

Sustainable Water Integrated Management (SWIM) - Demonstration Projects

SWIM Programme Launching Workshop
7 - 8th December 2011, Brussels



Water harvesting and Agricultural techniques in Dry lands: an Integrated and Sustainable model in MAghreb Regions



University of Sassari

NRD Desertification Research Group - www.nrd.uniss.it

Prof. Giorgio GHIGLIERI
Dr. Salvatore VIRDIS



Observatoire du Sahara et du Sahel



IRA



ANRH



Priorities

- Lot 1: Effective **WADIS-MAR** finance for integrated water resources management
- **Lot 2: Water and Climate Change**
- Lot 3: Water Demand Management and Efficiency, including non-conventional water resources
- Lot 4: Water financing
- Lot 5: De-pollution in the Mediterranean (Horizon 2020 Initiative)

Description of the action and its effectiveness



Overall and specific objectives of the action

WADIS-MAR

General objective

- to improve living standards of the rural population in arid and semi-arid areas of Maghreb region in which an increasing water scarcity contribute ongoing desertification processes

Strategic Approach

- To apply a “soft technology change” (challenge)

Specific objectives

- to achieve an integrated, sustainable and participate harvesting water and water & agriculture management for adaptation to climate change condition and drought

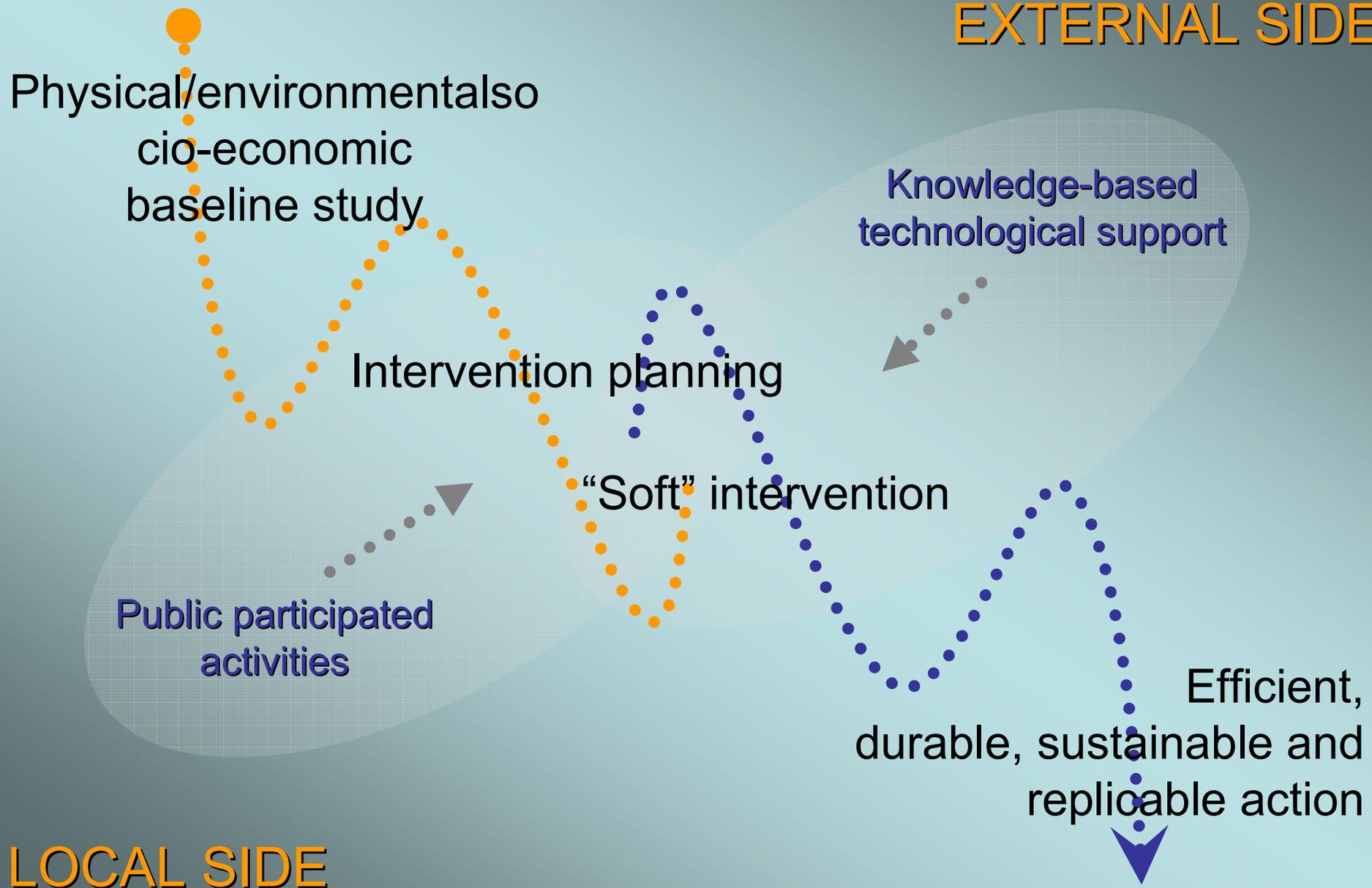
3



WADIS-MAR: THE CHALLENGE



EXTERNAL SIDE



SWIM Programme Launching Workshop
7-8th December 2011, Bruxelles



Description of the action and its effectiveness

Overall and specific objectives of the action



WADIS-MAR Partnership



Description of the action and its effectiveness

Overall and specific objectives of the action

