

# **An overview of current water distribution system of Khawajazai canal (intake) in Goshta district of Nangarhar province, Afghanistan**

A Thesis Submitted to Van Hall Larenstein University of Applied Sciences in Partial  
Fulfillment of the Requirements for the Degree of Masters in Land and Water  
Management



**Rahatullah Mohmand**  
**October, 2011**

**Wageningen**  
**The Netherlands.**  
**© Copyright Rahatullah, 2011.**  
**All rights reserved.**

*University of Applied Sciences*



**VAN HALL  
LARENSTEIN**  
PART OF WAGENINGEN UR

## **PERMISSION TO USE**

This research project was written for purpose to complete requirements for a postgraduate degree; furthermore I agree that the library of this University may make it freely available for assessment and review. I further agree that permission for copying of this research project in any manner, in whole or in part, for scholarly purposes may be granted by Larenstein Director of Research. It is understood that any copying or publication or use of this research project or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University in any scholarly use which may be made of any material in my research project.

Requests for permission to copy or to make other use of material in this research project in whole or part should be addressed to:

Director of Research  
Van Hall Larenstein University of Applied Sciences  
Part of Wageningen University  
Forum-Gebouw 102  
Droevendaalsesteeg 2  
6708 PB, Wageningen  
Postbox 411  
Tel: 0317- 486230

## **ACKNOWLEDGEMENTS**

God understands our prayers even when we can't find the words to say them. I wish specially to thank Almighty God, the sustainer of all the worlds, who helped to complete my work.

In addition I wish to thank Mr. Henk van Hoof, Mr. Robert baars and Mr. Marco Verschuur for their meaningful suggestions and advice regarding to research and related topics which provided a valuable support in my task completion.

Meanwhile I wish to thank all Van Hall Larenstein (VHL) of applied sciences team specially lecturers who provided a friendly environment and persuaded me in straightforward track in my whole Master program particularly in Land & Water Management (LWM) specialization.

Special appreciation to the Royal Netherlands government for their support to Afghanistan's agriculture education program in which I got the chance to study Agricultural Production Chain Management (APCM) specialization in Land & Water Management.

I am extremely grateful and pleased from Dutch people from their hospitality and admiration during our stay in Netherlands and I am also thankful from people of Afghanistan whom I met during data collection and helped me to make my work successful and more enjoyable.

I have spent good time being among them such as Mr. Fahim Khan, Mr. Fareed din Noori, Mr. Munsif Khan, Mr. Ajmal Humraz, and Mr. Eng Ahmad Ali Khan.

Finally I want to thank my beloved parents and family because parents know the song in your heart and can sing it back to you when you have forgotten the words, beside they guide and persuade me in throughout my tough time, however I was not faced any problems by their sides during my education expedition.

**Rahatullah,  
Department of Land & Water Management,  
Van Hall Larenstein University of Applied Sciences,  
Wageningen, the Netherlands.**

## **DEDICATION**

I would like to dedicate this humble effort to my respectable parents, family and to millions of innocent Afghans martyred, the widows and the Orphans during the war in Afghanistan,

I find myself at the extremity of a long beach. How gladly does the spirit leap forth, and suddenly enlarge its sense of being to the full extent of the broad, blue, sunny deep! A greeting and homage to the Sea! I descend over its margin, and dip my hand into the wave that meets me, and bathe my brow. That far-resounding roar is the Ocean's voice of welcome. His salt breath brings a blessing along with it (Nathaniel Hawthorne)

## **Abstract**

Irrigation water management and O&M of the infrastructure in Khawajazai canal of Goshta district, Afghanistan is the responsibility of a community based, traditional system known as Mirab. The Mirab system worked effectively in past but currently the effectiveness of this system has declined.

The main theme of this research is to find out “the causes of less effectiveness of the Mirab system” in Goshta district, Afghanistan, by studying the current water distribution system. The Mirab system irrigation water management accounts for 90% and the remaining 10 % is done formally through government agencies in Afghanistan.

The research investigated the current Mirab system and main hindrance in Mirab system. For investigation of all influential factors, certain actors from water users were surveyed, interviewed and observed. Survey questionnaires were distributed among randomly selected 30 farmers from Khawajazai canal, whose ages were 30-55 and have full information about current and past Mirab system. One government extension officer, one NGO employee who was working in neighbor district on Mirab system, community elders (Khan, Malik & Mullah) were interviewed for all other additional factors and information.

Data collected from survey was analyzed both quantitatively and qualitatively to find out effectiveness of both past and current Mirab system, its current influencing and hindered factor. The idea was taken about Mirab system selection, payment and its less effectiveness in current situation.

The result indicates that several suggestions were given by farmers for the improvement of Mirab system; they mentioned support from government, community elders and NGO in terms of training to acknowledged water rights and tightened social cohesion. Some of them mentioned about making committees from all water users and building of public hall specific to discuss water related problems, Transportation and free democratic annual election for Mirab system. Cleaning of canal on time was also mentioned.

It can be concluded that the main problem of less effectiveness of Mirab system is non-availability of Shura, similarly Mirab system has less knowledge in terms of communication.

It is recommended to establish committee from representatives of upstream, midstream and downstream to oversee and support the Mirab work. The amount of water needed for irrigation shall be determined according to the area under cultivation, the kind of crop, the irrigation regime, the water rights documents, the local practice and the amount of water in its source. Irrigation association should be made, in which all community elders, local government and representatives of water users should be present to elect four people, one person will be elect for Mirab position, one will be treasure and two will be assistants. Capacity building is also vital for developing institution skills. Capacity building through trainings should be given to Mirab and water users.

**Key words:** Water management in Khawajazai canal in Goshta district, Mirab system

## TABLE OF CONTENTS

## PAGE NO

PERMISSION TO USE-----	ii
ACKNOWLEDGMENT-----	iii
DIDICATION-----	iv
ABSTRACT-----	v
TABLE OF CONTENTS-----	vi
ABBREVIATIONS-----	vii
AFGHAN TERMS-----	viii

### Chapter

### Introduction

1. Background information-----	1
1.1 Afghanistan-----	1
1.1.1Climate-----	2
1.1.2 Importance of water-----	2
1.1.3 Water Management-----	2
1.2 Water resources of Afghanistan-----	3
1.2.1 Water resources-----	3
1.2.1.1Surface water-----	3
1.2.1.2 Groundwater-----	3
1.3 Irrigation Methods and Efficiency-----	4
1.4 Definition of Effectiveness-----	4
1.5 Khawajazai canal in Goshta district-----	4
1.6 Research problem-----	5
1.7 Research objective-----	5
1.8 Main questions-----	6
1.9 Sub-questions-----	6

### Chapter two

### Literature review

2.1 Irrigation in Afghanistan-----	7
2.2 Irrigation Water Management in Afghanistan-----	7
2.3 Traditional Irrigation Management System (Mirab System)-----	7
2.4Selection of Mirab-----	8
2.5Tasks of Mirab-----	8
2.6 Water Distribution and Operation & Management in Mirab System-----	9
2.7 Payments for Mirab-----	9
2.8 Causes of less Effectiveness of Mirab system-----	10
2.9 Why Mirab System is not effective-----	11

### Chapter three

### Methodology

3 Study area-----	12
3.1 Nangarhar province-----	12
3.2 Goshta district-----	13
3.3 Reason for selected area-----	14
3.4 Research strategy-----	14
3.5 Data type and source-----	15
3.6Selection of respondents and primary data gathering tools-----	15
3.7 Semi-structured interviews-----	16

3.8 Checklist discussion-----	16
3.9 Different arranged meetings-----	16
3.10 Research Limitation-----	17

#### **Chapter four: Result**

4.1 Discussions-----	18
4.1.1 Discussion with Mirab-----	18
4.1.2 Discussion with Government Member-----	20
4.1.3 Discussion with Community Elders-----	20
4.1.4 Discussion with NGO-----	21
4.2 Result of the Survey-----	21
4.2.1 Mirab system in past-----	21
4.2.2 Current Mirab system-----	22
4.2.3 Responsibilities of Mirab-----	23
4.2.4 Criteria for Mirab -----	23
4.2.5 Selection of Mirab-----	23
4.3 Water Distribution and O&M in Mirab System-----	23
4.4 Changes in Mirab system in last ten years-----	24
4.5 Less effectiveness of Mirab system-----	24
4.6 Influencing factor on Mirab system in study area-----	25
4.7 Further improvement-----	25

#### **Chapter five: Discussion**

5.1 Mirab system in Past-----	27
5.2 Current Mirab system-----	27
5.3 Role of Mirab system-----	28
5.4 Selection of Mirab-----	28
5.5 Water distribution-----	28
5.6 Operation & Maintenance-----	29
5.7 Less effectiveness of Mirab system-----	29

#### **Chapter six: Conclusion and Recommendation**

6.1 Conclusion-----	31
6.2Recommendation-----	32
Reference-----	33
Annex 1Survey questionnaire-----	35
Annex 2 Checklist for discussions-----	36
Annex 3 Names of Respondents-----	36
Annex 4 Names of Key informants-----	37
Annex 5 Classification of irrigation system types in Afghanistan (by area %)-	37
Annex 6 Field photos-----	38

## LIST OF TABLES

Table 1 Farm size distribution in Afghanistan-----	2
Table 2 River basins in Afghanistan-----	3
Table 3 Ground Water in Afghanistan-----	4

## LIST OF MAPS

Map 1 Showing Afghanistan location with surrounded countries-----	1
Map 2 Showing Khawajazai canal position in Goshta district-----	5
Map 3 Showing villages along Khawajazai canal-----	6
Map 4 Showing study area province -----	12
Map 5 Showing Goshta district -----	14

## LIST OF FIGURES

Figure 1 canal irrigation system and key actors-----	8
Figure 2 Monthly based Rainfall in Goshta district-----	13
Figure 3 Research framework-----	17
Figure 4 showing idea of respondents on Mirab system-----	22
Figure 5 Showing ideas of respondents on current Mirab system-----	22
Figure 6 Showing criteria for Mirab system-----	23
Figure 7 Mirab system effectiveness for conflict resolution-----	24
Figure 8 Influencing factor for Mirab system-----	25
Figure 9 showing respondents idea on Improvement of Mirab system-----	26

## LIST OF PHOTOS

Photo1 Interview with Farmer-----	15
Photo 2 Traditional structure -----	15



## **ABBREVIATIONS**

<b>NGO</b>	<b>Non Governmental Organization</b>
<b>MoEW</b>	<b>Ministry of Energy and Water</b>
<b>ASL</b>	<b>Altitude from sea level</b>
<b>IA</b>	<b>Irrigation association</b>
<b>DAI</b>	<b>Development Alternative Inc</b>
<b>DC</b>	<b>Department of Canal</b>
<b>DAIL</b>	<b>Department of Agricultural irrigation &amp; Livestock</b>
<b>MAIL</b>	<b>Ministry of Agriculture Irrigation &amp; Livestock</b>
<b>PAIL</b>	<b>Provisional Agriculture Irrigation &amp; Livestock</b>
<b>NEPA</b>	<b>National Environmental Program for Afghanistan</b>

## Afghan terms and definition

Khan	Elite person
Jerib	Unit of land Measurement (1jerib = 0.2 hectares)
Mirab	water master
Qulba	Traditionally farmers distributed their land into jeribs and they give crops to Mirab in Goshta district in Qulba form (1 Qulba is equal to 16 jeribs & 1 Ha = 5 jerib so 1 Qulba= 3 Hectare)
Shantai	A structure is made by local farmers to bring River level high to divert water into canal
Shura	Traditional gathering party of Afghan local people to solve issues within Afghan community
Intake	In this study an intake is a hydraulic structure designed to acquire water from a river to a main canal. It usually consists of a weir across the river and a gated headwork at the head of a main canal
Maan	Tradition scale (1 maan = 7kg) 1 Kg Price 18 Afg so 1 maan 126 Afghan (1 Euro =65 Afg)
Tail-end	Used in canal irrigation to refer to the irrigated area located at the far end of the main canal.

## 1. Background information

### 1.1 Afghanistan

Afghanistan is located between 29° 35', 38° 40' latitude and 60° 31' and 74° 55' of longitude. Turkmenistan, Uzbekistan and Tajikistan are located in the North, China to the Northeast, Pakistan to the East and South and Iran to the West (see map 1). Afghanistan is characterized by its rocky mountains with snow-covered peaks of high altitude, up to 7500 meters above sea level (m asl)<sup>1</sup>, fertile valleys and desert plains include river valleys are located in the northern, western, southwestern and southeastern parts while high lands are generally located in the central part of the country. From topographical point of view the country can be divided into three groups. Low lands with 300-500 m asl; medium land with 500-2000 m asl and high land between 2000-7500 m ASL. About half of the country has an altitude of more than 2000 m asl (Qureshi, 2002).

**Map 1 Showing Afghanistan location with surrounded countries ( DAI. 2006)**



Water resources management in Afghanistan is mainly irrigation water management because at current moment the annual water used for irrigation is about 99% of the all water used in country. Nearly 90 percent of all irrigation systems in Afghanistan, covering about 2.3 million ha, are traditional schemes developed and built by farmers and operated and maintained by them according to traditional communal customs and practices. Total developed irrigated area in 1978 was estimated to be 2.63 million ha of which only 1.44 million ha had sufficient water supply to support cropping in a year (AIMS, 2002).

Administratively, Afghanistan is divided into 34 provinces. The current population of Afghanistan is estimated at about 30 million with a rural population of around 16.5 million. They live in approximately 20,000 villages scattered across Afghanistan. Majority of the rural population is small subsistence farmers who live of small plots of land (Wegerich, 2009).

The average holding was 3 ha in 1987 (MoEW, 2007). The vast majority of holding fall in the range of 0.5 to 6 ha. Holding under 20 ha accounted for 60% of land ownership in 1987 and those over 100 ha for 8%. Distribution of farm size in irrigated and rainfed areas is given in (see Table 1) (Thakkar , 1999).

