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ENVIRONMENT PROGRAMME

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# *EMASAR PHASE II*

Volume IX

THE COUNTRIES OF NORTH AFRICA

*Education and training in the rangeland sector:  
Components of a strategy*

THE ECOLOGICAL MANAGEMENT OF ARID AND SEMI-ARID RANGELANDS

IN AFRICA AND THE NEAR AND MIDDLE EAST

(EMASAR - PHASE II)

Volume IX

THE COUNTRIES OF NORTH AFRICA

Education and training in the rangeland sector: Components of a strategy

by

J. CALEMBERT

Consultant

in collaboration with Mr. Larbi Firdawcy (Morocco),  
Mr. M.S. Hadjej (Tunisia) and Mr. M.A. Abdel Salam (Egypt)

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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## 1. FOREWORD

### 1.1 Objective of the mission

The representatives of the nations participating in the Conference on the Ecological Management of Arid and Semi-Arid Rangelands in Africa and the Near and Middle East held in Rome from 3 to 8 February 1975, after recognizing the seriousness of the rangeland problem, came to the following initial conclusion:

“Most nations have the technicians to conceive range management and development programmes, but the number of national technicians is inadequate for implementation, thus emphasizing the need for immediate action relative to training and educational programmes and centres”.

The Conference put forward as its first recommendation “That emphasis should be placed upon national development including the development of national expertise to formulate and implement projects and programmes”.

In order to meet the need for additional information, and for the purpose of formulating an education, training and information policy, consultant missions were organized in the various arid countries of Africa, the Near and the Middle East.

### 1.2 Terms of reference

In relation to the five countries of North Africa (Morocco, Algeria, Tunisia, Libya and Egypt) a consultant, Mr. J. Calembert, was sent on a mission in May-June 1977 having as its terms of reference:

- to make an inventory of the education, training and information systems at different levels in the livestock production and feed sector;
- to make an inventory of the present availability of local technicians and future personnel needs;
- to obtain detailed information on the courses given in agricultural education and to make proposals for their improvement and possibilities of re-training;
- to comment on information programmes affecting livestock procedures (including rural radio broadcasts) and to suggest improvements if necessary;
- to make proposals concerning ways of adapting the present training manuals and courses to North Africa;
- to make proposals with a view to a rangeland education, training and information policy for North Africa.

### 1.3 Execution of the mission

This mission, which consisted of a one-week visit in each country concerned to enable the consultant to hold talks with the leading instructors and civil service officers responsible for agricultural education, training and information, was the subject of a report in July 1977. However the data collected seem to have been inconsistent and fragmentary for various reasons: the local authorities seldom had all

the data requested; there were no documents or concise reports - or only very few - summarizing the situation in such traditional fields as agricultural education, extension, livestock production or even agricultural policy; the problem of development of arid areas had not yet been considered, or had only recently been viewed from the standpoint of education; lastly, a development policy for arid areas had not yet been established or had not received priority.

Therefore it was necessary to ask each country visited for a national report identifying and completing the data collected and indicating the policy contemplated in the field of agricultural education and training of the populations in the arid regions. Three out of the five countries responded to this request: Morocco, Tunisia and Egypt.

Therefore the present report is a summary of the data collected in the national reports and in the consultant's initial report. As the five countries have many points in common, a conclusion and general recommendations will be presented tentatively by the consultant. The opinion expressed will therefore reflect the general impression left both by the discussions with the responsible officers and by a reading of the national reports. The shortness of the consultant's stay left hardly any time to visit current projects adequately, and the present report is not intended to pass judgement on the rangeland policy of the countries visited, nor to establish a balance of successes and failures, but to evaluate resources and staff and specialist needs for rangeland development.

A longer stay, including an analysis of the results obtained by the current projects, would undoubtedly have made it possible to describe better the role of staff members and by the herdsmen themselves.

