

TRAINING AND RESEARCH FOR A MORE ACTIVE FARMERS' PARTICIPATION IN THE MANAGEMENT OF IRRIGATION SCHEMES IN TUNISIA

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IRRIGATION IN TUNISIA

Tunisia extends over a surface area of 16.4 million hectares. Agricultural areas are approximately 5 million hectares, whereas the potential irrigable land in Tunisia, considering also the water resources already exploited, is today of 0.4 million hectares. The surface areas equipped for irrigation have jumped from 0.05 million hectares in 1960 to 0.3 million hectares in 1995

(Table 1) and their contribution to the total agricultural production exceeds 30%. Two major types of irrigated schemes are present in Tunisia. The first one covers the public irrigated schemes (PIS) that extend over 0.16 million hectares. All the large hydraulic works have been realized by the State, but land belongs to and is managed by private farmers. The second group, that extends over 0.14 million hectares mainly concerns the plots supplied by shallow wells constructed by farmers, generally with a State contribution through subsidies or credits.

Their average intensification rate being close to 110%, they rank first, well ahead the public irrigated schemes. However, the master plans for the use of waters in the major natural regions of Tunisia have allowed the de-

Irrigated surface area in Tunisia is about 0.3 million hectares. The management of water resources is co-ordinated at the central level by the Agricultural Engineering Directorate and at the local level by the Development Bureaus. Together with these structures, new organisations have been promoted like the Public Concern Associations that take the responsibility, on behalf of farmers, of maintenance, distribution and use of waters.

ABSTRACT

RÉSUMÉ

La superficie irriguée en Tunisie atteint environ 0,3 millions d'hectares. La gestion des ressources en eau est coordonnée au niveau central par la Direction Générale de Génie Rural et au niveau local par les Offices de Mise en Valeur. En plus de ces structures, ces dernières années, d'autres organismes ont été promus, tels les Groupements d'Intérêt Collectif qui prennent la responsabilité, en tant que représentants des agriculteurs, des activités d'entretien, de distribution et d'utilisation des eaux.

velopment of large public schemes and the modernization and rehabilitation of the old ones. These plans have also ensured the regular supply of water to the country through large scale works. Under-ground waters contribute to irrigation waters by approximately 60%.

Special efforts are made today to prevent ground-water overdraft, particularly by the installation of a nation-wide network of observations pipes for the measurement of the ground-water level. Spectacular ground-water recharge operations have been started in Tunisia in the last few years. Irrigated surface areas per type of water resources are illustrated in table 2. In Tunisia, irrigation is the greatest water consumer (82% for agriculture and only 18% for industry, tourism and drinking water).

The traditional methods are still quite widespread. In more than 80% of the irrigated schemes, surface irrigation is practiced. In some conveyance networks, losses can easily exceed 30% of the discharge conveyed. State incentives are many to stimulate farmers to use water saving techniques and improve farm efficiency which is still very low. Subsidies granted by the State can be as high as 60% of the cost of the equipment used for water saving.

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Table 1 Evolution of the surface areas equipped for irrigation in Tunisia.

Year	Equipped surface (million ha)
1960	0.05
1970	0.12
1981	0.19
1986	0.26
1995	0.30

Table 2 Different water resources used for irrigation.

Water resources	Irrigated area (million ha)	Irrigable area (million ha)
Dams and hilly lakes	0.097	0.169
Deep ground-waters	0.058	0.062
Free ground-waters	0.125	0.130
Oueds	0.014	0.015
Treated waste waters	0.006	0.024
Total surface area	0.300	0.400

MANAGEMENT OF THE IRRIGATED SCHEMES IN TUNISIA

At the national level, the "Direction Générale de Génie Rural" (Agricultural Engineering Directorate) coordinates the major irrigation activities. At the regional scale, management was ensured by the "Offices de Mise en Valeur" (Agricultural Development Bureaus) that cover the whole country. They worked in parallel with the "Commissariats Régionaux au Développement Agricole" - CRDA (Regional Commissionerships for Agricultural Development). To prevent such a dualism, these two bodies merged into the Regional Commissionerships for Agricultural Development (CRDA) that have been strengthened by the creation of districts of irrigated schemes, of building and equipment plus the already existing districts of Agricultural Engineering. The target was decentralization but especially a progressive transfer of responsibility to farmers that are encouraged to organize themselves into groups or public concern associations (Associations d'Intérêt Collectif - AIC). These associations can be responsible for all or some of the following activities:

- 1) use of the waters of the State-owned hydraulic works in the scheme they are responsible for,
- 2) execution, maintenance or use of works related to the State-owned hydraulic facilities they are entitled to use,
- 3) irrigation or land reclamation by drainage or other reclaiming methods
- 4) use of a drinking water system Public concern associations have legal entity (water code of the Tunisian republic). A national strategy for the creation and follow-up of the AIC has been adopted since 1992. These associations have continuously increased in number over the years, since common use of water resources is an ancestral practice in Tunisia. A sound system of water sharing in the southern oases goes back to the XIIIth century. The great number of ancient water exploitation, conveyance and management works scattered all over the country, proves the importance the Tunisian has historically recognized to the problem of water.