**Table 1 Farm size distribution in Afghanistan**

Farm size (ha)	Irrigated farms (%)	Rainfed farms (%)
<3	83	8
3-6	14	8
>6	3	84
Median	1.4 ha	6-7 ha

(Qureshi, 2002)

### **1.1.1 Climate**

Afghanistan is characterized by a continental climate, although the presence of mountains causes many local variations. The typical climate varies from arid in the South and Southwest to semi-arid in most other parts of the country. The high mountain ranges of Hindu Kush and Pamir are moderate humid and covered by permanent snow and glaciers at altitudes above 5,000 m. With a few exceptions of some locations receiving sufficient rainfall in spring (Northern slopes of Hindu Kush above 1,000m altitude), the climate is not favorable for rainfed agriculture (Thomas, 2009). During winter, temperatures are low and precipitation occurs in form of snow whereas during summer, temperatures are high and rainfall is almost falling low. Without irrigation supplies, these arid to semi arid areas cannot support any irrigation. There are roughly 3.9 million ha of cultivated land of which 1.3 million ha is rain fed and 2.6 million ha is irrigated (Wegerich, 2009).

### **1.1.2 Importance of water**

Water is a precious natural resource because it plays a significant role in maintaining human health, fulfilling the human food requirements and boosting industrial development and above all, keeping the natural heritages and beauties. Agriculture in Afghanistan needs to grow at a minimum of 5 percent a year over the next decade for the country to make a dent in rural poverty and attain food security. While the vast majority of Afghans depend on agriculture for a living, only a little over 10 percent of the country's harsh and arid terrain is arable. Most of it requires irrigation. However, the country's basic irrigation infrastructure has been badly damaged by a quarter century of war and political upheavals. Only about a third of the farmland that was irrigated before the conflict now receives the irrigation water it needs. As a result, agricultural productivity remains low. In recent years, the situation has been further exacerbated by frequent droughts (A guide to Afghanistan, 2007).

### **1.1.3 Water Management**

Water management in Afghanistan is done in different form. The system which is constructed and maintained by traditional informal manner on a communal village basis, and water rights are also determined in similar manner in this system is known as small scale informal water system and can cover 100 ha, while the system which is located mainly in the plains and along main River valleys known as large scale informal water system, which is maintained and constructed by different communities with different ethnic groups and can cover 200,000 ha. Some systems have permanent intake structure which

is operated and maintained by the irrigation Department known as formal water system (Qureshi, 2002).

## 1.2 Water resources of Afghanistan

### 1.2.1 Water resources

The occurrence and distribution of water resources primarily determine the types and locations of irrigation systems in the country (see annex 5). Average annual precipitation is estimated to be approximately 180 billion m<sup>3</sup> of which 80 percent originates from snow in the Hindu Kush. While some of this water is lost to evaporation; the balance recharges surface and groundwater systems (Qureshi, 2002).

#### 1.2.1.1 Surface water

Afghanistan has five major river basins Hari Rod, Murghab, Helmand, Kabul (Indus), Northern and Amu Darya While the catchments of the other four basins originate entirely within the country, the Amu Darya is part of a larger transboundary catchment, which includes areas within neighboring Uzbekistan and Tajikistan. The five basins are summarized in Table 2 (Qureshi, 2002).

**Table 2 River basins in Afghanistan**

River basin	Area (%)	Water (%)	Rivers
Amu Darya	14	57	Amu Darya, Panj, Wakhan, Kunduz, Kokcha
Hari Rod-Murghab	12	4	Hari Rod, Murghab, Koshk
Helmand	41	11	Helmand, Arghandab, Tarnak, Ghazni, Farah, Khash
Kabul (Indus)	11	26	Kabul, Konar, Panjshir, Ghorband, Alinigar, Logar
Northern	11	2	Balkh, Sar-i-Pul, Khulm
non-drainage area	10		

**Source (Qureshi, 2002)**

#### 1.2.1.2 Groundwater

Estimations of groundwater average annual recharge and usage within the five river basins are shown in Table 3. The total recharge for confined and unconfined aquifers is roughly 10.6 billion m<sup>3</sup> per year while usage is 2.8 billion m<sup>3</sup> per year. Historically, usage has largely been limited to water from shallow unconfined aquifers abstracted through Karez as well as through traditional wells from which water is drawn using animal power (Arhad). More recently, deeper confined aquifers are being developed for domestic and municipal water supply using modern well-drilling techniques. There is a need to better understand major groundwater systems as well as to develop policies and strategies aimed at sustaining current use and meeting future demand.

<sup>1.</sup> M stands for Meter and ASL stands for Altitude from sea level

<sup>2.</sup> In Afghanistan rural farmers used animals to take out water from wells is known Arhad

**Table 3 Groundwater in Afghanistan (in million m<sup>3</sup>/year)**

<b>River Basin</b>	<b>Recharge</b>	<b>Usage</b>
Kabul	1,920	530
Helmand	2,480	1,500
Hari Rod-Murghab	1,140	460
Northern	2,140	210
Amu Darya	2,970	100
<b>Total</b>	<b>10,650</b>	<b>2,800</b>

(Qureshi, 2002)

### 1.3 Irrigation Methods and Efficiency

Irrigation practices today are characterized by the necessity to irrigate all lands by implication of proper irrigation Management system, where village communities could able to organize themselves in a peaceful manner and received assistance in the rehabilitation of destroyed intakes and old-fashioned irrigation structures in Afghanistan. Water distribution and O&M is mostly practiced and managed on communal basis under the supervision of Mirabs in Afghanistan. The disputes over water rights are solved by Mirabs. In many other cases where communities share the same water resource for the irrigation of their individual fields but are ruled by different "authorities", farmers are less fortunate and struggle to make their irrigation scheme somehow operational (Thomas. 2009). About 85 per cent of all crops in Afghanistan are grown under irrigation. Canal irrigation is the most commonly used method of irrigation in Afghanistan (Seckler, Rosegrant and Carruthers, 1997).

### 1.4 Definition of Effectiveness

The degrees to which objectives are achieved and the extent to which targeted problems are solved. In contrast to efficiency, effectiveness is determined without reference to costs and, whereas efficiency means "doing the thing right," effectiveness means "doing the right thing" (Thomas, 2009). Although, that work which can be reasonably achieved within an expected timeframe and with available resources is called objective (ACARDA, 2002). The Mirab system is not effective in terms of equity issues (equity and O&M of irrigation infrastructure. Equity (water distribution, labor contribution and equity in right to decision making)

### 1.5 Khawajazai canal in Goshta district

Khawajazai canal is emerged from Kunar River and is running along Goshta district. This canal was designed in time of King Amir Habibullah Khan in 1919 (see map 2) through traditional method by local people. According to DAIL, the length of canal is 7 kilometers. The total land of Khawajazai village is 380 ha and land which is irrigated by this canal is 160 ha and serving 2500 households with 315 farmers.

Water management is operated and maintained through communal life known as Mirab system. Small scale farmers live here, where literacy rate is low. The farmers cultivate their own lands as well as share lands with community elite people.

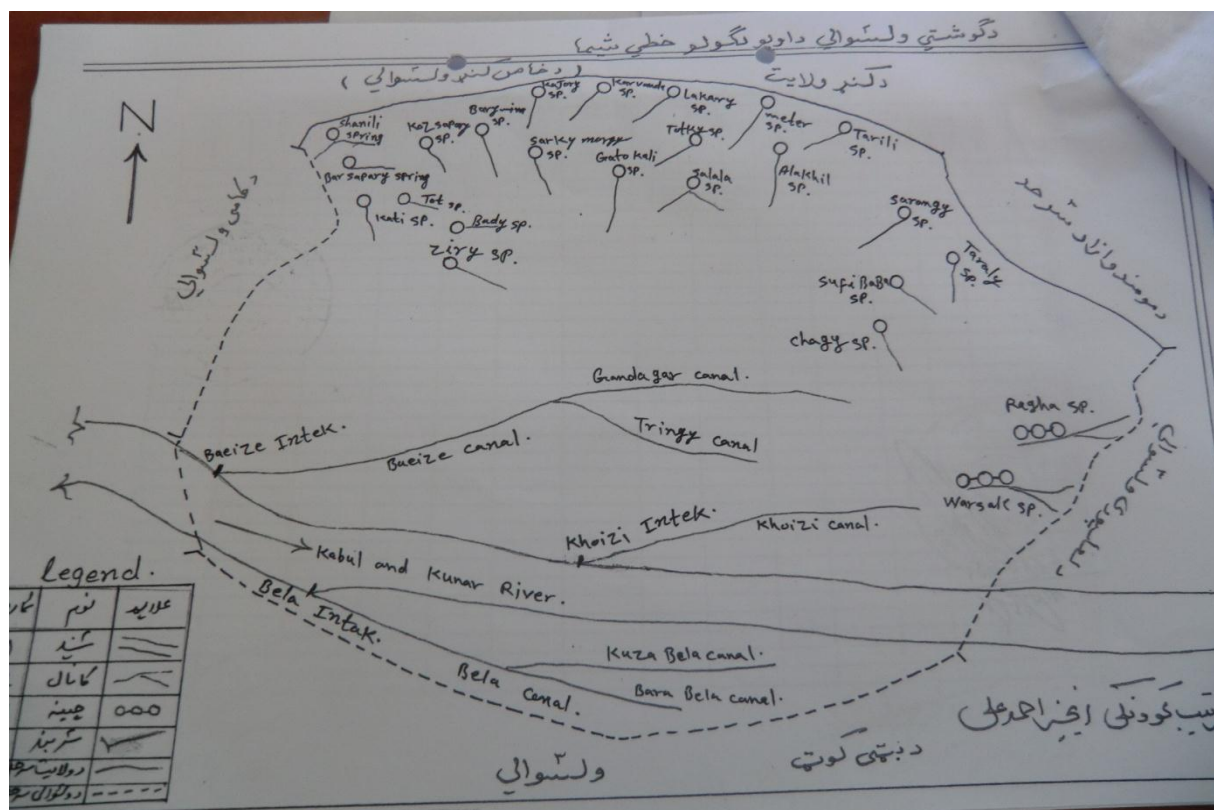
Geographically Goshta district is distributed into two main villages one is Goshta itself and second is Khawajazai. Khawajazai is further distributed into small villages which are Kharbandi, Sheikhan, Chorkhil (upstream) Yaquuib khil, Douta Khil (Midstream), Aka khil,

Worsak and Raghi (downstream) see map 3. In the Goshta district many villages are taking water from natural sources such as springs, tube-wells and wells. However, a number of villages depend upon the rainfall for cultivation of their land. Agriculture is the main source of income. The main crops sown are wheat, corn, sugar cane and rice, and vegetables. Floods often destroy fields due to unintentional rainfall (A guide to Afghanistan, 2007).

Literacy is poor. 7% of the population is educated in whole district. The UN estimated that only 2% were literate. There is only one school for boys named Abdul Hameed Momand High School and 15 primary schools, only three of which are for girls.

Due to Soviets invasion in the late nineteen seventies many local people and community elders have become Warlords and commanders which are still in power in the area, in addition Khan (elite person) Mullah (Religious man) Malik (Community elder) are dominant people in the region.

**Map 2 Showing Khawajazai canal position in Goshta district**



Source (DAIL, 2011)

### 1.6 Research problem

Irrigation water management and O&M of the infrastructure in Khawajazai canal of Goshta district is the responsibility of a community based, traditional system known as Mirab. The Mirab system worked effectively in past (in term equitable water distribution and O&M of irrigation infrastructure) but currently the effectiveness of this system has declined. It is necessary to investigate the causes of the less effectiveness of Mirab system and find out possible ways in which this system could be improved.

### 1.7 Research objective

The main objective of this research is to identify the causes of less effectiveness of the Mirab system of Khawajazai canal and to contribute in the improvement of this system.



## 1.8 Main questions

Q1. What is the effectiveness of Mirab system in solving the water related problems of farmer' community?

## 1.9 Sub-questions

- What is a Mirab system and how it is organized?
- How the Mirab system worked in the past?
- Who are involved in Mirab system and what is their role?
- What is the procedure of Mirab selection?
- How is the water distribution done in Mirab system?
- How the operation and maintenance of the canal is carried out?
- How the conflicts are resolved in Mirab system?
- What is the role of government in Mirab system?
- What are the causes of less effectiveness of Mirab system?
- What are the possible ways to improve the current Mirab system?

**Map 3 Showing villages along Khawajazai canal**



Source (Google earth)



**2.1 Irrigation in Afghanistan**

The history of irrigated agriculture in Afghanistan goes back to more than 4,500 years ago (ancient settlement near Kandahar). Except for a few areas where rainfed agriculture can be practiced, agricultural production in most of the country is not possible without irrigation as the rainfall is either insufficient or unreliable (Johansson, *et al.*, 2002). The allocation of water and land is closely related to customs and traditions of the inactive population, and maintenance works of irrigation schemes have always been a well-defined activity in the farmers' seasonal calendar. Irrigation systems in Afghanistan can be divided into two categories: Traditional irrigation systems and modern irrigation systems (Rout, 2008).

**2.2 Irrigation Water Management in Afghanistan**

In Afghanistan, the irrigation water management is done through community based irrigation management system known as Mirab system and the person who is managing this system known as Mirab. The Mirab system irrigation water management accounts for 90% and the remaining 10 % is done formally through government agencies. According to Reimann 2005, the formal irrigation system has permanent intake structure, which is operated and maintained by the Irrigation Department. The management of the irrigation scheme itself follows the rules of the large-scale traditional surface water schemes. However, the significant difference is that the regulation of water flow to the system depends on the interaction between government authorities and the village communities (Pain, 2004)

The informal management of irrigation water is carried out by Mirab. Mirab is a person selected by the community for irrigation water management and O&M of irrigation infrastructure. According to Thomas and Naeem 2011, Mirab is a community based water service provider selected by water users and community elders responsible for water distribution, operation & maintenances and prevention and resolution of conflicts over water (Pain, 2004).

**2.3 Traditional Irrigation Management System (Mirab System)**

Thomas and Naeem 2011, has defined the Mirab as a community based water service provider selected by water users and community elders responsible for water distribution, operation & maintenances and prevention and resolution of conflicts over water. The whole system is known as Mirab system.

These systems are constructed and maintained in a traditional informal manner on a communal village basis and water rights are also determined and recognized in the similar manner. These systems are mainly located in the plains and along the main river valleys. They can cover an area of up to 200,000 ha. Although they are called informal, their operation and maintenance was highly planned involving different communities of different ethnic origin (Hamdy, *et al.*, 2003).

