



RESEARCH PROJECT FOR IMPROVEMENT OF PARTICIPATORY IRRIGATION MANAGEMENT (THE TAFILALET AREA, SOUTH-EAST OF MOROCCO)

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SUMMARY

- 1- The research project for improvement of participatory irrigation management is a concrete follow-up of the Rural Development Project in the Tafilalet (PDRT). The Tafilalet is located South-east of Morocco, in the pre Saharan, south-of the Atlas mountains zone and extends over an acreage of 77 250 km², of which 60 000 ha are under irrigation. The region encompasses four major river watersheds: the Ziz, Ghéris, Guir and Maïder. It is divided into three major units: a mountainous slope on the southern piedmont of the calcareous eastern High Atlas in the north; an intermediate pre-Saharan region made up of highlands strewn with oases and a Saharan high plateaus region in the south .The area is renown for its natural constraints related to an arid climate and flood and desertification threats for the irrigation infrastructure impacting negatively on the productivity of the cropping systems in use. However, the area can take advantage of assets such as water resources development and irrigated crops.
- 2- During a mission carried out in the area by experts from the International Fund for Agricultural Development (IFAD), it was deemed necessary to undertake actions to upgrade users' capacities to deal with management of irrigation infrastructure. Based on the results of the mission, plans of the research project for the improvement of participatory irrigation management were developed and implemented. The project, financed through donations from IFAD (\$US 490, 000), aims to set up prerequisites to make it possible for users to upgrade their intrinsic capacities through: (i) organizing themselves within Water Users Associations (WUAs) where water resources are available; and (ii) meeting operation and maintenance costs incurred by irrigation systems.
- 3- A pilot action plan has been implemented in two small-scale irrigation systems falling within the scope of action of the Tafilalet Rural Development Project (PDRT). The project has targeted two localities Jorf and Tinjdad where the problem of water scarcity is most acute. The plan is based on the following three basic

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- actions: (i) promoting adoption of partnership schemes involving various departments of the Ministry for Agriculture and users as regards the development of water resources and rehabilitation of irrigation infrastructure; (ii) increasingly involve the Regional Office of Agricultural Development of the Tafilalet (ORMVATf) in providing supervision and technical backstopping to the WUAs and (iii) encouraging use of water-saving irrigation strategies.
- 4- During the four years of project implementation and while aiming at introducing new methodology and a new approach to prompt farmers to contribute to ensuring durability of irrigation infrastructure, the project has been able to reach almost all of the goals set down: (i) organizing and training farmers within the context of their WUAs; (ii) enhancing awareness by means of training courses and field trips; (iii) promoting water-saving irrigation strategies through practical demonstration plots and acquisition of logistics support; and (iv) setting up a database for follow-up evaluation of the WUAs' performance.

I. INTRODUCTION

- 1- Tapping the full potential of the biophysical environment is impossible without human resources availability. Indeed human resources do exist in the rural world, and are characterized by features such as the physical ability to discharge work properly, their indigenous know-how and resilience in adversity, innovative capacity and a rich cultural background.
- 2- Another important basic force factor of the rural world lies in its associative capacity. The latter is part and parcel of a strong and everlasting social tradition, i.e. the village-based jmaa (or traditional form of community organization) which has shouldered among many other things the role of water users associations for irrigation purposes. Real life experience has clearly demonstrated that as soon as the forces of associative capacity are pooled and unleashed, surprising results can be obtained. Today, the wealth of accumulated field experiences is vast and varied. The associative movement is witnessing an increasingly spiralling development pattern resulting in the formation of associations which are quite active in contributing to local development.
- 3- The various rural development projects carried out in Morocco by the International Fund for Agricultural Development (IFAD) have always focused on achieving the strategic goal of improving capacity-building of management and enhancing local development of poverty-stricken populations in mountainous areas, with a view to increasing their incomes, standards of living and ensuring food security, together with the overriding preoccupation of sustainable use of natural resources.
- 4- Indeed, this objective dovetails with the " 2020 rural development strategy ", put in place by the Ministry of Agriculture, Rural Development and Marine Fisheries, which aims at implementing a participatory approach to involve the population of the douars (villages) in matters pertaining to soil analysis, stock-taking of assets and constraints, identifying and prioritizing actions to be performed and managing them along the lines put forth by a participatory approach.

