an obstacle in implementing activities of sustainable development.

The Concept of Integrated Water Resources Management (IWRM)

Water resources management

Water resources management represents the creation of infrastructure, the distribution of resources, the realization of incentives for its effective implementation and security and the provision of finance for all these

accomplishments. All of these actions amid the others form water resources management. (Lenton & Muller., 2009, p. 5)

Nevertheless water resource management is not entirely comprehended whereas the management of water use (for internal, agricultural or industrial needs) is quite clear. Individual users making the first interference in water resources management by releasing and storing water for their individual objectives frequently determine such a half-faced comprehension. However the nature and environment of hydrological cycle are very interrelated, which indicates that particular activities of individuals may cause positive and negative consequences for other users. (Lenton & Muller., 2009)

The issues concerning activities such as river diversions for flood prevention maintaining transportation, or construction of dams to collect water are the most visible features of water management. Though occasionally, visible interventions may bring to the connection of water resources management with building activities of massive infrastructure, which is not the case.

R. Lenton (2009) stresses “soft management” measures that stand for regulating the consumption of resource and possible clashes among the users. There should be some mechanisms of making distribution between users in a prognosticated way. In many countries rules, settling “soft management” have originated for such a long time over practice, in other states there are regulations provided for by law or by international treaties.

More considerable are other engagements, dealing with pollution abatement measures in order to protect water for others. It is far more complicated to track

regulation of water quality rather than to control regulation of water quantity because that needs engineering capabilities for monitoring and implementing.

Another important issue lies in the fact that it is necessary to know about financing water management actions. In the past, such actions were financed by the public sector because most of the benefits have represented public goods rather than direct benefits to distinct parties. Lately it has been revealed that obligation of environmental charges in water sectors that utilize rivers and lakes for waste disposal has capability to not only increase government receipts but also to facilitate economic inducements to treat wastes in an environmental friendly way (Lenton & Muller., 2009).

The sense of integration

Though the Earth Summit highlighted the relevance to make water managers take a holistic approach and to bring stakeholders of different segments together into decision making of water management processes, there was more emphasis on integration rather than promoting actors to cooperate jointly. Since water was regarded as commitment to wide-ranging economic and social development, it turned out that its organization and supervision were assumed to consider wider national priorities.

The meaning of integration falls outside merely the range of natural systems. It connects natural systems with human systems, which define interests of balance and main concerns of development and the water segment with other segments of the economy. But most prominently, it comes with “vertical” bridging

through scopes and levels of decision-making, starting from local, provincial and national to water basin and transnational. (Lenton & Muller., 2009)

However the notion of integration is not constrained to water. Moreover integration does not intend to become a culmination in itself. Although most segments and parts of activities are interrelated to each other, it is quite difficult to manage the entire segment and the parts as one unit. Many variant institutions and organizations are formed to comply with the requirements of coordinating specializations. Assuring efficient coordination among field-specific activities and institutions is a basic component of good management.

In that regard the concept of integration does not attempt to link and manage everything jointly, which probably would become unfeasible. And the integrated approach does not mean that decision-making processes of different segments should be eliminated completely.

Integrated Water Resources Management (IWRM)

Subsequently in the early 1990 integrated water resources management (IWRM) has emerged as a new concept for water management and basically has been about best practices rather than about novelty. The concept constitutes a set of approaches intending to attain sustainable development, accepted by UNCED in 1992, following the report “Our Common Future” of the Brundtland Commission.

The integrated approach of the concept appears to support in meeting challenges that conventional approach of water resources management is not able to accomplish. But in order to meet the challenges, it is necessary to be aware of criteria that could direct water resources management.

Originally Agenda 21 of the Earth Summit in 1992 formulated the basic principles best known as the Dublin Principles, which laid a foundation to the approach of IWRM. The Agenda 21 puts forwards the utilization of the resource base in the best ways to encourage goals of social equity, economic development and environmental sustainability. Thus IWRM proposes a problem-solving approach to cope with issues of water resources development by harmonizing:

- economic efficiency – to increase the use of water resources to the fullest extent and to distribute water purposefully to diverse economic segments and utilizations;
- social equity – to provide fair access to water and the profits of water use, among males and females, wealthy and poor, between diverse economic and social groups that include issues of granting rights, accession and regulation;
- environmental sustainability – to safeguard water resource potential and connected water ecosystems as well as to contribute in addressing world environmental challenges.

“IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.” ("Global Water Partnership Technical Advisory Committee", 2000, p. 22)

Conceptual Framework of IWRM

IWRM introduces new perspectives of water governance in order to reach maximum social benefits. The conventional approach or *engineering* approach is

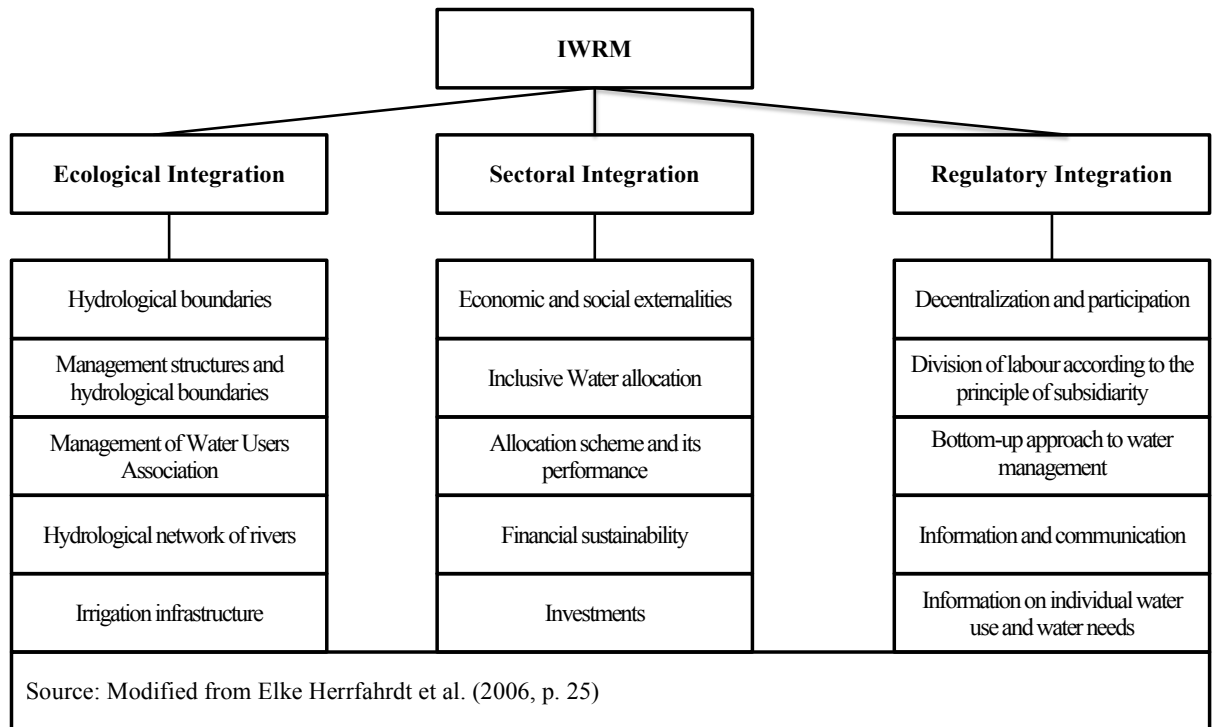
regarded having its irrelevance and weak spots due to growing populations and economic development. IWRM proposes an *integrated* approach with the holistic vision that includes three aspects of integration (Herrfahrdt, Kipping, Pickardt, Polak, Rohrer, & Wolff, 2006):

- Ecological integration based on eco-system approach;
- Sectoral integration of economic, ecological and social externalities of water management;
- Regulatory integration, which involves decision-making framework to analyze demands and efficiency of water use.

Herrfahrdt et al. (2006) emphasize several factors of irrelevance of engineering approach to water management:

- Water was regarded as an invaluable and infinite resource so that economic constituent of water supply was not revised properly;
- Environmental and social aspects were not evaluated systematically so that the nexus among economic, environmental and social developments were irrational;
- Ignorance of hydrological and ecological interactions of water resource management;
- Hierarchical top-down system causes a gap between water managers and water users that results in decreasing efficiency.

Figure 2.2_Conceptual Framework of the Study



Eco-system approach of ecological integration

Hydrological boundaries

IWRM regards water as having no boundaries like national boundaries or district's boundaries as a *hydrological unit* with its catchment area and sub-catchment areas that should be taken into consideration as a whole. Due to unflow of water within hydrological units, IWRM regards it as an insistent need to manage a catchment area as a whole. (Technical Advisory Committee of Global Water Partnership , 1999)

Additionally the interaction of surface water and groundwater represents another segment of hydrological boundaries, which makes the management of hydrological unit more complex. IWRM stands for considering this interaction of

surface water and ground water by evading, for instance, contamination of ground water with substances coming from rivers, or shrinking of rivers because of ground water overuse. (Technical Advisory Committee of Global Water Partnership , 1999)

Water quantity and water quality

Due to the growing pollution of water and current changes of temperature *water quality and quantity* should be regarded in an integrated way. There should be specific regulations to measure pollution and waste, to control the level of pesticides and fertilizer application to protect pure water sources for drinking. Moreover there is the most important part for implementation. One of the prerequisites is to provide a monitoring system of environmental regulations to collect data of water quality and quantity.

Water-land interaction

Ecological integration of IWRM requires giving serious attention to the impacts of land use on water utilization and impacts of water use on land. The most widespread difficulty of water-land interaction is an accretion of silt of reservoirs and canals resulting from erosion. Deforestation, intensive cultivation, or overgrazing are frequently the main reasons for erosion. Deforestation facilitates fallouts of runoff since forests serve as a buffer, which infiltrates and consumes water. At the same time alterations of water flow have influence on land areas. In the case of shrinking water flow it can cause disappearance of wetlands and lakes, turning them into deserts. On the contrary, the growth of water flow feeds off the growth of plants, however, it may result in salting and overwatering of soil.

Sectoral integration

Ecological externalities

The increasing understanding of ecological problems has significantly further advancement of IWRM. While the conventional approach has not considered nature as a rightful water user, IWRM acknowledges the true importance of nature.

Ecological integration is conceived as a simple determination of eco-systematic correlation that may be driven just by an economic rationale. Integration of ecological externalities, and vice versa, implies that impacts of water management to nature or environment are combined into a group of goals for water manager. Nature and environment are defined as values in themselves. The political system needs to call together and transform social favors into water management regulation, which determines an optimal balance between the healthy natural environment and economic benefits from water use. Therefore it is hard to find out in advance the best way of tackling of ecological issues. However, water management at least needs accurate consideration of ecological concerns to promote IWRM principles.

Economic externalities

Sectoral integration of economic segments requires that the full price for water should assure a long-range survivability of water supply service and keep under control water demand under control in order to provide sustainable management. Thus such a sustainable management demands that all direct and indirect water users should pay prices, which is equivalent to the full water cost. (Technical Advisory Committee of Global Water Partnership , 1999)

Such an economic segment implies that water executives consider all water demanding activities as irrigation, energy production, household provision and so on. In this regard water distribution could be directed towards the most profitable economic utilizations. In reality for the most part water resources have been engaged in economically less beneficial but politically strong stakeholders, for example, agrarian sectors that often enjoy more advantages. Water consumption could be directed to industrial activities or provision of potable water, which carry more benefits rather than to cultivation of inferior crops such as wheat or fodder. Baseless advantages of certain actors should be excluded to provide effective water distribution (Herrfahrdt et al., 2006).

Social externalities

Problems of measurement also occur in regard to social externalities of water management. It is incredibly difficult to quantify the importance of human welfare, of poverty decline, of fair gender relations. But in the case of water management it has significant influences – both positive and destructive – on these issues. Once ignored, social issues have occurred within the framework of water management, which Millennium Development Goals highlight as well. In this regard there is a unanimous agreement that effective performance of water management improves development of humans in no small part. For instance, rural development based on irrigation allows communities to fight poverty or hunger and slow down the process of rural emigration. Moreover when drive over decreasing water resources results in escalating water “stress”, rising conflicts can have a danger of destabilizing local communities or entire societies (Herrfahrdt et al., 2006).

Regulatory integration

Decentralization and participation

Conventionally water management accepted a top-down approach wherein governments such as official organs of infrastructure or water resources made decisions on behalf of people in terms of what volume of water to provide, to which water users and when and also what infrastructure to develop.

At this point IWRM requires that the differentiation of labor in water management should be formed in line with a principle of subsidiarity. (Technical Advisory Committee of Global Water Partnership , 1999) It implies that decision-making needs to be accomplished at the lowest proper level. However there is a general misleading conclusion that decision-making always need to be taken at the lowest level. IWRM seeks for coordination within a basin level and unity of decision-making organization. IWRM needs a proper differentiation of competencies of administrative units according to their certain responsibilities at each level. In practice most countries still have inadequately integrated decision-making organization of the water sector.

Demonstrating the necessity of increasing participation is one of the most effective ways to develop interaction among water managers and water users. One of the existing mechanisms to promote participation is a foundation of Water Users Association (WUA). There is a possibility to fosters farmers to cooperate within these associations to govern their own water provision at the local level. The farmers are considered to make decisions on water supply on their own as well as to take charge of operation and maintenance of infrastructure.

Such a straight participation of water users in water supply is expected to increase the quality and efficiency of water management, consolidating bottom-up approach.

River Basin Governance

IWRM is essential for providing water, energy and food security with its multisectoral standpoints, its emphasis on considering present availability and future needs of water, and its emphasis on social, economic and environmental integrity and its active involvement of stakeholders. The practice of IWRM makes a switch from segmented and sectoral projection to crosscutting long-standing development, which takes a holistic and comprehensive form.

For the last 10 years Asian countries have accepted water policies and legislation at national levels, which encourage the principles of IWRM in river basins. Accomplishment of the water policies is developing in the direction to cooperation amid central and local authorities, businesses and civil society to make water-related advantages meet national and local interests and needs.

River Basin Organizations (RBO)

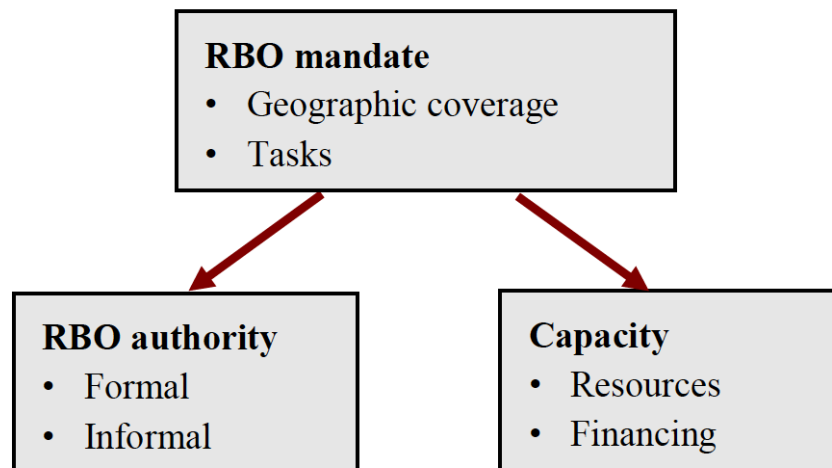
In Asia, a broad diversity of RBOs provides inputs to governments and other actors to carry out IWRM in river basins. Most RBOs function within a framework, which government departments usually have. The level of development, management needs in a concrete river basin and appropriate distribution of management duties between RBO and other organizations determine

an objective of RBO. RBO is engaged into different intersectional activities such as control, development design, realization and others. (Isnugroho & Nielsen, 2014)

According to Isnugroho (2014) generally RBO may be determined by its

- *Mandate*
- *Formal and informal authority*
- *Capacity*

Figure 2.3 River Basin Organizations



Source: (Isnugroho & Nielsen, 2014, p. 3)

The most important characteristic among the last two of RBO is a mandate, which defines what to do. Then the authority and the capacity of RBO are formed in accordance with the mandate. In a reverse situation a fulfillment will become low than expected.

In the case when a course of water-related activities alters, RBO has to adjust to new conditions, tasks and prospects. This can demand a modification of RBO's mandate, and further modifications of authority and capacity.

In its turn the difference of authority between *formal authority* (the government confers powers to RBO) and *informal authority* (consideration and credit) derives from decision makers, water users and various stakeholders. Moreover they are not immediately interconnected. (Isnugroho & Nielsen, 2014)

Some RBOs enjoy formal authority to a high extent while other RBOs do not. However, organization may bear imperative responsibilities and exercise them usefully and efficiently in both cases. (Isnugroho, 2009)

Isnugroho (2009) underlines that it is compulsory to have authority at least alternatively authority is at a minimum very helpful with regard to management responsibilities, dealing with water distribution, function and management of physical infrastructure (water supply and irrigational systems). However, generation of authority might become problematic and take considerable time and even sometimes it can be unnecessary. In such cases this may refer to key management tasks like policymaking and projection, cross-sector direction, scope of development and water allocation and sharing.

Informal authority in its highest level represents an asset for all RBOs though it is almost impossible to function properly without enough formal authority for councils and committees. As soon as it comes to accomplishment, government or a corporate RBOs might persist and will encounter serious obstacles.

Decent fulfillment and good informal authority stay dependent on each other and can evolve at the same time. And a high sense of credibility, a capacity to offer efficient solutions during water scarcity, a relevant comprehension and a determined impulse or advance of water governance and elaboration can facilitate this collaboration.

Three models of RBOs: The Council, Public and Corporate RBOs

There are many forms in which RBOs can function such as councils, committees, commissions, water boards, agencies and corporations. The exact term is not determined, but is associated with the status of RBOs. This variation of RBO's names specifies the level of formal authority.

Isnugroho (2014) distinguishes basic differentiation among the three models:

1. The council (or committee), giving directions to water related collaboration, water distribution and sector planning on basin level. Responsibilities of Secretariat can be established from outside, for instance, by a public RBO. The council is a unit of participants that represent different stakeholders from government, institutions and individual.

The strength of the council is connected to its objective – to operate as a basis for cooperation among governmental and non-governmental actors, representing a wide spectrum of interests of water resources management and evolvement.

Subject to the condition that the council operates properly, it can offer knowledge and inspection of water-related issues and needs, good interaction of planning at state, provincial and river basin levels for diverse sectors, ad hoc expertise and technological innovations and private sector evaluations with its own program of evolvement, which is additory to the public sector.

2. The public RBO (or river basin office) has a status of state body, frequently is managed and structured under a ministry by public servants. The public RBO is

an integrated unit of state system and it can comprise governmental and non-governmental representatives where its authority is a part of state authority.

IWRM-based RBO has to be cross - disciplinary or cross-agency at its root however typically it operates under official body and is responsible for state water resources management. On the other hand institutional involvement can influence the operation of the RBO so that much of intellectual capacity will base beyond the RBO and sectoral organizations other than a main organization will carry out fulfillment of development tasks. Such an institutional cooperation or connection can occur in respect of mutual administration of irrigation and agriculture or groundwater and surface water and so on.

One of the most important strengths for the public RBO is its legal authority. It stands for accomplishing plans and policies, which demand regulation. Compulsory execution of regulation is in a need of legal authority as well.

3.The corporate RBO functions as a separate authorized unit even if its ownership belongs to the state. In this case the RBO operates independently from government system and, entitled to a government administration and arranged acts, the RBO has an opportunity to make its own decisions. It is in charge of handling its own finances, revenues and employment issue. It is financially self-governing, but not totally independent since the state may fund the RBO and become a part of funding the RBO, being dependent on obligations and the scale of cost recovery.

