



# United Nations Food and Agriculture Organization

## Afghan Water Users

in the Methodology of the

**Community-Based Irrigation Infrastructure Rehabilitation  
and Institutional Strengthening in the Western Region**

GCP/AFG/024/GER

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January 2004, Kabul



# Afghan Water Users

The Meeting Place of Ancient Peoples, Cultures, and Trade

**AFGHANISTAN**

*“Asia is a breathing body of water and earth;  
to which the Afghan nation is the beating heart.  
Tranquility of the heart tranquility of the body,  
Suffering of the heart, suffering of the body.”*

Couplet by Iqbal Lahori  
Pakistan's late philosopher-poet



# Afghan Water Users



Afghanistan: The Eurasian Knot of Civilizations





# Afghan Water Users

## General feedback

- Total area of Afghanistan about 652,000 sq. km.
- Population is approximately 22.5 million (as on 2001)
- Population Distribution – Rural: 80% and Urban: 20%
- 85% of Afghanistan's population is dependent on agriculture
- Average elevation of 1,000 m above sea level, ranging from 150 to 8,000 m.
- Land, ~ 63 %, is within this mountain region. Rising to about 5,100 m.
- Afghanistan receives about 236 billion m<sup>3</sup> of water in the form of rain and snow.
- 65 BCM of water flow in Afghanistan's rivers and streams.
- Rainfed areas about 3.1 million ha (recent satellite data)
- 4,000 km<sup>2</sup> of Afghanistan's surface area is in the form of Glaciers (W.Haeberili et al, 1989).
- The Hari Rud & Murgab drain about 85,800 km<sup>2</sup> (13%) of the land area of the country.
- Before the Soviet occupation, there were approximately 2,586,000 ha of irrigated land in Afghanistan, supplied from:
  - Canals (85 % of the area),
  - springs (7%),
  - Karezes (7%) and
  - Wells (less than 1%).



# Afghan Water Users

## Water Resources in summary

Estimated Surface and groundwater balance (BCM per year)

Water resources	Potential	Present use	Balance	Future use *	Balance
Surface water	57	17	40	30	27
Groundwater	18	3	15	5	13
Total	75	20	55	35	40

\*-all existing irrigation schemes rehabilitated and managed efficiently.

ICARDA Draft, 2002.

**The highest proportion of groundwater usage is in the provinces of Baghdis and Ghor, about 41 and 53% of the irrigated land area** (Nathan Associates Inc, 1992).



# Afghan Water Users



**About 80% of Afghans are part of the Water Users structure**

Estimated settled population by province and location 1996 ('000 persons)

Urban proportion	Population			Rural %	Urban Province %
	Rural	Urban	Total		
High	3104.0	2972.0	6076.0	51.1	48.9 Kabul, Qandahar, Balkh, Herat, Kunduz
% national	21.4	82.3	33.6		
Intermediate	3794.3	425.4	4219.7	89.9	10.1 Baghlan, Jawzjan, Faryab, Takhar, Nangarhar, Farah, Sar-i-Pul
% national	26.2	11.8	23.3		
Low	4543.3	184.3	4727.6	96.1	3.9 Nimroz, Helmand, Parwan Ghazni, Paktia, Zabul, Bamiyan, Badghis, Logar, Samangan, Badakshshan
% national	31.4	5.1	26.1		
No Urban	3035.1	30.5	3065.6	99.0	1.0 Laghman, Oruzgan, Kunar, Ghor, Khost, Wardak, Paktika, Kapisa, Nuristan
% national	21.0	0.8	16.9		
<b>Total</b>	<b>14476.7</b>	<b>3612.2</b>	<b>18088.9</b>	<b>80.0</b>	<b>20.0</b>

Source: Estimated Population of Afghanistan 1375 (1996-97) Central Statistical Office, Kabul



# Afghan Water Users

The population can be divided into three broad categories representing their general level of food security regardless of whether people live in rural or urban areas, but their **FOOD SECURITY** is heavily influenced by their location. The groups are:

- (i) Those who are capable of being food self-sufficient
- (ii) Those who are potentially or marginally self-sufficient; and
- (iii) Those who have limited or no opportunities to provide for the needs of themselves and their families at an acceptable level.



# Afghan Water Users



## In five main locations

1. **Accessible, high productivity:** Kabul, Qandahar, Mazar-i Sharif, Herat and Kunduz.
  2. **Distant, high productivity:** Ghazni, Paktia, Paktika and Zabul,
  3. **Rainfed areas:** Badghis, Faryab, Jawzjan, Samangan to Baghlan.
  4. **Distant, lower productivity:** Most of Oruzgan, higher parts of Zabul, upper reaches of Kunar, Kapisa, Parwan and Nuristan.
  5. **Remote, high altitude:** Bamiyan, Ghor and Badakhshan.
  6. **Urban areas:** Kabul, cities of Qandahar, Herat, Mazar-i-Sharif and Kunduz.
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# Afghan Water Users