#### 1.4 Personalities encountered during the mission

##### Morocco

Messrs. Badra	FAO Representative
Bekkali	Director, Institut National Agronomique HASSAN II
Ben Souda	Acting Director, Livestock Production
Donadieu	In charge of courses in rangeland management, INAMV
Col. Jbiri	Director, Ecole Nationale Forestière d'Ingénieurs (ENFI)
Kadiri	Director, Ministry of the Environment
Maignan	FAO Expert in forest rangelands
Schoenenberger	FAO Expert - Professor of Ecology, ENFI
Zaki	Director, Eaux et Forêts

##### Algeria

Messrs. Bou Abdallah	Sous-Direction du Pastoralisme, Direction de l'Elevage, M.A.R.A.
Bou Maza	Direction de l'Education Agricole, M.A.R.A.
Khouri	Assistant Instructor, Institut National Agronomique, in charge of rangeland management courses
	Consultant to the Livestock Feed Bureau
Mansour	FAO Representative
Arzala	Office de l'Elevage et des Pâturages (acting for M. Skouri)
Ben Mustapha	Director of Education, Research and Training
Belkhodja	Dean, Institut National Agronomique Tunisien (INAT)
Brucher	FAO Representative



Cabée  
Dimanche  
Delhaye  
Gaddès  
Alaoui  
Labiod  
Hadjej

FAO Senior Expert on Livestock Production,  
Project TUN/71/525  
FAO Expert in Ecology, TUN/SIDA 5 and 13 (SWE)  
FAO Expert in Rangeland Management, idem  
Tunisian Specialist in Rangeland Management, idem  
FAO Expert in Sociology, idem  
Director, Training Department of DERF  
Director-General, l'Institut des Régions Arides

Libya

Messrs. Adly  
Ghartha  
Ben Ramadan  
Bachir  
Gintzburger  
Zehni

FAO Representative  
Under-Secretary (Technical) of the Council of  
Development  
Chairman, Jeffara Plain Authority  
Project Manager, Cereal Project (Jeffara Plain)  
FAO Expert/Ecology, Agricultural Research Centre (ARC)  
Director, Agricultural Research Centre (ARC)

Egypt

Messrs. Abdullah  
El Jaff  
Mahmoud  
El Moursi  
Sabet  
Nour  
Wazzan  
Kassas  
Shata

Adm., Foreign Relations Department, Ministry of  
Agriculture  
FAO Representative  
Dean, Faculty of Agriculture, Cairo University  
FAO Expert, Pasture and Fodder Development  
Regional Officer for Agricultural Research, FAO Regional  
Office for the Near East  
Assistant Director-General, FAO Regional Representative  
for the Near East  
Project Manager, Mariout Educational Project  
Professor of Plant Ecology, Cairo University  
Director of Desert Institute, Cairo

Authors of national reports

Morocco

Mr. Larbi Firdawcy  
Secrétaire général, Institut Agronomique et Vétérinaire  
HASSAN II, Rabat.

Tunisia

Mr. S. Hadjej  
Directeur général de l'Institut des Régions Arides,  
Directeur de l'Ecole Supérieure de Pastoralisme, Médénine

Egypt

Dr. M.A. Abdel Salam  
Vice-Director, Desert Institute, Cairo.

2. MOROCCO

2.1 Introduction

With its 19 million sheep and more than 8 million goats, Morocco is undoubtedly the major pastoral country of North Africa. Its highly diversified rangelands include a large proportion of forests or brush vegetation. Therefore the forestry engineers

and the Direction des Eaux et Forêts have a leading role to play in rangeland development and management.

The problem of overgrazing and its dangerous effects on soil erosion have been recognized in Morocco since 1947, and a soil protection and restoration service within the Direction des Eaux et Forêts was created in 1950. Pasture improvement districts have been set up; foreign species have been introduced and tried; reservations have been maintained for several years; in short, Morocco has fairly long rangeland experience whose results are often uncertain or controversial, but which is very useful and should be transmitted to future generations of pastoralists. Moreover the pastoral populations of Morocco have a wealth of traditions and customs which must be respected and understood. Migratory patterns and grazing rights are a part of the complex and fascinating sociology which should constitute a major aspect of pastoral education.

## 2.2 Agricultural education in Morocco, and the part assigned to rangeland education

Agricultural education in Morocco is structured so that the four training levels (technical agent, technical assistant, applied engineer, government engineer) are set in a single study block. This enables the students to obtain the diploma corresponding to their abilities or convenience either by limiting themselves to practical and technical training or by prolonging their studies up to the engineer or university graduate level.

The system has the advantage of reducing loss of time and money both for the students and for the state.

### 2.2.1 Higher education

Higher education in agriculture is given in the following three establishments:

- L'Institut National Agronomique et de Médecine Vétérinaire HASSAN II (INAMV) at Rabat, established in 1966;
- L'Ecole Nationale d'Agriculture (ENA) at Meknès, established in 1940;
- L'Ecole Nationale Forestière d'Ingénieurs (ENFI) at Salé, established in 1968.