There are three certain characters of the corporate RBO:

Performance focus: The public corporate RBO has certain advantages with reference to legal significance, administration, staff resources, technological improvements, organizational adjustments, reimbursement of expenses and

financial proficiency. It possesses a better capability to adapt to different necessities and knowledge. The public corporation is much easier able to reconsider responsibilities, employ new personnel and form new sections if necessary.

Implementation of decisions: When an investment (or other) request has been determined as helpful, it may be supported by intra-entity resources rather than by some companies, which are outward to the RBO that has made the request. With account of acceptable economic feasibility and reasonable effects, the investment may be funded in distinctive ways, counting loans that is unconnected from a long-lasting public investment processes.

Integration of basin management: Development projects can be implemented as entities, rather than getting divided into constituents of distinct sectors as usual prerequisites for accomplishment by line companies based on sectoral preparation. This diminishes the necessity of inter-companies reconciliation of main concerns and allows main concerns to be considered in an integrated standpoint rather than as an arrangement of discrete sector priorities.

Four elements of river basin approach

Bandaragoda (2000) focuses on four key elements of river basin approach that could be commonly practiced in any basin locations. These elements basically come according to the Murray-Darling River Basin model:

Appropriate Institutional Arrangements

There are multiple groups that deal with utilizing and managing water resources where each of them has a tendency to give a priority according to its needs. Usually this process is accompanied with no coordinating instruments within

sectoral water resources use. Thus examination of all water users and water uses in the framework of river basin encourages coming up with a relevant crosscutting coordination. Moreover, the actors can cooperatively take out concurrent gains by integrating their administrative efforts.

In order to benefit by integrating an administrative effort suitable forms of institutional arrangements (regulations) have to be established. Clear and well-organized rights and obligations with accurate policies, laws, organizational structures and procedures should design an anticipated performance of different stakeholders. Institutional arrangement should form well-structured and effective platform so that different actors could be familiar with their right and obligations.

In this regard the main goal of that must be to supervise operative organization and accomplishment of efficient and well-proportioned use of natural resources within river basin.

Reliable Information Base

Water resources management of a river basin should rely on a sense of knowledge for effective supervision and institutional accomplishment. Since the physical and social features of a river basin structure are less noticeable rather than a more evident irrigation structure, water management should bank on a profound database about economic, social, environmental, institutional and physical factors of a river basin.

The different stakeholders and different segments exploiting land and water resources in the frame of river basin need to comprehend and evaluate the requests

of each other, and the restrictions being obligatory to all of them due to general environmental regulations.

Integrated Natural Resources Management in a River Basin

There are a lot of actors (individuals, units) within a river basin that are engaged in exploiting land, water and environmental resources, following distinct sectoral objectives. A river basin approach in water resources management facilitates attainment of the best degree of integration between all possible uses of natural resources. Such integration comprises a directed complex of policies and regulations, dealing with natural resources of the basin, as well as an impactful supervision of the organizations, which are deployed for natural resources management. For instance, land legislation must be in harmony with legislation, which regulates the use of surface and ground water and makes provision of environmental protection.

The river basin approach to natural resources management promotes a coordinated exertion in managing ways of the resources use inside the basin.

Strong Community Participation

A large number of water users of a river basin, having multiple diverse purposes, demand a high level of supervision or coordination in their endeavors. The necessity for better supervision requires a better participation of all water users in resource management.

Usually local communities can more obviously and more simply determine challenging issues regarding local natural resources. Long-standing unions with a river basin character allow local people to accumulate sound knowledge concerning

the natural resources development and limitations on the resources utilization. Strong community participation induces a correction in the current authority relationship inside and beyond communities. Community participation vest local people with authority, affording ground for own decision-making within reconciliated regulation.

Institutions and Organizations

Institutions and organizations became a part of life-sustaining activities where people take the latter in a general sense on trust without getting clear in their mind that they may imply different notions. Taking into institutional arrangements into account it is significant to know a distinct conception of institute and its relationship to organizations since these terms have gained sufficient quantities of definitions and meanings according to one or another purposes they are used for.

According to Jepperson (1991) institution and institutionalization constitute basic concepts of general sociology. Many academics approach the terms to some purposes or other to associate with proximity of authoritative rules or binding organizations. In this regard the core notation of institution in general sociology could mean “an institution as an organized, established procedure” Jepperson (1991, p. 143). Such particular procedures usually have the form of composing rules of society (“the rules of the game”).

Institutional economics accepts the corresponding definition of institutions where D. North (1990, p. 3) describes them, as “rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction”.

The institutions adopt fundamental rules and formulate impetuses, information and enforcement, which drive economic output.

Bandaragoda (2000) distinguishes institutions as a composition of policies and aims, legislative regulations, organizations and their jurisdictional base, operational course of actions and procedures, motivation mechanisms, accountability and traditional norms, customs.

Formal organizations are commonly explained as systems of directed and well-ordered actions, which occur when work is rooted in complex arrangements of technical interactions and exchanges. However in contemporary societies organizational arrangements progress within extremely institutionalized structures. Businesses, policies and plans get formed together with the products and services that they are supposed to make in a rational way. Such an activity allows other new organizations to emerge and encourages organizations in existence to combine innovative methods of working and processes. Organizations which are determined to integrate the practices and procedures are designated by predominating rationalized conceptions of organizational work and institutionalized in society (Powell & DiMaggio., 1991).

On the other hand organizations introduce purposeful formations projected by their founders in order to increase abundance, gaining and other purposes determined by the prospects provided by the institutional structure of the society. In the exercise of achieving those goals, organizations gradually change the institutional structure. They could be no longer socially productive since institutional framework may very well possess distorted incitements. In this regard organizations will work as a function of institutional restraints (North, 1990).

The Nature of Institutions and Organizations

Institutions possess different outlets as a widespread issue that has an impact on many aspects of inter-relationship of human relationships. Eventually institutions have various explanations and specifications touching upon diverse disciplines and theories.

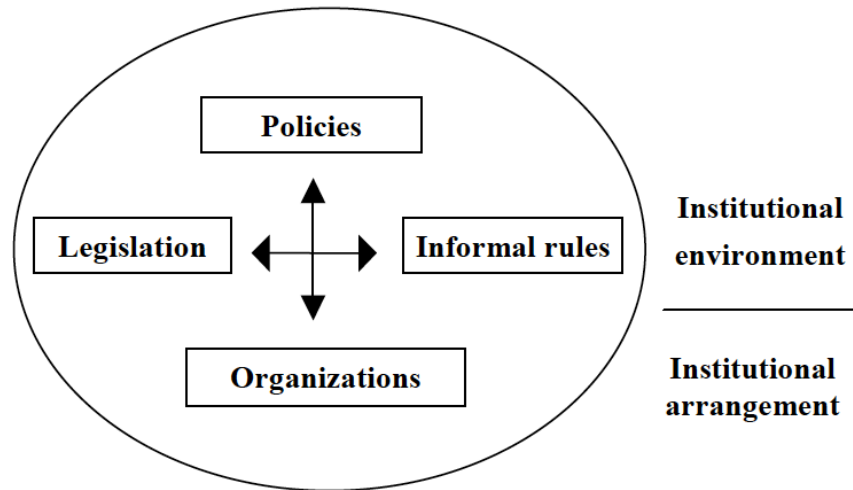
According to some researchers, attempting to increase their mental capabilities and to expand their limits, apply institutional forms for organized information, knowledge and skills. Institutions represent a systematic knowledge, which comes from wisdom arising from inherent principles in nature and agglomerated knowledge of society. In this regard institutions and knowledge serve as substitutions, having interconnection between each other. Institutions as a substitute are capable of providing with thorough information and thus could give a profound foundation for making a right decision (Saleth & Dinar, 2004; North, 1990; Simon, 1957; Coase, 1960).

In order to approach the nature of institutions and their functions they can be organized into two diverse sectors. These sectors basically rely on differentiation among *institutions* and *organizations* or between *institutional environment* and *institutional arrangement*. Institutional environment is characterized as a complex of essential political, social and legal regulations, which set a foundation for production, exchange and proliferation. Institutional arrangements represent a structure where every individual of society or a group of society associate or emulate. It comprises a governance structure that develops to better forms and interrelates with institutional environment, which in its turn sets a regulation (Saleth & Dinar, 2004; Williamson, 1995; North, 1990; Davis & North, 1970).

The governance structure combines organizations – political or economic, which get involved into building up partially institutional arrangement. It is important to stress that organizations or institutional arrangements exercise a function of “*agents of institutional change*”. Whereas regulations define result, organizations or individuals are capable of altering the rules being stipulated by their respective part of the result or by their political negotiating ability. Thus, institutional arrangements possess mechanisms to influence changes in institutional environment (Saleth & Dinar, 2004; Williamson, 1994; North, 1990).

There is no certain distinction between institutional environment and institutional arrangement, however it may range depending on specificity and scale of analysis. In this context several sectors of institutional arrangement could turn into portion of institutional environment and on the contrary. In the dimension of water resources political, economic, social and water resources institutions interact as a part of institutional environment. Institutions, becoming as a part of governance structure or institutional environment, are regarded as a complex of regulations connected and organized in order to attain goals or to bring attention for issues at stake (Saleth & Dinar, 2004).

Figure 2.4 Water Governance



Sources: Herrfahrdt et al. (2006, p. 34)

Water governance becomes the aggregate of all institutions and organizations or institutional environment and institutional arrangements that are interrelated to each other.

Herrfahrdt et al. (2006) stresses on the necessity of being aware of characteristic features of water institutions and organizations that play an important role, engaging with social environment.

Formal and informal institutions

Informal institutions, deriving from traditional habits, customs and kin relationships are regarded as “rules-in-use” and in a majority they enjoy more power rather than legally adopted laws. Traditional practice, norms, and customs work as a pillar for formal regulations, legislation and policies. Such institutions are considered to be more effective and stable and generally recognized. Therefore,

effective water governance of the Kyrgyz Republic depends on whether informal features are taken into account in fulfillment of water policy and regulations (Herrfahrdt et al., 2006).

Embeddedness

Successful implementation of water policies contend not only with informal rules but also it should be integrated into the general institutional framework, formed by other regulations of society. In this connection it is essential to make sure that water policy and legislation in the Kyrgyz Republic get harmonized with already existing regulations in all spheres of interaction such as land laws, environmental laws and other legislative norms as well as with informal work of water allocation. Only with account of all these abovementioned issues in their complexity water policy could be implemented effectively (Herrfahrdt et al., 2006).

Stability and Durability

Stable institutional arrangement ensures a consistent interrelation of people, decreasing indeterminacy and advancing the institutional framework. There are two specific points that affect institutional stability – learning ability and path dependency. Ability to learn is characterized to what extent organizations are able to adapt to new information. It is indispensable for organizations to have effective learning ability in order to become a stable institution. If this is not the case new organizations will appear for substitution. Path dependency is determined by the fact that oftentimes institutional change get constrained in space. The entire optimization is not realizable because existing historical aspects of institutional development are vital and those institutions, developing for a long time, have more

possibilities to increase their outcomes. Thus such institutions take priority in comparison with alternative institutions that even could be more successful in a long term. Path dependency sets certain limitations for institutional change and provides stability (Herrfahrdt et al., 2006).

After acceptance and accomplishment of new water legal regulations of the Kyrgyz Republic most official rules are exposed to alteration. In such circumstances of fluctuation, informal institutions and regulations assume prominence since they come as guarantors for stability in a fluctuating atmosphere. Having a top down management system from the Soviet time, water management of the Kyrgyz Republic is likely to miss learning ability, facing difficulties in adapting new rules, for instance, evolution of all stakeholders, as the last-mentioned are far away from traditional understanding of water management and possibly are connected to delegation of power. On the other hand on this account perhaps water users are not willing to demand their rights to get involved. Giving it in other words participation could be possible if water resource organizations, thinking of their specialists and awareness of stakeholders undergo a significant change. The same holds true for the necessity of decentralization of power (Herrfahrdt et al., 2006).

Analytical Framework: Institutional Decomposition and Analysis (IDA)

This section highlights IDA framework, which is proposed by R.Saleth (2004), and identifies the key parts of processes of institution-performance interaction within the water sector. The arrangement of analytical features of IDA

framework can be carried out in accordance with several stages. The concepts of *water sector*, *water institution* and *water sector performance* are determined to establish an extensive configuration of analysis. Then, water institution and water sector performance are essentially deconstructed to pinpoint main constituents and sub constituents. Finally, implementing this deconstruction process, taking into account the principles of IWRM, the analytical linkages between constituents of water institutions are determined and the impacts of both internal and external factors to the process of interrelationship amid water institution and the performance of water sector are evaluated.

Conceptual basis

The elucidation of the conceptual basis of *water sector*, *water institution* and *the performance* is indispensable to define the scope and perspectives of the analytical framework.

Water Sector

In the framework of this study, water sector represents surface, undersurface and cultivated sources. Likewise, the water sector covers consumptive and non-consumptive water uses as well as all main concerns starting from water quality and quantity and ending up with drought, flood and so forth.

However, basic consideration within the water sector lies more on general sectoral tendency and characters instead of on precise elements and particulars, since water sector is observed through macro prospect of a state or a region of a state. Nevertheless the macro prospect of water sector encompasses micro aspects with the object to strengthen the concentration on core idea of this study.

The macro perspective provides a supplementary benefit to examine the interfering impacts, which some of factors may expose to the interrelationship process.

Water Institution

Water institution, as well as water sector, is considered through macro prospect of a state or region and deals especially with the formal segments. Provided by the literature, institution has a wider scope of comprehension than the organization. In this regard institutions are defined to overtake the legal regulation, policy issues and administrative arrangements. Thus water institutions can be theorized as a unit, which is specified by three key constituents – *water law*, *water policy* and *water administration*. In this study water institution is considered as an amalgamated structure that includes both institutional environment and institutional arrangement.

The amalgamated structure of water institution is necessary to reach two analytical prerequisites, which stand for, firstly, accepting various approaches to institutional decomposition and, secondly, segregating water institution from its common environment.

The approach for the institutional decomposition comprises an analytical differentiation among the institutional constituents – water law, policy and administration. The structure of water institution, determined by these constituents, should be distinguished from its common environment to know how various external factors influence the structure and its performance. Such factors represent

aspects such as formal, policy and administrative issues, which are not related to water sector and institution.

Analytical Decomposition

While an institution is an incorporation of complex and integrated rules, it may be taken apart completely with a view to rules or their arrangement. However such an approach is not able to seize key aspects, which are very relevant for institutional linkages and their performance influence. Despite that the deconstruction based on rule's arrangement can cover the characteristics of various rules, it is not able to seize definite macro properties of two or more rules. Moreover the rule-based deconstruction encounters a difficulty in comprising the performance involvement of the linkage of rules.

R. Saleth (2004), taking into consideration of these limitations, proposes another approach, which deconstructs water institution with the view of its main *institutional constituents or components* and *institutional aspects*. Such constituents and aspects consider not only rules and their arrangement but also their general characters and performance involvement. In this connection such an approach has a more universal perspective to the decomposition that the rule-based approach has.

Deconstruction of Water Institution

There are two levels of the analytical deconstruction of water institution. At first, water institution is broken down into three institutional constituents or components – *water law*, *water policy* and *water administration or organization*. At the second level, the institutional components are broken down into *institutional aspects*. Though it is simple to define the institutional aspects of the components

that are implicated in water institution, it is problematic to deal with all the components within a single and manageable framework. Hence in order to have a good assessment, it is vital to focus on some of key institutional aspects as major factors for institutional and sectoral performance.

<i>Table 2.1 Breakdown of Water Institution</i>		
Water Law	Water Policy	Water Administration
<ul style="list-style-type: none"> -Legal treatment of water and related resources; -Format of water rights; -Provisions for conflict resolution; -Provisions for accountability; -Scope for private sector participation; -Centralization tendency; -Degree of legal integration within water law. 	<ul style="list-style-type: none"> -Project-selection criteria; -Pricing and cost recovery; -Interregional and sectoral water transfer; -Private sector participation; -User participation; -Linkage with other economic policies; -Law-policy linkages. 	<ul style="list-style-type: none"> -Spatial organizations; -Organizational features; -Functional capacity; -Pricing and finance; -Regulatory and accountability mechanisms; -Information, research, and technological capabilities.
Source: R. Saleth (2004, pp. 97-98)		

CHAPTER THREE

DESCRIPTION OF THE STUDY AREA

Background of the study

The Kyrgyz Republic is mountainous country with a population of 6 million people¹ and total land area of 198 thousand square km. Most of the Kyrgyz territory (approximately 94%) is over 1000 m above sea level ("Ministry of Agriculture and Melioration of the Kyrgyz Republic; United Nations Economic Commission for Europe; Organisation for Economic Cooperation and Development; European Union Water Initiative", 2013).

Figure 3.1 Map of Kyrgyzstan



Source: Kyrgyzstan: location. [Map/Still]. In Britannica Online for Kids. Retrieved from <http://kids.britannica.com/comptons/art-52657>

¹ The President of the Kyrgyz Republic Almazbek Atambayev, at the meeting with the Prime Minister of the Kyrgyz Republic Temir Sariev on November 26, 2015, announced that the population of the Kyrgyz Republic reached 6 million people. (Retrieved from http://www.president.kg/ru/news/6971_prezident_almazbek_atambaev_nas_stalo_6_millionov_i_rost_naseleniya_kyrgyzystana_govorit_ob_uverennosti_lyudey_v_buduschem_svoey_stranyi_/)

Kyrgyzstan has a very rich capacity of fresh water resources, which are contained in mountainous glaciers, big rivers, lakes and groundwater reserves. It has been estimated that the total amount of water resources in the Kyrgyz Republic is 2458 square km, where 650 square km of water stored in glaciers, 1745 square km in lakes, 13 square km in groundwater reserves and 44.5-51.9 square km in river flow annually ("Organization for Economic Cooperation and Development", 2013, p. 23).

Water resources in the Kyrgyz Republic is the most important natural resource which provides better quality of life and health of the people, food and energy security and economic development of the state. At the same time the Kyrgyz Republic has been experiencing some problems related to water resource management, starting from quality of accessible water resources and natural threats that may have a serious impact on physical water resource management facilities. Apart from these, water resource management and its infrastructure services for the most part have poor standards which influence socio-economic development negatively as well. ("Organization for Economic Cooperation and Development", 2013, p. 23)

After the dissolution of the Soviet Union and the independence of the Central Asian republics, the countries of the former Union shaped the courses from a centrally planned system to a market system, taking into account their interests and resources. Kyrgyzstan has also been forced to revise its interests and capabilities, taking into account political and socio - economic realities in order to develop the national economy and maintain sovereignty.

The main priority for the economic development and security of the Kyrgyz Republic has been the development of the water and energy policy and improvement of water resource management in order to provide people's domestic needs with water and electricity produced by the Toktogul hydroelectric power stations, collecting and releasing water from water reservoirs. The Toktogul reservoir is the biggest one in the Syr Darya River in the Kyrgyz Republic with a multiyear storage capacity where 14 bcm of accumulated water is an active storage volume.

At the time of Soviet period water resources of Central Asia were the common possession of the Soviet Union where Kyrgyzstan and Tajikistan as upstream countries provided Uzbekistan, Kazakhstan and Turkmenistan as downstream countries with water flow in summer time. In return the downstream countries provided them with gas, coal and electricity as amends for the lost energy that could be produced by hydroelectric power stations ("United Nations Development Programme", 2003).

After the "Parade of Sovereignities" in 1991 Kazakhstan, Uzbekistan and Turkmenistan stopped supplying gas, coal and fuel oil in winter on a mutually compensatory basis in return for the discharge of water during the growing season, forcing Kyrgyzstan to buy fossil fuel at world prices.