Strategic activity matrix for food security by group and access to resources

Category	Access to resources		
	Accessible Location 1	Distant Locations 2+3	Remote Locations 4+5
<b>Self sufficient</b> - large landowners, merchants, traders - medium to large area farmers - persons in regularly paid employment - kuchis with medium to large flocks	Group who are best placed to utilise present approaches to high-technology interventions with surplus output which can be marketed	High-technology solutions, but possibly at lower production levels and marketable surplus	Major emphasis on livestock as food source. Use better yielding low-input crop options Develop remote
<b>Marginally self-sufficient</b> - medium to small area farmers - sharecroppers and kuchis with some resources - households with part-time employment or remittances	with micro-finance and access to inputs. Also increased economic activity for jobs	Help with better technology but will need support	area economic activity to assist food security
<b>Not self-sufficient</b> - farm labourers working on share basis - kuchis with few or no animals - urban or rural landless with unemployed adult men - ex-government employees with no job or land - urban or rural landless families without adult men	The group most at risk from food insecurity. Best assisted by increased economic activity, off-farm wage employment or in-home activities, to earn cash income to buy food.		Location 6 and non-farm rural population

# Afghan Water Users

## Prevailing Water Resources

1. Karezes (groundwater)
2. Springs (groundwater)
3. Dug wells (groundwater)
4. Canal systems (rainwater and snowmelt)

## Karezes

Deep Karez



Open Karez

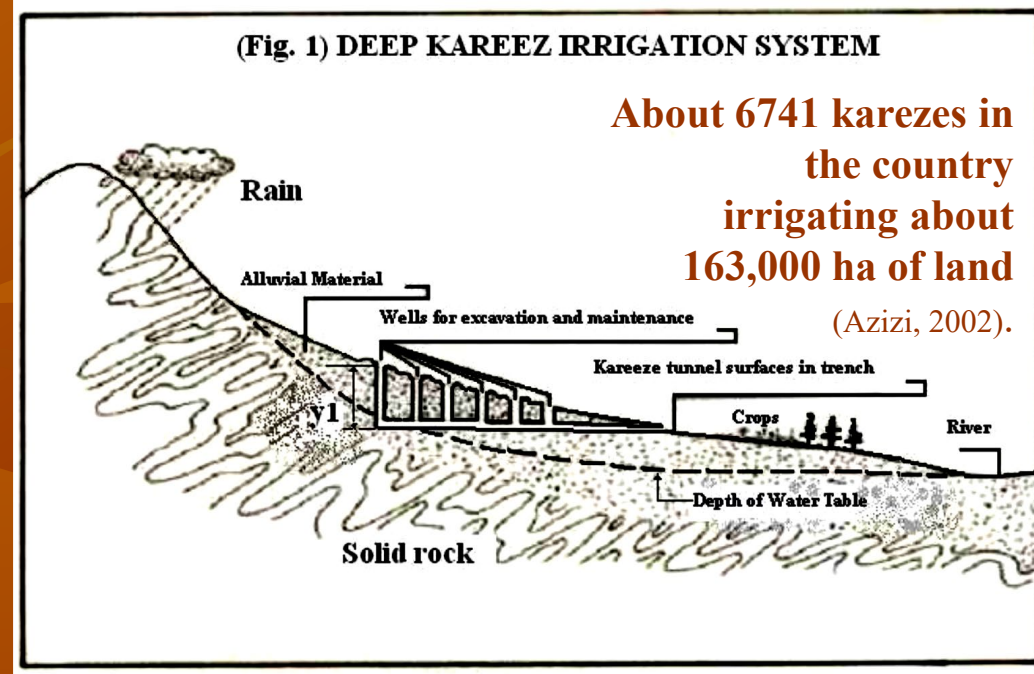


# Afghan Water Users

## Deep Karez

### Definition:

A Deep Karez is an infiltration tunnel, which taps groundwater in its upper reaches and slopes down to an outlet, at a gradient somewhat less than that of the land surface or the water table. Thus the upper reach of Karez tunnel acts as a collecting gallery and a drain while the lower end of the tunnel acts as a conduit.