These are centuries old systems. Water is supplied by stream flow diverted with the help of temporary brush weirs. They are often located in remote valleys along a stream or river and vary in size up to 100 ha (NPBC, 2009).

India has some 580,000 tanks of various sizes spread over across the country. Most of them were managed by local communities for several centuries, but recently they collapsed due to poor maintenance and lack of interest from the government (Nakashima, 1998).

## 2.4 Selection of Mirab

Selection of Mirabs, water masters elected by farmers (typically from the downstream end) to organize labour for canal maintenance, oversee water allocation and use and serve as a liaison with government officials. The election of Mirab and chack Bachi are elected through in a democratic process. All the elderly people, Arbabs of the villages, members of village shuras and Mirabs of the villages along the canal assemble at one place on a given day and discuss possible candidates for the Mirab positions in different places in Afghanistan (Postel, 1997).

The construction and maintenance of the secondary canal (in most cases, more than one secondary canal) is the responsibility of the mirab. The mirab is also generally elected by the community (NPBC, 2009). There are, however, cases where the position of mirab has been passed down over generations through same family. The appointment of the mirab can also be an ad hoc decision taken by a dominant group in the village. The ethnic composition of the settlement and associated power relations are important factors in the election of a mirab (Mielke and Schetter, 2007).

Selecting the mirab from tail-end villages indicates an element of equity has been built into the system.” Even though the mirab should be from the tail-end, and the mirab has to be “acceptable by all water users in upstream, midstream and downstream. Currently, this system is registered in water Management Department (WMD) in Afghanistan after their annual elections (Mokgope, Pollard and Butterworth, 2001).

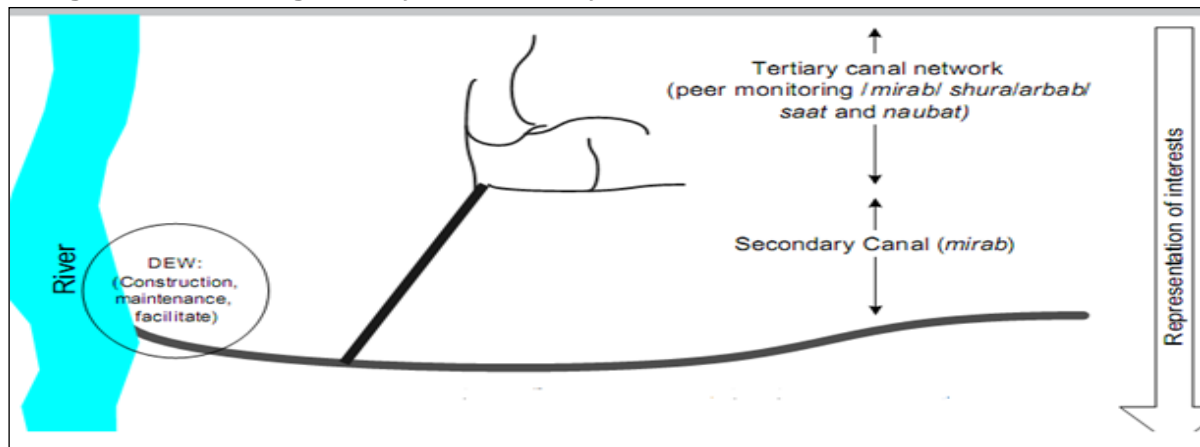
The system of inheriting the mirab position appears to have changed. It can be distinguished between two different Mirabs, one who is chosen by the community and one who is appointed directly by “commanders and landlords.” But in another case it does not make this distinction; an elite group only selects the mirab: “the landlords, key farmers, elders, and warlords” (Nakashima, 1998).

The process by which a mirab is appointed is solid and appears to be common to all villages. The shura and other informants all referred to a consensual process by which a person known for honesty and hard work is selected and appointed on an annual basis, renewable by mutual approval. The process by which a person is identified and put forward is not clear, but it was presented as a position of honour (NPBC, 2009).

## 2.5 Tasks of Mirab

Mirab is responsible for the construction and maintenance of related canals with the help of community members, and he also coordinates with the Wakils to ensure flow into the secondary canals (see figure 1).

**Figure 1 Canal irrigation system and key actor**



Source: (Qureshi, 2002)

The typical everyday tasks of a mirab include: checking any unauthorized breaching of the canal upstream; collecting and mobilizing people for maintenance activities; maintaining the diversion and regulatory structures, especially the natre (square weir) and kulb (circular outlet); and coordinating and mobilizing labour for main canal and river bed maintenance activities (Riemann, 2005).

The tertiary canal network that takes water from secondary canals to individual farms is the responsibility of the mirab to supervise, but individual farmers may choose to coordinate with the mirab in relation to the construction of their canals and during the diversion of water. Water diversion and monitoring of the quantity of water flow is done entirely through look closely monitoring according to the individual water rights that correspond to their landholdings. The distribution of water is done through the system of saat (the allocated time interval of water flow allowed in each cycle in proportion to the landholding of the farmer) and naubat (the order in which the water flow is allowed in each cycle). Conflicts about water distribution are resolved through the involvement of the mirab, the Arbab (village elder) and sometimes also the shura (village governing committee) (Thomas, and Ahmad, 2009).

## **2.6 Water Distribution and Operation & Management in Mirab System**

According to AWATT 2010, in Mirab system the water is basically distributed according to size of land. However, communities use different local terminologies and units for allocating waters to farmers. Example of traditional units are; Kalam (1 kalam is equal to 12 hours of water), Khord/Jerib (1 Khord is equal to 45 minutes), number of plants (1000 grapes plants are allowed 3 hours water per day), time (day or night) and turn (5-7 water turns for the lower reaches and 4-7 for the upper reaches).

Mirab (water manager) is appointed to oversee the management of water within the canal and the function of the mirab was reported to be the same; they were responsible for oversight of the water distribution within the villages, ensuring rotation on the agreed schedule between sub-canals and the distribution of water between farmers within the sub-canals. No mirab had written records on the allocated time for each farmer and the system appears to operate on memory (Seckler, Rosegrant, Carruthers, 1997).

According to Thomas, 2009 that during Mujahiddin period unregulated offtakes were built in Baghlan province which hindered water access to tail-end. Even today these offtakes are referred to as “illegal offtakes.” Almost all of the 35 “illegal offtakes” out of the 119 are recorded.

The operation and maintenance of irrigation canals is done by the Mirab. However, Mirabs have the right to call labour from all farmers cultivating irrigated land for canal maintenance. They have implemented O&M two times in year, after harvest of the crops in the month of November/December (Qaos/Jadi), and September/October (Sonbola/Mizan) after harvest of main crop in Heart province. The extent to which the mirab was directly involved at every stage is unclear, although it is clearly seen to be a full- time job. When asked about issues concerned with fair water distribution the almost inevitable reply was that the mirab was responsible (Thomas, 2009).

## **2.7 Payments for Mirab**

Mirabs are responsible for making regular assessments of the maintenance requirements of the secondary canal and for keeping farmers informed of this. Mirabs are compensated annually in kind, usually a crop share for example, at the rate of 4 kg of wheat per jerib of land. This unit varies among settlements. Some proportion of the wheat is given to the wakil of the section usually half or more. Where farmers do not grow wheat, they pay the equivalent cost of the wheat in cash at current market rates (Seckler, Rosegrant Carruthers, 1997).

Nevertheless, the wages of the mirab are directly related to the land under irrigation. This underlines the function of the mirab for the landowning community. Larger landowners pay more to the mirab than small landholders or sharecroppers. Although the size of the landholding may not be related to voting power to elect the mirab, however it is stated that “in a number of instances in the primary research sites, corrupt, inefficient or lazy water masters were reported to have been replaced (Murray, Lashari, and Memon, 2000)

## **2.8 Causes of less Effectiveness of Mirab system**

Despite flourishing existence and potential to produce equitable outcomes, the community irrigation management institutions of Mirab in Afghanistan face the reality of weak ethnic relations, deeply well-established power structures, huge inequalities, warlordism and weak state governance. The system of mirab, with all its merits, may not be able to stand up against these factors; however, the key strength of the system is the fundamental existence of “peasant organisation.” or local establishment. Endogenous development of peasant or local irrigation systems along with their associated injustices is an inconsistency that is necessary for the growth of long-enduring community management systems. Space for endogenous development of institutions implies the availability of cohesive bonding and collective struggle among peasants to fight and work against the prevailing injustices (Kakar, 2001).

The institutions of mirab and wakil appear, in the case of Herat, to be vibrant and effective on the whole, with many of their limitations in addressing inequities having much to do with prevailing warlordism and weak governance (Roe, 2009).

There is a need for an effective mechanism for settlement and resolution of disputes over common property; at present customary-based informal systems of negotiation are least effective in resolving these as they often involve actors from outside the community or power asymmetries or unbalanced (Mashal, 2008).

The second set of factors is those related to socioeconomic differences and associated power relations, while stressed ethnic relations in Afghanistan also play a role. The social or economic status of communities or individual households, irrespective of where they are located, can impact upon their access to a resource (Brichieri, 2003).

Warlordism and gun power are still prevalent in the country and have great influence on social relations among some communities. The third set of factors are those related to weaknesses in water management institutions, while the fourth relates to prevailing cultural norms, the dominant of these being gender-related inequities. Finally, the kind of land entitlement that a household has and the water rights associated with that often lead to inequities. Structural factors that also influence access to irrigation water include those that are a result of outdated traditional land relations combined with the “statelessness” or lack of effective government that Afghanistan has experienced over the past three decades. The high rate of returning IDPs and refugees is also affecting water distribution system (Seckler, Rosegrant, and Carruthers, 1997).

According to (Thomos, 2009) in Mirab system the upstream people were expected to contribute more in labor (one person per day per 10 jeribs of landholding) as compared to downstream users (one person per day per 20 jeribs of landholding). The mirab keeps an account of these requirements and calls for contributions accordingly. However, the extent to which these rules are implemented in practice is not clear, and with warlordism and weak institutions (of both the government and the community) still prevalent, it is not easy to mobilize labor from upstream sections.

## **2.9 Why Mirab System is not effective**

There are several reasons through which Mirab system could be considered less effective. According to Roe 2009, the community water management system (Mirab system) is effective whenever there is sufficient water which meets the needs of all the irrigators (upstream and downstream). In the case of water shortage and scarcity it is beyond the capacity of community water management to address the issue properly.

According to DAI 2006, the Mirab institutions are not well organized and not sufficient in order to face the new irrigation and economic challenges.

According to CPHD 2011, the Mirab systems has survived during the three decades of war and rapid change in the political environment but it has not adapted successfully to the new challenges. A great gap exists between the water right and actual water distribution among the users.

According to Roe 2009, there are inequities in the management of irrigation water. The farmers irrigating on the upstream of the canal receive more water than those downstream, while the downstream farmers must take relatively more burden of canal infrastructure maintenance to ensure that the water reaches their lands.

According to Pain 2004 the community institutions (Mirab system) are always not fair in equitable distribution of the resources due to the presence of powerful people who frustrate the distribution of common pool resources both between the village and within the villages.

## Chapter three Methodology

This chapter is used to introduce study area and some indication which was used during data collection.

### 3 Study area

#### 3.1 Nangarhar province

Nangarhar province is one of the well-known and more populated province which is located in eastern part of Afghanistan, it has boundary with Kunar province in the North east, and North-west Laghman with Kabul and Logar while in the west and south Paktia, Khost and Paktika provinces are located (see map 3). Total area is 7,641 square kilometers which is 1.17 percent of the whole Afghanistan (Nangarhar profile.2003).

Jalalabad is the capital city of Nangarhar province and has 22 districts such as Bihsud, Surkh Rod, Chaparhar, Rodat, Kama, Kuzz Kunar, Dar-e-noor, Sherzad, Hissark, Khugyani, pachirwagam, Jalalabad, Dih-e-Bala, Kot, Achin, Nazyan, Dur Baba, Bati-kot, Shinwar, Mohmand Dara, Lar pura and Goshta (MRRD, 2007).

Nangarhar is one of the most beautiful and famous provinces of Afghanistan which is known as Gul- Bahar means “Evergreen flower” which has 1,342,514 inhabitants that is equal to 5.8 percent of whole Afghanistan(Nangarhar profile.2003).

The main urban cities are Jalalabad, Markoh and Kama bazaar. The large majority of the population lives in rural areas. The total population of Nangarhar inhabitants is 1,133,646 which are distributed over 1400 settlements of variable sizes.

Pashtu language is spoken in about 92.1 percent of the village. The remaining eight percent speak Pashaie (60 villages), Dari language is speaking in 36 villages (UNHCR.2002).

According to the department of Agriculture in Jalalabad, total 97,000ha of arable irrigated agricultural land is in the province, however there is also rain fed agriculture but it is less as compared to irrigated agriculture land, most of land is abandoned due to war years or civil war within the province because many people have migrated to Pakistan or irrigation systems were damaged of wars (Nangarhar profile, 2003).

**Map 4 Showing study area province**



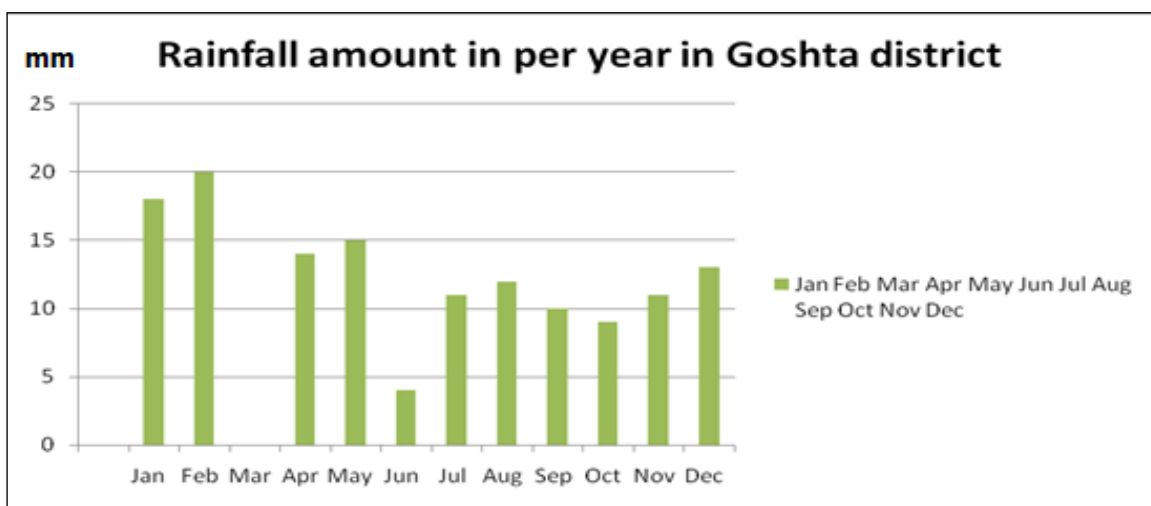
Source (UNEP, 2008)

The traditional Mirab (water master) system is very old and prominent system in the province and this system are existed in every big village to manage operation and maintenance of the irrigation structures and its distribution among water users and approximately every canal has one Mirab in Nangarhar province (Nangarhar profile, 2003).