WADIS-MAR Intervention areas



Overall and specific objectives of the action

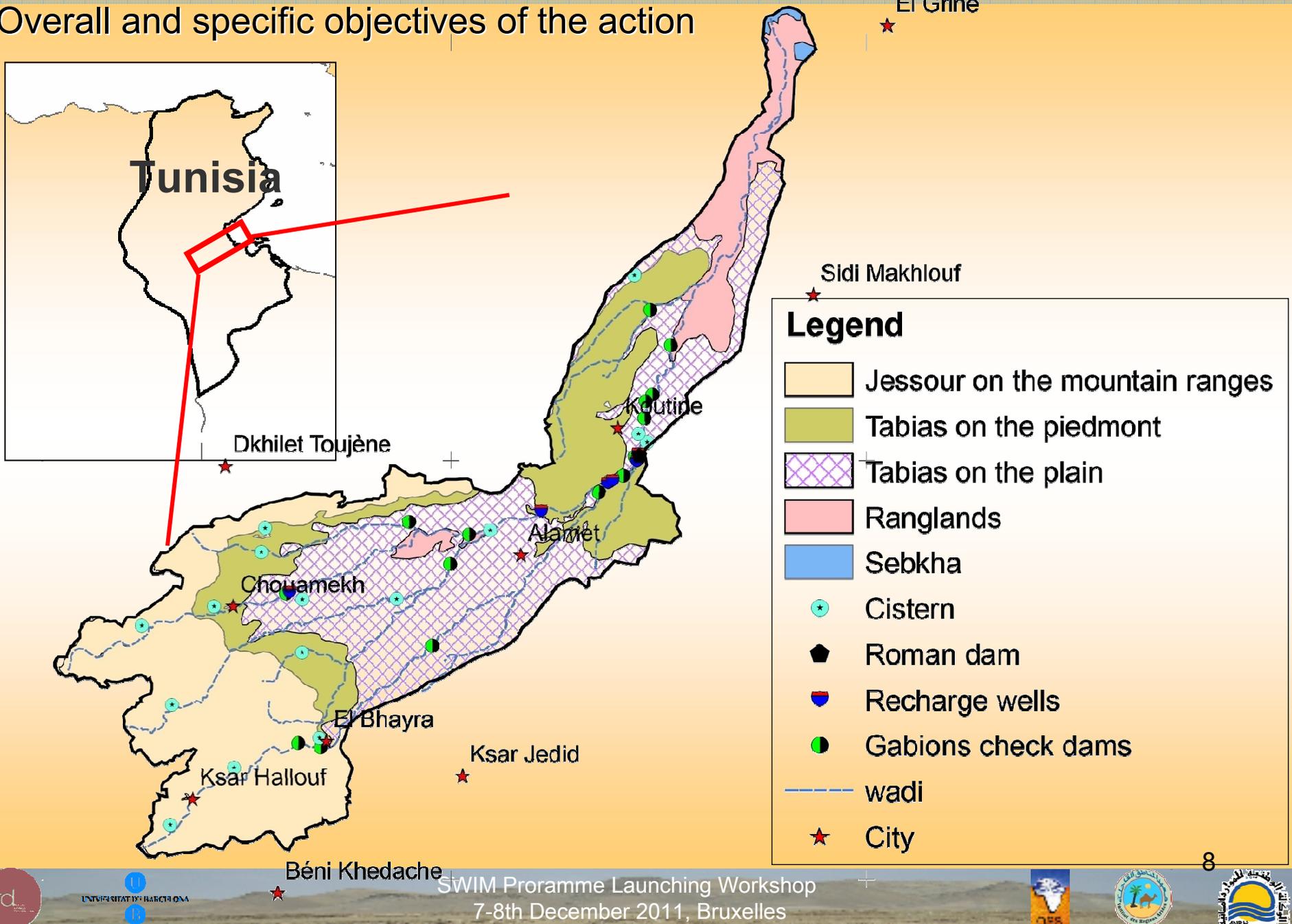
Wadi Oum Zessar (Tunisia)

- population of 25,000 inhabitants
- area of 370 km², province of Médenine
- Semi-Arid (150-230 mm/year; 20 °C/year)
- a non-regular agricultural production (← rainfall regime)
- the development of arboriculture/agriculture at the expense of rangelands;
- predominance of olive trees, episodic cereals
- livestock husbandry systems;
- surface- and groundwater resources exploiting

→ Water Harvesting Techniques WHT

Description of the action and its effectiveness

Overall and specific objectives of the action



Description of the action and its effectiveness

Overall and specific objectives of the action



Wadi Oum Zessar (Tunisia)

- rainfed farming (local perception)
- → tradition/ location in the watershed
 - upstream → jessour
 - piedmont/downstream → tabias

Controversies: herders are negatively affected

→run-off water is almost entirely retained in the watershed

→reduced quality and quantity of the halophyte vegetation of the *sebkhat*

Overall and specific objectives of the action

Oued Biskra (Algeria)

- Population of 210,000 inhabitants
- area of 160 km² (great basin of the Sahara Chott Melrhir)
- north-eastern Algeria on the northern edge of the Sahara Desert
- Semi-Arid climate (200 mm/year, 22°C/year)
- forestry-oriented agro-pastoral agriculture → large area of date palm cultivation
- Large irrigated area
 - >65.000 ha
 - 600 million m³/year

Description of the action and its effectiveness



Overall and specific objectives of the action

Justification:every drop of water counts !!!!!