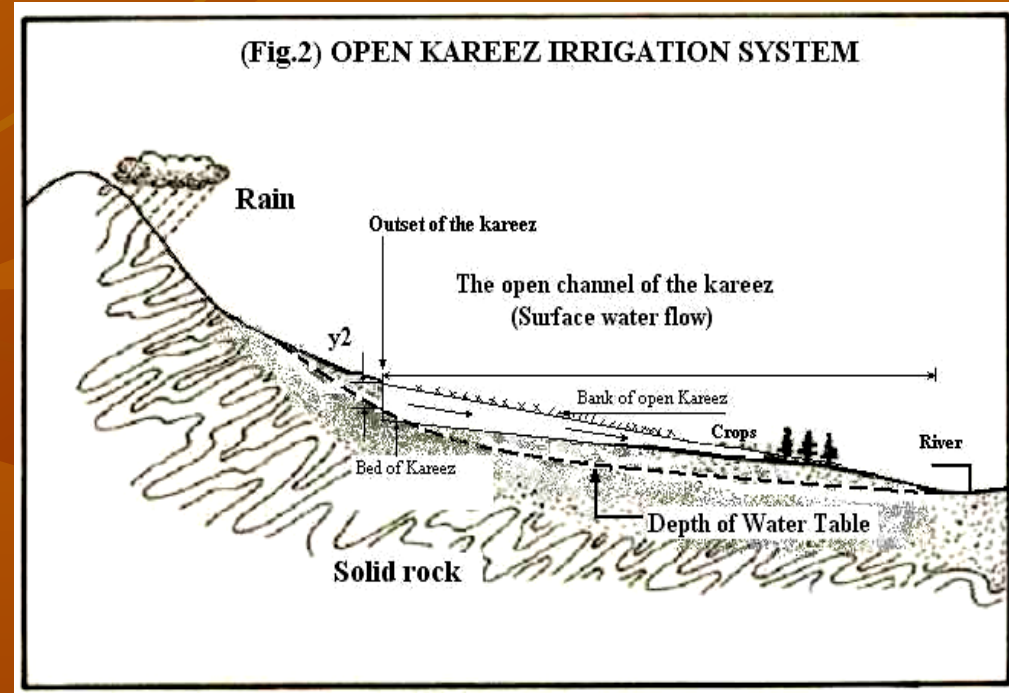
1. Used when depth of water table from natural ground surface (Y1) is found more than 6m.
2. The first well “mother well” is usually dug from 2 to 5 m below the water table.
3. Following the main well, some series of consecutive wells are drilled at a spacing of 20 –50 m for tunnel excavation and maintenance. These wells are connected from the bottom with a conveyance tunnel.
4. The discharge from the Karez depends more on the length of penetration in the aquifer.
5. Water flows by gravity in two portions; the ground tunnel and the open trench.
6. A typical Karez had a discharge of 20 lps; 10 years before the discharge was 25 lps
7. A typical Karez is cleaned once every 2 to 3 years.
8. Karez in broad valleys of a low gradient will be long; 3-8 km.
9. Usually the open trench is of fewer dimensions.

# Afghan Water Users

## Open Karez

### Definition:

A Deep Karez is an infiltration channel, which meets groundwater in its upper reaches and slopes down, at the gradient of the land surface or the water table. Thus the upper reach of Karez tunnel acts as a spring flowing into the trench conduit.



1. Used when depth of water table from natural ground level ( $Y_2$ ) is found less than 5 meters.
2. Source of water is ground water also.
3. Construction starts with a hole till the ground water table (not more than 5m deep).
4. Since the ground water table is close to ground surface, the water is conveyed through an opened trench without the need of consequent wells and tunnel.
5. Water flows by gravity in one portion which is the open trench only.
6. Usually the open trench is of deeper section at the outset.

# Afghan Water Users

## Springs



1. Before development of Karezes, spring outlets were improved and the water was directed by canals to the fields.
2. There are about 5558 springs in the country which irrigate about 188,000 ha of land (Azizi, 2002)

# Afghan Water Users

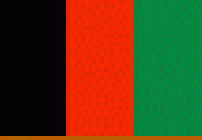


## Dug Wells



- The total number of shallow wells in Afghanistan is about 6598 irrigating around 12,060 ha of land.
- Depths of these wells can reach 40m.
- These wells penetrate more than 2m below the original water table.
- Dug wells for irrigation are typically some 4-5 m in diameter supplied with 15-30 HP diesel suction pumps.
- Large diameter irrigation wells are constructed to a max of some 6 m below the original water table.
- Boreholes for drinking water are typically drilled at 6-8” diameter and fitted with a 4” casing.
- They are often drilled to 15-20 meters below the water table and fitted with a pump.
- In Mazrah area of Guzara district (Herat), private irrigation boreholes drilled to 60-65 m deep
- Groundwater can be lifted from large diameter shallow wells with the help of a wheel or animal power.
- Drinking water wells will often be dug and lined either with stonemasonry or with concrete rings.

# Afghan Water Users



## Canal Systems



1. Canal irrigation is the most commonly used method of irrigation.
2. Canals in Afghanistan irrigate nearly 75% or 1.9 million ha of land.
3. Most of the canal-irrigated land is located in the North, West, and Southwest of the country.
4. At different locations along a river, small diversion structures are installed to divert water from the river to the canals.
5. From these canals, water is diverted to small irrigation channels or watercourses.



# Afghan Water Users

Most farmers are using the river water and the canal system, for their agricultural purposes since 700 years ago; they had to establish an indigenous system for water distribution and regulation between them by the name of Mirabs system.

In this system every canal has a person who should manage the distribution of water, control the discharge, and maintenance of the traditional irrigation system.

Therefore a Mirab is defined as the person who is elected by the water users and landowners of the same canal to carry out pertinent responsibilities to water issues.

Farmers/Water Users pay (Mirabee = 80kg/Zawj) to the Mirab from their seasonal harvest for providing services and inputs to the community

The period of assignment as mirab is one year or one season of harvesting.

All Mirabs are working under the umbrella of a person who is called Wakil who plays the role of leadership on the Main canal.



# Afghan Water Users

## Structural Composition of Afghan Water Users





# Afghan Water Users

## Responsibilities of the Waqil

- to remove unlawful obstructions in watercourses;
- to prevent any unlawful Act likely to reduce water quality;
- to exercise general supervision over water resources;
- to regulate flow;
- to investigate and record the quantity of water at different levels of flow in a watercourse.
- to construct or acquire waterworks;
- to regulate water distribution;
- to provide management services, training and support to rural communities



# Afghan Water Users

## Responsibilities of the Mirabs

- to manage and monitor permitted water use;
- to conserve and protect water resources and quality;
- to develop and operate waterworks;
- to implement the catchment management strategy;
- to make rules to regulate water use;
- to require from users the establishment of management systems
- to temporarily control, limit or prohibit water use during shortage periods.