### 3.2 Goshta district:

The Goshta district (see map 5) is located on the border between Afghanistan and the North-West Frontier Province of Pakistan. Majority Pashtoon people are living in this district which was estimated at 160,000 in 2002, the district centre is the village of Goshta which has 18 major villages includes 32 small villages. From the highlands that define the border, dry hilly area with seasonal streams slopes down to the flat land along the north side of the Kunar river valley, where most of the people live at an elevation of about 540 m. Average temperature in Goshta 27C o which is recorded in January. The Highest maximum (day) temperature are ever recorded was 45.5 °C (114 °F) June and July months. Precipitation is low, an average 150mm per year (see figure 2) mostly falling in the spring (UNHCR, 2002). But this rainfall is not in continuous form. March month was not measured.

**Figure 2: Monthly based Rainfall in Goshta district**



**Source (UNEP, 2008)**

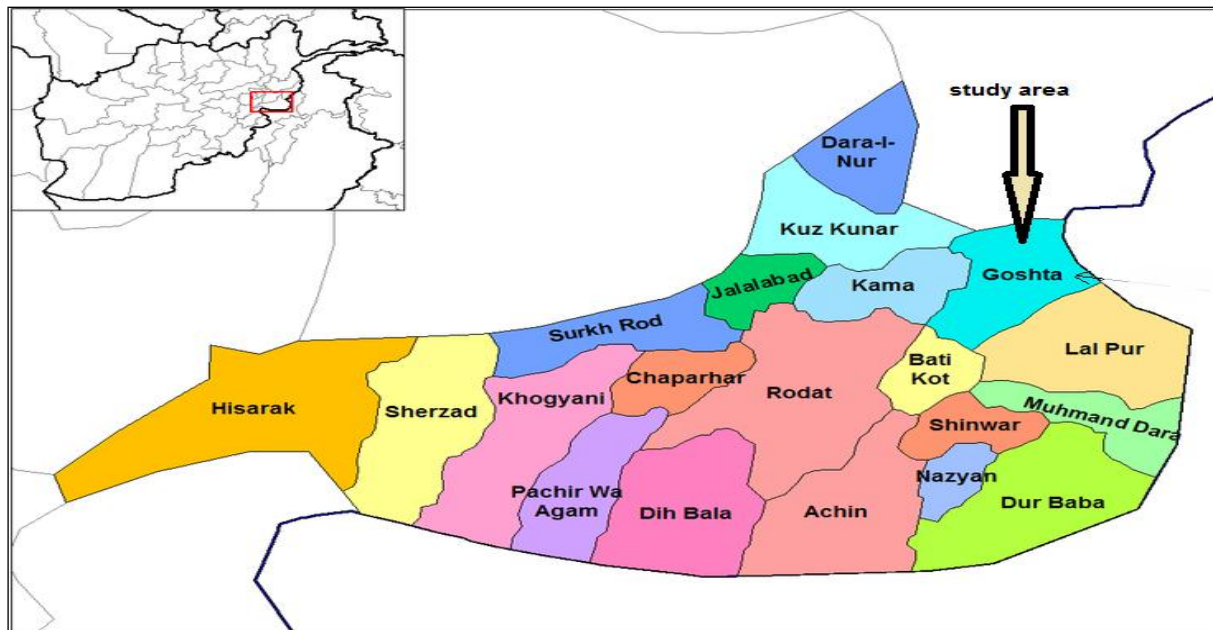
Goshta is a marginalized district and having boundary with Pakistan. Farming and agricultural sector is the major component and element for each households s' economy directly or indirectly for majority of households. Agrarian crops and vegetables such as wheat, onion, cotton, corn, sugarcane, rice and vegetables are produced and grown in district. The majority of the households are poor with few rich (Khans). Land-holding size does not vary and different, the average land holding size is 1-2 hectors of rain-fed and irrigated land.

Due to Soviet invasion like other countrymen people of Goshta were moved to Pakistan and Iran but since due to rehabilitation procedure many people have returned back to district and have become busy with agricultural activities, however lack of irrigation water is the major problems for downstream farmers which affect a large number of deprived farmers. There is large number of widows in the district who rely on their home job such as embroidery, tailoring and poultry farming but some old women are involved in agricultural fields as well, in addition number of the poorest population of the district are depending on agricultural production and activities (AIMS, 2002).



The water is distributed traditionally among the farmer's community in Goshta district. The traditional water distribution system is known as Mirab system. Mirab (water master) refers to a person from the local farmer's community selected by farmers and local elders for the proper distribution of irrigation water and operation and management of irrigation infrastructure.

**Map 5 Showing Goshta district**



**Source (AIMS, 2002)**

The district is covered administratively with 18 major villages includes 32 small villages. Main villages are Arkhai, Goshta, Khawajazai, Worsak, Raghi, Dor-khil and Anar-ghakhi and so on.

According to The district DAIL (Directorate of agriculture irrigation and livestock) two intakes are designed traditionally from Kunar river to Goshta district, one is Baeize canal which has two sub-canal like Gandaghar and Traingy canal and second canal which is having 14km length called Khawajazai canal and giving irrigation water for Sheikhan, Kharbandi, Chorkhil, Doutarkhil, Yaqoubkhil, Aka Khil, Worsak and Raghi. The main agrarian crops are Wheat, Maize, rice, hay and sorghum. Vegetables are onions, cauliflower, spinach and sweet oranges, apricot and plum, water melon are major fruits in the study area.

### **3.3 Reason for selected area**

The main reason for the selection of the study area is that Goshta is located along the river side which is called Kunar river (see map 5) compare to neighboring districts Mohmand Dara, Kama and Lalpora, Goshta districts downstream farmers still suffering from shortage of irrigation water, in addition large number of farmers migrated to other districts and cities of Afghanistan and Pakistan because of low agricultural productions. The study will help them to manage irrigation system which can increase their production and income, besides people will be busy

### **3.4 Research strategy:**

The researcher used both quantitative and qualitative approaches in addition both primary and secondary sources were used for collection of relevant data in the research study.



A desk study was used for secondary data collection to review available literature related to topic such as journals, books, reports and other study have conducted to get valuable and comprehend data about the subject.

To get primary data a field study was done through semi-structured interviews and one checklist for community elders (Malik, Khan, Mullah) government 's member, NGO member and Mirab to discuss Mirab system effectiveness as whole which was in-depth approach of data collection, which was very important and significant to get more fundamental information for analytical description on the responses, attitudes, values, feelings and aspirations of respondents about Mirab system and its effectiveness. The qualitative approach was chosen because of limited time and nature of the research issue.

### **3.5 Data type and source:**

For the completion of this study both secondary and primary data were used. The primary data was collected through field work using a semi-structured interviews see annex 1 and one checklist for community elders (Mullah, Malik, Khan) government's member, Mirab and NGO to discuss the effectiveness of Mirab system see annex 2, while secondary data were gathered through studying various literatures on subject, in this report the literature review discussed about general idea of Mirab system and its effectiveness within the country for irrigation management. Mostly the literature was collected by using internet and documents studied in Afghanistan.

Concerning primary data sources the total farmers were 315 in 2500 households but researcher has selected 30 farmers randomly from four villages, because to cover all canal 10 farmers from upstream, 10 farmers from midstream and 10 farmers from downstream. 10 farmers from Chorkhil (upstream) of Khawajazai canal, 10 farmers from Doutarkhil and Yaquuib khil (midstream) and 10 farmers have interviewed from Aka-khil village (downstream) see annex 3. Some key informants' ideas were included with NGO representative discussion because he was working for (FWMP) On Farm Water Management project in Neighbor district (Kama) on Mirab system. The Key informants were community elders (Khan (Elites), Mullah (Religious person) & Malik) government's member, NGO employee, and one Mirab from Khawajazai canal within study area to get more information about Mirab system (see annex 4).



**Photo1 Interview with Farmer**



**Photo 2 Traditional structure**

### **3.6 Selection of respondents and primary data gathering tools**

In the primary data collection phase, data gathering tools such as semi-structured questionnaire and checklist were used to find out the effectiveness of Mirab system in the study area, However to cover all canal area four villages respondents were interviewed randomly such as 10 farmers of Chor Khil (upstream) 10 farmer from Yaquuib Khil & Douta

Khil (midstream) and 10 farmers from Aka Khil (downstream), in addition one checklist with community elders (Malik, Khan (Elite) Mullah (Religious person), government member, NGO person and Mirab to get related information of Mirab system in the study area, the literature review was used for comparison for collected data during discussion and interviews in the study area.

### **3.7 Semi-structured interviews:**

After a complete identification with study area and acknowledgments with respondents, before going to field for data collection a meetings with DAIL and PAIL was held to get information on study area and irrigation system to make the process of data collection easier and comfortable.

Randomly 30 interviews with farmers which hold the whole canal such as 10 farmers of Chorkhil village (upstream) of Khawajazai canal, 10 farmers from Douter khil and Youqib khil (midstream) and 10 farmers from Aka-khil downstream.

It is to be mentioned that it was not possible or might be difficult for the researcher to spend a lot of time with farmers during interviews time because they were hesitating during response to questions, because of insecure condition and also due to wrong propaganda about NGO and international community in the study area, respondents have not had an idea about research or researcher because of lack of education.

During discussion and interviews a local language and local accent were used to give a clear image of questions to respondents and informants see photo. Before applying the interviews and checklist it was pre-tested on 6 persons, a team of 3 persons were selected, one from MAIL, one from NGO and one from Development Alternative Inc (DAI) under the supervision of the researcher to collect the data. 3 farmers from DC (Department of canal in Nangarhar province) Pre-tested have done because to get general information, objective of the study and cultural respect during interview time.

A formal letter have taken from MAIL and MoEW which was registered in DAIL in Nangarhar province for the execution of study, in addition community elder was informed before arranging interview in a village one day in advance to help with interview team in data collection and for researcher security.

5 days have spent to collect information in the study area and 6 questionnaires were completed in per day with checklists as well. The researcher was accompanying the interviewers for 5 full working days in the four villages.

### **3.8 Checklist discussion**

After conducting semi-structured interview, checklist discussion were arranged with community elders (Malik, Khan, Mullah), Mirab, NGO person, and one key informant from government members (DAIL) They were explained the objective of the study and helped to researcher with situation of Mirab system, for the checklist discussion 30-55 years old men have chosen from the study area. The discussion took place in different places to get an isolate perception and idea on related to topic. However NGO person was selected because he was working for (FWMP) On Farm Water Management project in Neighbor district on Mirab system.

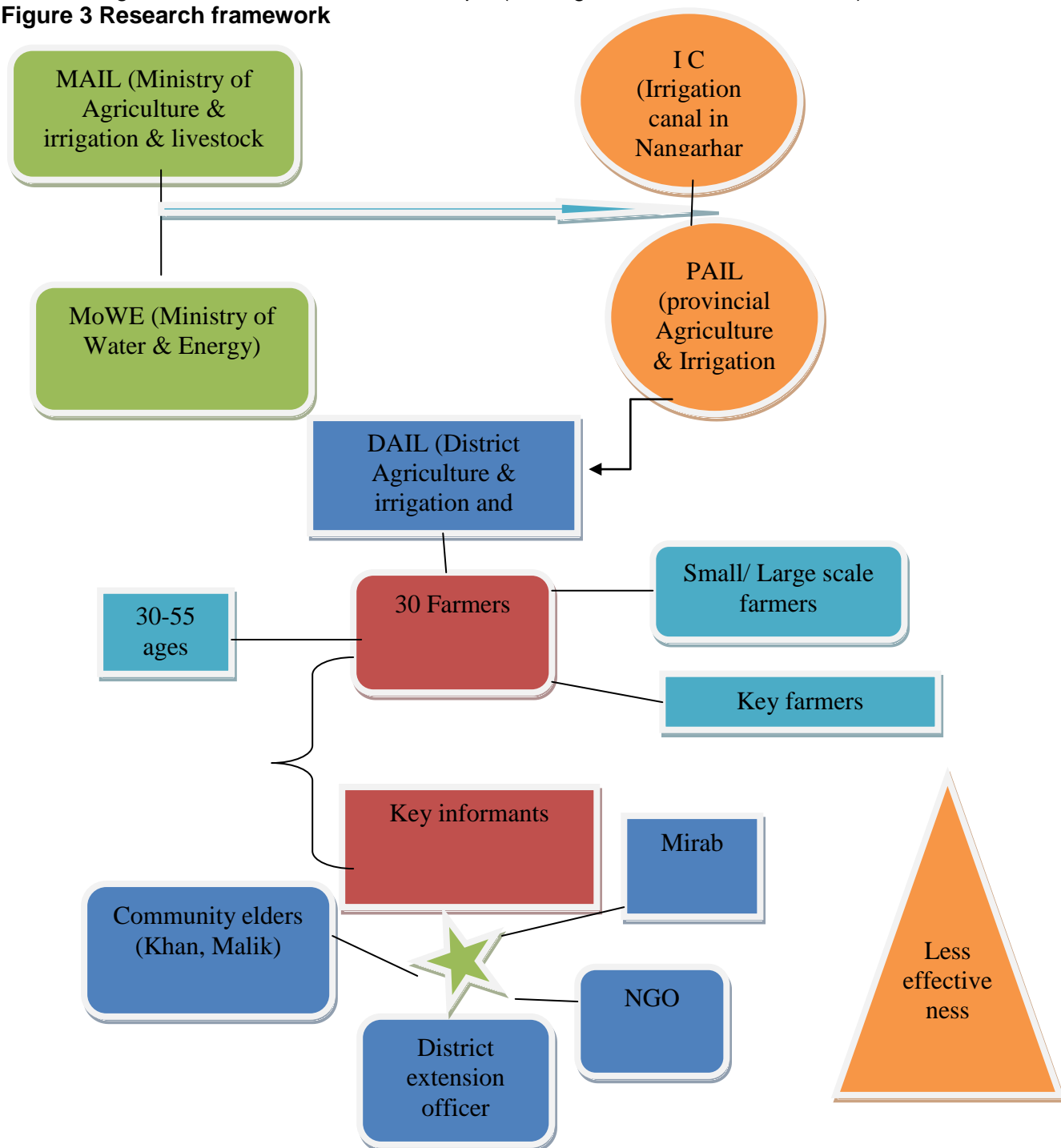
Finally the results are summarized in the final report to draw a clear image of the proposed research objective.