In that sense it is necessary to point out that Kyrgyzstan collects and manages water flows originated on its territory, formulating the Syr Darya River. Mostly the water of the Syr Darya River goes to cotton yield of Uzbekistan and Kazakhstan, while Kyrgyzstan has been keeping financial costs for maintenance of dams and reservoirs and continues to store and release necessary amount of water for

downstream states at no cost to its detriment ("United Nations Development Programme", 2003).

In this connection, Kyrgyzstan has to switch the Toktogul hydropower electric power plant within the Syr Darya River basin from the irrigation regime to the hydro energy to provide its population with electricity in winter as a time of high demand.

As a consequences tensions have escalated between the riparian states in the Central Asian region that are not focused on water allocation in the Syr Darya River basin but in terms of switching the Toktogul hydroelectric power plant from irrigation to hydro energy regime in inappropriate time for vegetation period of crops but appropriate for producing energy (Wegerich, 2008).

Within the Intergovernmental Agreement between the Government of the Republic of Kazakhstan, the Government of Kyrgyz Republic, the Government of the Republic of Tajikistan, and the Government of the Republic of Uzbekistan Concerning Use of Water and Energy Resources in the Syr Darya River basin (1998) the upstream countries confirm the necessity of rational and efficient use of water in the Syr Darya River basin where mutual compensation for regulating and maintaining water infrastructure of the Naryn and the Syr Darya Rivers should be provided (Wegerich, 2008).

Unfortunately there is no optimal approach to water resource management between the upstream and downstream countries in the region.

Despite the difficulties related to a physical and moral deterioration of the existing water infrastructure, a lack of financing construction of new hydropower stations, a lack of financing costs for maintenance and operation of water systems

the Kyrgyz Republic has to switch off the electricity for its people, refraining from producing energy by the Toktogul hydroelectric power station in winter. Instead the state goes on collecting water for irrigation of downstream countries' crop in the vegetation period.

On the other hand it is quite relevant to stress challenging issues of global warming. With the tendency of climate warming there is a progressing process of glaciers melting in the Kyrgyz Republic. According to some assessments, the area of glaciers will decrease by 30-40% by 2025, leading to shrinking of stream flow by 25-35 % in Kyrgyzstan. Following the estimation of the Institute of Hydroenergy under National Academy of Science of the Kyrgyz Republic currently the glaciers is melting three times faster than they did in 1950. Keeping such an intensive pace of glacial melting Central Asia will become very close to ecological disaster in as soon as in 20 years (Bakas uluu & Smagulov, 2011).

Formation and operation of the Syr Darya River

The Aral Sea basin of the Central Asian region is a territory of about 2.2 million sq.km with population of 35 million in the Kyrgyz Republic, Republic of Uzbekistan, Republic of Tajikistan, Turkmenistan and South Kazakhstan. The Syr Darya River and the Amu Darya River are the two major rivers in the region that flow into Aral Sea and formulate Aral Sea basin.

The Syr Darya has the length of 2200 km with a discharge of 37 billion cubic meters (BCM) annually and it takes its beginning with two tributaries, the Naryn and the Karadarya rivers, which are originated in the Tien Shan mountain of the

Kyrgyz Republic, flowing through Republic of Tajikistan, Republic of Uzbekistan and Republic of Kazakhstan ("The World Bank", 2004).

Figure 3.2 Map of the Syr Darya River



Source: Eelke Kraak. 2012. The Geopolitics of Hydropower in Central Asia: the Syr Darya. Retrieved from <http://apjjf.org/2012/10/15/Eelke-P.-Kraak/3737/article.html>

During the Soviet period, the water of the Syr Darya and the Amu Darya River basins were diverted for cultivating agricultural products such as cotton, wheat, fodder, fruits and vegetables through construction of irrigation infrastructure – canals, dams (diversion and storage dams) and pumping stations. Since the Central Asian region is an arid area it is vital for agricultural crops to have enough water for irrigation. There are two seasons for the crops – vegetation period, which starts from April until September when the crops are grown and non-vegetation period from October until March when the weather is cold and none of the crops are grown except from winter wheat. The irrigation infrastructure was mainly built during 1970-1989 in order to increase the agricultural area so that the Syr Darya

River basin extended its irrigated area by 130 % and the Amu Darya River basin by 150 %. On the other hand this has been resulted in negative environmental impact because the area of Aral Sea has shrunk by 50% and has not got enough inflowing water from the river basins. The Syr Darya River basin has 3.4 million hectares of agricultural area in total of which 56 % belongs to Uzbekistan, and 24% to Kazakhstan ("The World Bank", 2004).

The growth of crop demand and the growing necessity of water from the Syr Darya River was a serious matter for appropriate irrigation. Thus by 1960 year the total flow of the Syr Darya River was insufficient, so a multi-year storage reservoir (the Toktogul reservoir) on the Naryn River on the Kyrgyz territory, the main contributor of the Syr Darya River, was a next decision for construction in order to store water in wet times and release the accumulated water in dry seasons for irrigation.

The Naryn River of the Kyrgyz Republic

The Naryn River, one of the biggest river in the Kyrgyz Republic, provides a huge water flow and significantly impacts not only the economical activity of the Kyrgyz Republic, but also that of Uzbekistan, Kazakhstan and Tajikistan. It flows within Kyrgyz borders 535 km long with the basin area of 53.7 thousand square km and the river flow ranges from 10.6 to 19 cubic km. The Naryn River, flowing into the Karadarya River outside of the territory of Kyrgyzstan, forms the Syr Darya River ("Национальный Институт Стратегических Исследований Кыргызской Республики (The National Institute for Strategic Studies of the Kyrgyz Republic)", 2014).

Figure 3.3 Map of the Naryn River



Source: Source: ("The United Nations Economic Commission for Europe", 2000, p. 70)

Hydroelectric generators were installed in the Toktogul reservoir to produce electricity while releasing water as well as four reservoirs, having insignificant volume, were constructed additionally on the Naryn River. The last four reservoirs – Kurpsai, Tash-kumyr, Shamaldysai and Uch-Kurgan – were equipped with hydropower stations as well. All together these five HPPs form the Naryn Cascade with a total generating capacity of 2870 MW.

Table 3.1 Hydropower electric plants on the Naryn River of the Kyrgyz Republic		
	Power/Megawatt	Volume of water reservoir/ billion cubic meters
Toktogul HPP	1200	19.5
Kurpsai HPP	800	370
Uch-Kurgan HPP	180	52.5
Tash-kumyr HPP	450	140

Shamaldysai HPP	240	39.4
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Source: (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014, p. 10)

The full volume of the Toktogul reservoir is 19.5 BCM of water so the highest water level was reached by 1988 year caused by rain and snow melt. From 1976 until 1990 the average volume of water from the Toktogul reservoir released in summer was 8.09 BCM, ranging from 3.6 BCM to 11.2 BCM and in winter time – 2.68 BCM, ranging from 1.2 BCM to 4.4 BCM. The surplus of generated electricity from the Toktogul Hydropower plant in summer time was transmitted to the integrated Central Asian Power System being used by Republic of Uzbekistan and Kazakhstan. In wintertime a small amount of water released did not meet the electric power demand to cover all needs of the Kyrgyz people. Thus the shortage of electricity in Kyrgyzstan was compensated by coal, gas and oil from Uzbekistan and Kazakhstan at the time of Soviet rule ("The World Bank", 2004).

In 2010 the volume of water in the Toktogul reservoir rose sharply to the level of 19.039 million cubic meters and starting from 2014 it has decreased to the level of 11.600 million cubic meters.

The Kyrgyz Republic consumes only 15 % of total water flow of the Naryn River mostly to the benefit of energy production and Uzbekistan and Kazakhstan use the rest of the water flow.

Major purposes of the Syr Darya River

Irrigation

In accordance with aforementioned information it is obvious that one of the objectives of using the Syr Darya River is irrigation. The leadership of the USSR during that time devoted its efforts to expand irrigated territories for cultivated crops and thus it was vital to provide these areas with the appropriate amount of water during wet and dry seasons. It was down to the fact that the Toktogul reservoir has been holding irrigation mode of its operation, where it released around 75% of collected water during summer time, terminating releases of the remaining 25% of water in winters ("The World Bank", 2004).

In the early 20th century the Syr Darya River basin had around one million ha of irrigated area where 68% was located in the upper zone, 28% - in the middle and 5% - in the lower zone. By 1966 according to the Soviet planning the irrigated land of the basin reached over two million ha. By that period of time, use of the natural water flow of the river was the main way of irrigation that guaranteed high provision of water in summer and moderate water flows in winter. (Karimov, Giordano, Mukherji, Borisov, & Djumanov, 2012)

Starting in 1966 in order to continue extending irrigation area, building of reservoirs in the region allowed regulating long-term and seasonal water flow. During that time the Chardara reservoir, located in the Kazakh SSR, the Andijan reservoir in the Uzbek SSR, the Toktogul reservoir in the Kyrgyz SSR and the Kairakum reservoir in the Tajik SSR were built. All reservoirs were installed with

hydro turbines with the aggregate energy power over 4,267 MW (Karimov et al., 2012).

By 1988, reaching 32.5 km³ of total water storage in the Syr Darya River basin, the irrigation land could cover 3.4 million ha. Approximately half of this growth of irrigated area was cultivated on the territory of the Syr Darya and the Djizak provinces of the Uzbek SSR and the Kazakh SSR (Karimov et al., 2012).

Consideration of water resource management of the Syr Darya River basin and agriculture were approached in accordance to the Soviet centralized system. The national planned system of the Soviet leadership provided an approach of “benefit sharing” which implied that the upstream states of the region released the irrigation water in favorable season in summer, however in winter these states refrained from discharging the water upon condition that the downstream republics indemnified by centrally organized provision of coal and gas (Karimov et al., 2012).

Energy

After dissolution of USSR and formation of the independent Republics of Kyrgyz, Kazakhstan and Uzbekistan, the issue related to operation mode of the Toktogul reservoir became a transnational problem because the new appeared states of Central Asia reconsidered their state interests and strategic directions that were most often not coinciding with one another. Water and energy resources in Central Asian countries were arranged in different ways, whereas the Kyrgyz Republic and the Republic of Tajikistan possessed a significant amount of water resources and few fossil fuel reserves. Kazakhstan and Uzbekistan were on the contrary situation,

having huge reserves of fossil fuels. Then selling costs of natural gas, oil and coal in Kazakhstan and Uzbekistan went up reaching international rates and dealing only with strong currencies. Under these new conditions, the Kyrgyz Republic could not allow to buy the energy resources at higher prices in order to provide Kyrgyz people with fossil fuels in winters.

Subsequently maintenance of onward irrigation mode operation of the Toktogul reservoir led Kyrgyzstan to produce electricity during summer times of plenty, and to encounter huge deficit of electrical power in winter. These circumstances were triggered by the fact that Kyrgyz people had to switch from fuel heating to electrical heating, which put more pressure on energy demand in winter.

In 1990 Kyrgyzstan started to release less water from the Toktogul reservoir in summer and to generate more electricity in winter by increasing the volume of water released in order to cover energy demand. Thus during 1991-2000 the annual release of water in summer went down from 75% to 45.6% and in winter the annual release was extended from 25% to 55.4%. The proportion of domestic consumption at this period grew from 15% to 60% of electrical energy ("The World Bank", 2004).

The energy system of Kyrgyzstan consists of 17 functioning power stations, composed of 15 HPPs and 2 thermal electric plants. There is a fixed quantity of 3.713 MW in the Kyrgyz Republic where 2.950 MW (75.9%) comes from hydropower and 763 MW (20.5%) is thermal power, comprising mostly the combined heat and power plants (CHP), located in the capital and Osh city of Kyrgyzstan. Moreover 97% of hydropower capacity belongs to the Naryn Cascade

of HPPs. (the Toktogul HPP and four downstream HPPs) For the period 1998-2002 the total annual generation of electricity figured up to 11.7 TWh and internal supply to the Kyrgyz market was 11.2 TWh of which domestic distribution constituted 7 TWh with account of energy loss around 37% ("The World Bank", 2004; Antipova, Zyryanov, McKinney, & Savitsky, 2002).

In this respect energy production by means of HPPs of the Naryn Cascade represents important goal of utilizing running water of the Naryn River within Kyrgyz territory. After gaining independence energy mode of the Toktogul operation is very vital for the Kyrgyz Republic in order to provide Kyrgyz people with sustained and stable amount of electricity.

After the dissolution of Soviet Union in 1991 year the Syr Darya River became a transnational river since it crosses the borders of already independent countries in Central Asia. Thus management of the Syr Darya River got complicated because Kyrgyzstan was willing to generate electricity by releasing water from Toktogul Hydropower plant while Uzbekistan and Kazakhstan sought to use water for irrigation especially in summer. (Teasley & McKinney, 2011)

Institutions and Organizations of Water Resource Management of the Kyrgyz Republic

According to the Water Law of the Kyrgyz Republic adopted in 1994 the National Water Fund of the Kyrgyz Republic is an absolute and inalienable property of the state. The National Water Fund is the aggregate of all water objects and their occupied land, including water body buffer zones with all water resources concentrated there. Water objects are rivers, lakes, glaciers, wetlands and other

surface run offs and concentrative zones of ground water with healing mineral and thermal water, located within the territory of the Kyrgyz Republic ("Закон Кыргызской Республики "О воде" (The Law of the Kyrgyz Republic "About water")", 1994).

At the summit of the hierarchy are the Jogorku Kenesh (Parliament) of the Kyrgyz Republic, the President of the Kyrgyz Republic, fulfilling to a greater extent regulatory and governance functions and the Government of the Kyrgyz Republic, accomplishing executive role. The most important task of the President is to determine water policy of the state, taking into account proposals of the National Committee on Water Strategy, academic scientists and ad hoc experts ("The Water Code of the Kyrgyz Republic", 2004).

The National Committee on Water Strategy is formed by the Government of the Kyrgyz Republic and consists of heads of ministries, administrative organs and other state bodies responsible for management of water resources, including financial aspects and national security. The chairman of the National Committee is the Prime Minister of the Kyrgyz Republic and the deputy chairman – the head of the State Water Administration, which accomplishes functions of the Secretariat of the National Committee on Water Strategy. The Government of the Kyrgyz Republic determines the rest composition of the National Committee ("The Water Code of the Kyrgyz Republic", 2004).

The main functions of the National Committee are the following:

- To coordinate activities of ministries, administrative organs and other state bodies related to the management of water resources, their utilization and protection;

- To prepare a draft of the National Water Strategy and to submit for approval by the President of the Kyrgyz Republic;
- To prepare draft laws and to submit for consideration by the Government of the Kyrgyz Republic;
- To supervise over activities of the State Water Administration.

The competence of Jogorku Kenesh of the Kyrgyz Republic resides in elaboration, adoption, amendment and addition of water legislation; ratification and denunciation of international agreements in the matter of water relationships and establishment of prices for water abstraction ("The Water Code of the Kyrgyz Republic", 2004).

The Government of the Kyrgyz Republic is responsible for designating territorial borders of the main basins following the hydrological principal in water resource management; forming the National Committee on Water Strategy; determining special authorized state organs for implementing appropriate functions; establishing monitoring system of water resources; and developing, investing and financing hydro economic programs and adopting perspective evaluations of condition of water resources with consideration for climate change. ("The Water Code of the Kyrgyz Republic", 2004)

Through the Ministry of Finance of the Kyrgyz Republic, the Government allocates an appropriate budget for the MAM of the Kyrgyz Republic and its subordinate water management organizations. The Government regulates their performance in accordance to their functions ("The Water Code of the Kyrgyz Republic", 2004).

The MAM of the Kyrgyz Republic and its water management organizations, located in different administrative, provincial and district areas of the Kyrgyz Republic are the main executive organs, which deal with management of water resources ("The Water Code of the Kyrgyz Republic", 2004).

The administrative – territorial division of Kyrgyzstan consists of seven provinces with their major cities where key Government administrations and branches of administrative organizations are located, including representatives of the MAM. Then provinces are divided into districts and districts have village administrations and local self-government units. Besides these, city Bishkek – a capital of the Kyrgyz Republic, and city Osh – the southern capital of Kyrgyzstan - have republican status. There are 45 districts and 494 village administrations in the republic. There are several villages combined together at the level of village administrations that constitute the lowest administration of local government (Herrfahrdt et al., 2006).

Department of Water Management under the MAM combines several important divisions of its activities. They are directly related to agricultural issues, management of water resources and industrial issues. For instance Water Resources and Water Use Department carries out duties for water allocation and distribution, the Irrigation Systems Maintenance Department is responsible for technical operation of the system and Economics, Finance and Registration Department is in charge of provision of financial resources.

There are a number of existing institutions and organizations that are involved in water resource management of the Syr Darya River in the Kyrgyz Republic and all riparian states.

Starting in 1950 with increased production of agriculture, comprehensive plans for using water resources of Central Asia were developed by central planning organizations and ministries in Moscow. In order to ensure stable work of water allocation in the Syr Darya River, the regional Basin Water Organization (BWO) was established in 1986, which operated in accordance with the plans approved by the Soviet Ministry of Water Management.

The Soviet Union apportioned only designated volume of transboundary surface water flow in a year that was provided by the Kyrgyz Soviet Socialist Republic to the Kyrgyz SSR itself and then to the Kazakh SSR, Uzbek SSR and Tajik SSR ("AQUASTAT of Food and Agriculture Organization of the United Nations", 2012).

The distribution of water of the Syr Darya River among the states in the region was regulated by Protocol No. 413, February 7th, 1984. This Protocol shared total surface water flow of 22.7 BCM in such a way that Uzbek SSR received 46% of the water, Kazakh SSR – 44%, Tajik SSR – 8% and Kyrgyz SSR – 2 %. Such allocation was dictated by the accorded priority for tilling of cotton, forage, fruits and vegetables. This required annual discharge of 9.43 BCM of water from the Toktogul reservoir. The Toktogul reservoir released 75 % of its water annually in summer and the rest 25% - in winter. After the dissociation of the Union Soviet Socialist Republics (USSR), one of the main goals for regional collaboration was to save the pre-1991 operating regime of the Toktogul reservoir ("The World Bank", 2004).

In 1991 after the Parade of Independence, there was a necessity for keeping regional water management stable. In 1992 the Republic of Kazakhstan, the

Republic of Kyrgyzstan, the Republic of Uzbekistan, the Republic of Tajikistan and Turkmenistan got together and came to an Agreement of 18 February «On Cooperation in the Field of Joint Management and Conservation of Interstate Water Resources» that confirmed extension of using the existing Soviet structure and principles of interstate water allocation until a new system of water distribution could be established (McKinney, 2004).

According to article 17 of this Agreement, all its participants came to a decision on 18 February, 1992 to found an Interstate Coordinating Water Management Commission (ICWC) on the issues of regulation, rational utilization and protection of water resources.

ICWC is considered to be liable for policy-making of water resources management in Central Asian region, design of policy's tendencies in terms of needs of all dimensions of state economy, all-inclusive and efficient water resources use, sustained programs of water provision and accomplishment.

In 1998, Kazakhstan, Kyrgyzstan and Uzbekistan signed an agreement "On the Use of Water and Energy Resources of the Syr Darya River basin" that provided a new mechanism of water and energy exchange (Bernauer & Siegfried., 2008).

However, there were difficulties that multiyear hydrological fluctuations needed to be taken into account and reservoir storage service had to be valued (Teasley & McKinney, 2011).

In Teasley and McKinney's paper they present the Syr Darya River Model and Game Theoretic Concept in order to assess potential benefits for all riparian countries under different arrangement of cooperation (Teasley & McKinney, 2011).

In addition to difficulties in implementation of the mechanism established by the Agreement of 1998 climatic-hydrological and socio-political development also affect water allocation in the Syr Darya River basin where adaptation measures are needed to cope with these changes of water resources (Sorg, Mosselo, Shalpykova, Allan, Hill Clarvis, & Stoffel, 2014).