# Afghan Water Users



## Election Criteria of Waqils and Mirabs each as per his Designated Level

### Qualification

- Honesty and confidence
- Pro-Activeness
- Efficiency and Age convenience (age limit may vary between the regions)
- Background as Farming and Agriculture
- Water Management skills
- Descending from a domestic family
- Broader public and social relationships

### Not necessarily

- his Property size
- his Family background in Mirab roles
- his Governmental or political connections
- from Influential tribal origin



# Afghan Water Users

## Other electoral considerations

Replacement of the Waqil or the Mirab is always as per the election criteria.

The decision on Replacement of a Waqil or Mirab is always made by the farmers/Water Users sometimes with the help of the local Irrigation Department.

Farmers/Water Users may decide to extend the Waqil or Mirab assignment for one more year or harvesting season upon the same election criteria

If farmers/Water Users are not satisfied with the assignee's performance; they will announce to all the Water Users on a new election of Waqil or Mirab.



# Afghan Water Users

## Indigenous Rules of Mirab System in Water Distribution

The system was set 700 years ago by “Maulana Abdul Rahman Jami” in the following concept:

The intake capacity of any branch taking water from the main canal depends on:

1. The command area of the main canal (measured in Zawj)
2. The command area of the branch canal (measured in Zawj)
3. The total width of the main canal in centimeters

### Indigenous terminologies in the concept:

1. Zawj means “couple”, and refers to the couple of bulls that can plough max area of 80 jeribs; (therefore 1 Zawj = 80 Jeribs)
2. Sha Natra is the weir (overflow section) crossing the canal, to regulate the water level at the intake of the branch. Therefore; the length of Sha Natra = the width of the main canal
3. Natra is the rectangular intake section of the branch canal, this works only with the Sha Natra.
4. Qolb is the circular shape of the intake section of the branch canal, this work without the need of the weir (Sha Natra).

# Afghan Water Users



## Typical example on the calculation of the intake dimensions (Sha Natra type)

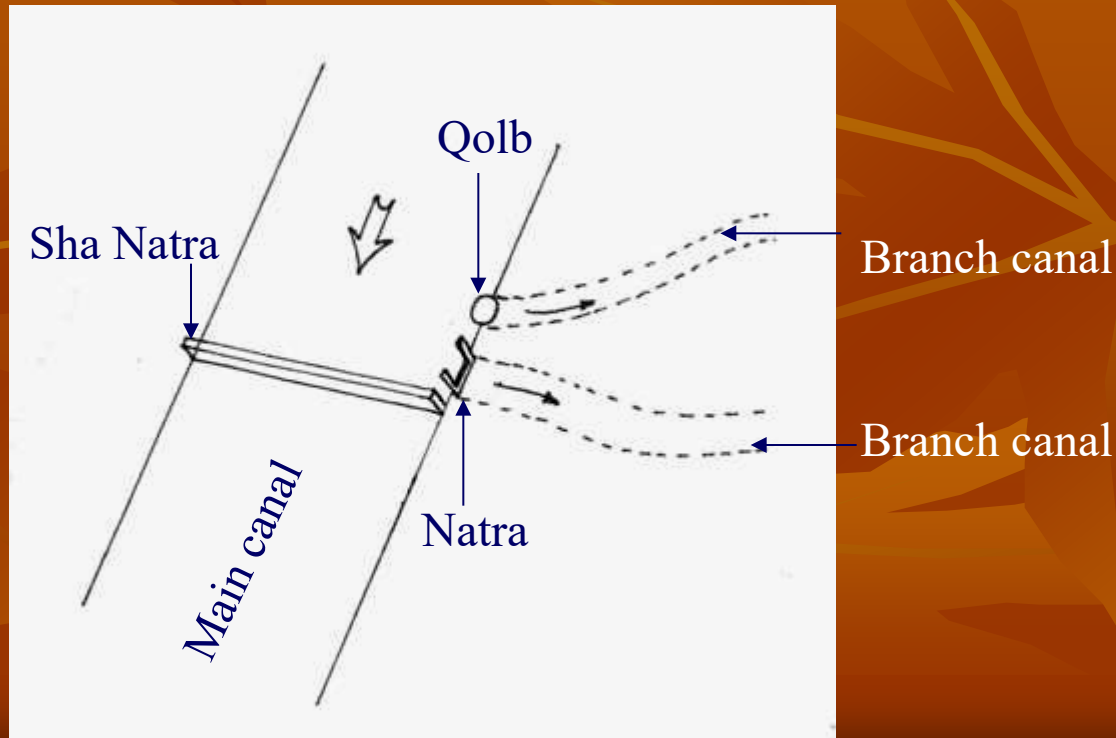
Given parameters:

Command area of the main canal ( $CA_{\text{main}}$ ) = 300 Zawj

Command area of the branch canal ( $CA_{\text{branch}}$ ) = 20 Zawj

Width of the main canal (length of Sha Natra) = 4 meters

Find the required width dimension of the branch canal intake (Natra)