- In semi-arid zones is essential
 - storage
 - to hamper quick runoff out of a catchment area
- In a framework of CC the WHT would be useful
 - major role → rainfed agriculture
 - to combat/mitigate soil loss & desertification
- Awareness of local population on the impacts of the new WHT
- Perception depends on:
 - typology of agric. activities
 - location of fields/pastures in the watershed
- Upstream and downstream areas Interactions

Description of the action and its effectiveness

Expected results and outputs at the end of the project



Result 1 – Integrated Water and Agricultural Management (IWAM) System design

Result 2 - Agricultural practices and rational irrigation techniques are improved

Result 3 - Capacity building and awareness in local and national institutions are improved



Description of the action and its effectiveness

breakdown of the activities and subactivities



Activity 1 - Project Management and coordination

Activity 2 - Integrated Water and Agricultural Management (IWAM) System design

Activity 3 - IWAM System construction

Activity 4 - Performance assessment and maintenance phase

Activity 5 - Awareness raising and capacity building

Activity 6 - Dissemination

Description of the action and its effectiveness



breakdown of the activities and subactivities

Activity 1 - Project Management and coordination

Activity 2 - Integrated Water and Agricultural Management (IWAM) System design

Activity 3 - IWAM System construction

Activity 4 - Performance assessment and maintenance phase

Activity 5 - Awareness raising and capacity building

Activity 6 - Dissemination

How
quality
interdisciplinarity
and public participation will be ensured



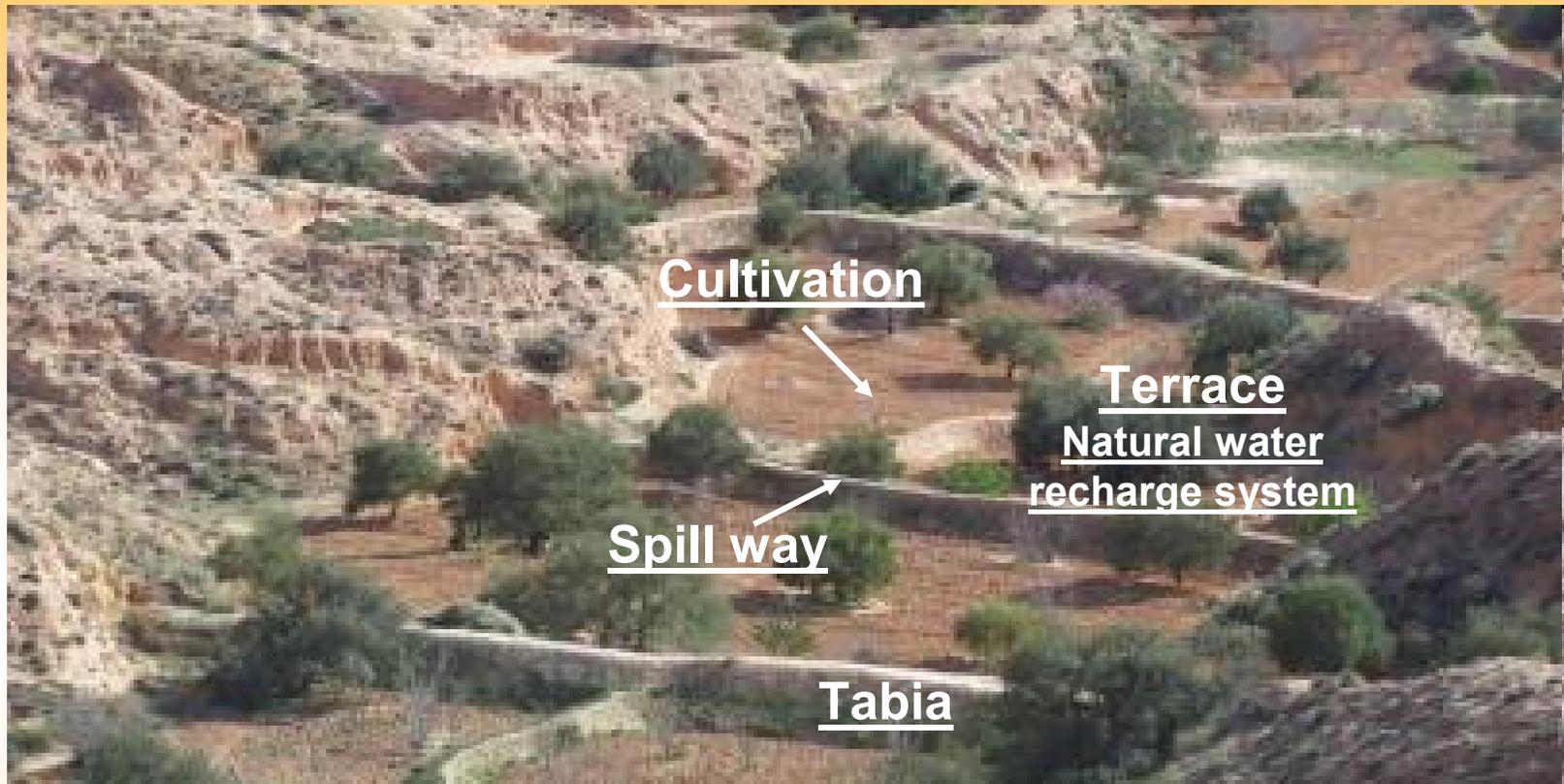
15



Example of intervention: Jessour



Example of intervention: Jessour



Strengths and how to improve	Weaknesses and how to improve
Traditional technique → maintenance interventions	CC risk exposure → combination with supplemental irrigation/tillage
Well known technique → training of new generations	Risk of local know-how depletion → Training/sustaining of new generations
	Productivity of the land is low → Development of alternative income generation activities
	Land ownership fragmentation → New land access