The students obtain the following diplomas according to the level of training:

- Ingénieur d'Etat, at the INAMV in six years of study after the Bachelor of Science degree;
- Ingénieur d'Application at ENA and ENFI in four years after the Bachelor of Science.

#### 2.2.1.1 Preparatory year for higher studies in agriculture (APESA)

This year in common, open to 600 holders of the Bachelor degree in mathematics and experimental sciences after taking a competitive entrance examination, is designed to provide a basic scientific training (mathematics, physics, chemistry, geology, biology) and initiation to living in nature and rural life. At the end of the year, on the basis of results and classification according to adjusted

coefficients and also to the inclinations and wishes the students have expressed, they are directed to the different training blocks according to the number of vacancies available (e.g. agronomists: 100/year).

- 150 will take the long training for the degree of Ingénieur d'Etat Agronome or Docteur Vétérinaire;
- 200 will take one of the eight training programmes for Ingénieur d'Application given at the Institut Agronomique et Vétérinaire HASSAN II;
- 100 will take one of two training programmes at the Ecole Nationale d'Agriculture of Meknès;
- 20 will take the training offered at the Ecole Nationale Forestière d'Ingénieurs.

191 hours of courses and supervised and practical work, of the 836 hours in APESA, are devoted to the disciplines of plant biology, rural geography and sociology with an additional six weeks for the training session in discovery of nature and the training session in rural life.

#### 2.2.1.2 L'Institut National Agronomique et de Médecine Vétérinaire HASSAN II (INAMV), Rabat

At INAMV the studies include four non-specialized years in common, of which APESA is a part.

The subjects taught during this common study programme give the students a good training in general agronomy and an awareness of all its problems including pastoralism and management of arid areas.

- In the 2nd year, 450 out of 926 hours are devoted to the disciplines of geomorphology, animal and plant physiology and social science and rural sociology methods, and a study tour enables the students to become acquainted with different ecological regions of the country.
- The 3rd-year programme includes, in addition to plant physiology, the environmental sciences block: 157 hours; the animal production block: 120 hours, and 120 hours for the human sciences which are of direct use to range management.
- The 4th-year programme, in addition to the animal production and human sciences blocks, deals specifically with range problems in which ecologists, animal production specialists and range specialists participate.

A 20-hour course entitled "Phyto-écologie et Pastoralisme" (plant ecology and pastoralism) is given by a professor, assisted by an INAMV agronomist who has specialized in range management in the United States, and by an ecologist.

Six hours of that course are devoted to animal husbandry problems taught by an animal husbandry specialist: 3 practical work sessions and a 3-day tour with the Soil Science Department complete this course which constitutes a survey of study methods of natural vegetation applied to range management.

Other courses have a direct bearing on the teaching of range management, for example, photo-interpretation, animal husbandry organization of livestock production, sociology, development, etc.

The training sessions which begin in the first year with the discovery of nature and study of the environment, and are continued by study of rural life in the second year, farming in the third and regional development in the fourth, constitute outstanding forms of active education capable of drawing the student's attention to pastoral problems and of giving rise to vocations.

The third cycle enables the students to acquire and apply more detailed knowledge in the specialization of their choice. The first year is devoted to complementary theoretical training in the specific branch of their choice and to bibliographical research with the writing of a term paper or training course final study. The second year is devoted mainly to a personal study project on a subject of national interest culminating in a final report defended before a jury composed, in addition to teachers, of outside personalities interested in the subject studied.

So far students of the third cycle have been trained abroad (France, United States, Belgium). Of the 39 students in the seventh class, 2 are specializing in range management at the Universities of Arizona, Colorado and Oregon, 2 in soil conservation and watershed management and 5 in animal husbandry at INA (Paris). One range management specialist of the sixth class is completing his training at the University of Minnesota, as are 2 specialists in soil conservation and one in watershed management.

In 1979, when the agricultural classes of 100 students reach the fifth year, the third cycle will be fully operative in Morocco.

It will then be possible to offer thorough and specialized courses to an adequate number of students (5 to 20).