CHAPTER FOUR

FINDINGS AND DISCUSSIONS

This Chapter analyses current performance of water resource management in the Naryn River of the Kyrgyz Republic through the conceptual framework of IWRM, which introduces a sustainable way of water resource management by considering *ecological*, *sectoral* and *regulatory* integrations. Both interview findings and secondary data are used in analytical discussions.

The Role of the Naryn River in the Kyrgyz Republic

“The Naryn River is a strategic resource of the Kyrgyz Republic since the country possesses a huge potential for hydro energy production. [...] From the Soviet time within the Naryn River, the Naryn cascade of hydropower plants was constructed to produce electricity for domestic consumption and for export. [...] Water resources of the Kyrgyz Republic are natural wealth of the country, especially of the Naryn River that must be considered with a high priority.” (Code F1²)

“[...] Hydro energy in the Kyrgyz Republic holds a prominent place in energy security of the country. Due to location of the state within mountainous ranges, there is a big amount of glaciers and snow, feeding lakes and rivers of the country, which are being used for hydro energy production. Energetic potential of Kyrgyz rivers equals to around 150 billion kWh, but unfortunately these days Kyrgyzstan has exploited water resources of rivers up to 10 %. [...] The Naryn river has become the most exploited river in the Kyrgyz Republic where its water resources are being utilized for power generation almost by 50%. By means of the Toktogul, the Kurpsai, the Tashkumyr, the Shamaldysai and the Uchkurgan

² Interview with the Head of the Farming Policy Development Department of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th -25th, 2016)

hydropower plants, the Naryn cascade generates 90 % electric power of total country demand.” (Code W1³)

“[...] The Naryn River is the most abundant river and powerful in terms of energy generation in the republic. [...] The biggest advantages of hydro energy production in Kyrgyzstan are the lowest cost of electricity and generation of electric power with no environmental pollution. [...] Nevertheless Kyrgyzstan has been experiencing a shortage of water in the rivers driven by natural changing processes of climate warming, decreasing rainfalls and water leakage because of poor technical infrastructure. In this regard hydro energy and agricultural development become vulnerable when it comes to water shortage in the rivers. A need arises for buying alternative sources of energy such as coal, gas and oil.” (Code F2⁴)

These statements make it clear that the Kyrgyz Republic is trying to make a best use of what it possesses, in particular, its geographical location in mountainous part of the Tien Shan and the Pamir Alai ranges, which explain the abundance of water resources. On the other hand in time of the USSR, then leadership of the Kyrgyz SSR constructed aforementioned HPPs in the Naryn River, called the Naryn Cascade of HPPs to produce electricity by releasing water from the Toktogul reservoir. Today it is obvious Kyrgyzstan is highly dependent on hydropower generation from the Naryn Cascade because it is able to cover almost the whole country’s need for cheap electricity. At the same time lack of coal, oil and natural gas reserves in the Republic forced to buy them at the high prices after the dissolution of the USSR and gives incentives for further development of hydro energy in the Republic.

³ Interview with the Leading specialist on water resource management of the Department of Water Management of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

⁴ Interview with the Head of Crop Production Division of the Farming Policy Development Department of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

However, it should be noted the abovementioned notions of the experts did not address one of significant issues regarding formation and functioning of the Syr Darya River and its ecological problems. That could explain unwillingness of the experts to link the importance of the Naryn River to the Syr Darya River for a certain reason. The Syr Darya River is a transnational river, flowing through areas of Kyrgyzstan, Tajikistan, Uzbekistan and Kazakhstan and its water resources are utilized for irrigation purposes of cotton, wheat and fodder by the last two – Uzbekistan and Kazakhstan, which demand a huge amount of irrigation water ("The World Bank", 2004). In this sense, the Naryn River as a major tributary for the Syr Darya River has its responsibilities to maintain annual water flow of the Syr Darya River for irrigation of the downstream countries while Kyrgyzstan aims at hydro energy generation ("The World Bank", 2004). Needless to say that each of states tries to pursue national interests, especially when it comes to economic development of any given state. In this case tensions on the issue whether the Toktogul reservoir should function in hydro energy or irrigation modes are growing.

Surface water resources of the Kyrgyz Republic possess six main river basins on its territory, where the Syr Darya River is the biggest one. Below you may see the scale of the Syr Darya River in comparison to other rivers, originated in the Kyrgyz Republic.

Table 4.1 The major river basins in the Kyrgyz Republic

Water-shed (Main Tributaries)	Region	Part of Territory (%)	Internal RSWR* (km ³ /year)	Outflow to	Quantity Reserved for Other Countries (km ³ /year)	Quantity Available to Kyrgyzstan (km ³ /year)
Syr Darya (Naryn & Kara Darya)	Central/ West	55.3	27.25	Tajikistan & Uzbekistan	22.33	4.92
Chu, Talas & Assa	North	21.1	6.83	Kazakhstan	2.03	4.80
South-eastern	Southeast	12.9	6.18	China	–	6.18
Lake Issyk-Kul	Northeast	6.5	1.50	Interior basin	–	1.50
Amu Darya (Kysyl-Suu)	Southwest	3.9	1.93	Tajikistan	1.51	0.42
Lake Balkhash (Ili)	Northeast	0.3	0.36	Kazakhstan	–	0.36
Total		100	44.05		25.87	18.18

Source: (Herrfahrdt et al., 2006, p. 65)

Apart from the above concerns, it is noticeable to take a look at other aspects, which the following quotes can illustrate:

“[...] Nevertheless Kyrgyzstan has been experiencing a shortage of water in the rivers driven by natural changing processes of climate warming, decreasing rainfalls and water leakage because of poor technical infrastructure. In this regard

hydro energy and agricultural development become vulnerable when it comes to water shortage in the rivers.” (Code W1⁵)

Such as a statement finds these problems very significant since they have negative impacts on a hydro energy mode of the Naryn River, which also enhance an important role of the River. The National Institute for Strategic Studies of the Kyrgyz Republic (2014) investigated that 48 % of all drainage system and farm drainage system of the Kyrgyz Republic are in unsatisfactory condition. The leakage of water estimates to 23 % of water loss and carrying capacity of canals declined by 15-25 % (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014). Starting from 1950 climatic changes in Kyrgyzstan has negatively manifested with cold springs and late melting of glaciers and snow cover that in turn decrease water flows of rivers (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014). It is estimated that by 2050 river flows of the Republic will decrease by 32% and crop harvesting might be reduced by 30% (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014).

In this regard it is easy to predict, taking into consideration of above prognoses that a hydro energy production of the Naryn River proportionally will decrease as well.

“[...] Besides the presence of electricity production in the Naryn River, water resources of the river provide irrigation water for agricultural products of the Naryn province of the state. Within the Naryn province there are crops such as cucurbits and grains being cultivated, which do not demand copious irrigation

⁵ Interview with the Leading specialist on river water use of the Department of Water Management of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

unlike cotton production. However, the Naryn province has observed perspectives of supplementary needs for water to increase irrigation of crops.” (Code F4⁶)

At this point the above comment shows an agricultural implication of the Naryn River in further cultivation of agricultural crops in the Naryn province, which might become a very feasible issue. An agricultural sector of the Kyrgyz Republic is a main leading sector of economics. So far within the territory of the Naryn province there are grains, wheat, barley, corn, vegetables oils, potatoes and vegetables, being cultivated ("The National Statistical Committee of the Kyrgyz Republic", 2011). Thus, as it was stated, increasing the volume of irrigation water from the Naryn River and improving technical condition of the irrigation infrastructure could easily facilitate cultivation of cotton, rice, sugar beet, melons, fruits and berries in the Naryn province. Moreover it should be noted that the Government of the Kyrgyz Republic subsidizes the costs for use of irrigation networks up to 90% from the state budget (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014). In addition OECD (2013) conducted an exploration and estimated that expenses of Kyrgyz farmers for irrigation water fees according to the existing tariffs account from 0.5% to 2.5% of their revenues. At these points expansion of the agricultural crops in the Naryn province is expected to become feasible.

⁶ Interview with the Leading specialist on crop production of the Farming Policy Development Department of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

Introduction

Within the context of IWRM, the principle of the hydrological boundaries, Water User Associations (WUA) and the irrigation infrastructure are discussed in order to understand insights of their interactions of IWRM. IWRM strongly demands that these interactions should be taken into consideration properly to elaborate relevant measures for prevention of destructive consequences.

Regarding to the principle of the hydrological boundaries, the interview research reveals the following.

“It is very important to consider hydrological boundaries of the Naryn River. The perspective of hydrological approach should be taken into account on a first-priority basis in water resource management of the republic, which has been known long ago back to the Soviet time. The importance of hydrological management lies in the fact that it allows water managers to regulate the entire catchment area of the Naryn River in order to get a holistic observation of positive and negative factors, deriving from the upstream performance on the downstream activities. For instance, the Department of Water Management under the Ministry of Agriculture and Melioration of the Kyrgyz Republic (DWM) and its regional representatives – *OblVodKhozes* and *RayVodKhozes* - must manage water resources of the Naryn River all the flow way from Issyk-Kul province to Djalal-Abad province by one administrative unit.” (Code W3⁷)

“Ideally such a principle should be implemented over all the rivers in Kyrgyzstan. Hydrological principle towards the Naryn River could decrease administrative differentiation of labor between the state organizations, which are in charge of water management of the republic. In this regard the Oblvodkhoz of the

⁷ Interview with the Specialist on hydrological monitoring of the Department of Water Management of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

Naryn province is not aware of water needs in the Djalal-Abad province simply because the Oblvodkhoz of Djalal Abad is responsible of water management within its province. Furthermore the centralized up-bottom system inherited from the Soviet time does not give space for very close interaction between Oblvodkhozes of the Kyrgyz provinces because decisions are made by the headquarter of the Ministry of Agriculture and Melioration of the republic.” (Code W3⁸)

“[...] The hydrological approach also could propose a bottom-up system of water management by facilitating local community participation and improve efficiency of water storage and water distribution by creating Water User Associations (WUA).” (Code F3⁹)

The above statements reveal that the hydrological principle of water resources in the Kyrgyz Republic has been considered quite long time ago back to the USSR. Moreover the interview research shows that the experts are well aware of the hydrological approach, sharing their notions on the mentioned aspects such as a holistic regulation within the catchment area of the Naryn River, a reduction of differentiation of labor within water management and an introduction of the bottom-up approach through a creation of the WUA. Importantly to stress that the concept of IWRM finds these aspects of the hydrological approach fundamental for sustainable water resource management, which were discussed in Chapter 2.

However, Herrfahrdt et al. (2006) argues that in order to approach hydrological boundaries of the Naryn River according to the concept of IWRM, the entire catchment area should be taken into account. For instance, in the case of the Naryn River, the Syr Darya River basin of the Aral Sea is supposed to be the whole

⁸ Ibid.

⁹ Interview with the National specialist on WUA Development of the Farming Policy Development Department of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

catchment territory, which covers the whole Central Asian region. The Aral Sea basin comprises parts of territories of Turkmenistan, Tajikistan and Uzbekistan throughout Kazakhstan and the Kyrgyz Republic to Afghanistan and Iran. At this point the Naryn River can be regarded as the stand-alone area since IWRM accepts consideration of the hydrological catchment area by division into sub-catchment areas ("Global Water Partnership Technical Advisory Committee", 2000).

According to the Food and Agriculture Organization of the UN (1997) the Kyrgyz Republic has two hydrological zones, which divide the Kyrgyz territory into zones of flow generation and flow dissipation. The flow generation zone is formed in the mountainous areas of the Tien Shan and the Pamir Alay, composing 87% of the state's surface water resources, and the flow dissipation zone, representing mostly lowlands and flatlands, covers 13 % of the Kyrgyz territory. The flow generation zone represents major spots of fallouts and water collection, located in high-set and not highly populated areas of the state. The flow dissipation zone is characterized by being centered in economically more developed and highly populated areas in the north part – the Chu and the Talas lowlands - and in the south part – the Fergana Valley - of the state.

“In 2005 Kyrgyz Republic adopted the Water Code, which comprises all state principles and policy towards water resource management, rights and duties of water users and various state organs, involved in certain aspects of water resource management. The Water Code covers the issues of establishment of national water policy and strategy, water utilization within different sectors of economy, protection of water objects and water resources. The Water Code reflects the hydrological cycle of water in nature. It implies that water above and under ground,

in glaciers and snow cover, rivers and canals must be considered, and is considered as a part of the same resource.” (Code W2¹⁰)

The comment shows that the leadership of the Kyrgyz Republic carried out a very profound revision of the Kyrgyz legislation by adopting a new Water Code of the Kyrgyz Republic to the extent applicable to water resource management. In this sense it is necessary to look at the causes for such a revision that were underlined in the following statement.

“Before the new Water Code adopted in 2005, there were dozens of secondary legislation such as instructions, methodological instructive regulations, standards, provisions elaborated in early 1990, which became inadequate to modern conditions. For example, with the use of computer technologies in managing national database of the water fund monitoring, there emerged the necessity in standardization of indication system and modernization of accounting instruments and reporting. Or there were some collision between provisions of the land use of the water fund and land law.” (Code W2¹¹)

“However, the most serious obstacle has become the collisions with regard to duplication of functions in the provisions of various executive bodies. As a result this has given rise to conflicting situations among the governing bodies belonged to different state agencies and economic entities. In turn that also negatively has influenced procedures of management of the water fund. Thus the main goal of the Water Code of the republic is the formation of the united juridical base for regulating water resources. The Code combined the major part of legal norms into one logically connected context.” (Code W1¹²)

“One of the main tasks of the Code is the establishment of official mechanisms for coordination of activities and information exchange among the

¹⁰ Interview with the Leading specialist on water resource management of the Department of Water Management of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

¹¹ Ibid.

¹² Interview with the Leading specialist on river water use of the Department of Water Management of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

involved parties. For these purposes the Water Code has provisions for creation of *the National Water Council*. Water resource management and its protection must be implemented within the main basin of hydrological territories proposed by *the National Water Council*.” (Code F1¹³)

In regard to the hydrological principal, it should be added that according to the Water Code of the Kyrgyz Republic – the article 5 implies that management and protection of water resources must be implemented within the boundaries of the territory of a main basin in concordance with the hydrographical principle, corresponding to main rivers of the Kyrgyz Republic.

The abovementioned statements reveal that the Government of the Republic has taken a serious step towards contemplating the hydrological perspective within the Kyrgyz water legislation. Nevertheless below some experts admitted that a factual implementation of the hydrological approach is facing certain difficulties in the Republic.

“The Department of Water Management under the Ministry of Agriculture and Melioration of the republic carries out its duties in the state’s provinces by means of appropriate provincial administrative organs, which are called the *Province Basin Management Departments* or *OblVodKhozes*. Due to the geographical location, Kyrgyz provinces comply with hydrological borders on general lines of administrative-territorial borders of the state. However, in the case of the Naryn River, it crosses several provinces of the Kyrgyz Republic from Issyk-Kul province through the Naryn province to the Djalal-Abad province. The rough coincidence of the Kyrgyz provinces with hydrological boundaries is determined by the fact that during the Soviet time all significant water canals were planned and constructed within a single province without overpassing lines of the neighboring provinces. If we think from the hydrological perspective this has caused difficulties in allocating irrigation water among the provinces of Kyrgyzstan because each

¹³ Interview with the Head of the Farming Policy Development Department of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

OblVodKhoz within the provinces is in charge of only its territorial water demands.” (Code F2¹⁴)

Moreover, it must be noticed that the organization’s name – the Province Basin Management Department - comprised the notion of a *basin* not long ago in Kyrgyzstan and in fact it was not entitled with any segregation of competencies or operation areas (Herrfahrdt et al., 2006). Though the Kyrgyz provinces can conform to the hydrological boundaries due to their physical border lines of the state.

Herrfahrdt (2006) reveals that in the case of the district level the situation concerning implementation of hydrological principle is more complicated. The Kyrgyz districts are not organized in accordance with the hydrological units but just in compliance with the administrative boundaries (Herrfahrdt et al., 2006). Thus, *RayVodKhozes* as main administrative bodies at the district level, encounter certain troubles (Herrfahrdt et al., 2006). For instance, in some cases RayVodKhozes lack water provision on their own that creates a serious problem with regard to the reliance of water supply to Water Users Associations within each part of their areas (Herrfahrdt et al., 2006).

Water User Associations in the Naryn River

“The districts within the bounds of service areas are arranged by irrigation management entities. Such an entity includes a not big hydrological unit because it is organized, taking into account the source of its water resources. Provided that one district gathers water from two rivers by means of two water canals, it comprises four irrigation management entities. Irrigation management entities get

¹⁴ Interview with the Head of Crop Production Division of the Farming Policy Development of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

responsible for maintenance and operation of facilities and water provision. In the areas of the country where there are no operation of WUAs, irrigation management entities should serve as immediate contact spots for water users.” (Code W3¹⁵)

“At the local level, Water User Associations are considered as key performers, which are facilitated by Kyrgyz authority and strongly financed by international contributors. The most important element for their establishment is that WUAs compose one hydrological unit.” (Code F3¹⁶)

It should be added that WUAs are considered as a new organization, taking responsibility for operation and maintenance of the irrigation facilities over the long run (Sehring, 2005). These irrigation facilities represent territories of the former kolkhozes and sovkhozes (Sehring, 2005). In 2000, the Department of Water Management under the Ministry of Agriculture and Melioration of the Kyrgyz Republic and its representatives in all seven provinces and 42 districts embodied the Departments of WUA Support (Sehring, 2005). With the long-term goal to incorporate WUAs with the national water administration, the Departments of WUA support provide assistance to WUAs in registration, composition of their budget and placing contracts over water with water users and RayVodKhozes (Sehring, 2005).

Additionally they carry out special trainings for WUA’s personnel in the matter of establishment and elaboration of WUA, financing management, engineering, water contribution and law issues (Sehring, 2005).

¹⁵ Interview with the Specialist on hydrological monitoring of the Department of Water Management of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

¹⁶ Interview with the National specialist on WUA Development of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

“The main tasks of WUAs consist of operation and maintenance (O&M) of the on-farm irrigation system, water supply, conflict management and self-financing. Accomplishing these tasks, WUAs must be organized in accordance with hydrological principles wherein the service areas are served by one water canal or a sub-system of a water canal.” (Code F3¹⁷)

Putting this another way, WUAs at the local level comprise all areas, consuming water from one water source. Nonetheless it is necessary to acknowledge that some WUAs tend to follow the hydrological lines where areas of these WUAs have been designated just by village borders, boundaries of local self-government bodies, the former large-scale agricultural enterprises of the Soviet time (*Kolkhozes*)¹⁸ and farms (Herrfahrdt et al., 2006). This causes diverse complications such as accessibility of water in WUAs, located downstream, or disagreements concerning obligations for recovery provision in joint use of the infrastructure (Herrfahrdt et al., 2006).

“Currently activities of WUAs are evaluated as in less satisfactory condition and not well organized in their operation that needs additional revision. Poor condition of material and technical facilities of irrigative constituent and lack of adequate financing are considered as main common difficulties in improving activities of all WUAs in the republic.” (Code F3¹⁹)

In 1995, the initial WUAs were founded by physical and juridical individuals as founders on the territory of the Kyrgyz Republic within the former shared farms (Wegerich, 2000). Later in the ninetieth, the Kyrgyz authority

¹⁷ Ibid.