Example of intervention: Gabion check – recharge well



Strengths and how to improve	Weaknesses and how to improve
Robust and flexible structures → intervention on regular/good maintenance	Accumulation of soil/sediments → Desilting and soft technology intervention
Efficient structures → intervention on regular/good maintenance	Usually are not fully exploited by the farmers → Change regulations (stakeholder involvement)
	Expensive, cost not affordable by normal farmers → Government/policy support

Improve the situation of target groups

Simple, small-scale interventions will be implemented

Target Groups

- Selection criteria: location, vulnerability, typology of intervention, willingness and commitment to undertake planned activities, gender
- households, smallholder irrigation farmers, herdsman, user of wells in upstream or downstream intervention areas will have more water and of better quality for drinking and agriculture

Final beneficiaries

- All households living in intervention areas
- National and local institutions and organizations

Description of the action and its effectiveness



Improve technical/management capacities of target groups

WHTs performance improving

The TG full and direct involvement in all operational tasks (PPGIS)

increasing technical/management capacity, knowledge and awareness (CC adaptation strategies)

→ adapting traditional agricultural practices

→ improving crop production

→ to make farming activities more remunerative
maintenance costs reducing

cross-area and cross-country experience exchanging

20



Methodology

Sustainability of the Action

Experienced Partnership

Effective and historical linkage among partners

Public participation of stakeholders at all levels

Risk and mitigation measures are planned/taken

Start from lessons learnt of previous projects
(implemented even by WM partners)

Implementation costs are carefully weighted
(experience based)

THANK YOU !!!!

on behalf of WM partners



UNISS



UNIVERSITAT DE BARCELONA



Observatoire du Sahara et du Sahel



IRA



ANRH

ADDITIONAL DETAILS FOR FURTHER DISCUSSION

WADIS-MAR ACTIVITIES IN DETAIL

breakdown of the activities and subactivities

Activity 1 - Project Management and coordination:

This activity aims at setting up technical/administrative arrangements for a correct project management, coordination among project partners, coordination with other initiatives and stakeholders.

- A 1.1 - Establishment of steering committee and Project coordination;
- A 1.2 – Administrative and financial setting up and arrangement;
- A 1.3 - Project website building and launching workshop

breakdown of the activities and subactivities

Activity 2 - IWAM System design: baseline study, provide a range of potential solution and options for improving the situation (short/long term), identifying the implementation requirements (problem analysis and planning).

- A 2.1 - Existing data collection and geodatabase realization;
- A 2.2 - Field data survey;
- A 2.3 - Public Participatory GIS PPGIS;
- A 2.4 - Final design.
 - A 2.4.1 - Choice and design of best site for the IWAM system;
 - A 2.4.2 - Definition of best irrigation techniques and better irrigation infrastructure;
 - A 2.4.3 - Definition of best agricultural practices

Description of the action and its effectiveness breakdown of the activities and subactivities

- 1. Physiographic characterization
- 2. Hydrogeological and Hydrochemical characterization of the project areas
- 3. Geophysical characterization of the project areas
- 4. Geotechnical characterization of selected areas
- 5. Climatic characterization
- 6. Agronomic and agricultural data collection

realization;

- A 2.2 - Field data survey;
- A 2.3 - Public Participatory GIS PPGIS;
- A 2.4 - Final design.
 - A 2.4.1 - Choice and design of best site for the IWAM system;
 - A 2.4.2 - Definition of best irrigation techniques and better irrigation infrastructure;
 - A 2.4.3 - Definition of best agricultural practices

breakdown of the activities and subactivities

Activity 3 - IWAM System construction: through the activity carried out inside the A3, the proposed solution of Activity 2 will be physically realized making the Action effective and operational ensuring the desired impact (intervention implementation).

- A 3.1 - Construction sites and management;
- A 3.2 - Realization of the Artificial Aquifer Recharge interventions;
- A 3.3 - Realization and rehabilitation of existing irrigation infrastructures;
- A 3.4 Implementation of best agricultural practices;

Description of the action and its effectiveness breakdown of the activities and subactivities

- 20 rehabilitated *Jessour* in Tunisia; 10 new *Jessour* in Algeria
- 15 new gabions dam check in Algeria; 15 new gabions dam check in Tunisia
- 15 new recharge wells in Tunisia; 15 new recharge wells in Algeria;
- 4 new discharge wells in Tunisia;
- 12 piezometers.

– A 3.1 - Construction sites and management:

– A 3.2 - Realization of the Artificial Aquifer Recharge interventions;

– A 3.3 - Realization and rehabilitation of existing irrigation infrastructures;

– A 3.4 Implementation of best agricultural practices;

Description of the action and its effectiveness breakdown of the activities and subactivities

- 5 Artificial flooding system in Tunisia;
- 60 technology system application to evacuate excess water;
- 20 cattle troughs;
- 30 planting pit;
- 3 ha of localized underground traditional irrigation;
- 10 ha of improved traditional surface irrigation and localized irrigation.