- 5- Actually among the projects implemented by IFAD in Morocco is the Rural Development Project in the Tafilalet (PDRT¹). The Tafilalet is located South-east of Morocco, in the pre Saharan, south-of the Atlas mountains zone and extends over an area of 77 250 km², of which 60 000 ha are under irrigation. The region encompasses four river watersheds: the Ziz, Ghéris, Guir and Maïder. It is divided into three major units: a mountainous slope on the southern piedmont of the calcareous eastern High Atlas in the north; an intermediate pre-Saharan region made up of highlands strewn with oases and a Saharan high plateaus region in the south. The area is known for its natural constraints particularly with regard to an arid climate, a flood and desertification prone area with real threats to the irrigation infrastructure impacting negatively on productivity of the cropping systems in use. However, the area can take advantage of assets such as water resources development schemes and irrigated crops.
- 6- As stated earlier on, the PDRT seeks to achieve the following set goals: i) increasing crop yields by improving irrigation efficiency; ii) increasing acreage under irrigation; iii) increasing productivity of collectively-used rangelands, while contributing to ensure environmental protection; iv) protecting villages and irrigation networks against sand-dust storms; v) building rural facilities and vi) promoting gender equity in economic and cultural development.
- 7- The total project cost is estimated at USD 30,02 million, financed by an IFAD loan of 11,8 million Special Drawing Rights (SDRs) (16,45 million USD), an IDB loan of USD 7,04 million. The Government's contribution totals approximately USD 5,63 million. Beneficiaries have contributed USD 0,90 million in the form of labour. The irrigation component represents 69 % of the total cost of the project.
- 8- During a mission carried out in the area by experts from the International Fund for Agricultural Development (IFAD), it was deemed necessary to undertake actions to upgrade users' capacities to deal with management of irrigation infrastructure. Based on the results of the mission, plans of the research project for the improvement of participatory irrigation management were developed and implemented.
- 9- The current document is a progress report on the research project for improvement of the participatory irrigation management. After a brief overview of the project (in terms of goals, components and implementation strategies), the results and achievements are presented. Conclusions and recommendations are put forth.

II. PRESENTATION OF RESEARCH PROJECT FOR IMPROVEMENT OF PARTICIPATORY IRRIGATION MANAGEMENT.

A. AIMS.

- 10- The project which has benefited from an IFAD donation², aims to put in ballast the prerequisites to make it possible for users to upgrade their capacities pertaining to:

1- PDRT is financed by the Government of Morocco, The Islamic Bank for Development (IDB) and the International Fund for Agricultural Development (IFAD)

2- The project is jointly financed by ORMVATf, through making staff and facilities available to the project, and by IFAD through a donation of \$US 490.000.

- (i) getting organized within the structure of an association to deal with water resources; and (ii) meeting operation and maintenance costs of irrigation systems.
- 11- A pilot action plan has been implemented in two small-scale irrigation systems falling within the scope of action of the Tafilalet Rural Development Project (PDRT). The project has targeted two localities Jorf and Tinjdad where the problem of water scarcity is most acute. The plan is based on the following three basic actions: (i) promoting adoption of partnership schemes involving various departments of the Ministry of Agriculture and users as regards the development of water resources and rehabilitation of irrigation infrastructure; (ii) increasingly involve the Regional Office of Agricultural Development of the Tafilalet (ORMVATf)¹ in providing supervision and technical backstopping to the WUAs and (iii) encouraging use of water-saving irrigation strategies.

B. IMPLEMENTATION STRATEGY.

- 12- In order to achieve the set goals stated earlier on, the following courses of action have been followed:
- (i) ORMVATf engaged in consultations with irrigation system users in the area to gauge their predisposition to take part in the program. The consultations were used as a platform to shed light on the program goals and the criteria underpinning the participation of grass roots populations. On the basis of results accruing from these consultations, geographical units were identified in joint collaboration with IFAD;
- (ii) ORMVATf helped to organize users in associations according to the type of irrigation resource available: *khetaras* (underground galleries)² allowing storage and transport of inflow water from aquifers located several kilometres away from the irrigation system, also from wells and floodwater for combined use of these resources;
- (iii) The IFAD/ORMVATf working group took part in the workshop hosted by Bari, Italy from 12-16 June, 2000. It finalized the project action plan and identified the course of action for its implementation;
- (iv) ORMVATf in joint collaboration with IFAD organized a workshop and a study tour program for staff in charge of the Participatory Irrigation Management (PIM), the WUAs' members and farmers with a view : (i) to developing a common understanding of the goals pursued by the program; (ii) facilitating training and orientation on regulatory and procedural measures in force; and (iii) providing assistance to ensure promotion of co-operation and conflict-management mechanisms in the field of PIM;