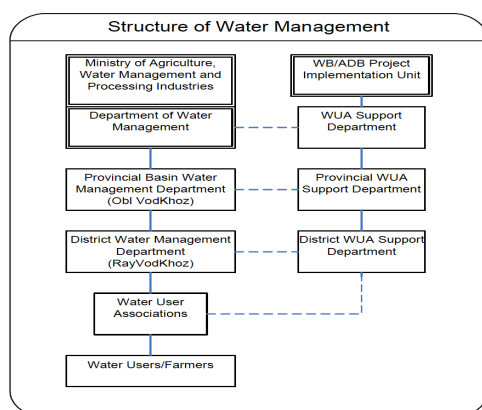
¹⁸ *Kolkhozes* represent collective farms in the Kyrgyz Republic (Wegerich, 2000)

¹⁹ Interview with the National specialist on WUA Development of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

promoted the concept of WUA and pioneering projects with the support of the Food and Agriculture Organization (FAO), the Asian Development Bank (ADB) and the Government of Japan. Wide expansion of WUAs within the state carried on by means of “the On-Farm Irrigation Project” of the World Bank, covering the Northern provinces of the Kyrgyz Republic except from the Chu province, and the ADB through “Agriculture Area Development Project”, comprising the Southern provinces of the country, including the Chu province. The projects determined their objectives for overall restoration and effective management of off-farm and on-farm irrigation waterways with a foundation of WUAs as a consistent component (Sehring, 2005).

The Kyrgyz Government decrees “Regulations on WUAs in Rural Areas” in 1995 and “Statute of WUAs in Rural Areas” in 1997 laid a juridical foundation of WUAs in the Kyrgyz Republic. The last decree of 1997 has provision for regulations, which allow shifting of the on-farm infrastructure to WUAs, speculation with water, accounting service and imposition of penalties in the event of rule violation. Consequently in 2002, the Parliament of the Kyrgyz Republic accepted the “Law on Water User Association”.

Figure 4.2



Source: (Sehring, 2005, p. 9)

“Such a weak operation of WUAs in the Naryn province was characterized by low activities of agricultural development and cultivation of cucurbits crops that do not demand much irrigation water for cultivation. At the same time as water users in the Naryn province along with other provinces of the Kyrgyz Republic have low repaying power for water supply by WUAs.” (Code F5²⁰)

On the other hand Sehring (2005) emphasized that the developing progress of WUAs was distinguishing in the various regions. The numbers did not imply that all WUAs were operating in reality. Only 37 of the total number of WUAs have accomplished necessary standards out of 353 WUAs and 50 WUAs were itemized just on paper. He added that it was very hard for WUAs to be a self-financed entity so that many of them become significantly indebted. In 2003 the debt of WUAs to the Kyrgyz government as a result of unpaid charges was 42 million KGS²¹ or one million US Dollars (Sehring, 2005).

In this connection it is important to know about the hydrological network of the Naryn River to get more insights of WUAs' operation.

The Naryn River constitutes an extensive hydrological network in the Naryn region of the Kyrgyz Republic with 13,187 hectares of an agricultural area (Degembaeva, Mamyrbaev, & Baybagyshov, 2016). The Naryn River with the confluence of the Kara-Darya River formulates the Syr Darya River. The On-Archa, the Chyrpykty, the Kazhyrty and the Ottuk are water sources of the Naryn River arrangement, which executes irrigation activities within their areas by means

²⁰ Interview with the Leading specialist on seed production of the Farming Policy Development Department of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

²¹ *The Kyrgyz som* is the state currency of the Kyrgyz Republic. According to the ISO 4217, *KGS* is a currency code of the Kyrgyz Republic

of onfarm water canals (Degembaeva, Mamyrbaev, & Baybagyshov, 2016). The Naryn district Water Management (NDWM) is in charge of O&M of onfarm irrigation activity (Degembaeva, Mamyrbaev, & Baybagyshov, 2016).

Degembaeva et al. (2016) say that in pursuance of the Decree of the Government of the Kyrgyz Republic “On Water User Associations in Rural Areas” in 2004 within the Naryn region, twelve juridically registered WUAs were founded. Subsequently tasks of providing regulations and management of water resources in the Naryn district have been vested to the WUAs. They take responsibility for irrigation of 15,024 hectares of land, implementing an irrigation water supply and gathering costs O&M of the irrigation infrastructure (Degembaeva, Mamyrbaev, & Baybagyshov, 2016).

The research study of Degembaeva (2016) identifies that currently after more than 10 years since establishment of the WUAs in the Naryn region, there are only 4 out of 12 WUAs that are functioning and serving 6,773 hectares of land. The main reason for termination of the remaining WUAs activity has become low payments for water. The WUAs are not receiving enough money from the local community for their water services therefore they are not able to pay their personnel in a sufficient quantity. Eventually the WUAs have to get in close cooperation with international organizations in the form of various projects, which are financed by them. However, international organizations do not make commitments on the issues of facility modernization, acquisition of equipment for irrigation and reconstruction of irrigation water canals.

“[...] All the WUAs encounter problems related to the issue of water use. In particular, they are water distribution and water resource assessment, transport of irrigation water to the fields of the members of WUAs without loss and with the minimal expenses and timeous payment for irrigation service for water delivery.” (Code F4²²)

The Basin Water Management Departments of the Ministry of Agriculture and Melioration of the Kyrgyz Republic control water objects, which are highly sensitive water sources. NDWM delivers water from the water sources to WUAs, which hereafter provide irrigation water to final consumers. In areas where WUAs are organized, water delivery is realized by WUAs themselves directly from the water sources to final water users without any intervention of NDWM. WUAs in their accomplishment of water supply rely on actual water demand. The local self-government bodies ascertain water price for irrigation water and the average payment per hectare is 250-300 KGS (Degembaeva et al., 2016, p. 99). Water distribution is made with regard to irrigation modes of yield from June till August, laying account with climatic changes in Naryn district (Degembaeva et al., 2016).

Along with above stated comments it is quite interesting to notice that organization of WUAs in the republic is not necessarily due to water distribution and water use among the Kyrgyz farmers, but it gives an opportunity to get an access to external international finances (Wegerich, 2000). At this point there are various hydro services, which artificially change their name titles for the purpose of receiving finances for project improvement as a WUA (Wegerich, 2000). Thus

²² Interview with the Leading specialist on crop production of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

formation of WUAs could be also considered as a chance to obtain money for purposes other than that intended.

Irrigation Infrastructure

“[...] Poor condition of irrigation infrastructure is considered as one of major problems in water resource management in the Kyrgyz Republic. In the case of the Naryn district, such a problem is not so relevant since there is no available drainage system and availability of farm drainage network is very low.” (Code W2²³)

“The majority of irrigation system has run out of its life cycle and has been exploited with no balance cost. In this context independent water users and public utility companies have to exploit the infrastructure of irrigation network at the most minimal technical level with increasing risk of technogenic accidents.” (Code W2²⁴)

“The Government of the republic must allocate finance for construction and improvement of irrigation and drainage system in order to raise potential of cultivating agricultural crops in the Naryn province.” (Code F5²⁵)

According to The National Institute for Strategic Studies of the Kyrgyz Republic (2014) the infrastructure of water service in the Kyrgyz Republic delivers to fields around 10 km³ of irrigation water or 10 000-12 000 cubic meters of water per hectare for the whole vegetative period. However, according to the estimation the real demand for irrigation water is 18 km³. In the Soviet time an amount of irrigation water, delivered to the Kyrgyz fields was 13 km³, in the beginning of 1990th it was decreased by 5-6 km³ and currently it is about 10 km³.

²³ Interview with the Leading specialist on water resource management of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

²⁴ Ibid.

²⁵ Interview with the Leading specialist on seed production of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

The irrigation infrastructure of the Kyrgyz Republic consists of irrigation and collector and drainage systems, which at most are the property of the Republic.

In comparison with the state and the municipal water supply system, the farm irrigation system in the early 2000th was in a much worse condition. There are 34 water reservoirs and 8318 different hydro-technical utilities in the Republic. The total length of collector and drainage system amounts to 642.46 km and of farm irrigation system is 22 700 km of irrigation canals (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014).

The leakage of water in the process of its conveying from a water supply intake to fields due to poor technical condition of irrigation canals reaches 23% of water loss according to the official statistics, but some experts estimate more than 40%. At the same time numbers and duration of watering of agricultural products are inclined to decrease. In addition with a lack of regular cleaning of the irrigation and collector and drainage system, carrying capacity of canals declined by 15-25% (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014).

Table 4.2 Condition of drainage and farm drainage system, 2005

Provinces of the Kyrgyz Republic	Availability of drainage system (km)		Availability of farm drainage system (km)	
	Total	Unsatisfactory condition	Total	Unsatisfactory condition
Batken	22.8	12.1	268.2	88.3
Djalal-Abad	-	-	254.57	73.7
Issyk-Kul	23.9	16.5	206.3	169.9
Naryn	-	-	120.2	69.8
Osh	19.2	12.1	354.7	242.1
Talas	4	-	270.4	134.5
Chui	575.6	125.1	3 418.3	1 201.1
Total	646.5	158.4	4 892.7	1 938.3

Source: (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014, p. 30)

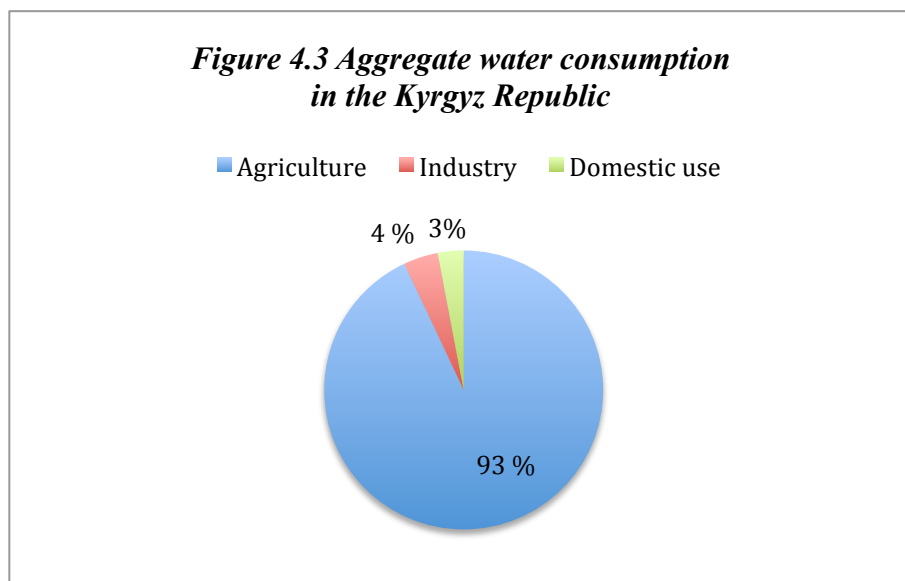
Sectoral integration according to IWRM

Introduction

The objective of this section is to analyze to what extent water resource management of the Kyrgyz Republic in the Naryn River makes a contribution for economic development, taking water allocation between irrigation and hydro energy power into consideration.

Inclusive water allocation of the Naryn River

Aggregate water consumption in the Kyrgyz Republic ranges up to 9000 m³/year, where distribution of water is diverging significantly among different economic sectors ("The United Nations Economic Commission for Europe", 2000). The agricultural sector is estimated for 93% of total water consumption, industrial sector consumes 4 % and domestic water uses accounts for 3 % (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014).



Water consumption in the industrial sector decreased by approximately 80% in the period between 1991 – 1998 that was characterized by process of deindustrialization in the Kyrgyz Republic (Herrfahrdt et al., 2006). General water consumption from 2001 to 2012 declined by 885 million m³ or by 2%, going down from 5754 million m³ in 2001 to 4869 million m³ in 2012 (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014). This trend was explained by the industrial downturn, lack of means for farmers to cultivate their irrigated land, incentives for rational water utilization in terms of fixing payment for water use and shifts from cultivation of crops of cotton, white beet, weed and corn to industrial crops, which have shorter vegetative period (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014).

In this context it is worth emphasizing that the abovementioned figures of water consumption in the Kyrgyz Republic do not comprise water use for energy production since the last is considered not to be water-consumptive. The issues related to hydropower generation in Kyrgyzstan have posed a serious difficulty, reckoning with that “benefit sharing” in the region of Central Asia turned out to be unfeasible after the dissolution of the USSR and import of hydrocarbon resources for the Kyrgyz Republic became high-priced (Herrfahrdt et al., 2006). The Toktogul HPP is strategically the most important producer of hydro energy power in the republic, which provides 97% of the electric power (Antipova, Zyryanov, McKinney, & Savitsky, 2002, p. 506). Thus the operation regime of the Toktogul HPP has been switched to the energy regime to meet necessary domestic demand for electricity since gaining the independence of the republic (Herrfahrdt et al.,

2006). In accordance with some experts, hydropower resources of Kyrgyzstan amounts to 142 billion kWh where real use of them does not exceed 10%.²⁶

“There is no struggle among energy production and the rest water uses because hydropower generation is not water-consumptive. The key concern lies in seasonal release of water from the Toktogul reservoir. The agricultural cultivation needs watering in vegetative period, i.e. in summer, whilst the highest demand of energy comes during a non-vegetative season, i.e. in winter.” (Code W2²⁷)

“[...] The Water Code does not address the sphere of transnational use of water resources because such issues are regulated by bilateral and multilateral agreements and by other international norms of international water law recognized by the Kyrgyz Republic.” (Code W2²⁸)

Allocation scheme of the Naryn River

It is known that with the support of United States Agency for International Development (USAID) on March 17, 1998 the Kyrgyz Republic, the Republic of Kazakhstan and the Republic of Uzbekistan concluded a new Agreement on the Use of Water and Energy Resources of the Syr Darya River basin. The Republic of Tajikistan joined the Agreement one year later in 1999. The Agreement was generally acknowledged as a significant enhancement in comparison with the previous agreements, which was considered to decrease the worries in the region ("The World Bank", 2004).

²⁶ The data obtained from the report of the Ministry of Energy and Industry of the Kyrgyz Republic “Information about the Kyrgyz Republic for participation in the Scaling-Up Renewable Energy Program for Low Income Countries (SREP)”

²⁷ Interview with the Leading specialist on water resource management of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

²⁸ Ibid.

It is quite important to stress on some prominent parts of the Agreement that comprise: a willingness of the Parties to abide by the principles of international law, a consideration of the necessity for joint operation of the Toktogul reservoir by means of long-term flow regulation and flood control actions to take the utilization of water for energy production and irrigation, a distinct acknowledgement of necessary compensation for the losses of energy generation due to multi-year collection and storage of water in the Toktogul reservoir, the proposition to carry out the compensation on the basis of barter in the form of gas, coal, electricity, fuel oil or on the basis of value terms, replacing by financial dealings, a prospect for employing instruments of guaranties like credit lines, deposits and so forth, a conflict management by means of intermediate court. Duration of this Agreement is five years and can be prolonged for another five years unless any of the Parties expresses an objection ("The World Bank", 2004).

On 17th of June 1999 the states entered into another Agreement in order to keep further simultaneous function of power systems of these republics to promote imports and exports of electricity, using 500 Kilovolt (kV), 220 kV and other energy networks.

“[...] All these agreements are the normative legal acts considered as framework agreement. They form main directions of cooperation without providing concrete mechanisms and their implementation. At the moment the level of water relations can be defined very low and ineffective.” (Code F1²⁹)

²⁹ Interview with the Head of the Farming Policy Development Department of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

Regardless the Agreement of 1998 became a significant enhancement among the previous arrangements it could assure only the actual amount of water distributions and compensations ("The World Bank", 2004). The performance of this multiyear Agreement turned out to be insufficient. While the Agreement includes provisions for compensation by means of barter or financial relation that is more preferable, the barter deals still remains ("The World Bank", 2004).

The Framework of the Agreement does not allow reaching the agreed numbers because the volume of water in the Toktogul reservoir decreases. It should be said that Kyrgyzstan suffered from the severe lack of water in the Toktogul reservoir in 2002, 2008 and 2009, which resulted in the rolling blackouts in the Republic in wintertime. For example the volume water of the Toktogul reservoir went as low as 7.5 billion m³ by April 2002 ("The World Bank", 2004). The problem is that the multiyear Agreement of 1998 does not take abnormally dry or wet years into consideration ("The World Bank", 2004). In the period of abnormally wet time of 1999 – 2002, Uzbekistan and Kazakhstan were not in need and thus did not take the agreed volume of water in summer time. This caused cutbacks of summer exports of electricity from Kyrgyzstan to Uzbekistan and Kazakhstan. Then it resulted in decreasing gas supply from Uzbekistan and coal supply from Kazakhstan to Kyrgyzstan in wintertime. Consequently the downstream republics, undersupplying the agreed quantity of gas and coal as compensation, forced the Kyrgyz Republic to raise water releases in winters ("The World Bank", 2004).

“All these international Agreements, regulating water and water-energy resources in the region at international scale practically have been hardly realized. The reason is that in practice provisions of water relations in Central Asia elaborated in the Soviet time, today have an affect on the transnational use of water resources and water objects. The final goal of water regulations among the states in the region was to increase the All-Soviet Union budget by increasing agricultural yield. Thus those principles of water distribution and water use were satisfying the former Republics cause instead the upstream states received gas, oil and coal from the downstream states. Today they became irrelevant.” (Code F1³⁰)

“As a result due to the long-term and seasonal regulations of the Naryn River flow by the Toktogul reservoir, Kazakhstan and Uzbekistan receive water at the right time with the necessary volume. Kyrgyzstan is also in charge of carrying out activities on eliminating damages caused by flood flows. Moreover Kyrgyzstan is entirely responsible for environmental protection measures within the Naryn River Basin, accountability and forecasting and exploitation of reservoirs. Along with this the Republic bears land losses and other natural resources on its own within the flooded part of the Ketmen-Tubinski valley of the Republic.” (Code F2³¹)

The charge for water service is not evident. The costs for electricity provided by Kyrgyzstan and the costs for gas and coal supplied by Uzbekistan and Kazakhstan are high and explicitly unspecified because the cost, given to the Kyrgyz Republic for electricity comprises a portion for water collection services ("The World Bank", 2004). However, the downstream states adhere to an opinion that they are imposed to purchase unnecessary energy of the Kyrgyz Republic at a higher price than the price of their own production ("The World Bank", 2004).

Multiyear agreements require a lot of time to be completed implicating ambiguities. Practical negotiations last with exceeding the term of the beginning of vegetative period and agreements get concluded by the middle of that period ("The

³⁰ Ibid.

³¹ Interview with the Head of Crop Production Division of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

World Bank", 2004). That results in creation of ambiguities to farmers of the downstream republics and in escalating stresses on each side. On the other hand when the Kyrgyz Republic carries out its obligations in compliance with the Agreement, it is forced to wait for the following winter to receive the compensation, having ambiguities dealing with the prices, quantity and even quality ("The World Bank", 2004). The issue of quality often came out to be meaningful because coal, carrying a great substance of rocks and mud, is problematic to use in the tanks ("The World Bank", 2004). In this context Kyrgyzstan comes across a great risk.

The long-term framework of the 1998 Agreement among the previous multiyear agreements appears to have no concentration on sustainable water distribution supporting annual water storage character of the Toktogul reservoir of Naryn river. The Agreement lacks a multiyear prospect to tackle different conditions of water flows in usual, wet and dry time and the seasonal distinction in the resource demands of the republics. It does not include provisions that could clearly regulate charges for water service, relying on the viewpoint that the downstream states are granted the rights for irrigation water without charges for water services.

“Today it is obvious that for such rivers as the Naryn River it is not enough just to harmonize quotas of water apportioning, depending on annual water flows. Because even changes in monthly schedule of the Toktogul reservoir with account of irrigation and hydro energy needs are capable to affect economic interests of the involved states significantly. This issue has gone beyond the competence of river authorities not only of the Kyrgyz Republic but also that of the downstream states

so that the settlement of the issue should be found at intergovernmental scale.”
(Code W1³²)

In 2003 the United Nations General Assembly approved a resolution (A/RES/58/217), which announced the years of 2005-2015 as “International Decade for Action “Water for Life”. One of the main objectives of “Water for Life” was to elaborate strategies for IWRM and water application efficiency in contributing support to developing states. On 9 June 2015 the Prime Minister of the Kyrgyz Republic Temir Sariev took a part in a High-Level International Conference on the Implementation of the International Decade “Water for Life” where he signified positions of the republic on water issues.