### **3.9 Different arranged meetings:**

Some important meetings was also done regarding to topic discussion such as meeting with Deputy of Ministry of Agriculture Irrigation and Livestock and Deputy of Ministry of Energy and Water, in addition meeting with some MAIL representatives in Nangarhar

province and meeting with ISAF representatives in Goshta district combine with district minister to get written document related to topic (see Figure 3 for more information).

**Figure 3 Research framework**



**Source (Field survey)**

### 3.10 Research Limitation

**Security:** The security situation of the study area was not good. The data collection was difficult in some part of the study area due to the fear of bomb blasts along road side, kidnapping and insurgent attacks from anti-government side especially on NGO, local government and international community.

**Limited Available Data:** There was limited data about water distribution and water rights in the DAIL. Moreover, technical data about the discharge and losses were also not available.

This chapter is proceeding to present the result which got from primary data collection that was done through 30 semi-structured interviews (see annex 1) with farmers of four villages from up, mid and end tail of Khawajazai canal and one checklist (see annex 2) in which open discussion was done with government member, community member (Mullah, Mirab, Khan) from the same Khawajazai canal in Goshta district. However one open checklist was done with NGO person who was working on Mirab system in Neighbor district.

## **4.1 Discussions**

### **4.1.1 Discussion with Mirab**

A discussion with the Mirab was held to get the in-depth information about Mirab system in past as well as at present. The summary of the discussion is presented below:

#### **Effectiveness of Mirab in Past (1945-78)**

In past, the Mirab system was organized from community elders, water users, government and Mirabs. The community elders were playing great role in conflicts resolution, Mirab selection and developing rules and regulation. Mirab was responsible for water distribution and O&M of irrigation infrastructure. The role of the water users was to participate in Mirab selection and contribute labor for the O&M of infrastructure. The government was playing great role in Mirab system by implementation of water rights and monitoring of the system.

In the past the system was supported by government side in terms of payment, bonus and rewards, in addition repairing of canal portion (intake, off-takes) and provided labors salary with tools for maintenance and cleaning of canal which helped to encourage the system. There was social cohesion among community and farmers were growing same crops in upstream and downstream area which indicated Mirab system authority in past. Apart from this government were giving guidance and supervision behind system would carried out in terms of water distribution and O&M, in addition assistants were provided to Mirab to help him in water distribution among villages which controlled of not using illegal water and they were also helped him in O&M to count labourers and accumulating fine from them.

#### **Mirab System at Present (2001-11)**

Currently, the Mirab system is organized from water users and Mirabs.

The system of Mirab does not have power in community and influencing by many powerful people (Khan, Malik, and Warlords). The government is now weak and cannot give support to Mirab (payment, bonus, rewards) for O&M.

According to his role he replied that he is managing the whole process of water distribution and O&M, Organizing water from intake to off takes and to farmers' fields, organizing labourers for cleaning process and conflict resolution among water users in distribution and O&M. Observing the whole process to avoid using of illegal water and informing & indicating water turn for farmers to organize water turn. In case of conflict contact is done with government.

In the past O&M could carry out in collaborate way with community elders and government, the government could give wages for labourers and for buying tools, O&M could implement in two times in year, one is before September and second could implement in early January before cultivation of wheat. All the water users could take part in O&M, if some people could not join they would pay fine to Mirab. The Mirab has committee who could help him in this process.

Currently, O&M is done on ad hoc decision, which is carried out once in year at early June before cultivation of Maize. The people who have large size land will give more laborers as compared to who have less land. Canal will be cleaned by farmers who have close land with canal. The farmers who could not clean, they will give fine on per labour which is 200 Afg. While O&M is done by local farmers side based on Qulba land and from each Qulba (16 jerib) farmers join in O&M activity, in every time Mirab is counting farmers, if one person is absent, he becomes fine by Mirab side, but in this process no one can help to Mirab.

In summer ice melts on mountains so water flow becomes increases, in this case water in canal becomes high then water is distributed based on location of village, the village which locate at head position, getting turn for 24 hours (day/night) when this time is completed then off-takes becomes open to next village. But in winter season water flow becomes decrease, in case there is water scarcity then the water is distributed on hours, the first five hours, first village will get water then water is leaving to next village for irrigation.

There is no any support and facility provided to Mirab system by government and community side now, if government would work in intake of canal along River side which can help to bring water high to canal then water can pass effectively to downstream area, so they did not help like we had in past from government side, for this purpose local farmers make a traditional structure which is called Shantai (Trunk, cement, stones together in river to divert water into intake)

The system is less effective now because weak government connection with Mirab system and influencing factor such as community elder (Khan, Malik, Warlords) which decreases power of Mirab in community, less payment is giving to Mirab, improper tools and unskilled laborers, using illegal water, lack of proper water channels, No shuras has been made among water user, lack of transportation. Crop pattern has been changed.

The system could be improved when there is good connection of community and mirab which can be possible from government, powerful people support to Mirab in the area in terms of facility such as bikes and decision authority. Shura should be made to help with Mirab, building of public hall. Proper tools, skilled laborers and balanced crop pattern among community should be grown.

In past conflicts were resolved through Shura and Mirab system together, but currently there is no shura existed so water users discussed conflicts with Mirab, but sometimes conflicts can be solved by Mirab then it is passed to DAIL, then they transferred to local police.

Changes which have brought to community for last 10 years are, due to unrest situation warlords are still powerful and government is weak which has breakdown social cohesion and Mirab relation. There is no shura to help with Mirab, social cohesion and crop pattern among farmers have changed. Conflicts among community are increased on water rights. No development activities are seen in area regarding to water distribution and O&M. canal is not paved which has more losses in summer season. People have left agriculture activities.

These changes have effected on Mirab system because many people are sending unskilled labour with poor tools to canal operation. Conflicts have increased and people have lost trust on Mirab system because many people have started to steel water from canal, which have caused inequalities of water. People do not participate in active form in cleaning.

#### **4.1.2 Discussion with Government Member**

During discussion with district extension officer about current strategy for Mirab system, in response he replied that currently they do not have any specific strategy for Mirab system. However, the government has started strengthening the Mirab system in some parts of the country by making irrigation association. In our district, we do not have such kind of projects yet.

Currently, in our district we do not provide any kind of financially or technically support to Mirab.

In past the district government was playing great role in Mirab system. The Mirab system was regularly monitored by government. The government was supporting the Mirab system both financially and technically. Unfortunately, we do not have great role in the Mirab system due to weak government both financially and technically but in case of conflict we can help him to resolve it.

Regarding to less effectiveness he mentioned that our government is weak because in the past government provided full support to Mirab system for example supervision and guidance to Mirab system, payment, bonus and reward to motivate his works but currently there is no investigation behind Mirab system. Due to Market demand crop pattern is increasing, crop is changed to double crop. Mirab system has no power in terms of making decision. Growing much consumptive crops (rice) less knowledge of farmers in terms of water rights, poor tools and unskilled labors

Mirab system could be improved by providing full support to Mirab system from government side and community elders, the decision should be done in presence of all actors, Mirab should be elected based on free democratic election. The training and capacity building activities should be implemented with Mirab and community to make strong social cohesion, in addition transportation, payments, bonus and rewards should be provided to Mirab to encourage system works.

Local government should give assistants to Mirab with guidance and building a supervision team to avoid bribe and to depress power of influencing factor from system.

#### **4.1.3 Discussion with Community Elders**

The community elders were asked about the selection of Mirab and the duration of his services. They replied that the Mirab is selected by water users themselves. The Mirab stays in his job as long as the water users are happy with him. The community elders are not involved in the Mirab selection.

In past Mirab was elected in general meetings where government, community elders and farmers from up, mid and downstream participate to vote for Mirab. The mirab was elected each year. Currently, the Mirab has got a form of heritance. When a Mirab dies or become too old then his son takes his place.

Regarding to water distribution they said that water is distributed on water users based on location for example the Chor khil is located in upstream gets water for 24 hours (day/night) during this time water is not allowed to other villages but when this time is completed, It is not necessary to be irrigated all fields so water will be allowed to another village.

O&M is done in every one year in the month of Jouza<sup>2</sup> (June) before cultivation of Maize. Laborers are joining based on Qulba<sup>2</sup> land (1 Qulba = 16 jerib) all activities is supervised by Mirab and he is counting labourers when labourers is absent so he gives fine to Mirab. Meanwhile community elders mentioned that in past they were supporting Mirab system

and they were present in every meeting for election process and to solve water related problems but now they are not involved in a selection process.

All community elders told that Mirab system is less effective because government is weak and they are not giving any support to system as they were giving in past, there is no specific place to join meetings like Public Hall. Conflicts among community has increased which has broken social cohesion, meanwhile crop pattern based on market demanding has developed, in addition dessert land has been cultivated for last couple of years, however there is no supervision behind system as well.

#### **4.1.4 Discussion with NGO**

According to Mirab system works, NGO employee have indicated that currently Mirab system in eastern part has no any connection with local government, meanwhile system of Mirab is being supported in other parts of Afghanistan in form of Irrigation association (IA). Mirabs are registered after annual election in other parts of Afghanistan but in project area Mirab is working based on inheritance.

This is selected by water users. The community elders and government are involved in selection. The Mirab has no knowledge to write down labourers names and other tools provided to O&M and about canal water losses. Mirab is responsible to solve water related issues among water users, distribution of water and monitoring of O&M of canal, organizing laborers and indicating water turn for each village. Mirab is paid by water users based on Qulba land. He received 2.5 maan for one Qulba<sup>3</sup>.

According to less effectiveness he added that Mirab is not supported by government in terms of payment and rewards. There is no training for both Mirab and farmers in terms of water distribution, organizing of laborers and proper O&M. Community elders (Khan, Malik) are not supporting Mirab system, in addition Mirab works under the authority of these people. Meanwhile farmers have less knowledge on water crop requirements and water rights which have caused inequities and stealing of water. Transportation and lack of proper tools and unskilled labors are also causes of less effectiveness.

He replied, about improvement that basic training should be provided both farmers and water users about water rights and crop water requirements. Legal and free democratic election should be done in the area. Local government and community elder support should be provided to Mirab system in terms of power and decision making. Supervision and guidance and transportation should be provided in order to trained unskilled labourers.

## **4.2 Result of the Survey**

### **4.2.1 Mirab system in past**

Figure 4 has shown an idea of respondents in upstream, midstream and downstream about Mirab system effectiveness in past. They have mentioned that Mirab system in past was effective because in past Mirab system had more power as compare to now, the system was supported by government. Mirab was given payment, bonus, reward and equipments to motivate him in his duty. There was social cohesion among water users and conflicts were limited, the conflicts were resolved through shura. The Mirab was elected based on free democratic election for one year.

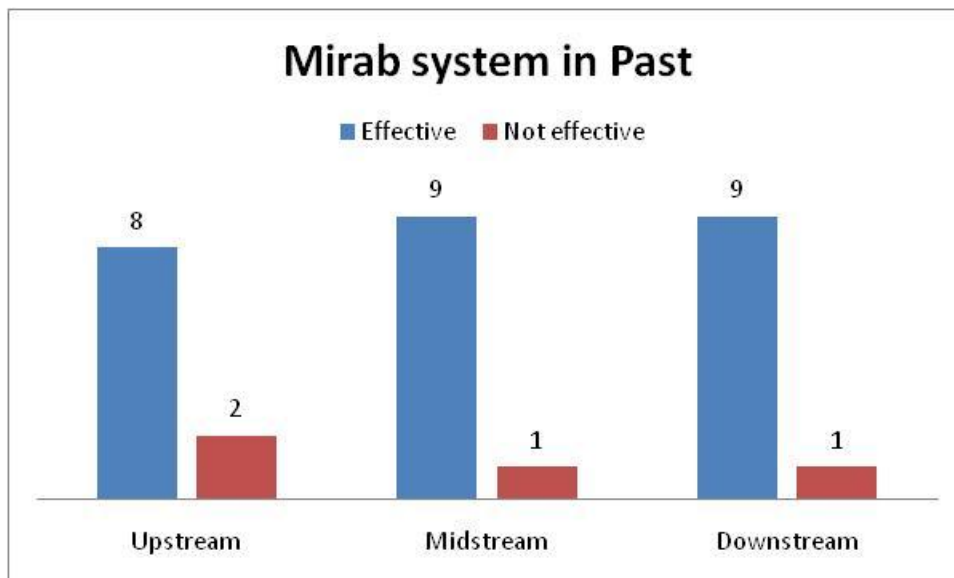
---

<sup>2</sup>This is Afghanistan month name equal to June

<sup>3</sup>Qulba Local word which is used for land 1 Qulba = 16 jerib or 3 Ha

Farmers were using mono-cropping pattern in head, mid and down position. The government extension officer was assigned to supervised Mirab works, while Mirab was received guidance from extension officer as well. General meetings were held to discuss water related problems, where actors such as government, community elders like Mullah, Khan, Malik and farmers have joined meetings to discuss their problems (see figure 4)