– A 3.2 - Realization of the Artificial Aquifer Recharge interventions;

– A 3.3 - Realization and rehabilitation of existing irrigation infrastructures;

– A 3.4 Implementation of best agricultural practices;

Description of the action and its effectiveness breakdown of the activities and subactivities

- 25 ha of marginal agriculture and agro-breeders subsystems worked by soil surface tillage practice;
- improving of pasture lands by means of endemic annuals and perennial forage plants;
- 5 ha of olive threes system interested by conservation tillage and mulching;
- established and equipped of two nursery;
- 2,5 ha of wide beds;
- realization of pasture biomass technology system.

interventions,

- A 3.3 - Realization and rehabilitation of existing irrigation infrastructures;

- A 3.4 Implementation of best agricultural practices;

Description of the action and its effectiveness breakdown of the activities and subactivities



Activity 4 - Performance assessment and maintenance phase (Monitoring/evaluation)

- A 4.1 - Evaluation of infrastructure performances and technical sustainability ;
- A 4.2 - Management and Maintenance

Activity 5 - Awareness raising and capacity building

- A 5.1 - Capacity building;
- A 5.2 - Interchange experience and South-South transfer results

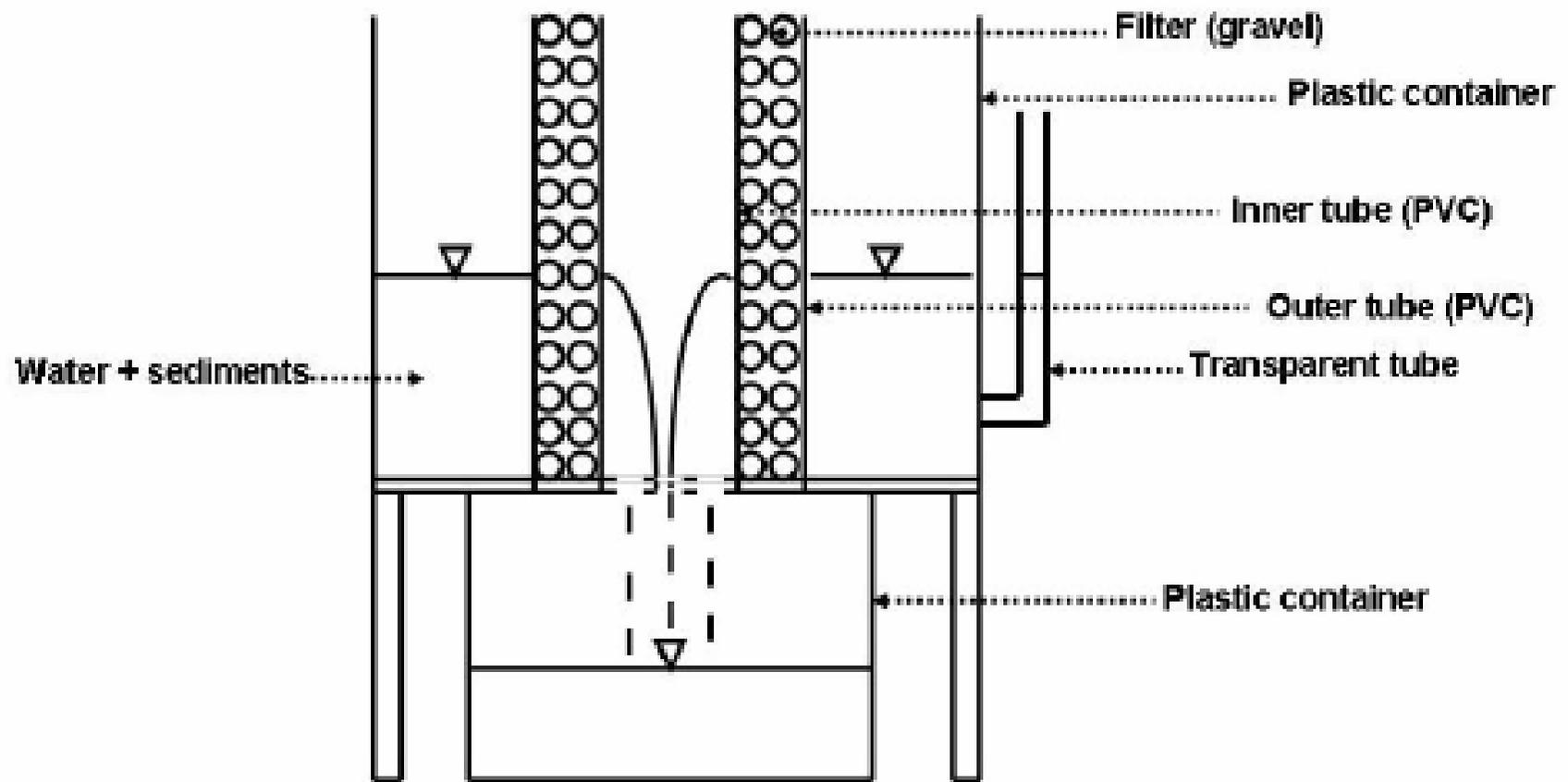
Activity 6 - Dissemination:

- promoting the use of Project WADIS-MAR system as a possible solution of water scarcity and overexploitation, in arid and semiarid areas.