# Afghan Water Users

**Width of Natra (in Cm) = [length of Sha Natra (in Cm)  $\div$  (CA<sub>main</sub>)]  $\times$  (CA<sub>branch</sub>)**

Width of Natra = ( 400  $\div$  300 )  $\times$  20 = 26.67 Cm

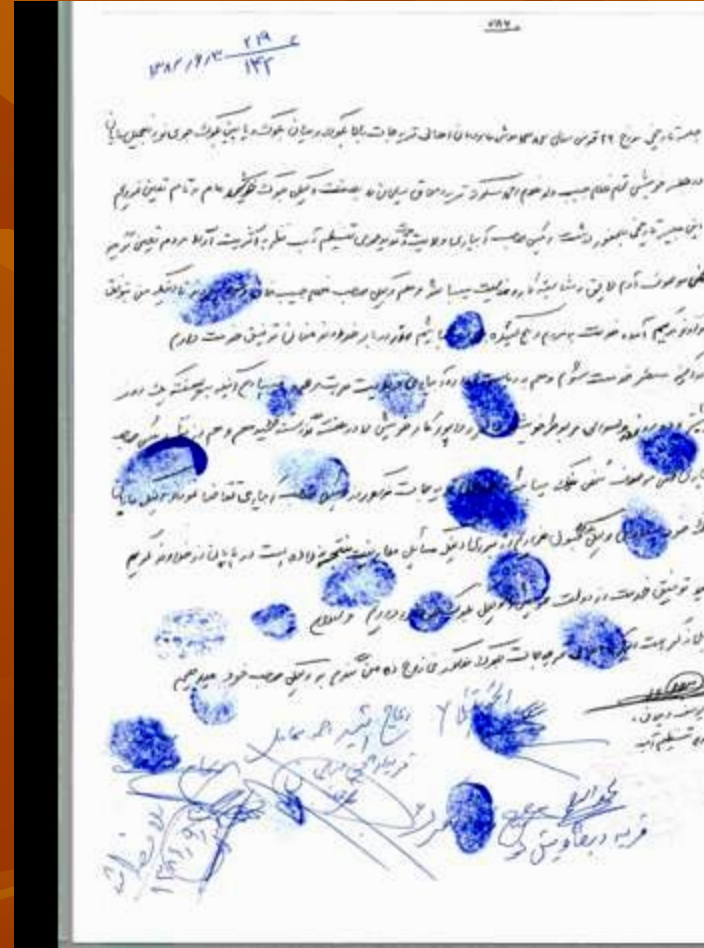
A factor of losses is also considered in the formula.

In case of any malfunction in the irrigation system, the Mirab of the canal collects the cost of repairs from the Water Users.

In case of any malfunction in the irrigation system, the Wakil of the main canal collects the cost of repairs from the Water Users through the Mirabs.

# Afghan Water Users

A Waqil or Mirab is officially recognized by his authorization, and when he is elected or re-elected, the Irrigation Department will be informed by the community.





# Afghan Water Users

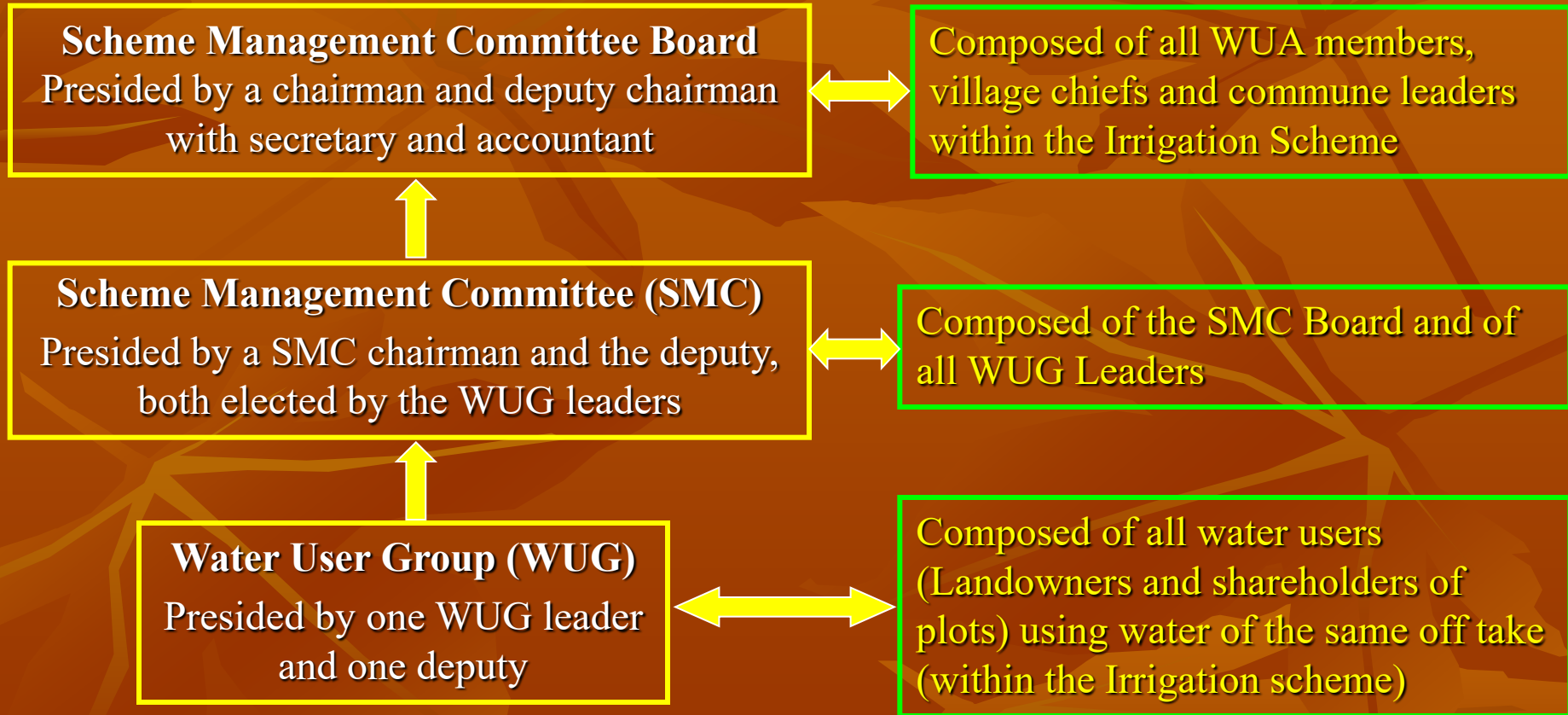
## Global objectives behind establishment of Water Users Associations