**Figure 4 showing idea of respondents on Mirab system**

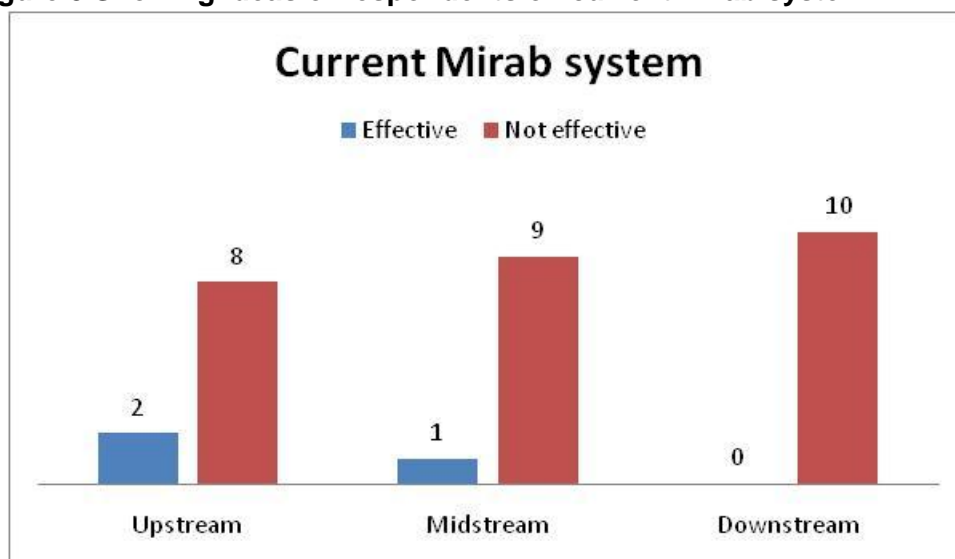


**Source (Field survey)**

#### **4.2.2 Current Mirab system**

Figure 5 showed the idea of upstream, midstream and downstream respondents about current Mirab system effectiveness. They told that Mirab system is not effective now as compare to past because the system worked in past is not implementing now for instance the government situation is weak now, so there is no support provided to Mirab system, guidance, supervision, bonus, rewards and tools are not provided to Mirab system, in addition there is no social cohesion among up, mid, and downstream, conflicts among water users have arisen, the system is held based on inheriting process when a person is died or retired, his son becomes Mirab for unlimited time (see Figure 5)

**Figure 5 Showing ideas of respondents on current Mirab system**



**Source (Field survey)**



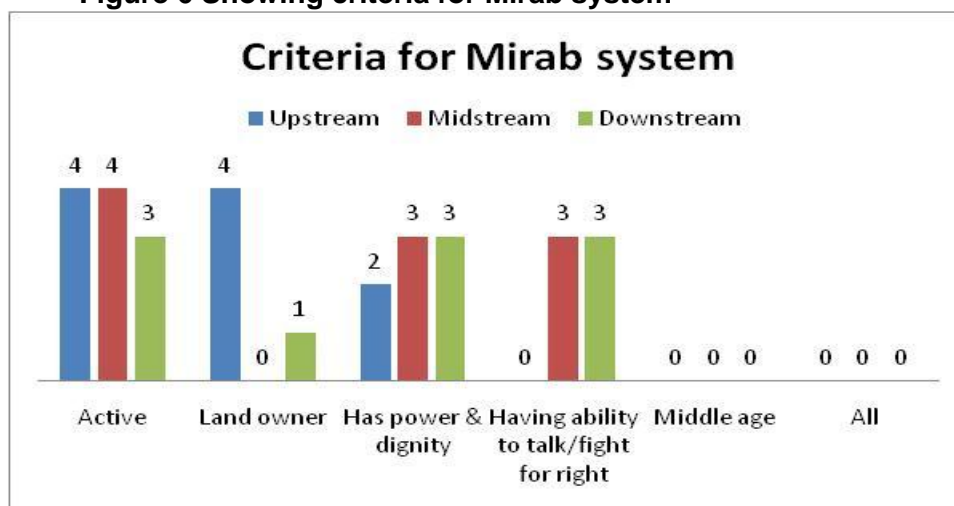
### 4.2.3 Responsibilities of Mirab

Respondents of each up, mid and downstream revealed that Mirab system is responsible for distribution of water, conflict resolution specifying water turn for each village, announcement for water turn & maintenance, mobilizing & organizing labourers for cleaning canal and contact with actors such as government, NGO and community elders.

### 4.2.4 Criteria for Mirab

Figure 6 has shown perception of respondents (up, mid & down) for selection of Mirab system, however their views were different for selection because in upstream four respondents said Mirab should be an active while four said he should be a land owner and two respondents said he should has power and dignity in community to implement all rules & regulation, However in midstream also four respondents mentioned about activeness and three respondents voted to has power and dignity, in addition other three respondents said he should have ability to talk/fight for right. Though in midstream one respondent voted to land owner and three respondents said he should has power and dignity while three said he should be active, in addition other three respondents said he should has ability to talk/fight to right.

**Figure 6 Showing criteria for Mirab system**



**Source (Field survey)**

### 4.2.5 Selection of Mirab

Respondents have revealed that selection is done based on inheriting process which means when Mirab is died or becomes retired, his son would be next Mirab and it is not necessary the criteria which is mentioned in above figure 3 can be fitted on him or not. Mirab is selected by farmers.

## 4.3 Water Distribution and O&M in Mirab System

In the past community elders and government were supporting in O/M the government could give wages for labourers and equipments, O&M could implement in two times in year, one is before September and second could implement in early January before cultivation of wheat. All the water users could take part in O&M, if some people could not join they would pay fine to Mirab. The Mirab has committee who could help him in this process.

Currently, O&M is carried out once in year at early June before cultivation of Maize. The people who have large size land will give more laborers as compared to who have less

land. Canal will be cleaned by farmers who have close land with canal. The farmers who could not clean, they will give fine on per labour which is 200 Afghnis<sup>4</sup>. O&M is done by local farmers side based on Qulba land and from each Qulba (16 jerib) farmers join in O&M activity, in every time Mirab is counting farmers, if one person is absent, he becomes fine by Mirab side, but in this process no one can help to Mirab.

Water flow in summer become increases, in this case water flow in canal becomes fast then water is distributed based on location of village, the village which locate at head position, getting turn for 24 hours (day/night) when this time is completed then off-takes becomes open to next village. But in winter season water flow becomes decrease, in case there is water scarcity then the water is distributed on hours, the first five hours, first village will get water then water is leaving to next village for irrigation.

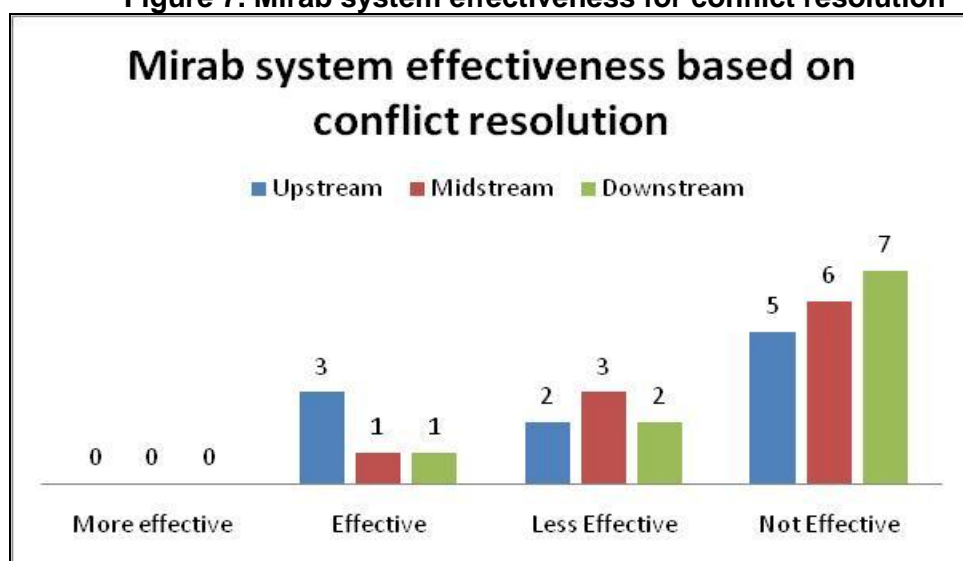
#### 4.4 Changes in Mirab system in last ten years

Respondents told that there have been many changes occurred for last ten years such as weak link of government with Mirab system, no guidance and supervision is done by government side for last ten years, the system is influencing by powerful people such as Khan, Malik, and Warlords. Mirab is not given any payment, bonus, reward and equipments from government and NGO side, however Mirab is paid by farmer side by given crops based on land availability, according to respondents they are giving 2.5 maan on per Qulba, so 1 Qulba is equal to 16 jerib while 5 jerib is equal to 1 Ha, however mostly wheat is given to Mirab and 1 Kg of Wheat has 18 Afg price so 1 maan is equal to 7 Kg therefore they are giving 126 Afg to Mirab meanwhile taxes has been increased per land from government side, besides Mirab has no assistants in distribution & maintenance process. Water rights are known to farmers. Conflicts were solved through shura, currently local police are involved in solving conflicts, but they were given bribe, due to which downstream remains without water.

#### 4.5 Less effectiveness of Mirab system

Figure 7 has shown respondents views on current Mirab system many water users have told that system is not effective, especially downstream water users have indicated, that currently system is not effective regarding to conflict resolution because it has been working individual form. The conflict is usually not solved.

**Figure 7. Mirab system effectiveness for conflict resolution**



Source (Field survey)

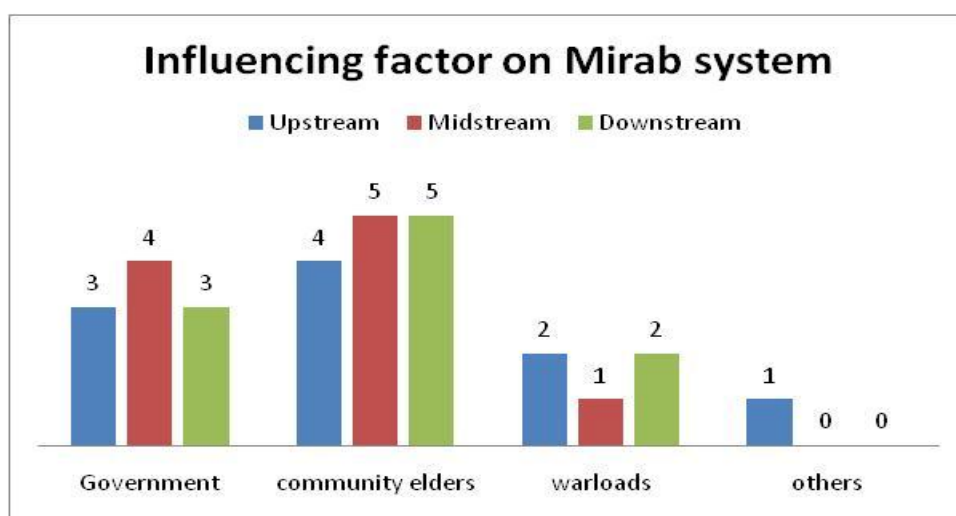
<sup>4</sup>. This is Afghani currency (1 \$ = 47 Afghanis)

#### 4.6 Influencing factor on Mirab system in study area

Figure 8 has revealed respondents' perception (up, mid & downstream) about influencing factor on Mirab system. According to upstream s' opinion three respondents said that the system is influenced by government side, however four person said it is influenced by community elders while two included that Mirab system has influenced by Warlords and one said it has influenced by NGO as well.

In midstream four respondents said that Mirab system is influencing by government side while five respondents have mentioned that system is influenced by community elders, however one respondent voted to Warlords as well. In downstream three respondents said that system is influenced by government while five respondents indicated that Mirab system is influenced by community elders and two respondents revealed Warlords to be influencing factor in study area.

**Figure 8 Influencing factor for Mirab system**



**Source (Field survey)**

According to Gul Ahmad (downstream area) indicated that in upstream landowners are running water mills on water which has affected water distribution in downstream area, as in upstream Warlords and community elders such as Khan, Malik are living in upstream area so Mirab could not able to take our water rights from them beside they are growing rice which has good market nowadays in area. The Mirab is tried many times to convince them but he has no power on them and they also giving some money to Mirab as well which makes him inactive.

Sher Muhammad from Midstream area has mentioned that one project which was the construction of Khawajazai canal intake next to River was implemented by government, community elder and NGO. The total budged were 20,000\$ (which is equal to 940,000 Afg) However this project was completed without taking any advice and suggestion from Mirab or community people whose lands are irrigated from this canal

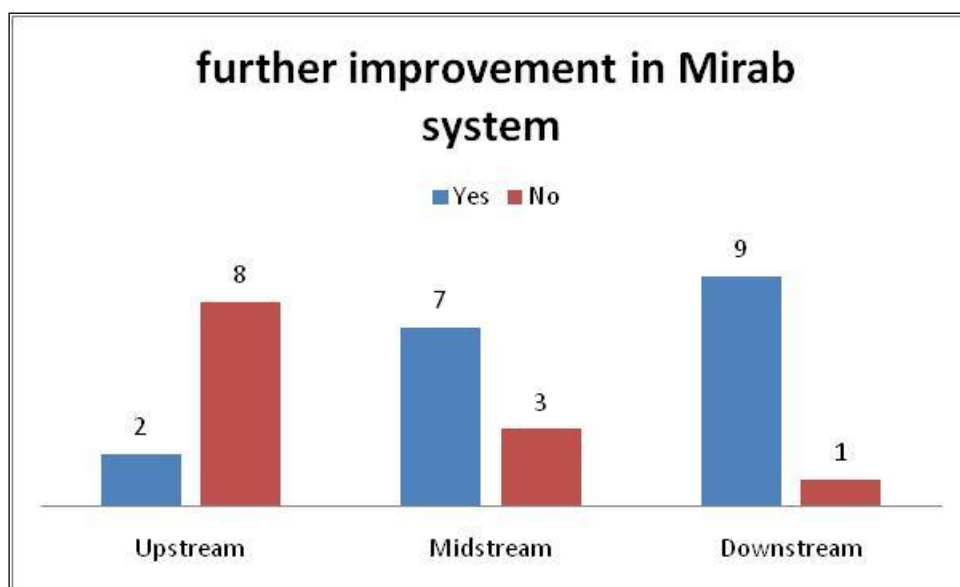
#### 4.5 Further improvement

Regarding to further improvement majority of respondents have mentioned that Mirab system needs improvement (see figure 9) where in upstream eight person have indicated that system does not need improvement because they mentioned they were satisfied from allocation of water rights but two respondents said that Mirab system needs improvement, however in midstream seven respondent have mentioned that improvement should be bring in fair distribution and O & M while three respondents were not agreed for

improvements, in addition in downstream nine respondents mentioned that they want to be in improved system, while one was not agree for improvement of Mirab system. Based on respondents views these improvement should be brought to system;

- I. Establishing Shura
- II. Support of actors such as government, community elders & NGO to enhance Mirab system power in community
- III. Legal form ( Mirab registration with government)
- IV. Rewards, bonus, payment from government side to motivate system works
- V. Transportation facility (bike or horse)
- VI. Public Hall where weekly and monthly meetings to discuss water problems
- VII. Assistants from (up, mid & downstream) and cleaning of canal on time
- VIII. Capacity building program to train both Mirab & community which can develop social cohesion water users

**Figure 9 showing respondents idea on Improvement of Mirab system**



**Source (Field survey)**

**5.1 Mirab system in Past (1945-1977)**

The study results of the group discussions revealed that in past Mirab system, the Mirab selection was done through democratic election process where Mirab was appointed for one year. All the actors such as government, community elders (Khan, Mullah, and Malik) were involved in the Mirab system. Mirab had full power on making decision among community. The Mirab system was supported by government in terms of labor payments, rewards, bonus, wages, and equipments for O&M. There was a strong social cohesion and conflicts over water were limited and conflicts were solved through Shura. There was a community Shura engaged in solution of the community problems. The local DAIL department deployed an extension officer for the guidance and supervision of Mirab works.