RISK ANALYSIS AND MITIGATION MEASURES

Activity	Risk	Level	Mitigation Measure
A1	Co-financing commitments may not appropriately materialize	Low	The local partners have made commitment to dedicate resources to the project from their budgetary allocation. Proper and timely communication will be maintained so that the cofinancing is obtained on time as per commitment
A2.1 A2.2	Key data missing or difficult to access	Low	Adequate time built-in to allow for delays without delaying finish date
A2.3 A2.4	Low levels of participation by local people because of limited personal and family resources, suspicion that their access to natural resources (water and rangeland) may be restricted.	Medium	Project will develop social communication and participatory approaches to engage with village leaders, social groups and local community. Project will ensure that decisions about rights and access to natural resources (water and rangeland) are taken at community level.
A3.1	Some equipment unavailable or price inflated	Low	Equipment sourced inside and outside local partners; Some items borrowed instead
A.3.2	Impact of climate change on Maghreb's dryland causes more frequent droughts	Medium	All agro-pastoralist demonstration interventions and practices will be assessed for their climate resilience, and their climate resilience will be enhanced increasing available water through water harvesting techniques
A.4	Stakeholders reticent at participating in training activities	Low	Strenuous efforts made to encourage full participation by all stakeholders

WHTs



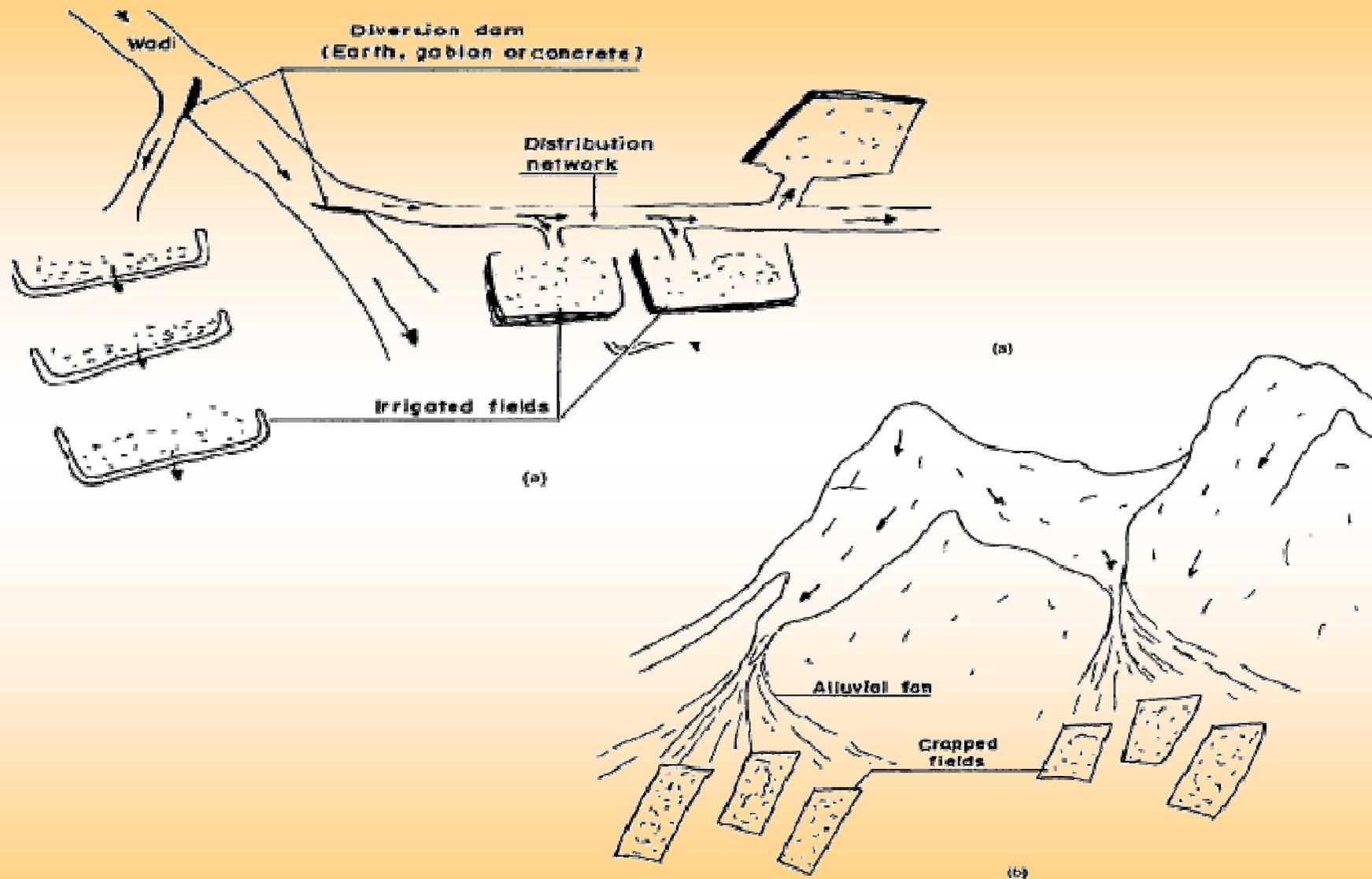
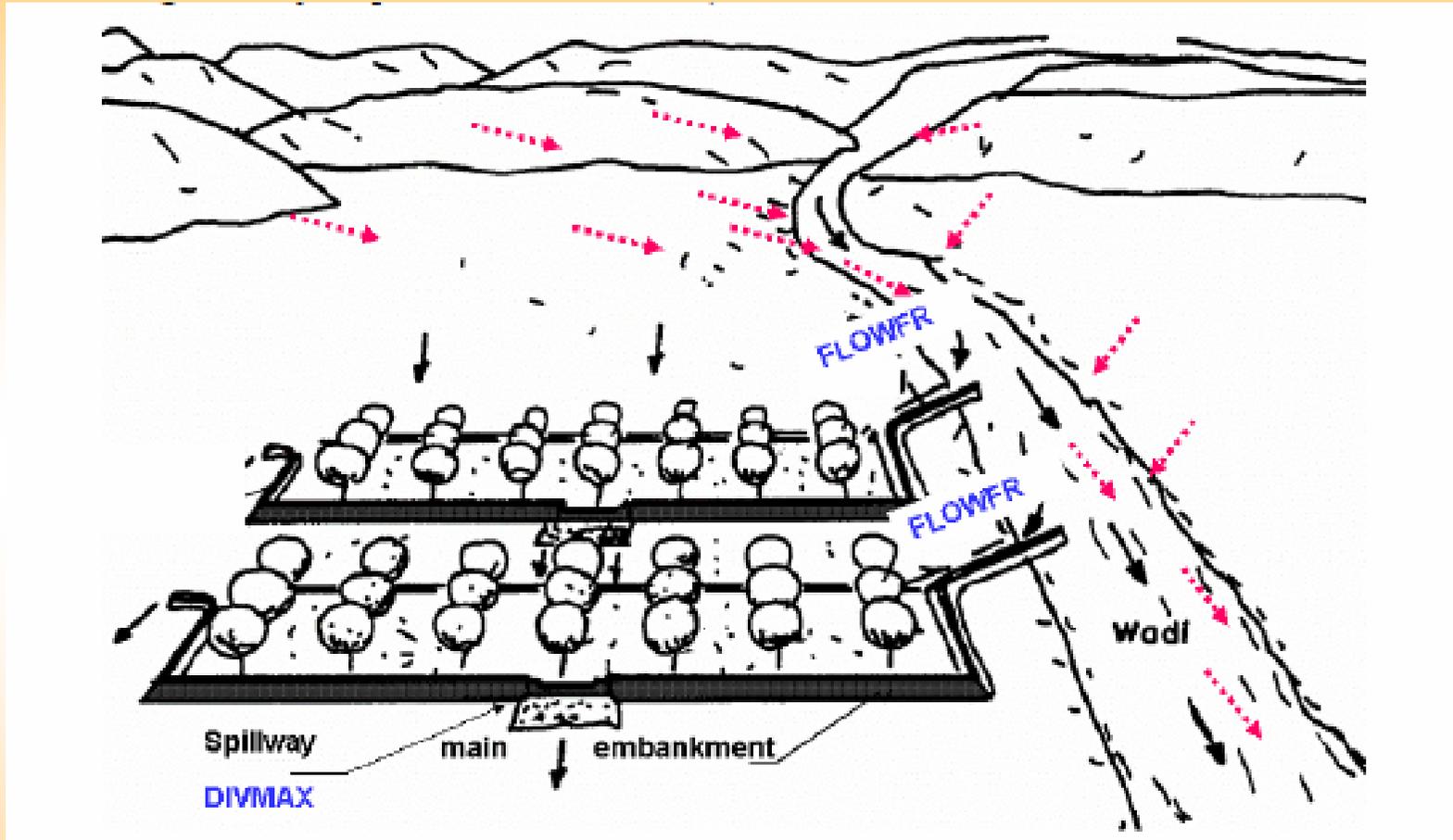