“Water, vitally important natural resource, must be considered as a key factor for the prosperity of Central Asia under the conditions of global challenges, climatic change, a danger of energy crisis and demographic increase in the region. It was revealed that committed position of the republic lies in the fact that water resources and energetics are inseparable and inherent.”³³

“For the purpose of ensuing energy security, the Kyrgyz Republic should gradually carry out certain projects, dealing with construction of HPPs within the limits of the republic, which are ecologically clean resources of energy.”³⁴

“Construction of Kambar-Ata HPPs will enable the operation of the Toktogul reservoir to change from energy to irrigation mode. Reservoirs of the Kambar-Ata

³² Interview with the Leading specialist on river water use of the Department of Water Management of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

³³ The Speech of the Prime Minister of the Kyrgyz Republic Temir Sariev within the framework of International Conference “Water for Life” on 9 June, 2015 in Dushanbe, the Republic of Tajikistan. Retrieved from:
http://www.vb.kg/doc/315971_temir_sariev_vystypil_s_rechu_na_mejdynarodnoy_konferencii_v_d_yshanbe.html

³⁴ Ibid

HPPs will allow achieving a balanced regime of water resource use and raising the level of guaranteed water supply for the irrigation land of the downstream countries. Thus the downstream states should on a first-priority basis hold an interest in implementation of these projects. Furthermore this totally corresponds to the initiative of the UN Secretary - General that declares 2014-2024 years as a decade of “Sustainable Energy for All”. Supporting this initiative, Kyrgyzstan believes that development of hydro energy is the most important prerequisite in assuring sustainable development.”³⁵

“Limitation of water resources in the world sooner or later must lead to the comprehension of economic value of water. It should be realized that expenses for water resource storage, conservation, management and delivery should be adequately compensated. This issue is strongly related both to a domestic water policy of certain select country and to interstate relations of countries, which share water resources. The Agreement between the Kyrgyz Republic and the Republic of Kazakhstan on the Use of Water Management Facilities of Intergovernmental Status on the Rivers Chu and Talas concluded in 2000 should be regarded as a successful bilateral cooperation and new relations of joint use of water resources.”³⁶

Financial sustainability

“Water resource management of the Kyrgyz Republic does not receive adequate amount of finance, especially it centers on exploitation and maintenance operations of hydro-technical utilities.” (Code W3³⁷)

“An overall deficiency of funding is one of the major concerns within the segment that reduces the economic profits of agricultural cultivation and the efficiency of water storages. Quality degradation of water resource infrastructure is characterized by a heavy shortage of resources for technical servicing and restoration, which sensibly impact the productive capacity. Distribution of irrigation water has a compound organization, running through water reservoirs,

³⁵ Ibid

³⁶ Ibid

³⁷ Interview with the Specialist on hydrological monitoring of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

water abstractions, waterways and pump works that got ruined after the independence at the high rate”³⁸.

A majority of water reservoirs in the Republic – 15 large and 24 small reservoirs – are experiencing substantial losses of storage capacities, induced by the formation of precipitation ("The United Nations Economic Commission for Europe", 2000). The in-farm irrigation networks in kolkhozes and sovkhoses have been weakly projected, constructed and maintained, where the growing length of it is not functional ("The United Nations Economic Commission for Europe", 2000). According to the certain evaluation, the general losses of the main network and secondary distribution system amount to 26-45% and the following losses of the third-rate level reach up to 50 % of the rest water (Hassan, Starkloff, & Nizamedinkhodjaeva, 2004).

The average necessary expenses for exploitation of state irrigation funds are equal to 700 KGS per hectare, and of irrigation network of WUA – 470 KGS per hectare (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014). The factual finance is provided in the range of 20-30 % out of the demand (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014). Therefore, 1200 – 2800 KGS per hectare is necessary to compensate that demand of irrigation fund. Based on the expert³⁹ data as on January 1st, 2014, the total area of irrigated farm fields is 788.9 thousand hectares so that restoration and maintenance of

³⁸ The Speech of the Prime Minister of the Kyrgyz Republic Temir Sariev within the framework of International Conference “Water for Life” on 9 June, 2015 in Dushanbe, the Republic of Tajikistan. Retrieved from: http://www.vb.kg/doc/315971_temir_sariev_vystypil_s_rechu_na_mejdynarodnoy_konferencii_v_d_yshanbe.html

³⁹ The manager of a project of the National component in the Kyrgyz Republic “Promoting the implementation of IWRM” (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014)

irrigation network necessitates around 946.7 – 2.208.9 million KGS (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014).

At the present time financial resources for maintenance and development of multipurpose waterworks facilities get mobilized by means of the following economic instruments:

- Payments for supply services of irrigation water for water users of agrarian sector;
- Payments for water delivery and water discharge services for water users of municipal and industrial sectors;
- Subsidies of the state budget;
- Charges under commitments for indemnifying inflicted damages;
- Attraction of funds by external credit and donor support (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014).

The regime of fee-paying water consumption in irrigation sector came into action in 1996 and in 1999 it was codified on the basis of the Law of the Kyrgyz Republic “As regard to tariff settlement for supply services of irrigation water” (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014).

Starting from 2010 the rates of tariff for supply services of irrigation water constitute 0.03 KGS/m³, 0.10 KGS/m³ – for water users of industrial and energetic sectors, 0.01 KGS/m³ – for enterprises of science, culture, education and public health (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014).

Such low tariff rates are determined by a very weak paying capacity of the rural population that eventually leads to entire degradation of irrigation network (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014). Real

sums of tolling range between 70-125 million KGS annually (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014). As consequence the Government of the republic annually has to allocate annual dotations for irrigation needs from the state budget and fall back upon external support (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014). From 2000 the state budget of the republic covered around a quarter of overall expenses for maintenance of interfarm irrigation network (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014). A donor assistance program of the European Union made a compensation of further additional 20 % of the annual expenses (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014). Credit means of the World Bank and ADB appropriated for rehabilitation of irrigation canals and facilities also filled significant financial holes of the irrigation budget in the amount of 40 % (The National Institute for Strategic Studies of the Kyrgyz Republic, 2014).

Regulatory integration according to IWRM

Introduction

The objective of this section is to evaluate to what extent water resource management of the Kyrgyz Republic follows main preconditions of decentralization and participation as well as information and communication processes according to IWRM, which serve for sustainable water management. This section analyses the national water resource management of the whole Republic, not only specifically in the Naryn River due to managerial aspects of IWRM.

Decentralization and participation

The principle of decentralization implies that water management should be arranged on the principle of subsidiarity as it was mentioned in Chapter 3.

The water management of the Kyrgyz Republic consists of multiple concerned organizations, having certain responsibilities and duties of operations. Nevertheless sometimes it becomes quite difficult to determine their corresponding division of labor. In order to understand a performance of Kyrgyz water management, Herrfahrdt et al. (2006) proposes to consider functions and tasks of administrative stages, their capabilities to exercise their tasks and their interactions through the national, the provincial and the district levels of the Republic.

The National level

The MAM of the Kyrgyz Republic, including its Department of Water Management (DWM) is the main competent organ that executes water management in the Republic. It is noticed that the DWM undergoes internal partitions between prevailing agricultural specialists and insignificant water experts. The remaining participants within the national level are the Ministry of Emergency Situation of the Kyrgyz Republic (MES), the Ministry of Health of the Kyrgyz Republic, the Ministry of Finance of the Kyrgyz Republic, the State Agency on Environment Protection and Forestry of the Kyrgyz Republic, the State Agency on Geology and Mineral Resources of the Kyrgyz Republic and the Agency for Hydrometeorology under the MES (Herrfahrdt et al., 2006).

Interaction among those state organs is considered to be insufficient.

Herrfahrdt (2006) exemplifies by the connection between the DWM and the Ministry of Ecology and Emergency Situation of the Republic (MEES)⁴⁰. Whereas the DWM was in charge of water abstraction, the MEES was responsible for controlling water pollution. But in comparison with the DWM, the MEES played a less important role. The lack of appropriate interactions for collaboration and direction between these official organizations trends towards further limiting the MEES.

“[...] The existing water management structure is still determined by weak elaboration of horizontal interactions and lack of coordination among the main ministries and departments.” (Code F1⁴¹)

The administrative vertical scheme usually comprises of national, regional, basin, district and local levels of management. Currently, of all meaningful responsibilities within water resource management of the Kyrgyz Republic, provisioned by the Kyrgyz legislative, the central and regional state organizations accomplish just functions related to water infrastructure and water delivery to water users ("Ministry of Agriculture and Melioration of the Kyrgyz Republic; United Nations Economic Commission for Europe; Organisation for Economic Cooperation and Development; European Union Water Initiative", 2013).

⁴⁰ Currently the Ministry of Ecology and Emergency Situation of the Kyrgyz Republic is reorganized into the Ministry of Emergency Situation of the Kyrgyz Republic and the State Agency on Environment Protection and Forestry of the Kyrgyz Republic. Retrieved from http://www.gov.kg/?page_id=27292&lang=ru

⁴¹ Interview with the Head of the Farming Policy Development Department of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

Eventually a mixture of regulating, administrative and economic functionings is carried out by a variety of involved executive organizations; monitoring operation for surface and ground water resources are accomplished by the state agencies according to the administrative-territorial division of the Republic, which is against the hydrological principles of IWRM; there are no mid-range and long-term mapping of the water resource management and the protection, relying on a basin approach ("Ministry of Agriculture and Melioration of the Kyrgyz Republic; United Nations Economic Commission for Europe; Organisation for Economic Cooperation and Development; European Union Water Initiative", 2013).

“The common deficiency of horisontal communication could happen to some extent because of the top-down management system remained from the Soviet time.” (Code F2⁴²)

This issue looks more evident taking a distribution of information among the state organizations into account. The water management is not likely to struggle with a lack of information, but rather than with an inadequate information conveying among various participants. For instance, two state research institutes in the capital of Kyrgyzstan provide identical Geographic Information Systems (GIS) maps concerning the water resources and its quality. The data of these maps relies on the same source – a state servant. However, the water managers are not eager to use them due to their high prices (Herrfahrdt et al., 2006).

⁴² Interview with the Head of Crop Production Division of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

“Path dependency of the top-down management system gets manifested in the bureaucracy of Kyrgyz water management. Mostly it comes with a deficiency of key perspective, which leads to an outcome of weak policy-making authorities amid the organizations.” (Code F2⁴³)

On the contrary, the President Administration of the Kyrgyz Republic, functioning along with the ministries, is of consequence for decision-making. When the President Administration takes even minor decisions that can be in conflict to the principle of subsidiarity. Moreover the state organizations themselves are prone to intervene daily work of lower administrative stages (Herrfahrdt et al., 2006).

Based on the abovementioned it has become clear that there is no systematic adherence to the principle of subsidiarity. Competencies are distributed unevenly and along with that the organs are without proper authorities, making attempts to control everything. Such a lie of matters poses a problem for fulfillment of the IWRM approach. Intersecting duties together with an incomplete regulation are indicative of serious complications of organizational structures. Thus it results in making the water management time-consuming and overpriced as well as the organizations problematic to adjust to changing realities. Therefore the institutional setup itself could be taken as a reason to change.

However, it is necessary to underline the presence of political will of the Kyrgyz leadership to revise the water management in compliance with IWRM.

“A new Water Code of the Kyrgyz Republic includes two important alterations in the institutional arrangement of water management. First of all, the Water Code makes provisions of forming a new institutional entity – the State Water Administration -, in order to combine regulatory functions within one

⁴³ Ibid.

organization. The State Water Administration is supposed to succeed the DWM, which at the moment enjoys more executive functions and authority. Moreover this new body is regarded to be institutionally autonomous from the MAM with a bias for agriculture, which will serve as a foundation for better inter-sectoral integration of the water resource management. Secondly, the Code creates a foundation for the presentation of National and Basin Water Councils, which could facilitate the fulfillment of IWRM.” (Code W3⁴⁴)

There are some hesitations about the efficiency of the State Water Administration. Because of the reluctance of other involved organs, functions of monitoring operation and policy-making and its coordination throughout the various administrative levels are likely to stay within these opposing organs (Herrfahrdt et al., 2006). In fact this could lead to a split between policy-making and implementation. Probably it is one of the reasons that the State Water Administration has not been formed yet.

Province level

It should be emphasized that two aspects can characterize the performance of the OblVodKhozes. Firstly, the competencies of the OblVodKhozes continue to be ambiguous (Herrfahrdt et al., 2006). The water administration within the province level does not have sense in terms of lacking real functions of administration (Herrfahrdt et al., 2006). Secondly, the relationship between the OblVodKhozes and the DWM has a multilayered character. One of the distinctive features of their work is supremacy of reporting-back method, making an accent on positive update. Nonetheless the current possibility of the OblVodKhozes for realization of IWRM

⁴⁴ Interview with the Specialist on hydrological monitoring of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

derives from the fact that they have been functioning to a certain degree in line with hydrological borders (Herrfahrdt et al., 2006).

The WUA Support Unions (WSU) of the OblVodKhozes play an important role in the decentralization of the water management. Such entities facilitate concerned water users in establishing WUAs and organizing trainings related to the administration of WUAs. The WB funds the WSUs in the amount of 40%, which gives an edge over other organizations of the OblVodKhozes (Herrfahrdt et al., 2006). However, there is an ambiguity about relative advantages between the province WSUs and the local ones. The main function of the province WSUs is to monitor and to regulate the work of the local WSUs. In fact the province WSUs execute the same tasks as the local WSUs. Subsequently it causes difficulties for the OblVodKhozes in terms of accomplishing regulatory or executive tasks (Herrfahrdt et al., 2006).

Local level

Despite a strong vertical hierarchy between the OblVodKhozes as a supervisory organ and the RayVodKhozes, the latter has opportunities for making maneuvers. In fact control by the OblVodKhozes is weak so that the RayVodKhozes can allow their personnel to follow parochial interests.

Simultaneously most finances are expended within the local level (Herrfahrdt et al., 2006). These finances comprise not only a certain proportion of budget from the Government of the Kyrgyz Republic but also irrigation service fee (ISF) from the water users (Herrfahrdt et al., 2006). The budget accountability of the RayVodKhozes is considered as a significant difficulty in water resource management of the Republic (Herrfahrdt et al., 2006).

“The performance of the RayVodKhozes is characterised by deficiency of credibility and failure of trust from water users. There are several main features that could shed a light on such a destructive relation in respect to the local level participants. The RayVodKhozes continue to take control over important parts of irrigation networks within the local area. Nevertheless most of WUAs executives along with other water stakeholders believe that WUAs realize the largest share of maintenance and rehabilitation activities. After undertaking a commitment over manifold functions, excersiced by the RayVodKhozes before, WUAs make the former irrelevant.” (Code W3⁴⁵)

The RayVodKhozes partially own some irrigation nets that give them rights to charge ISF. In this regard the water users find this unjust because they must pay ISF in the amount of 0.03 KGS or they can use the local canals, which are one km far (Herrfahrdt et al., 2006). Lack of trust whether the financial sources from the ISF are put to good use for the purpose of maintenance and rehabilitation, is remaining open (Herrfahrdt et al., 2006).

“There is no enough authority of WUAs to make the RayVodKhozes carry out their responsibilities. For instance, the RayVodKhozes did not compensate financially to WUAs for the lost harvests since they did not provide a certain quantity of water to WUAs according to their applications. Such an agreement is based on the contracts.” (Code W3⁴⁶)

In order to overcome these discordance between the RayVodKhozes and WUAs, which are really posing a problem for the state water management, Herrfahrdt (2006) proposes to take a look at WUA Federations as a possible solution. WUA Federations possess an ability to administer the whole irrigation

⁴⁵ Ibid.

⁴⁶ Ibid.

networks by themselves and, in the meantime, eliminating the RayVodKhozes would facilitate the implementation of IWRM in terms of meeting the principles of hydrological borders and improving the management at the higher levels of water administration.

The Bottom-up approach

Facilitating development of WUAs, the Government of the Kyrgyz Republic shaped its course for strengthening involvement of water users in the water management. Following the principle of participation, the Law of the Kyrgyz Republic (2002) about WUAs envisaged the right for water users to take a part in water resource management of the Republic. Apart from this, the Water Code of the Kyrgyz Republic (2005) has a major power for further promotion of water user involvement. It foresees a legitimate foundation for the Irrigation and Drainage Commissions and Basin Councils with all related stakeholders, including representatives of WUAs.

However, there are cases that water users are not engaged in decision-making process effectively in practice and, in this regard, many of WUAs could turn out to be on the line of becoming just water supply entities instead of actual water user associations (Herrfahrdt et al., 2006). IWRM requires water management to be close to water stakeholders. In order to understand to what extent WUAs are meeting the principles of IWRM, there are several aspects to be considered (Herrfahrdt et al., 2006).

First of all, it is necessary to notice that path dependency and mind change, with regard to the issue of desire or lack of desire of water users to be arranged into WUAs, have significant impacts. Path dependency deriving from the Soviet time is characterised by the overall misunderstanding amid the water users why the Republic is no longer entirely involved in a restoration of the irrigation infrastructure and why the state does not supply water free of charge (Herrfahrdt et al., 2006). In this context the top-down approach is the possible way to accelerate an organization of WUAs. And in fact, the outer stakeholders such as the RayVodKhozes, the WUA Support Units and financial donors supported formations of WUAs rather than farmers themselves (Herrfahrdt et al., 2006). On the other hand the water users of the rural areas started experiencing a process of mind change (Herrfahrdt et al., 2006). At origin a presentation of WUAs was accompanied by the top-down approach. The water users have become aware of a sense of WUAs. By means of WSUs at various stages of the water administration, NGOs and benefactors, social concentration efforts have been carried out in order to awaken farmers to take advantages of WUA operation (Herrfahrdt et al., 2006).

Information and communication

One of the preconditions according to IWRM should be an existence of information and communication between various stages of water administration, but first of all, between water users and water managers. It is because decision-making must take into account of water demands of all water users and in the meantime water users have to count on water quantity they are eager to request.

“Currently the measurement of individual water use should be improved in order to raise efficiency of water use. Tracking individual water consumption allows to reduce damaging attitude such as non-repayable water utilization, which could be punished according to the Kyrgyz legislation. Besides this, measuring and controlling water consumption can make water managers fulfill more precise water distribution to water users and facilitate water conservation.” (Code W1⁴⁷)

“Basically the RayVodKhozes accomplish functions of measuring water quantity for all major canals and greater part of secondary canals. Along with this, WUAs also carry out general water measurement once water is delivered to them. Mostly WUAs and other big farms possess their own measurement equipment while private water users are incapable to define their own water consumption accurately.” (Code W1⁴⁸)

The current measurement equipments have been suffering from overservice of life cycle and becoming unserviceable (Herrfahrdt et al., 2006). The same as the irrigation infrastructure of the Republic, the deterioration of technical water measurement equipments, started from the Soviet time, is going on worsening (Herrfahrdt et al., 2006). As a result this furthermore worsen the water measurement because of growing water losses.

Given the above it becomes obvious that the precise water measurement is not being practiced under the local level of the Republic. In such a case water managers estimate their average water consumption in corcondance with harvest type and irrigated area (Herrfahrdt et al., 2006). The local water users can possess information only about the costs for water in general, but they do not know about the volume of cubic meters of water they consume (Herrfahrdt et al., 2006). The

⁴⁷ Interview with the Leading specialist on river water use of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

⁴⁸ Ibid.

method of estimating water utilization by harvest type and irrigated area is considered to be the most feasible and reasonable despite having inaccuracy of water measurement.