1- The Regional Office of Agricultural Development of the Tafilalet (ORMVATf) is a regional structure of the Ministry of Agriculture, Rural Development and Marine Fisheries in the area of Tafilalet.

2- It is a system which has been cleverly engineered and is well- developed in the arid regions of Morocco and Algeria; it is also known in Central Asia (i.e. Iran...). Khetara, originally from Iran and is known as "Qanat" is a traditional mechanism for harvesting underground waters and introduced into Morocco by Arabs in the 12th century.

- (v) The study trips abroad were prepared in such a way as to give a chance to all participants to benefit from the experiences of other countries in the field;
- (vi) Reinforcing the unit in charge of PIM through creating a multidisciplinary team made up of community-based organizations, communication and management workers as well as agents with expertise in the technical specificities and in the social magnitude of the irrigation systems peculiar to the area;
- (vii) Implementing an institutional development programme for WUAs and ORMVATf employees to allow them to upgrade their skills in planning, assessment and financial management of projects and improvement of irrigation water efficiency.
- (viii) Also implementation of a follow-up evaluation system of the program: (i) to monitor users' participation rates in management of irrigation systems ; and (ii) to study the impact of this integrated approach on irrigation systems efficiency in the project areas;

C. PROJECT COMPONENTS

- 13- The major project components are: (i) promoting awareness building, organizing and establishing associations; (ii) supporting NGOs in their efforts to ensure operation and maintenance of irrigation infrastructure; (iii) equipping demonstration plots with drip irrigation; (iv) organizing study tours and training courses; and (v) acquiring logistics support

III. PROJECT ACHIEVEMENTS

A. BUILDING AWARENESS, PROMOTING ORGANIZATION AND ESTABLISHMENT OF ASSOCIATIONS

- 14- CIHEAM, Bari, Italy, provided technical support for project implementation through organizing workshops, orientation missions and consensus-building. ORMVATf ensured project monitoring and implementation by calling upon national experts when needed: (agreements with the Horticultural Complex of Agadir of Hassan II Institute of Agronomy and Veterinary Sciences (IAV), the Office of Co-operation Development (ODCO) and the Office for Vocational Training and Promotion of Employment (OFPPT)).
- 15- Awareness-building and training campaigns provided for within the project framework were carried out totally. On the whole twenty-one training courses were administered and their breakdowns are as follows:
- (i) Two awareness-building sessions involving 31 associations and co-operatives which fully endorsed the project and agreed to sign a management contract;
 - (ii) Three follow-up workshop sessions organized in Bari and two training sessions on accounting;

- (iii) Two institutional and organisational training courses aiming at strengthening capacity building of WUAs' in institutional and organisational areas to improve their management skills;
- (iv) Seven technical training sessions to promote irrigation water-saving strategies; and
- (v) Six training sessions on computer-based techniques: (Excel, Access and Autocad).

B. SUPPORT TO NGOS FOR ENHANCING PROTECTION OF IRRIGATION INFRASTRUCTURE

- 16- This action aims to support WUAs to protect and take ownership for irrigation infrastructure. Two agreements were signed and carried out:
- (i) The first agreement pertains to digging and equipping a well with a motor pump for drip irrigation: 700 ml pipe in addition to a network of calibrated hydraulic nozzles for biological protection against sand dusts of the Guefifat flood water canal spill;
 - (ii) The second agreement consists in purchasing two cisterns to the Tinjdad NGO for irrigating plantations intended for protecting irrigation infrastructure in the Tinejdad irrigation system;
- 17- Two other agreements are being implemented. They target the rehabilitation of inlet gates in Tinjdad and irrigation networks in Jorf. The agreements are scheduled for implementation within the framework of the budget allowance of IFAD donation.