Postel (1997) also mentioned that in past was working as a liaison officer for government and Mirab was elected based on free democratic election. All the community elders (Khan, Malik, and Mullah), famers, government and nominated Mirabs were gathered in a specific place along canal to choose possible person for Mirab position.

Pollard 2001, stated that selection of Mirab from tail-end is an element of equity in system. However, that the process by which Mirab is appointed in Shura was solid and common process to all villagers, which was a consensual process through which a honest and hardworking person was chosen.

It is also important to discuss that legal frame (Mirab registration with government) for Mirab system would bring positive results. The Mirab will be legally recognized by water users and other stakeholders and will have support from the government. The local government (DAIL) will supervise and give guidance for Mirab in water management and O&M of infrastructure.

**5.2 Current Mirab system**

It is also obvious from the group discussion and survey results that the currently Mirab system on Khawajazai canal is not effective in term of equitable water distribution and O&M of irrigation infrastructure. The study discovered several reasons for the less effectiveness of the current Mirab system in Khawajazai canal. These factors include, lack of government support (no supervision, guidance and financially support) and the breakdown of social cohesion. The exclusion of community elders from the Mirab system, water steeling, conversion of non-arable land to cultivated land, socioeconomic differences, power relation, lack of knowledge and inheriting system are the reasons for less effectiveness of Mirab system.

Roe, 2009 has stated that years of war, uncontrolled warlordism and increasing socioeconomic inequalities have had a serious and deleterious impact on the ability of these institutions to function to their maximum capacity because of absence of appropriate linkages with government institutions.

According to Roe 2009, the community water management system (Mirab system) is effective whenever there is sufficient water which meets the needs of all the irrigators (upstream and downstream). In the case of water shortage and scarcity it is the beyond the capacity of community water management to address the issue properly.

The effectiveness of the Mirab system could be improved, if the above mentioned factors affecting Mirab system are addressed properly. One of the most important factors is the

social cohesion for any intervention or system. The broken down social cohesion needs rebuilding on sound basis. Establishing community Shura from community elders of the different villages, farmers, Mirab and government authorities will play great role in rebuilding of the social cohesion and will contribute in the improvement of effectiveness of Mirab system. The Shura could appoint persons for support of Mirab in water distribution and O&M of irrigation infrastructure.

### **5.3 Role of Mirab**

Results has shown that Mirab is responsible to manage water distribution, O&M, organizing & mobilizing labors for O&M, conflicts resolution among water users, contact with government and specifying water turn for water users.

Riemann, 2005 has indicated that Mirab is responsible for the construction and maintenance of related canals with the help of community members, the typical everyday tasks of a mirab include: checking any unauthorized breaching of the canal upstream; collecting and mobilizing people for maintenance activities; maintaining the diversion and regulatory structures and coordinating and mobilizing labour for main canal and canal bed maintenance activities.

### **5.4 Selection of Mirab**

It is clear from the group discussion and survey results that in the current Mirab system of Khawajazai canal the Mirab is selected by the water users. The duration of Mirab services is not specific and he stays as long as water uses are happy with him. The community elders and local government are not involved in selection process. Sometimes Mirab get his position as Mirab due to inheritance. For example a son replaces his father when the father becomes old or dies.

Mielke and Schetter, 2007 have indicated that there are cases where the position of mirab can also be an ad hoc decision taken by a dominant group in the village.

Mokgope, Pollard and Butterworth, 2011 have mentioned that selecting of mirab from tail-end villagers have indicated an element of equity which is built in system. Even though the mirab should be from the tail-end, but Mirab system could be acceptable for all up, mid and downstream water users.

However it was observed that Mirab was chosen from upstream area (Aka khil) in study area. Sometimes the Mirab give priority for upstream and downstream people because of getting more reward from them in form of wheat.

### **5.5 Water distribution**

Results of the group discussion and survey showed that there are two ways to distribute water among farmers. In summer season, there is more water in the canal so the total time allocated for upstream, midstream and downstream is s 24 hours (day & night) per turn. In case of scarcity of water the number hours per turn is reduced to 5 hours.

It is worth mentioning that the time allocated for upstream and downstream per turn is the same (24 hours per day). However, there are lot conveyance water losses due to the poor condition of canal. The water discharge at the upstream is much higher than that of the downstream area. This is a kind of inequity in water distribution among the users. It would have been better if the downstream people had comparatively more hours of water per turn in order to compensate for the water losses in the canal.

AWATT, 2010 has stated that in Mirab system the water is basically distributed according to size of land. However, communities use different local terminologies and units for allocating waters to farmers. Example of traditional units are; Kalam (1 kalam is equal to 12 hours of water), Khord/Jerib (1 Khord is equal to 45 minutes), number of plants (1000

grapes plants are allowed 3 hours water per day), time (day or night) and turn (5-7 water turns for the lower reaches and 4-7 for the upper reaches).

## **5.6 Operation & Maintenance**

The results have indicated that in past the maintenance of the irrigation infrastructure was done in group form by the water users with the full support of community elders and local government. The maintenance included the canal cleaning, de-silting, weeding and maintenance of some parts of the canal. The local government provided wages for labor, and payment of tools for O&M, while community elders supported local farmers in case of solving conflicts and fair water distribution. The maintenance of the irrigation infrastructure was done two times in year, one in early September and second was done in November. If someone did not participate in canal cleaning then he was fined by Mirab. In the whole process a committee was set by community elders, local government and key farmers to help Mirab.

Currently the maintenance of the canal is done once in year at early June. The maintenance includes canal cleaning, de-silting, weeding and maintenance of some parts of the canal. The local government and community elders are not involved in the process. The people who have large land are giving more labors. Only those parts of the canal were cleaned jointly which are shared by all the farmers. The parts of the canal which are not shared are cleaned by each farmer himself. In principle, if someone does not participate in communal work he gets fined but recently this is not implemented.

Thomas, 2009 has stated that the operation and maintenance of irrigation canals is done by the Mirab. However, Mirabs have the right to call labour from all farmers cultivating irrigated land for canal maintenance. They have implemented O&M two times in year, after harvest of the crops in the month of November/December (Qaos/Jadi), and September/October (Sonbola/Mizan) after harvest of main crop in Heart province.

From the discussion with the Mirab it was discovered that community elders instead of supporting Mirab were breaking the basic principles of Mirab system. For example, if someone gets fined by not participating in the communal work was protected from the fine by the community elders (Khan, Malik). The upstream people were not contributing in labor although they used more water and had more lands. This has created tension among the water users especially the downstream users.

According to (Thomos, 2009) in Mirab system the upstream people were expected to contribute more in labor (one person per day per 10 jeribs of landholding) as compared to downstream users (one person per day per 20 jeribs of landholding). The mirab keeps an account of these requirements and calls for contributions accordingly. Warlordism and weak institutions (of both the government and the community) still prevalent, it is not easy to mobilize labor from upstream sections.

## **5.7 Less effectiveness of Mirab system**

Results have indicated that system of Mirab is less effective now because this system is not supported by government as well as community elders. Mirab is working on imbalanced payment, improper equipments, and lack of proper water channels, unskilled and unbalanced laborers. Social cohesion among water users has not found. Farmers have less knowledge on water rights so farmers of upstream are using more water then downstream. Water has been used illegally. Some of conflicts are not solved by Mirab.

The system of Mirab is working individual form, there is no Shura or committee who help him, beside there is no facility to Mirab such as bikes, horse for transportation. Crop pattern has also changed. Some of illegal water channels are dug.

Roe, 2009 has stated that the institutions of mirab appear, in the case of Herat, to be vibrant and effective on the whole, with many of their limitations in addressing inequities having much to do with prevailing warlordism and weak governance.

Kakar, 2001 has also stated that in spite of flourishing existence and potential to produce equitable outcomes, the community irrigation management institutions of Mirab in Afghanistan face the reality of weak tribal relations, deeply well-established power structures, huge inequalities, warlordism and weak state governance.

Seckler, Rosegrant and Carruthers, 1997 have stated that Mirab was paid 4 kg of wheat per jerib of land but this amount fluctuates among water users. Larger landowners pay more to the mirab than small landholders or sharecroppers. Warlordism and gun power are still prevalent in the country and have great influence on social relations among some communities because related weaknesses in water management institutions and current cultural norms.

Thomas, 2009 have stated that the operation and maintenance of irrigation canals is done by the Mirab. However, Mirabs have the right to call labour from all farmers cultivating irrigated land for canal maintenance. They have implemented O&M two times in year, after harvest of the crops in the month of November/December (Qaos/Jadi), and September/October (Sonbola/Mizan) after harvest of main crop in Heart province.

Thomas, 2009 also stated that during Mujahiddin<sup>5</sup> period unregulated offtakes were built in Baghlan province which hindered water access to tail-end. Even today these offtakes are referred to as "illegal offtakes".

From the discussion with the Mirab it was discovered that the Mirab was doing majority of work himself without the contribution of the farmers. He was alone and there were no assistants to help him in monitoring and observation of canal. The canal cleaning was done annually. Water was distributed among water users based on 24 hours (day/night) which was using more upstream farmers because when the tern of downstream could reach, the flow of water becomes decrease and they would not get proper water. Secondly it is also possible that he gets some bribe from water users because there is nobody to investigate his work. Rice has sown in upstream area because of market demand.

---

<sup>5</sup> Late commanders



## Conclusion

The irrigation water is management by a traditional system locally known as Mirab system. A person from the community is appointed for the water distribution and O&M of irrigation infrastructure which is commonly called Mirab (Water Master). The water distribution and O&M of irrigation infrastructure is based totally on community rules and regulations.

In past, the Mirab system consisted of Mirab, water users, community elders and the government. The Mirab system was working effectively because of the full support and involvement of government and the community elders. The government was providing financially and technically support to the Mirab. The system was regularly monitored by government authorities (DAIL). There was strong social cohesion in the Mirab system and community elders (Khan, Mullah and Malik) were playing active role in the Mirab system. The Mirab had authority of decision making and was supported by the government and community elders.

The current Mirab system of Khawajazai canal consists of farmers and Mirab. The role of the Mirab is water distribution among the users and O&M of irrigation infrastructure. The role of the farmers is to contribute in labor for the communal work and participate in Mirab selection. Mirab is selected by the water users for an un-specific period of time. He can stay in his job as long as the farmers are happy with him. Sometimes Mirab gets his position due to inheritance.

The water distribution is done on a turn basis and is dependent upon the availability of the water in the canal. In summer season, there is more water in the canal so the total time allocated for upstream, midstream and downstream is 24 hours (day & night) per turn. In case of scarcity of water the number of hours per turn is reduced to 5 hours.

The maintenance of the irrigation infrastructure is done through joint work of the community. The maintenance includes canal cleaning, de-silting, weeding and maintenance of some parts of the canal and is done once per year. The parts of the canal which are not shared are cleaned by each farmer himself. In principle, if someone does not participate in communal work he gets fined but recently this is not implemented.

In past conflicts were resolved through common Shura, but currently this Shura does not exist. Mirab tries to solve the conflicts over water but if he fails to do so then DAIL department is approached. The DAIL transfers it to Local police department for its resolution.

There are various factors that have contributed to the less effectiveness of Mirab system. The breakdown of the social cohesion, lack of government support, exclusion of community elders are the main three reasons for the less effectiveness of Mirab. These three main factors have affected the whole Mirab system in one and other way. For example, the breakdown of the social cohesion and exclusion of community elders have caused the problems of illegal water use and establishment of new illegal water channels and change in the cropping pattern. The lack of government support has affected the proper O&M of irrigation infrastructure and violation of water rights.

There are many ways to improve Mirab system such as making social shura from up, mid and downstream which have good connection with government and community elders, facility to Mirab (bikes, horse), the capacity building programs to give awareness to local water users in terms of allocation water rights, Mirab system and selection of Mirab based on annual election. Reward and assistants shall be given to Mirab to motivate his work.

## **Recommendation**

There is certainly a need to strengthen local communities to enable them to take more responsibility for water management in a more transparent way, for this purpose Committee should be made from representatives of upstream, midstream and downstream along the length of the canal to oversee and support the Mirab work, which will identify and encourage the participation of small scale farmers.

The amount of water needed for irrigation shall be determined according to the area under cultivation, the kind of crop, the irrigation regime, the water rights documents, the local practice and the amount of water in its source.

Irrigation association should be made, in which all community elders, local government and representatives of water users should be present to elect four people, one person will be elect for Mirab position, one will be treasure and two will be assistants.

The process of inheritance should be change to free annual democratic election. All water users should be present to select best communicator and honest man for Mirab position. Canal should be cleaned two times in year one should be after Mizan (October-November) month and second should be done during Asad (August) month. Because in Mizan due to heavy and sudden rainfall floods are coming out which damages canal and during month of Asad the flow of water becomes decrease which will be easy to clean.

Capacity building is also vital for developing institution skills. Capacity building through trainings should be given to Mirab and water users. Trainings are to be designed based on locally specific requirements such as water rights, Mirab selection and skilled labors.