“The decision-making process of the Kyrgyz water administration must take information of water needs of each water consumer into consideration. Nevertheless there is a difficulty in terms of availability of such an information on water needs of small-scale users since lack of carrying out appropriate study activities on them does not permit to collect proper information.” (Code W3⁴⁹)

Water need information of the water users is defined by means of making requests. In turn WUAs and the RayVodKhozes, relying on water requests of farmers, estimate water needs for harvests and irrigated areas of individual users (Herrfahrdt et al., 2006). Thus water managers at various stages of water administration are aware of the total needs, which allows to make a decision in a proper way (Herrfahrdt et al., 2006).

However in practice the water administration can not meet water needs of all users for the most part (Herrfahrdt et al., 2006). The process of water requests is organized on the annual basis to manage water provision through the whole irrigation period (Herrfahrdt et al., 2006). Besides water requests, water administration should take care of the capacities of irrigation infrastructure (Herrfahrdt et al., 2006). One of the obstacle why most requests of water users can not be fulfilled is that they usually make water requests during the vegetative season when they feel the need (Herrfahrdt et al., 2006). Moreover they try to

⁴⁹ Interview with the Specialist on hydrological monitoring of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (April 18th-25th, 2016)

request more water than they are really in need whilst water managers do not inspect systematically their applications (Herrfahrdt et al., 2006). It becomes clear that neither water managers nor water users reflect the information collected before water distribution in the growing season.

Summary of the results

Based on the interviews' comments and their discussions it can be stated that the Naryn River and its water resources are economically important and vital to the Kyrgyz Republic and in Central Asian region on the whole. On the one hand the hydro energy production of the Kyrgyz Republic, the main source of electric power, highly depends on a constant water flow exceptionally from the Naryn River. Secondly, this River serves as a source for an irrigation of the agricultural harvest and its further expansion in the Naryn province. On the other hand the Naryn River represents a major water supply for the Syr Darya River, which contributes agricultural development of the downstream states in the region.

Within the ecological integration of water resource management in the Naryn River according to the IWRM framework, it can be concluded that the water management seriously takes the hydrological principle into consideration. The holistic vision of the whole catchment area, the decrease of labor differentiation between the state organizations, the introduction of the bottom-up approach and the local community participation through creating WUAs became the main advantages of the hydrological approach. The water legislation of the Kyrgyz Republic came

up with the Water Code in 2005, calling for appropriate norms in the water resource management, and gave a legal basis for implementation of the mentioned approach.

However, the practical realization of the norms provisioned by the Water Code is very weak because of the existing Soviet centralized system among involved state administrative organs, the strong division of labor and duplication of functions of the involved state organs, the geographical difficulties in organizing the united hydrological units within the district and the local areas of the Republic and the poor irrigation infrastructure. In case of the Naryn River such a slow pace of promoting hydrological approach is related in addition to the low agricultural activities and cultivation of the less water demanding crops in the province.

Nevertheless it should be acknowledged that the leadership of the Kyrgyz Republic managed to create institutions of WUAs in order to facilitate participation of the local communities in the regions by uniting in associations. It was found that activities of WUAs were acknowledged insufficient. The formation of WUAs is accomplished with a great external financial support. The delegated authority to WUAs in terms of providing irrigation water for water users and collecting service fee is not fulfilled properly since the RayVodKhozes – the local water administration – are still duplicating such activities. At this point WUAs can not receive adequate finances just to keep working, at the same time the local farmers are characterized to have a low paying capacity for water service fee. The case of the Naryn province showed the tendency of WUAs decrease, their inability to cover all the irrigation areas responsible for. Furthermore it was noticed that the organization of WUAs could be carried out with no relation to the irrigation

problems. WUAs are expected to receive external funds for project development and this opportunity can be used for making business.

The sectoral integration of IWRM reveals that the inclusive water allocation of the Naryn River is carried out for two major economic purposes: the Toktogul reservoir generates electricity for Kyrgyzstan's needs by releasing water and then Kazakhstan and Uzbekistan consume water for agricultural development. In this regard the main problem in the water allocation resides in a seasonal allocation of the Naryn River water flow, trying to be timely relevant for both energy and agriculture. The scheme of water allocation is practiced insufficiently in the Kyrgyz Republic for a score of reasons. The Agreement on the Use of Water and Energy Resources of the Syr Darya River basin from 1998 does not take the tendency of decreasing the water flow of the River and the multiyear water regulation of the Naryn River into account with the focus on abnormally dry or wet time and charges for water service. The perception of the time back to the USSR regarding water resources and their management can not make the upstream Republics contribute for maintaining exploitation activities of the water allocation facilities of the Naryn River. Kyrgyzstan on its own bears expenses for the water storage, the conservation, the management and the water delivery. But in fact the Republic is not able to provide an adequate amount of finance, especially on exploitation and maintenance operations of the hydro-technical utilities, which results in growing losses of energy and water.

The regulatory integration finds that the principle of subsidiarity is not systematic. The water resource management of the Kyrgyz Republic is characterized by very weak horizontal interactions and coordination among the

involved ministries and departments of the Republic. The regulating, administrative and economic functions are not fixed within the concrete executive organs, resulting in duplicating appropriate activities or the lack of their performance. Some executive bodies also can intervene work of the lower administrative organs. Furthermore path dependency of the top-down management remained from the USSR complicates the bureaucracy of the water management, lacking the holistic perspective in policy making. Such a tendency can be observed in the province and the local levels among the OblVodKhozes, the RayVodKhozes and the WUAs in their interactions.

The formation of WUAs is supported by financial donors and the administrative authorities rather than by farmers themselves. In fact performance of WUAs are accompanied by the top-down approach rather than by the bottom-up one. The top-down approach plays the role of accelerating organization of WUAs. The path dependency deriving from the Soviet time and the mind change together with the lack of finance and the poor irrigation infrastructure become major reasons for the top-down approach. On the other hand local water users started realizing the real sense of mind change in order to understand the wide range of local participation. WSUs, NGO and benefactors help to take advantages of WUA operation by the local farmers.

Exchange of information and communication are accomplished between the water users and the water managers. The information field should process data of the water demands for water users and water quantity they intend to apply for. Tracking the individual water consumption needs improving in order to reduce practice of non-payable water use, which is against the existing water legislation of

the Republic. Furthermore it will give opportunities for the water managers to come up with a more precise distribution of water and to facilitate water conservation.

The existing water measurement equipment are unserviceable. In fact the water users are not aware of the exact water consumption and their measurement relies on harvest types and irrigated areas. On the other hand the water administration of the Republic is able to satisfy all the needs of the water users. Poor condition of irrigation infrastructure, late water requests at the right time of vegetative period and artificially high water request than that needed are the major reasons.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

Conclusion

The Naryn River is a vital economic resource in the Kyrgyz Republic and the Central Asian states. The River contributes energy demand in the whole Kyrgyz Republic and facilitates agricultural development in Uzbekistan and Kazakhstan. It maintains ecological and hydrological balance in the Syr Darya River, feeding the Aral Sea. In this sense exploring Integrated Water Resource Management practiced in the Naryn River became the main question of this study.

Based on the results of this research, Integrated Water Resource Management in the Naryn River is in the initial phase of its implementation.

A noteworthy detail is that the Government of the Kyrgyz Republic managed to unify all regulations dealing with water management into the Water Code of the Republic. The Water Code provisions appropriate differentiations of functional regulations among involved ministries and departments, formation of the Water State Administration as a central body for elaborating strategies and policies in water management of the Republic, and organization of Water User Associations, facilitating the local participation in the water resource management.

Unfortunately it should be noted that duplication of regulation functions within the province and the local levels, especially among the RayVodKhozes, the OblVodKhozes and the WUAs are in evidence in many cases. The Water State Administration has not been formed so far in order to make decisions with the holistic approach. However, WUAs were organized within all the provinces and the

districts of the Republic but exceptionally with external financial support. Today all WUAs have not been able to become self-financed entities, which leads to their growing indebtedness. In the case of the Naryn province the WUAs were reduced by three times and the rest of them serve just half of the required irrigation area.

The existing water allocation of the Naryn River does not meet the interest of Kyrgyzstan. Established scheme of water allocation rooted in the USSR far past does not consider water resources of the Naryn River within abnormally dry or wet time and financial costs for water storage, conservation, management and water delivery carried out only by the Kyrgyz side. Kyrgyzstan more than once went through dry time, which caused water scarcity in the Naryn River and the Toktogul reservoir. With the purpose to collect necessary amount of water for the downstream countries, Kyrgyzstan has to reduce water releases for energy production that leads to electricity cuts in the Republic in winter.

The charge of water service for water resource storage, conservation, management and delivery has continued to be unspecified. Currently the cost for exported electricity by Kyrgyzstan and the costs for gas and coal provided by Uzbekistan and Kazakhstan are high and not specified.

The water resource management of the Kyrgyz Republic does not receive adequate amount of finances on exploitation and maintenance operations of the hydro-technical utilities. Factual finances are provided in the range of 20-30% out of the total demand for the irrigation fund. Low tariff rates are determined by a very weak paying capacity of the rural population that leads to an entire degradation of the irrigation network. The state budget covers around a quarter of overall expenses for maintenance of the interfarm irrigation networks, the EU provides a donor

assistance in the amount of additional 20% and the World Bank and the ADB – another 40%.

Within the last aspect of IWRM there is no systematic adherence to the principle of subsidiarity. Competencies are distributed unevenly, the state bodies are without proper authorities, making attempts to control everything.

The exchange of information and communication are accomplished between water users and water managers. The measurement of individual water use needs improving to better control water consumption. It would allow to reduce non-repayable water use, to fulfill more precise water distribution and to raise water saving. Neither the water managers nor the water users properly consider information of water needs collected before the growing season.

Recommendations

Enhancement of Integrated Water Resource Management in the Naryn River of the Kyrgyz Republic

Taking the constrained political and financial possibilities of the public officials and the policy-makers of the Government of the Kyrgyz Republic into account, recommendations focused on the most feasible aspects in enhancing integrated water resource management in the Naryn River of the Kyrgyz Republic.

1. The Government of the Kyrgyz Republic should enhance support to activities of WUAs within the province and the district levels of the Republic. First of all, the support relates to strengthening control of WUA's activities and their formation to make sure that they meet the agricultural interests of the local

irrigation areas in the field. The fictional existence of WUAs, their annual decreases and willingness of some individuals to receive possible finances acting as a WUA are considered as signs for lacking profound examination of requirements for creation and functioning of WUAs. Secondly, it is necessary to continue further decentralization of irrigation water management in terms of replacing the RayVodKhozes by WUAs. Still it can be observed when the OblVodKhozes intervene activities of the RayVodKhozes, and the RayVodKhozes in many cases try to keep functions of water delivery to end water users and to collect water service fees in parallel with WUAs. Thirdly, Herrfahrdt et al. (2006) proposes that external beneficiaries should provide finances as grants. WUAs, receiving such grants could be obliged to pay it back in some time. Eventually this returned fund can be disbursed by “The National Irrigation Rehabilitation Fund”, which could give loans for further activities of WUAs.

2. The Ministry of Agriculture and Melioration of the Kyrgyz Republic as an executive body in the water resource management should initiate the issue with regard to the formation of the Water State Administration. The Water Code of the Republic has a provision for creation of the Water State Administration, however there is no detailed organization of this Administration in terms of its structure, composition of administration and allocation of budget. In this regard, the MAM of the Kyrgyz Republic together with the Department of Water Management could take responsibility for projecting an institution of the Water State Administration within current financial budget allocated from the national budget for the water resource management among all involved ministries and departments of the Republic. According to the established procedure of reconciliation of this project

within the Cabinet of Ministries, the MAM could receive further recommendations for realization. Formation of the Water State Administration could seriously improve the principle of subsidiarity and the exchange of information and communication among the involved agencies.

3. The Government of the Kyrgyz Republic should continue to promote the Chu – Talas River Basin Agreement between Kyrgyzstan and Kazakhstan as a successful model for sustainable management of transboundary rivers. The main aspect of this Agreement is that two states are responsible for operation and maintenance expenses of the water resource infrastructure. Each state individually compensates expenses for O&M of the water allocation infrastructure proportionally to received amount of water (Wegerich, 2008). The Agreement of 1998, regulating the Naryn River in fact does not provide any collective sharing of costs for operation and maintenance of water distribution facilities. At this point the downstream states, taking individual responsibility for water service costs could raise efficient utilization of the water resources.

4. The Government of the Kyrgyz Republic should continue to construct the Kambarata HPP-1 and Kambarata HPP-2 in the upper Naryn River, which would allow changing operation mode of the Toktogul reservoir from hydro energy to irrigation. Thus it would assure the guaranteed water supply for irrigation activities of the downstream states and energy demand in Kyrgyzstan. The installed capacity of the Kambarata HPP-1 is estimated to be 1900 MW at the cost of 1.2 billion US Dollars ("The World Bank", 2004). And the second one is with the capacity of 360 MW at the cost of 270 million US Dollars ("The World Bank", 2004). The main problem for realization of the hydropower project of the Kambarata HPP-1 and

Kambarata HPP-2 is a lack of own financial resources and external investments (Rozanov, 2015).

5. Researchers in collaboration with think tanks should pay attention that IWRM approach does not provide any regulation of transboundary river cooperation. In the case of the Naryn River it became clear that IWRM approach has nothing to do with the transboundary management between the upstream and the downstream states. The approach is limited by norms of international water law, which acknowledges intergovernmental agreements on the use of rivers. Thereby IWRM does not elaborate universal mechanisms of water distribution and water service fees of rivers shared by two or more countries. At this point it is recommended that the Government of the Kyrgyz Republic in collaboration with appropriate international institutions, dealing with transboundary water resource management could consider and integrate the existing mechanism of water distribution and compensation for water regulation service learnt from the Chu-Talas River basin between Kyrgyzstan and Kazakhstan as one of the successful strategy in meeting the interests of all involved Parties. The World Bank (2004) states that the concept of water service fees is well-established practice when downstream countries pay for water and water regulation service to upstream countries. 44 out of the 145 Agreements within the last century stipulate such payments for water service ("The World Bank", 2004).

LIST OF REFERENCES

- "Закон Кыргызской Республики "О воде" (The Law of the Kyrgyz Republic "About water")". (1994, January 14). Закон Кыргызской Республики "О воде" (The Law of the Kyrgyz Republic "About water").
- "Национальный Институт Стратегических Исследований Кыргызской Республики (The National Institute for Strategic Studies of the Kyrgyz Republic)". (2014). *Состояние водных ресурсов Кыргызской Республики (Condition of water resources of the Kyrgyz Republic)*. Bishkek.
- "AQUASTAT of Food and Agriculture Organization of the United Nations". (1997). *FAO's information system on water and agriculture: Kyrgyz Republic*.
- "AQUASTAT of Food and Agriculture Organization of the United Nations". (2012). *Irrigation in Central Asia in figures*.
- "Department of Water Management and Melioration of the Ministry of Agriculture and Melioration of the Kyrgyz Republic". (2013). *National policy dialogue on integrated water resources management*.
- "Global Water Partnership Technical Advisory Committee". (2000, March). Integrated Water Resources Management. p. 22.
- "Ministry of Agriculture and Melioration of the Kyrgyz Republic; United Nations Economic Commission for Europe; Organisation for Economic Cooperation and Development; European Union Water Initiative". (2013). *National policy dialogue on integrated water resources management 2008-2013*.
- "Organization for Economic Cooperation and Development". (n.d.). Improving the use of economic instruments for water resource management in Kyrgyzstan: the case of Lake Issyk-Kul Basin.
- "Organization for Economic Cooperation and Development". (2013). *Improving the use of economic instruments for water resource management in Kyrgyzstan: The case of lake issyk-kul basin*.
- "The National Statistical Committee of the Kyrgyz Republic". (2011). Crops' yield by territory.
- "The United Nations Economic Commission for Europe". (2000). *Environmental Performance Reviews. Kyrgyzstan*.
- "The Water Code of the Kyrgyz Republic". (2004, January).
- "The World Bank". (2004). Water Energy Nexus in Central Asia. Improving regional cooperation in the Syr Darya River Basin.
- "United Nations Development Programme". (2003). *Central Asian Water Mission*.
- "United Nations World Commission on Environment and Development". (1987). *Our Common Future*.
- Antipova, E., Zyryanov, A., McKinney, D., & Savitsky, A. (2002). Optimization of Syr Darya water and energy uses. *Water International*, XXVII, pp. 504-516.
- Bakas uluu, B., & Smagulov, K. (2011). Водноэнергетические проблемы Центральной Азии: Политика государств региона и перспективы развития ситуации (Water-energy problems of Central Asia: Policy of the region's states and perspectives of situation development. *Центральная Азия и Кавказ (Central Asia and Caucasus)*).

- Bandaragoda, D. J. (2000). *A Framework for institutional analysis for water resources management in a river basin context*. International Water Management Institute.
- Bernauer, T., & Siegfried, T. (2008). Compliance and Performance in International Water Agreements: The Case of the Naryn/Syr Darya Basin. *Global Governance* , 479-501.
- Ciegis, R., Ramanauskiene, J., & Martinkus, B. (2009). The Concept of Sustainable Development and its Use for Sustainability Scenarios. 32-33.
- Coase, R. H. (1960, October). The problem of social cost. *Journal of Law and Economics* , III.
- Davis, L., & North, D. (1970). Institutional change and american economic growth: A first step towards a theory of institutional innovation. *Journal of Economic History* , 131-49.
- Degembaeva, N., Mamyrbaev, A., & Baybagyshov, E. (2016). Irrigation water management at the local level. V.
- Drexhage, J., & Murphy, D. (2010). *Sustainable development: From Brundtland to Rio 2012*.
- Hassan, M. U., Starkloff, R., & Nizamedinkhodjaeva, N. (2004). *Inadequacies in the Water Reforms in the Kyrgyz Republic: An Institutional Analysis*. International Water Management Institute.
- Herrfahrdt, E., Kipping, M., Pickardt, T., Polak, M., Rohrer, C., & Wolff, C. (2006). Water governance in the Kyrgyz agricultural sector: On its way to integrated water resource management? *German Development Institute* .
- Isnugroho. (2009). Authority and responsibility in river basin management.
- Isnugroho, & Nielsen, T. K. (2014). Functional frameworks for river basin governance.
- Karimov, A., Giordano, M., Mukherji, A., Borisov, V., & Djumanov, J. (2012). Of transboundary basins, integrated water resources management (IWRM) and second best solutions: the case of groundwater banking in Central Asia. 99-111.
- Koshmatov, B. *Organizational structure of water resources management in Central Asia and ways to improvements*.
- Lenton, R., & Muller, M. (2009). *Integrated Water Resources Management in Practice: better water management for development*.
- Mamatov, N., Cusupov, M., & Raimcanov, B. *Water resources problems in Kyrgyzstan*.
- McKinney, D. (2004). Cooperative management of transboundary water resources in Central Asia. *Transboundary water resources* , 187-219.
- Merriam, S. B. (2002). Qualitative research in practice: examples for discussion and analysis.
- Mosello, B. (2008). Water in Central Asia: A Prospect of Conflict or Cooperation?
- North, D. C. (1990). *Institutions, institutional change, and economic performance*.
- Patton, M. Q. (1985). Quality in qualitative research: Methodological principles and recent developments.