C. EQUIPPING ON-FARM DEMONSTRATION PLOTS WITH DRIP IRRIGATION

- 18- Infrastructure deployment and equipment of on-farm demonstration plots has concerned equipping five farms with drip irrigation using water from pumping stations (2 in Tinjdad and 3 in Jorf). As regards khattaras, equipment of 2 farms was performed through construction of a geomembrane storage pond capacity of 2000 m³ and setting up a drip-irrigation network for optimizing water rights from khattaras.. Within the project framework, the total area equipped with drip irrigation amounts to 10 hectares.

D. ORGANIZING STUDY TOURS AND TRAINING SESSIONS

- 19- The study tours and training sessions scheduled by the project were intended to help farmers and technicians to have access to and share experiences with similar associations operating in irrigated systems using state of the art water-saving strategies. Thus, 3 in-country field trips (lasting over 12 days) were organized to the irrigation systems of Moulouya (North-eastern Morocco), Haouz (Center-southern) and Souss Massa (South-western) involving 150 people (WUAs' members and technicians affiliated with ORMVATf).
- 20- A trip was also organized to Valence in Spain for 2 presidents of WUAs, 4 farmers (who were provided with drip irrigation implements by project), 2 directors of the

centres for agricultural development, one coordinator of the subdivision activities of Goulmima and an officer in charge of WUAs' follow-up unit.

- 21- These field trips made it possible for participants to draw benefits from home-grown experiences as well as from those of foreign countries as regards participatory irrigation management and water-saving strategies.
- 22- In addition, during project implementation period, four workshops were organized:
- (i) A project start-up workshop to address issues related to creating appropriate conditions for better participatory irrigation management;
 - (ii) Three other follow-up workshops were convened to accommodate project implementation: (i) Tunis from 28/02/04 through 3/03/2004; (ii) Cairo from 15/02/2005 through 17/02/2005; and (iii) Morocco from 30/05/05 through 3/06/2005.
- 23- During the workshops, previous achievements were surveyed and proposals for approval of the program for the following year were tabled.

E. FOLLOW-UP EVALUATION SYSTEM:

- 24- A database for conducting follow-up evaluation of participatory irrigation management was developed with project support. Setting –up of database was carried out in the subdivisions of ORMVATF. Data processing is underway.

F. ACQUISITION OF LOGISTICS SUPPORT:

- 25- To ease implementation of project work, four vehicles in addition to computer and audio-visual equipment were purchased.

IV. RESULTS AND PROJECT IMPACT

- 26- Thanks to the efforts made within the framework of the project, a very positive impact was recorded with regard to three main aspects.

A. ORGANISATIONAL ASPECTS OF FARMERS CLUSTERED IN ASSOCIATION OR COOPERATIVES:

- 27- The number of farmers targeted by the project amounts to 13. 200. They are organized in 20 associations and 10 water pumping co-operatives. The table below shows the membership of WUAs.

	Jorf	Tinejdad	Total
Number of prospective members	8. 107	5. 080	13. 187
Membership	5. 685	2. 914	8. 599
Membership percentage	70 %	57 %	65 %

28- About half (15) of the 30 WUAs are regularly active. One third (11) of the WUAs still face some organisational problems- problems which yet are not a major hurdle to their being operational. 4 WUAs (13%) are confronted with operation difficulties.

B. NATURE OF USERS' CONTRIBUTIONS TOWARDS IRRIGATION INFRASTRUCTURE REHABILITATION.

29- The most striking impact of the development of WUAs is reflected through their large-scale contribution towards rehabilitating and maintaining the irrigation infrastructure initiated by ORMVATF. This is also illustrative of the reorganization and approval made of 30 WUAs within the two areas targeted by the project. These have become partly responsible for a variety of maintenance activities and for settling conflicts for ensuring efficient water management.

30- The users' contribution towards maintenance of irrigation infrastructure is one of the aspects worthy of consideration. This contribution is provided through labour. The table below shows the financial value of WUAs' contribution in rehabilitating irrigation infrastructure.