TRAINING AND RESEARCH PROBLEMS IN IRRIGATION

At least three distinct training levels have to be envisaged for the success of any irrigation policy. Each training form has its specificities. They are complementary



to each other. To each training type a well defined working methodology does correspond:

1. First type: Training for farmers

It is an important and heterogenous population with multifaceted interests. Only achievements (end products) are to be made available to this population since any failure at this level has rather serious effects. The economic interest has to be well kept in mind although to the detriment of the technical interest since profit is the primary factor in the farmer's choice.

2. Second type: Training for engineers in practice and extensionists:

This second group of the population consisting of wage-earners is quite homogeneous and concerns a limited number of people. Also, it should effectively participate in adapting the results of research to the field situation, although the time-shortness may be a constraint.

3. Third type: Academic and research training addressed to student engineers

It is a rather small population, homogeneous but with a "very limited" field experience. Academic formation collides with many constraints that are going to be overcome by the adaptation of programmes, a greater flexibility in teaching programmes subdivided into modules and a wider and wider opening onto the external environment.

THE TUNISIAN EXPERIENCE IN TRAINING FOR IRRIGATION

Tunisia has worked in this field at different levels.

a) Farmers' and users' training

Several agricultural vocational training centres train young farmers and skilled farm labour. Training and briefing days are organized on a regular basis by these

entres, by the CRDA, by the Tunisian Union of Agriculture and Fishery and by the Professional Organizations to the benefit of farmers. A praiseworthy effort is being made for extending AIC - Associations d'intérêt public (public concern associations) to all the irrigated schemes in Tunisia in order to make users responsible and aware of the problems in the everyday management of irrigation. Each year, many State-owned plots are made available, in the form of long-term rent, to engineers and young people leaving the Agricultural training centres. Such plots should be a model for neighboring farmers.

b) Training to engineers in practice and extensionists

For engineers in practice and extensionists, several training actions have been carried out and a national extension strategy is under preparation. For many years, permanent training cycles are organised in Tunisia as well as training periods in the said centres would allow to exchange experience and expertise between the beneficiaries of permanent training.

c) Academic training (student engineers, MSc, PhD)

Almost twenty years ago, research centres and several specialised engineering schools in agricultural equipment, horticulture, field crops and agricultural management were set up. The localization of these schools around research poles installed in the major natural regions of the country, makes it possible to follow a regional scale approach of training and agricultural research.

d) Vocational training

Several agricultural high schools, advanced and specialized training centres to train young farmers and the skilled labor in the different agricultural activities are present in the region. The reform introduced in the vocational training system proves the will of the State to give a new impetus to the agricultural sector in order to improve its competitiveness.

THE PRIORITY LINES OF SHORT COURSES

The priority themes and projects for Tunisia in this field are defined according to the concerned targeted populations and to the national policy in the matter of development of the agricultural sector.

a) Case of farmers and users

- irrigation technique;
- possibility to improve irrigation techniques;
- maintenance of an irrigation network;
- maintenance of a drainage network;
- critical irrigation periods;
- additional actions (wind-breaks, land grading...);
- other factors (cropping techniques, fertilizers, crop rotation...).

Achievements and techniques on this subject are taught.

b) Case of technical centres, research centres and engineering schools

Tunisia has training schools specialized in the field of irrigation. However, courses similar to those delivered at the Agronomic Mediterranean Institute of Bari aimed at reconciling agricultural engineers and agronomists are to be promoted. As for the short duration courses, several topics have been retained after concertation between professionals, university staff and farmers (Committee for the use of water for agricultural purposes). It would suffice to mention (without being exhaustive) the topics related to crops strategic for Tunisia, i.e. cereals, tomato and potato.

Theme 1: *Crop water requirements:*

- development of irrigation scheduling methods;
- water requirements and fertilization;
- improvement of the cropping patterns for a better use of water;
- supplementary irrigation of cereals (scheduling).

Theme 2: *Irrigation technique:*

- improvement of surface irrigation techniques applied to potato and tomato;
- working-out and preparation of graphs and technical sheets to be used in the professional practice;
- improvement of micro-irrigation and fertigation management for potato and tomato;
- supplementary irrigation of cereals (techniques).

Theme 3: *Use of unconventional waters in the irrigation of these strategic crops (geothermal waters, treated waste waters, drainage waters).*

Theme 4: *Additional actions (wind-breaks, drainage network, roads).*

Theme 5: *Salinity and drainage of irrigated schemes.*

Theme 6: *Economic, social and cultural aspects of irrigation water.*

c) Engineers in practice and extensionists

Engineers in practice and extensionists have to act as the interface between universities and the profession. This is a quite delicate task.

They have to master the results of research and adapt them to the field conditions. This accounts for the primary role of Technical Centres that have to be the theatre for the adaptation of results of research to the field situation and give farmers a demonstration, under natural conditions, of the innovations introduced by our research system. ●

REFERENCES

Code des Eaux, 38 pages, République Tunisienne

Etude du Secteur de l'EAU, 39 pages, DGRE, Ministère de l'Agriculture, Tunisie

Résultats des Enquêtes sur les Périmètres Irrigués, DGPIA, Ministère de l'Agriculture, Tunisie

Stratégie Nationale des Ressources en Eau, 95 pages, Ministère de l'Agriculture, Tunisie.