Figure 6. Scheme of flood spreading: a: artificial spreading, b: natural spreading.



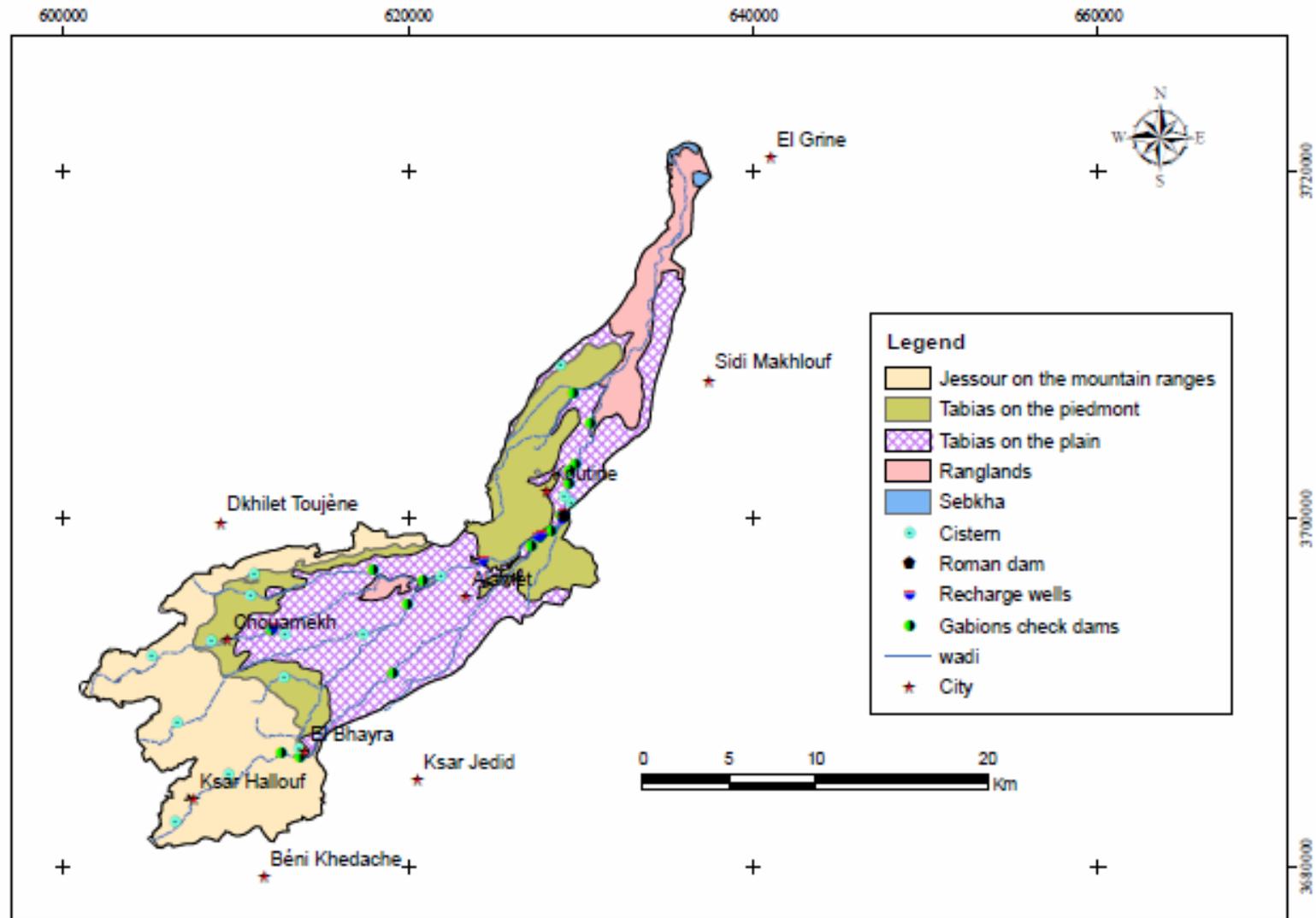


Figure 14. Water harvesting systems in the study watershed.

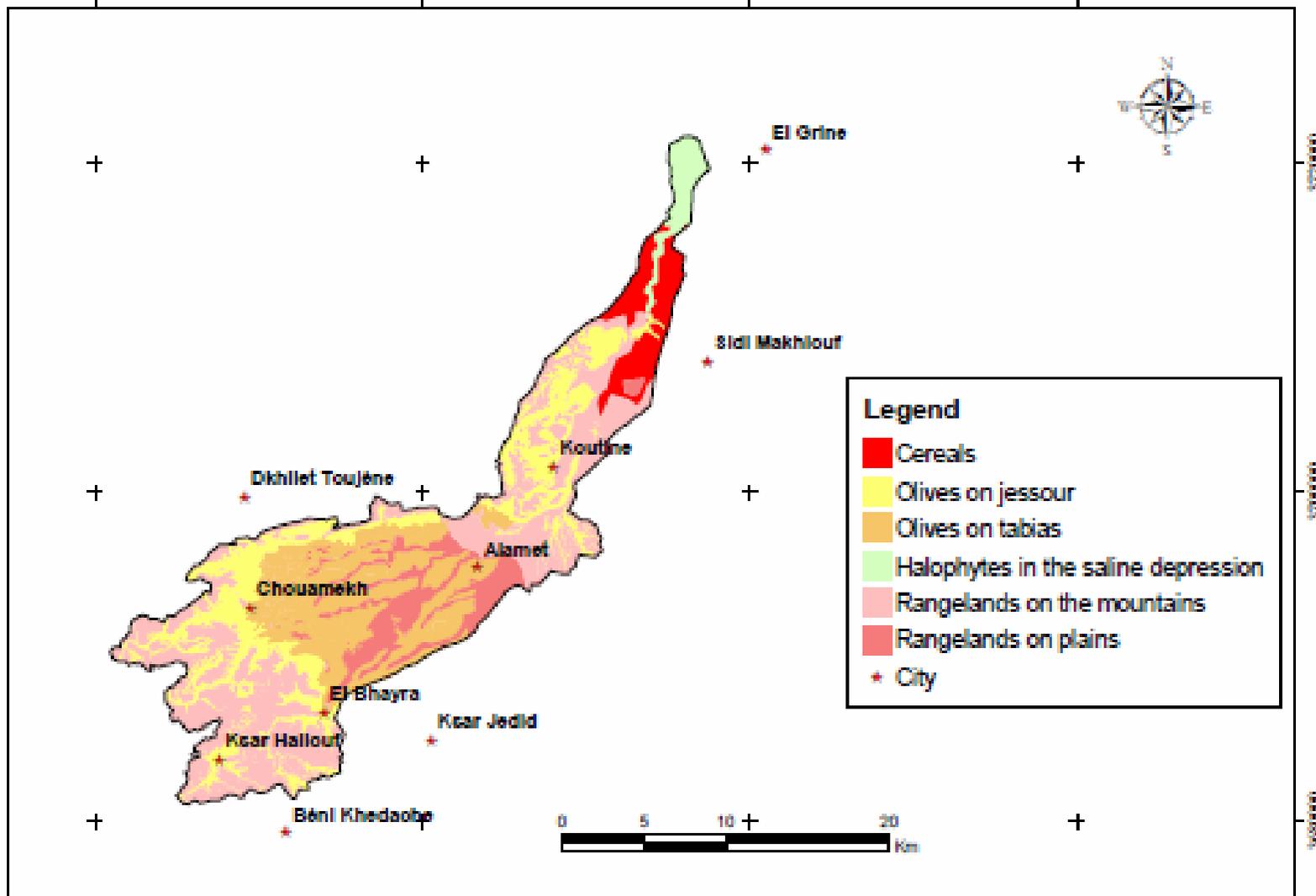


Figure 32. Land use map of the situation after project (year 2004).