1. Develop irrigation, in a sustainable way
2. Rules for the use and maintenance of the irrigation system
3. Efficient operation of the irrigation system
4. Set procedures for election of members
5. Solve conflicts
6. Guide action in case of emergency
7. Set contributions
8. Promote participation in decision making process by the farmers
9. Promote the cooperation between all the villages in the command area

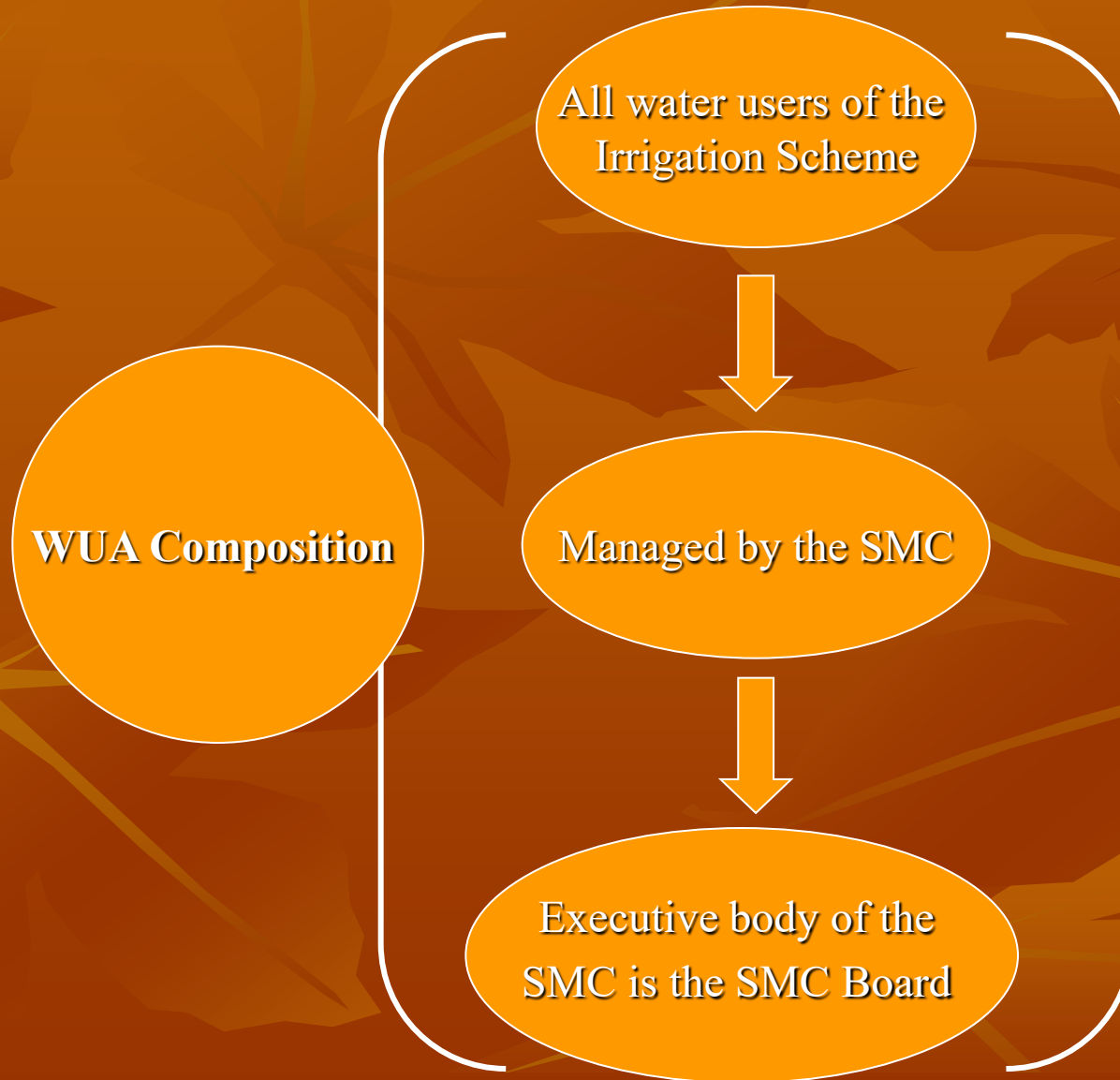


# Afghan Water Users

## Typical Composition of Water Users Association



# Afghan Water Users





# Afghan Water Users

## Water Users Group (WUG)

### Meetings:

at least one WUG Meeting per month during the irrigation season

will focus on arrangements for the coming irrigation season

date, time and place of the WUG meetings will be decided by the WUG Leader

older than 18 years are entitled to participate

WUG meeting one month before the irrigation season to elect two representatives: one WUG leader and one deputy for a period of one year and can be prolonged or revised at a WUG meeting.



# Afghan Water Users

## Water Users Group (WUG)

### Role

1. Ensuring proper distribution of the water
2. carry-out maintenance and repair works
3. elect a WUG Leader and a deputy

### Duties of the WUG Team Leader

- Weekly inspection of the sub-system.
- Monthly inspection of the main system together with the SO (Scheme Operators)
- Annual inspection of the main system with the SMC (Scheme Management Committee)
- Daily check of the water distribution among the water users
- Daily check of the water supply from the main system to sub-system
- Representing the water users at the SMC meetings
- Ensuring that the water users abide by the rules and regulations
- Informing WUG about the decisions taken at the SMC meetings
- Collection of O&M fees of the water users, jointly the accountant of the SMC and the village chief
- organize a general meeting when necessary
- maintain and repair the irrigation infrastructure



# Afghan Water Users

## Scheme Management Committee (SMC)

### Meetings:

SMC meeting will be decided by the SMC Board

Quorum of the SMC meeting is 75% of the SMC and WUG Leaders

Held once a month before the irrigation season and post-harvest SMC meeting one month after the harvest

The WUG Leaders will elect the SMC members to be appointed at the pre-seasonal SMC meeting

Water users of the Irrigation Scheme are represented by their WUG Leaders and deputies

Decisions made by vote shall be valid



# Afghan Water Users

## Roles and Duties:

Representing the water users

Promulgation of rules and regulations

Approve the proposals of the SMC Board or other WUA members

Verifying the budget expenditures

Checking the performance of the SMC Board and approving activities

Arbitration in case of conflicts between WUGs or water users

Organization of annual maintenance and repair campaigns