- Powell, W. W., & DiMaggio, P. J. (1991). *The New Institutionalism in Organizational Analysis*. The University of Chicago Press.
- Rahaman, M. M. (2012). Principles of Transboundary Water Resources Management and Water-related Agreements in Central Asia: An Analysis.
- Raimzhanova, N. (2014). Legal aspects in regulation of transboundary waters of Central Asia.
- Rozanov, D. (2015). The problem of the construction of the largest hydroelectric power plant in Central Asia.
- Rysbekov, Y. (n.d.). Transnational Water Resources of Central Asia: Political and Legislative Aspects of Use without a conflict.
- Saleth, R. M., & Dinar, A. (2004). *The Institutional economics of water a cross-country analysis of institutions and performance*.
- Sehring, J. (2005). *Water User Associations (WUAs) in Kyrgyzstan A Case Study on Institutional Reform in Local Irrigation Management*.
- Simon, H. A. (1957). *Models of Man: Social and Rational*. New York.
- Sorg, A., Mosselo, B., Shalpykova, G., Allan, A., Hill Clarvis, M., & Stoffel, M. (2014). Coping with changing water resources: The case of the Syr Darya river basin in Central Asia. *Environmental science and policy* , 68-77.
- Teasley, R. L., & McKinney, D. C. (2011). Calculating the Benefits of Transboundary River Basin Cooperation: Syr Darya Basin. *American Society of Civil Engineers* .
- Technical Advisory Committee of Global Water Partnership . (1999). *Integrated water resources management*.
- Volovik, Y. (2011). *"Promoting IWRM and Fostering Transboundary Dialogue in Central Asia*. EC-UNDP Project.
- Wegerich, K. (2008). Passing over the conflict. The Chu Talas Basin Agreement as a Model for Central Asia?
- Wegerich, K. (2000). *Water User Associations in Uzbekistan and Kyrgyzstan: Study on Conditions for Sustainable Development*.
- Williamson, O. E. (1994). Institutions and economic organization: the governance perspective.
- Williamson, O. E. (1995). The Institutions and Governance of Economic Development and Reform. 171-196.
- Wouters, P. (2013). International Law - Facilitating Transboundary Water Cooperation.
- Zeijl-Rozema, A. v., Cörvers, R., Kemp, R., & Martens, P. (2008). Governance for sustainable development: A framework. 410-421.

APPENDICES

Appendix 1

Interview questions

1. How important are the Naryn River and its watershed in the territory of the Kyrgyz Republic?
2. What are the main purposes of using the Naryn River within the territory of the Kyrgyz Republic?
3. What are the possible factors that influence performance of water resource management of the Naryn River in Kyrgyzstan?
4. What are the main gaps of legislation of the Kyrgyz Republic in terms of water resource management?
5. Is it adequate amount of finance, allocated to water resources management of the Kyrgyz Republic?
6. Is it necessary to consider water resource management of the Naryn River within hydrological perspective instead of administrative perspective?
7. How do you assess the activity of Water User Association?
8. Is it adequate proportion of water allocation from the Toktogul reservoir between the needs of the Kyrgyz Republic and the needs of downstream states?
9. Taking into account all abovementioned is water resource management of the Naryn River sustainable or not?
10. What would you recommend in order to improve water resource management of the Kyrgyz Republic and to make it more sustainable?

The summary of the online interview information

(April 18th -25th, 2016)

1.	<i>Head of the Farming Policy Development Department of the Ministry of Agriculture and Melioration of the Kyrgyz Republic (the MAM)</i>	“The Naryn River is a strategic resource of the Kyrgyz Republic since the country possesses a huge potential for hydro energy production. [...] From the Soviet time within the Naryn River, the Naryn cascade of hydropower plants was constructed to produce electricity for domestic consumption and for export. [...] Water resources of the Kyrgyz Republic are natural wealth of the country, especially of the Naryn River that must be considered with a high priority.”
2.	<i>Leading specialist on river water use of the Department of Water Management of the MAM</i>	“[...] Hydro energy in the Kyrgyz Republic holds a prominent place in energy security of the country. Due to location of the state within mountainous ranges, there is a big amount of glaciers and snow, feeding lakes and rivers of the country, which are being used for hydro energy production. Energetic potential of Kyrgyz rivers equals to around 150 billion kWh, but unfortunately these days Kyrgyzstan has exploited water resources of rivers up to 10 %. [...] The Naryn river has become the most exploited river in the Kyrgyz Republic where its water resources are being utilized for power generation almost by 50%. By means of Toktogul, Kurpsai, Tashkumyr, Shamaldysai and Uchkurgan hydropower plants on the Naryn cascade generates 90 % electricity of total country demand.”
3.	<i>Head of Crop Production Division of the Farming Policy Development Department of the MAM</i>	“[...] The Naryn River is the most abundant river and powerful in terms of energy generation in the republic. [...] The biggest advantages of hydro energy production in Kyrgyzstan are the lowest cost of electricity and generation of electric power with no environmental pollution. [...]

		<p>Nevertheless Kyrgyzstan has been experiencing a shortage of water in the rivers driven by natural changing processes of climate warming, decreasing rainfalls and water leakage because of poor technical infrastructure. In this regard hydro energy and agricultural development become vulnerable when it comes to water shortage in the rivers. A need arises for buying alternative sources of energy such as coal, gas and oil.”</p>
4.	<p><i>Leading specialist on river water use of the Department of Water Management of the MAM</i></p>	<p>“[...] Nevertheless Kyrgyzstan has been experiencing a shortage of water in the rivers driven by natural changing processes of climate warming, decreasing rainfalls and water leakage because of poor technical infrastructure. In this regard hydro energy and agricultural development become vulnerable when it comes to water shortage in the rivers.”</p>
5.	<p><i>Leading specialist on crop production of the Farming Policy Development Department of the MAM</i></p>	<p>“[...] Besides the presence of electricity production in the Naryn River, water resources of the river provide irrigation water for agricultural products of the Naryn province of the state. Within the Naryn province there are crops such as cucurbits and grains being cultivated, which do not demand copious irrigation unlike cotton production. However, the Naryn province has observed perspectives of supplementary needs for water to increase irrigation of crops.”</p>
6.	<p><i>Specialist on hydrological monitoring of the Department of Water Management of the MAM</i></p>	<p>“It is very important to consider hydrological boundaries of the Naryn River. The perspective of hydrological approach should be taken into account on a first-priority basis in water resource management of the republic, which has been known long ago back to the Soviet time. The importance of hydrological management lies in the fact that it allows water managers to regulate the entire catchment area of the Naryn River in order to get a holistic observation of positive and negative factors, deriving from the upstream performance on the downstream activities. For instance, the Department of Water Management under the Ministry of Agriculture and</p>

7.	<i>Specialist on hydrological monitoring of the Department of Water Management of the MAM</i>	<p>Melioration of the Kyrgyz Republic (DWM) and its regional representatives – <i>OblVodKhozes</i> and <i>RayVodKhozes</i> - must manage water resources of the Naryn River all the flow way from Issyk-Kul province to Djalal-Abad province by one administrative unit.”</p> <p>“Ideally such a principle should be implemented over all the rivers in Kyrgyzstan. Hydrological principle towards the Naryn River could decrease administrative differentiation of labor between the state organizations, which are in charge of water management of the republic. In this regard the Oblvodkhoz of the Naryn province is not aware of water needs in the Djalal-Abad province simply because the Oblvodkhoz of Djalal Abad is responsible of water management within its province. Furthermore the centralized up-bottom system inherited from the Soviet time does not give space for very close interaction between Oblvodkhozes of the Kyrgyz provinces because decisions are made by the headquarter of the Ministry of Agriculture and Melioration of the republic.”</p>
8.	<i>National specialist on Water User Association Development of the Farming Policy Development Department of the MAM</i>	<p>“[...] The hydrological approach also could propose a bottom-up system of water management by facilitating local community participation and improve efficiency of water storage and water distribution by creating Water User Associations (WUA).”</p>
9.	<i>Leading specialist on water resource management of the Department of Water Management of the Ministry</i>	<p>“In 2005 Kyrgyz Republic adopted the Water Code, which comprises all state principles and policy towards water resource management, rights and duties of water users and various state organs, involved in certain aspects of water resource management. The Water Code covers the issues of establishment of national water policy and strategy, water utilization within different sectors of economy, protection of water</p>

		<p>objects and water resources. The Water Code reflects the hydrological cycle of water in nature. It implies that water above and under ground, in glaciers and snow cover, rivers and canals must be considered, and is considered as a part of the same resource.”</p>
10.	<p><i>Leading specialist on water resource management of the Department of Water Management of the Ministry</i></p>	<p>“Before the new Water Code adopted in 2005, there were dozens of secondary legislation such as instructions, methodological instructive regulations, standards, provisions elaborated in early 1990, which became inadequate to modern conditions. For example, with the use of computer technologies in managing national database of the water fund monitoring, there emerged the necessity in standardization of indication system and modernization of accounting instruments and reporting. Or there were some collision between provisions of the land use of the water fund and land law.”</p>
11.	<p><i>Leading specialist on river water use of the Department of Water Management of the MAM</i></p>	<p>“However, the most serious obstacle has become the collisions with regard to duplication of functions in the provisions of various executive bodies. As a result this has given rise to conflicting situations among the governing bodies belonged to different state agencies and economic entities. In turn that also negatively has influenced procedures of management of the water fund. Thus the main goal of the Water Code of the republic is the formation of the united juridical base for regulating water resources. The Code combined the major part of legal norms into one logically connected context.”</p>
12.	<p><i>Head of the Farming Policy Development Department of the MAM</i></p>	<p>“One of the main tasks of the Code is the establishment of official mechanisms for coordination of activities and information exchange among the involved parties. For these purposes the Water Code has provisions for creation of <i>the National Water Council</i>. Water resource management and its protection must be implemented within the main basin of</p>

		<p>hydrological territories proposed by <i>the National Water Council.</i>”</p>
13.	<p><i>Head of Crop Production Division of the Farming Policy Development Department of the MAM</i></p>	<p>“The Department of Water Management under the Ministry of Agriculture and Melioration of the republic carries out its duties in the state’s provinces by means of appropriate provincial administrative organs, which are called the <i>Province Basin Management Departments</i> or <i>OblVodKhozes</i>. Due to the geographical location, Kyrgyz provinces comply with hydrological borders on general lines of administrative-territorial borders of the state. However, in the case of the Naryn River, it crosses several provinces of the Kyrgyz Republic from Issyk-Kul province through the Naryn province to the Djalal-Abad province. The rough coincidence of the Kyrgyz provinces with hydrological boundaries is determined by the fact that during the Soviet time all significant water canals were planned and constructed within a single province without overpassing lines of the neighboring provinces. If we think from the hydrological perspective this has caused difficulties in allocating irrigation water among the provinces of Kyrgyzstan because each OblVodKhoz within the provinces is in charge of only its territorial water demands.”</p>
14.	<p><i>Specialist on hydrological monitoring of the Department of Water Management of the MAM</i></p>	<p>“The districts within the bounds of service areas are arranged by irrigation management entities. Such an entity includes a not big hydrological unit because it is organized, taking into account the source of its water resources. Provided that one district gathers water from two rivers by means of two water canals, it comprises four irrigation management entities. Irrigation management entities get responsible for maintenance and operation of facilities and water provision. In the areas of the country where there are no operation of WUAs, irrigation management entities should serve as immediate contact spots for water users.”</p>

15.	<i>National specialist on Water User Association Development of the Farming Policy Development Department of the MAM</i>	“At the local level, Water User Associations are considered as key performers, which are facilitated by Kyrgyz authority and strongly financed by international contributors. The most important element for their establishment is that WUAs compose one hydrological unit.”
16.	<i>National specialist on Water User Association Development of the Farming Policy Development Department of the MAM</i>	“The main tasks of WUAs consist of operation and maintenance (O&M) of the on-farm irrigation system, water supply, conflict management and self-financing. Accomplishing these tasks, WUAs must be organized in accordance with hydrological principles wherein the service areas are served by one water canal or a sub-system of a water canal.”
17.	<i>National specialist on Water User Association Development of the Farming Policy Development Department of the MAM</i>	“Currently activities of WUAs are evaluated as in less satisfactory condition and not well organized in their operation that needs additional revision. Poor condition of material and technical facilities of irrigative constituent and lack of adequate financing are considered as main common difficulties in improving activities of all WUAs in the republic.”
18.	<i>Leading specialist on seed production of the Farming Policy Development Department of the MAM</i>	“Such a weak operation of WUAs in the Naryn province was characterized by low activities of agricultural development and cultivation of cucurbits crops that do not demand much irrigation water for cultivation. At the same time as water users in the Naryn province along with other provinces of the Kyrgyz Republic have low repaying power for water supply by WUAs.”
19.	<i>Leading specialist on crop production of the Farming Policy Development Department of the MAM</i>	“[...] All the WUAs encounter problems related to the issue of water use. In particular, they are water distribution and water resource assessment, transport of irrigation water to the fields of the members of WUAs without loss and with the minimal expenses and timeous payment for irrigation service for water delivery.”

20.	<i>Leading specialist on water resource management of the Department of Water Management of the MAM</i>	“[...] Poor condition of irrigation infrastructure is considered as one of major problems in water resource management in the Kyrgyz Republic. In the case of the Naryn district, such a problem is not so relevant since there is no available drainage system and availability of farm drainage network is very low.”
21.	<i>Leading specialist on water resource management of the Department of Water Management of the MAM</i>	“The majority of irrigation system has run out of its life cycle and has been exploited with no balance cost. In this context independent water users and public utility companies have to exploit the infrastructure of irrigation network at the most minimal technical level with increasing risk of technogenic accidents.”
22.	<i>Leading specialist on seed production of the Farming Policy Development Department of the MAM</i>	“The Government of the republic must allocate finance for construction and improvement of irrigation and drainage system in order to raise potential of cultivating agricultural crops in the Naryn province.”
23.	<i>Leading specialist on water resource management of the Department of Water Management of the MAM</i>	“There is no struggle among energy production and the rest water uses because hydropower generation is not water-consumptive. The key concern lies in seasonal release of water from the Toktogul reservoir. The agricultural cultivation needs watering in vegetative period, i.e. in summer, whilst the highest demand of energy comes during a non-vegetative season, i.e. in winter.”
24.	<i>Leading specialist on water resource management of the Department of Water Management of the MAM</i>	“[...] The Water Code does not address the sphere of transnational use of water resources because such issues are regulated by bilateral and multilateral agreements and by other international norms of international water law recognized by the Kyrgyz Republic.”
25.	<i>Head of the Farming</i>	“[...] All these agreements are the normative

	<i>Policy Development Department of the MAM</i>	legal acts considered as framework agreement. They form main directions of cooperation without providing concrete mechanisms and their implementation. At the moment the level of water relations can be defined very low and ineffective.”
26.	<i>Head of the Farming Policy Development Department of the MAM</i>	“All these international Agreements, regulating water and water-energy resources in the region at international scale practically have been hardly realized. The reason is that in practice provisions of water relations in Central Asia elaborated in the Soviet time, today have an affect on the transnational use of water resources and water objects. The final goal of water regulations among the states in the region was to increase the All-Soviet Union budget by increasing agricultural yield. Thus those principles of water distribution and water use were satisfying the former Republics cause instead the upstream states received gas, oil and coal from the downstream states. Today they became irrelevant.”
27.	<i>Head of Crop Production Division of the Farming Policy Development Department of the MAM</i>	“As a result due to the long-term and seasonal regulations of the Naryn River flow by the Toktogul reservoir, Kazakhstan and Uzbekistan receive water at the right time with the necessary volume. Kyrgyzstan is also in charge of carrying out activities on eliminating damages caused by flood flows. Moreover Kyrgyzstan is entirely responsible for environmental protection measures within the Naryn River Basin, accountability and forecasting and exploitation of reservoirs. Along with this the Republic bears land losses and other natural resources on its own within the flooded part of the Ketmen-Tubinski valley of the Republic.”
28.	<i>Leading specialist on river water use of the Department of Water Management of the MAM</i>	“Today it is obvious that for such rivers as the Naryn River it is not enough just to harmonize quotas of water apportioning, depending on annual water flows. Because even changes in monthly schedule of the Toktogul reservoir with

		account of irrigation and hydro energy needs are capable to affect economic interests of the involved states significantly. This issue has gone beyond the competence of river authorities not only of the Kyrgyz Republic but also that of the downstream states so that the settlement of the issue should be found at intergovernmental scale.”
29.	<i>Specialist on hydrological monitoring of the Department of Water Management of the MAM</i>	“Water resource management of the Kyrgyz Republic does not receive adequate amount of finance, especially it centers on exploitation and maintenance operations of hydro-technical utilities.”
30.	<i>Head of the Farming Policy Development Department of the MAM</i>	“[...] The existing water management structure is still determined by weak elaboration of horizontal interactions and lack of coordination among the main ministries and departments.”
31.	<i>Head of Crop Production Division of the Farming Policy Development Department of the MAM</i>	“The common deficiency of horizontal communication could happen to some extent because of the top-down management system remained from the Soviet time.”
32.	<i>Head of Crop Production Division of the Farming Policy Development Department of the MAM</i>	“Path dependency of the top-down management system gets manifested in the bureaucracy of Kyrgyz water management. Mostly it comes with a deficiency of key perspective, which leads to an outcome of weak policy-making authorities amid the organizations.”
33.	<i>Specialist on hydrological monitoring of the Department of Water Management of the MAM</i>	“A new Water Code of the Kyrgyz Republic includes two important alterations in the institutional arrangement of water management. First of all, the Water Code makes provisions of forming a new institutional entity – the State Water Administration -, in order to combine regulatory functions within one organization. The State Water Administration is supposed to

		<p>succeed the DWM, which at the moment enjoys more executive functions and authority. Moreover this new body is regarded to be institutionally autonomous from the MAM with a bias for agriculture, which will serve as a foundation for better inter-sectoral integration of the water resource management. Secondly, the Code creates a foundation for the presentation of National and Basin Water Councils, which could facilitate the fulfillment of IWRM.”</p>
34.	<p><i>Specialist on hydrological monitoring of the Department of Water Management of the MAM</i></p>	<p>“The performance of the RayVodKhozes is characterised by deficiency of credibility and failure of trust from water users. There are several main features that could shed a light on such a destructive relation in respect to the local level participants. The RayVodKhozes continue to take control over important parts of irrigation networks within the local area. Nevertheless most of WUAs executives along with other water stakeholders believe that WUAs realize the largest share of maintenance and rehabilitation activities. After undertaking a commitment over manifold functions, exercised by the RayVodKhozes before, WUAs make the former irrelevant.”</p>
35.	<p><i>Specialist on hydrological monitoring of the Department of Water Management of the MAM</i></p>	<p>“There is no enough authority of WUAs to make the RayVodKhozes carry out their responsibilities. For instance, the RayVodKhozes did not compensate financially to WUAs for the lost harvests since they did not provide a certain quantity of water to WUAs according to their applications. Such an agreement is based on the contracts.”</p>
36.	<p><i>Leading specialist on river water use of the Department of Water Management of the MAM</i></p>	<p>“Currently the measurement of individual water use should be improved in order to raise efficiency of water use. Tracking individual water consumption allows to reduce damaging attitude such as non-repayable water utilization, which could be punished according to the Kyrgyz legislation. Besides this, measuring and controlling water consumption can make water</p>

37.	<i>Leading specialist on river water use of the Department of Water Management of the MAM</i>	<p>managers fulfill more precise water distribution to water users and facilitate water conservation.”</p> <p>“Basically the RayVodKhozes accomplish functions of measuring water quantity for all major canals and greater part of secondary canals. Along with this, WUAs also carry out general water measurement once water is delivered to them. Mostly WUAs and other big farms possess their own measurement equipment while private water users are incapable to define their own water consumption accurately.”</p>
38.	<i>Specialist on hydrological monitoring of the Department of Water Management of the MAM</i>	<p>“The decision-making process of the Kyrgyz water administration must take information of water needs of each water consumer into consideration. Nevertheless there is a difficulty in terms of availability of such an information on water needs of small-scale users since lack of carrying out appropriate study activities on them does not permit to collect proper information.”</p>