	ORMVATaf (in 1000 hectare)	WUAs (1000) Dirhams
Diversion weirs	10	12.8
Main canals ¹	69.6	152.5
Khettaras	51	145
Pumping stations	135	52.2
Sand control	981.4	386
Aggregate total	1247	784.5
%	62	38

C. NATURE OF IRRIGATION IMPROVEMENT TECHNIQUES

31- Farmers running the demonstration plots expressed their satisfaction regarding the introduction of this new irrigation technique (i.e. drip irrigation) into the targeted areas. Irrigation is mainly associated with market gardening crops which is viewed as a highly beneficial short- term type of farming. The long-term objective is to use drip irrigation for date palms and other adjoining key cash crops.

32- The water savings made through the newly- introduced irrigation pattern (i.e. drip irrigation) enabled farmers: (i) to grow two or three crops per year; (ii) to expand cropping to involve previously insufficiently watered plots using the conventional

1- Users take full charge of maintenance of secondary and tertiary canals.

irrigation system (i.e flow irrigation); (iii) to sell excess water to the khetaras; and (iv) to decrease water pumping from wells, therefore contributing to ensure stability of the water table.

- 33- The total acreage of demonstration plots equipped through project support is 10 hectares. Fully convinced of the benefits accruing from drip irrigation, farmers took the initiative to equip their farms at their own expenses. Over a two years' period, 12 additional hectares of acreage currently under equipment with drip irrigation by farmers will be made available, amounting to a 120 % increase through project gradual support.
- 34- The project has impacted positively on the area. The table below shows the evolution pattern of drip irrigation:

	Area outfitted in 2002 (ha)	Area outfitted in 2004 (ha)	Area currently being outfitted (ha)	Expressed requests (ha)
Total	119	285	412	909

D. A Sample of Achievements Recorded by some Farmers

- 35- The table below shows a sample of some of the accomplishments performed by some farmers

Farm n°	1	2	3	4	5	6
Rural commune	F.Oulia	F.Oulia	Fezna	Jorf	Jorf	Hanabou
Cropped acreage (ha)						
Total	8	22	8	13	6	4,5
Outfitted by projet	1.8	1 9	1 .7	1.25	1.16	2.5
Outfitted by farmers		9.5	2.5			
Outcomes						
Water savings	50%	40%	60%	70%	40%	60%
Labour savings	85%	80%	90%	60%		65%
Improvement in productivity	60%	50%	80%	75%		65%

- 36- Thus, after two years' training and experimentation, we have noticed the following features:
- (i) Farmer n°1 was able to set up his own nursery to produce good quality plantlets which he distributed to farmers in the area;
 - (ii) Farmer n°2: Being persuaded that localised irrigation is advantageous, he proceeded to gradually outfit 9.5 ha acreage at his own expenses.
 - (iii) Farmer n°3 bought and outfitted 2.5 ha, in addition to producing plantlets. His aim is to equip and crop a 6 ha acreage with high quality date palms and other key cash crops.

V. CONCLUSION AND RECOMMENDATIONS:

- 37- After four years of program implementation, and while still focusing on introduction of a new methodology and an approach for involving farmers in securing the durability of irrigation infrastructure, the project can boast of accomplishing the goals set down: (i) organizing and training of farmers within the framework of their WUAs; (ii) raising their consciousness through training and study trips; (iii) improving irrigation water management through setting up demonstration plots and purchasing logistics support; and (iv) setting up a database to be used in the follow-up evaluation of WUAs' performances.
- 38- The experience gained by all partners, i.e. ORMVATF (project team members and staff), NGOs and WUAs as regards implementation of participatory irrigation management and water-saving strategies, will be generalized to cover the whole of ORMVATF area and will certainly have a positive impact on water management policy at the scale of the region.
- 39- However, because of some shortcomings in terms of implementation of follow-up evaluation and in terms of capacity building of the co-operatives and associations, a consolidation programme in the form of a research-oriented development project is deemed necessary – a project geared toward:
- (i) Pursuing the project action plan related to water-saving strategies, particularly from *khettaras*, the pumping stations through use of storage basins.
 - (ii) Consolidating water demand management (i.e. through technical and institutional measures and through capacity building of technicians and farmers);
 - (iii) Designing effective strategies for the management of the water tables and *khettaras* that are subjected to inopportune uses through excessive pumping;
 - (iv) Seeking more effective ways to keep within an associative framework management of floodwaters and water from storage dams.
 - (v) Within water management issues, incorporating a research component on ways and means to integrate rural gender within association-based groups for increasing the returns on water in economic terms.