Making decisions on all expenses

Drawing-up work schedules for the Scheme Operator

Ensuring equitable access to water for each WUG

Sanctioning water users which fail to follow agreed rules

regular inspection

Setting the O&M fees

Approving or disapproving the annual budget submitted by the SMC Board



# Afghan Water Users

## Scheme Management Committee Board

Appointed for a period of three years and normally do not receive any remuneration

### Roles & Duties:

#### In General:

Daily oversight of the WUA

Reporting to the SMC

present monthly accounting and document all the expenses

Preparing an annual estimated budget

Direct intervention in case of a disaster or emergency

#### Chairman

Organizing of SMC meeting whenever the need arises

Preside SMC meetings

Initiation and overseeing maintenance and repair activities to the main system

Preparing agenda's and proposals for action for the SMC meetings



# Afghan Water Users

## WUs at the present stage

1. Present mirab/wakil system might work at 80-90% efficiency in water distribution, taking the optimal water distribution as 100%.
2. According to WB, only 30% of water resources are used in Afghanistan at present (99% for irrigation).
3. More than 50% of irrigation systems need rehabilitation. They are dilapidated, deteriorated, damaged or neglected as a result of conflicts, floods, drought and migration.
4. Maintenance might under the present system be less efficient.

In view of these facts it is suggested that the rehabilitation of the 50% of irrigation systems (still damaged or working at a low level) has a much higher impact and priority.



# Afghan Water Users

**The methodology of the FAO Community-Based Irrigation Infrastructure Rehabilitation and Institutional Strengthening Project in the Western Region of Afghanistan when dealing with the Water Users issues\*:**

**Linkage between irrigation, agriculture, other rural water uses (livestock, forestry, horticulture, aquatic resources) has yet to be established at the level of policies and strategies**

**looking at systems as whole unit**

**apply some measure of consultation with local communities and the traditional management structure, with a view to secure local contributions**

**for the recognition of water rights and allocations, structures will need to evolve with legal recognition and more formal types of structures**

\*the project is funded by the Government of Germany



# Afghan Water Users

to have a defined, effective and appropriate approach and strategy for capacity building of water users:

selection of two irrigation systems in each province, in which rehabilitation activities are planned.

on each system, carrying out a systematic appraisal, level by level, from the water source down to the farm level, of the system, including technical issues, management structures and procedures, operation rules, maintenance system, etc.