The role of NGOs is particularly relevant for providing facilitation support and for ensuring the participation of local communities. The local government should play a supportive role at all.

## References

- AIMS, 2002. Afghanistan District Vulnerability Mapping- Landmines/UXO AIMS office Kabul, Afghanistan
- ACARDA, 2002. Future Harvest Consortium to Rebuild Agriculture in Afghanistan, International center for Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria. United States Agency for International Development (USIAD)
- AWATT. 2010. Report on the Second Regional Mirab Conference and Workshop for Central Provinces, Badam Bag Farm, and Kabul, Afghanistan.
- CPHD. 2011. An Overview of Key Messages, Afghanistan Human Development Report. 2011, the Forgotten Front: Water Security and the Crisis in Sanitation.
- DAI. 2006. Water users association in Afghanistan. Development Alternatives Inc. USAID.
- Flaming L and Roe A. 2009. Water Management, Livestock and the Opium Economy, Opportunities for Pro-Poor Agricultural Growth Afghanistan Research and Evaluation Unit Kabul, Afghanistan
- Kakar K. 2001. Afghanistan Human Development Report 2011, Case study, Water and Conflict in Ali Abad, Kunduz
- MAIL, 2001. General magazine on water law Ministry of Agriculture Irrigation & livestock: 45-47
- MoEW, 2007. Power Sector Strategy for Afghanistan's National Development Strategy (focus on Prioritization) Islamic Republic of Afghanistan, Ministry of Energy & Water
- Murray H. Lashari B. and Memon Y. 2000. Water Distribution Equity in Sind Province, Sind
- Mashal, T., Takano, T., Nakamura, K., Kizuki, M., Hemat, S., Watanabe, M. and Seino, K. 2008. Factors associated with the health and nutritional status of children less than 5 years of age in Afghanistan: family behavior related to women and past experience of war-related hardships. <http://www.biomedcentral.com/1471-2458/8/301/> (Accessed on: August 8, 2011).
- Mielke, K. and Schetter, C. 2007. Where is village? ; Local perceptions and development approaches in Kunduz province. ASIEN 104, S. 71-87. Center for Development Research, Bonn
- MRRD, 2007. Summary of district development plan Goshta district, Nangarhar province. Ministry of Rural Rehabilitation and Development, Kabul, Afghanistan
- Mokgope, K., Pollard, S. and Butterworth, J. 2001. Water resources and water supply for rural communities in Sand River Catchment, South Africa 27th WEDC Conference on People and system for water, sanitation and health Lusaka, Zambia
- Nakashima, M. 1998. Water Users' Organization for Institutional Reform in Pakistan's Irrigation Sector Faculty of International Studies, Hiroshima University, Japan
- Nawabi, N. 2008. Civil society role in Reconciliation and Conflict Resolution CPAU, Civil Society Conference, Paris

NPBC, 2009. Water challenges a crucial issue in Central-South Asia. Norwegian Peace Building Centre <http://www.pakistanconflictmonitor.org/food-security/> Accessed on: August 13, 2011.

NEPA and UNEP, 2008. Afghanistan's environment National Environmental Protection Agency of Afghanistan and United Nations Environment Programme, Afghanistan [http://postconflict.unep.ch/publications/afg\\_soe\\_E.pdf](http://postconflict.unep.ch/publications/afg_soe_E.pdf) Accessed on: August 2, 2011.

Nangarhar profile.2003. Provincial profile for Nangarhar Regional Rural Economic Regeneration Strategies (RRERS) Nangarhar, Afghanistan

Paul-Lee, M. 2002. Community based natural resource management (Internship Report). International Development Research Centre, Ottawa.

Pain. A. 2004. Understanding Village Institutions, Case Studies on Water Management from Faryab and Saripul, Afghanistan Research and Evaluation Unit, Kabul, Afghanistan.

Qureshi. A. S. 2002. Water Resources Management in Afghanistan, the Issues and Options

Rout, B. 2008. Water management, livestock and the opium economy Kabul: Afghanistan Research and Evaluation Unit, Kabul, Afghanistan.

Reimann, C. 2005. Assessing the State-of-the-Art in Conflict Transformation Research Center for Constructive Conflict Management, Berghof

Seckler, D. Rosegrant, W, M. Carruthers, I, 1997. Irrigation and Food security in the 21<sup>st</sup> century, Kluwer Academic Publishers, Netherlands

Thomas. V. 2009. Historical Perspective on Mirab System, A case study of Jangharoq Canal, Baghlan, Afghanistan Research and Evaluation Unit Available at: <http://www.areu.org.af> [Accessed 20 May 2011].

Thomas. V. and Naeem. S. 2011. Sharing Water Equitable, Human Development Report, Afghanistan

Thakkar H, 1999. Contribution of Large Dams in food production, Food security in India

UNHCR.2002. UNHCR Sub-Office Jalalabad District Profile, Nangarhar, Afghanistan, UNHCR Jalalabad district profile UNHCR, Nangarhar, Afghanistan

Wegerich K, 2009. Water strategy Meets Local Reality Published by Afghanistan Research and Evaluation Unit (AREU): PP 1-25

**. Annexes 1: Survey questionnaire**

Interview Date: \_\_\_\_\_

Name of Interviewee: \_\_\_\_\_ F/Name: \_\_\_\_\_

Position \_\_\_\_\_ upstream midstream  
downstream

Address: Village: \_\_\_\_\_ District: \_\_\_\_\_ Contact No. \_\_\_\_\_

Q1. What are the criteria for Mirab?

a. Active b. land owner b. Has power and dignity c. Having ability to talk/fight for right d. Middle age (e) All

Q.2 For what period of time the Mirab is selected?

a) One year (b) Two years (c) Three years (d) More than three

Q3. Who are responsible for selecting Mirab?

a) Farmers (b) Govt (c) Local elders (d) public

Q4 How many Mirabs do you have?

Q5. How Mirab is paid?

Q6. Is the Mirab influenced by powerful people?

a) Yes b) No

Q7. Does Mirab have assistants?

(a) Yes (b) No

Q8. To what extent the Mirab system is effective in solving the community water related problems?

(a) More effective (b) effective (c) Less effective (d) Not effective

Q.9 what kinds of facilities are provided to Mirab?

(a) Bike (b) Motor Bike (c) Car (d) None

Q10. Is Mirab system well organized to face the new irrigation challenges?

(a) Yes (b) No

Q11. If yes can you indicate why or if no why not capable?

Q12. Does the Mirab system influenced by any external pressure?

(a) Govt (b) community elders (c) warlords (d) others

Please describe it.....

Q13. Does Mirab system need further improvement?

(a) Yes (b) No

Q14 If Yes what kind of improvement he needs or if no why?

Q15 How Mirab systems work in your village?

Q16. What are the responsibilities of Mirab?

Q 17 How water distribution is done?

Q18 How O/M is carried out in your area?

Q19. How was the Mirab system in the past?

a) Effective b) Not effective

Q20. If effective why or not effective why?

-----  
Q21. How is the Mirab system now for you?  
a. Effective b. Not effective

Q22. If effective why or not effective why?

-----  
Q23 What changes have been occurred for last 10 years?

## **Annex 2 Checklist for discussions**

### **Checklist for Mirab**

- Q 1 How the system worked in the past?
- Q2. How the Mirab system works now?
- Q3. What is your role in water distribution?
- Q 4 How O&M is done by Mirab system?
- Q5 How effective is the Mirab system in water distribution and O&M of infrastructure?
- Q 6 What are the causes of less effectiveness of Mirab system?
- Q 7 What improvement does Mirab system needs?
- Q8 What kind of support provided to Mirab system by government and Community side?
- Q.9 What changes have occurred in the community since last 10 years?
- Q 10 What is the effect of those changes on Mirab system?

### **Checklist for Government member**

- Q1. What is current strategy of government for Mirab system?
- Q2. What kind of support is provided to Mirab system by government?
- Q3. What is your role in Mirab system?
- Q4. What are the causes of less effectiveness of Mirab system?
- Q5 How Mirab system could be improved?

### **Checklist for NGO**

- Q1. How Mirab system works in your project area?
- Q2. How effective is the Mirab system in equitable water distribution and O&M of infrastructure?
- Q3. What are the causes of less effectiveness of Mirab system?
- Q4 What are the possible ways to improve Mirab system?

### **Checklist for (community elder such as Malik, Khan, Mullah)**

- Q 1 How Mirab is appointed and how long he stays in his job?
- Q2. What are the criteria for the selection of Mirab?
- Q 3 How irrigation water is distributed in the area?
- Q 4 How O&M is carried by Mirab system in the area?
- Q 5 What is your role in the Mirab system?
- Q6 Why Mirab system is less effective now?

## **Annex 3 Names of Respondents**

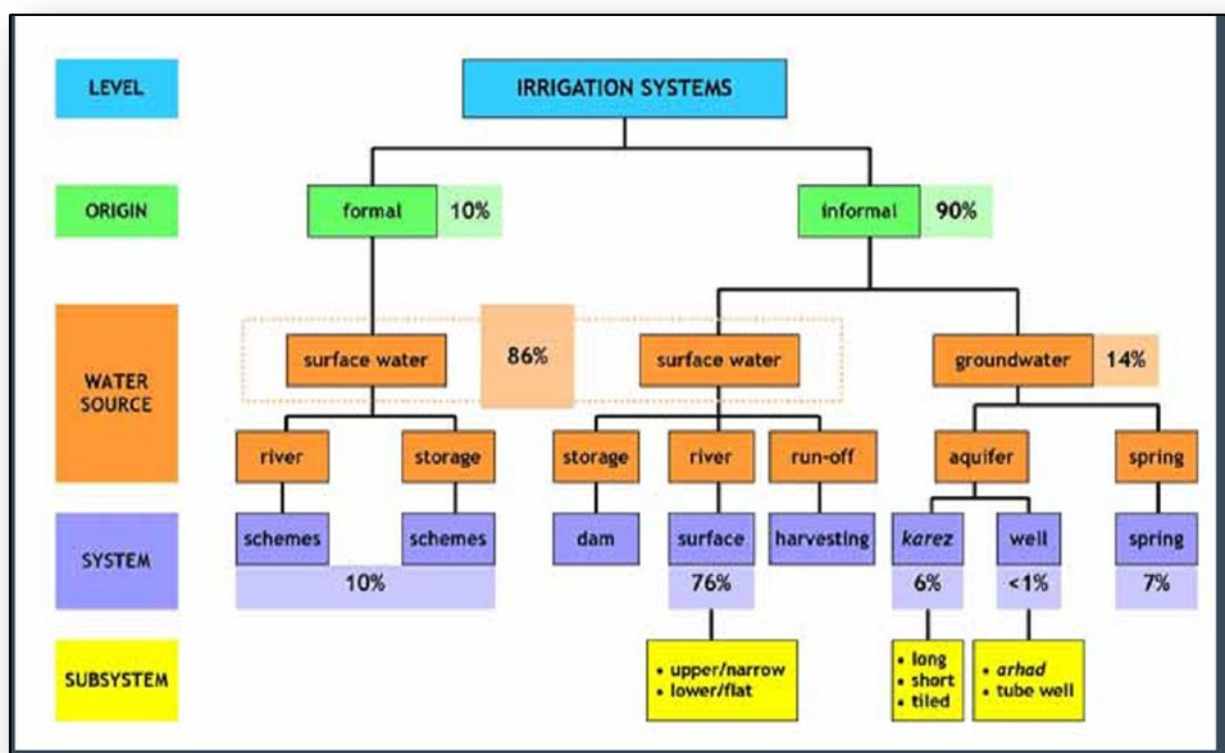
	Name of Farmers	Contact	Location	Village
1	Yasin		Upstream	Chor Khil
2	Muhammad Ilias	0093-799-435731	Upstream	Chor Khil
3	Barat Khan	0093-786-486038	Upstream	Chor Khil
4	Yama Khan	0093-799-050539	Upstream	Chor Khil
5	Shir Baz	0093-799-045788	Upstream	Chor Khil
6	Faridoon	0093-799-346577	Upstream	Chor Khil
7	Amir shah	0093-799-896634	Upstream	Chor Khil
8	Tote khan		Upstream	Chor Khil
9	Gulzir mamor	0093-799-672273	Upstream	Chor Khil
10	Saif khan	0093-789-566764	Upstream	Chor Khil

11	Hassan jan	0093-799-768854	Midstream	Yaquib khil
12	Ahmad Ali	0093-799-472054	Midstream	Yaquib khil
13	Musafar	0093-799-213267	Midstream	Yaquib khil
14	Habib-ur-rehman	0093-799-886547	Midstream	Yaquib khil
15	Gul khan	0093-799-567784	Midstream	Yaquib khil
16	Pir Ghulam	0093-799-345673	Midstream	Douta Khil
17	Mula Gul	0093-799-675542	Midstream	Douta Khil
18	Musa jan	0093-788-564423	Midstream	Douta Khil
19	Taous khan	0093-799-786545	Midstream	Douta Khil
20	Bashir	0093-799-345621	Midstream	Douta Khil
21	Gul said	0093-799-484714	Downstream	Aka khil
22	Afsar Khan	0093-799-481714	Downstream	Aka khil
23	Gul Ahmad	0093-799-077050	Downstream	Aka khil
24	Mohib	0093-799457765	Downstream	Aka khil
25	Mirab shah	0093-799-973462	Downstream	Aka khil
26	Omid		Downstream	Aka khil
27	Obaid		Downstream	Aka khil
28	Noor-amin	0093-788-453476	Downstream	Aka khil
29	Wasi shah	0093-789-215379	Downstream	Aka khil
30	Matiullah	0093-799-238861	Downstream	Aka khil

#### Annex 4 Names of Key informants

Name of Key informants	Position	Contact Number
Rohul-ul-amin	Community Elder	0093-79971-1245
Abdul Karim Khan	Khan (Elite)	0093-77-808-0392
Abdul Said	Mirab	0093-77-283-0026
Sharifullah safe	NGO member	0093-77-53-29951
Eng Ahmad Ali	Government Member	0093-79947-2054
Afghan Mullah	Mullah (Religious person)	0093-799-050-539

#### Annex 5 Classification of irrigation system types in Afghanistan (by area %)





## Annex 6 Field photos