The appraisal would be based on a simplified and adapted version of the rapid appraisal procedure developed by FAO, and carried out with responsible community leaders and mirabs/wakeels etc.



# Afghan Water Users

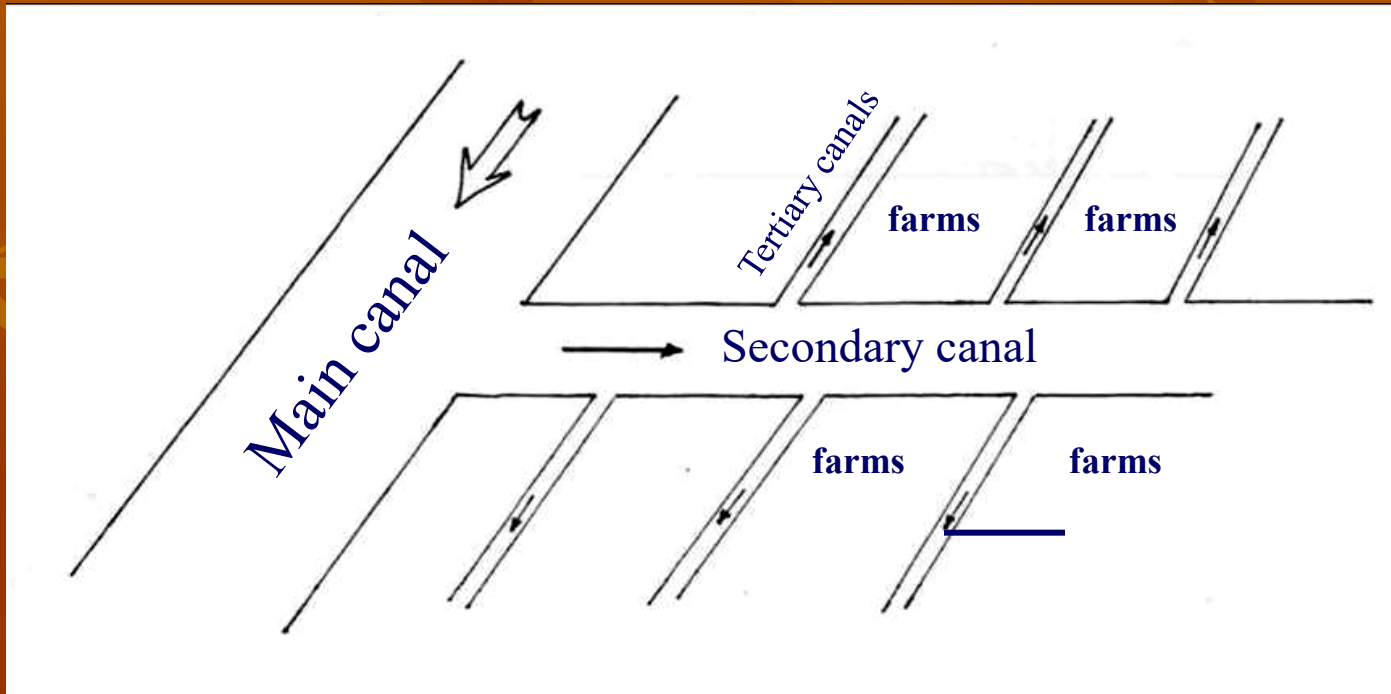
starting from the farm level up:

- carry out a participatory assessment of each level's constraints and issues,
- identify areas for improvement linked to specific agricultural objectives and practices, to solving a specific issue or reach a specific improvement,
- identify technical and managerial options, and sort these options in the following categories:
  - 1- options that can be implemented by this level and which do not require any change in rules or cooperation from upper levels (for instance, on-farm techniques such as leveling that do not require changes in scheduling of water delivery, or use of ponds or shallow tubewells, etc.);
  - 2- options that require acquiring new functions or capacities at this level and do not need cooperation or changes from other levels (such as improving distribution scheduling among a group of farmers receiving a proportion of flowrate from an upper level canal)
  - 3- options that require cooperation or change from upper levels of management

# Afghan Water Users

finalize and consolidate water management improvement plan, for the whole system, articulated at all levels;

develop a training programme from the farmer-level up to the higher level, including development of specific training materials and modules;





# Afghan Water Users

The specific objectives of the process described above are the following:

1. To acquire an organized understanding of existing water management systems, their performance and constraints;
2. To develop a participatory appraisal method as a basis for water management improvement plans and associated capacity building;
3. To gain an understanding of the possible improvements that can be made in water management, building of existing structures, proposing changes agreed by users for specific improvements or problems to solve and at the required level, by the acquisition of new functions or knowledge;
4. Start from the lower level to identify improvements that can be effected by lower levels without changing rigid upper level rules and structures, including on-farm water management;
5. Develop training programmes that are based in field issues and demands, and tie the conduct of the training programmes to the identification with the users of specific solutions to specific problems,



# Afghan Water Users

6. Identify and generate options that can easily be introduced and disseminated;
7. Understand the limits to possible improvements without fundamentally changing the existing management structures;
8. Make specific proposals for future improvements to water management institutions;
9. Develop the capacity of national staff in water management;
10. Develop linkages with other FAO projects, specifically at the farmer-level;