<u>Specialization</u>	<u>At present</u>	<u>From 1979</u>
Range management	2	5
Animal husbandry	5	10
Ecology	2	4
Watercourses and forestry	6	8
Plant physiology	1	1
Botany	1	1
Watershed management	2	4
Soil conservation	2	4
Rural sociology	2	4
Development	2	4

The subjects chosen for the third cycle are final papers and are often directly related to the problems raised by pastoralism in Morocco, both for the animal husbandry and human sciences specialities and for those of range management.

A census of INMV-trained Ingénieurs d'Etat shows clearly that the requirements for pastoralists are far from being met: of the three graduate engineers trained previously the oldest is in charge of range management at the Direction de l'Élevage (MARA), another is attached to the Société nationale de développement de l'élevage (national society of livestock production development) and the third is an Assistant at INAMV.

#### 2.2.1.3 L'Ecole Nationale d'Agriculture de Meknès (ENA)

At present ENA can accept about a hundred students and it graduates classes of approximately forty Ingénieurs d'Application. There is no "Pastoralism" (Rangeland) speciality, but the specializations in "Elevage" (livestock production) and "Technique et Développement" (techniques and development) can prepare the students to some extent to undertake range management tasks.

The "livestock" study block at ENA consists of training focussed mainly on "animals", knowledge of them, their physiology, and different kinds of animal production with the respective technical, economic and social aspects. Forty students per year opt for this programme. The "techniques and development" block is organized in two main branches, the first concerning plant production methods, and the second relating to economic and social aspects (development, sociology, extension, cooperation, rural institutions, legislation...). Sixty students per year take this training.

Although there are no "courses in range management" in the strict sense, in each section the students are made aware of the problem through several hours of courses and a tour guided by professors from INAMV and ENFI.

#### 2.2.1.4 L'Ecole Nationale Forestière d'Ingénieurs de Salé (ENFI)

ENFI offers much more intensive and practical specialization in the field of range management, precisely because of the role played by the Direction des Eaux et Forêts in the development and management of public lands, most of which are used as rangelands and which often bring more income from meat than from timber production. This school has received FAO/UNDP support for Project MOR/68/519 "Education and Training in Forestry". A rangeland expert in this project teaches a 75-hour exhaustive course in range management. The course includes: the description of types of grasslands in North Africa; some concepts of animal husbandry; the description, ecology and cultivation methods of the principal fodder crops, with emphasis on fodder shrubs and trees; range improvement, particularly that of forest rangelands, and finally, range legislation and administrative organization.

The curriculum is not confined to this theoretical aspect. The students have a chance to become familiar with grassland and forest vegetation and its ecology through ecology courses and tours. Furthermore, and this is an extremely important aspect which it would be desirable to generalize, the students take active part in pasture improvement trials carried out in the framework of Project FAO/UNDP/MOR/73/016 "Forest Rangeland", mainly in the Mamora forest.

Each year a few (4 or 5) students choose as their final paper/thesis a rangeland or forest-rangeland management subject which constitutes a personal study and, to some extent, a form of specialization.

73 students are taking the ENFI courses, of whom 36 are non-Moroccan Africans. About 20 diplomas of Ingénieur Forestier d'Application (applied forestry engineer) are awarded every year.

## 2.2.2 Technical education

The technical education programme consists of two levels: technical assistants and technical agents.

### 2.2.2.1 Training for technical assistants

Eight regional schools give training for technical assistants in different specialities (agriculture, horticulture, forestry, livestock production, rural engineering, agricultural machinery management) with average classes of 60 technical assistants per school per year.

The Ecole Royale d'Elevage de Fouarat (90 technical assistants per year), the Ecole Royale Forestière de Salé and in particular the three schools of agriculture deal with rangeland, and pasture projects. The establishment of the Ecole Régionale de Pastoralisme of Missouri within the framework of 1978-1982 five-year plan completes the range of specialists at the technical assistant level and, due to the school's location in the midst of a primarily pastoral steppe region, it will be able to give appropriate training. The school, which will have a demonstration district and a trial station, will represent a pole of development in the region.

### 2.2.2.2 Training for technical agents

Eight technical agent training centres complete the agricultural personnel training structure. Of these centres, that of Fouarat training 120 livestock production agents, and that of Salé with 20 forestry agents, can provide staff at that level to teams specialized in range management problems.

## 2.2.3 Permanent training

Since 1972 permanent training actions have been conducted on one hand by the Service de la Formation Permanente, and on the other hand by several organizations.

The objectives are mainly the updating of information and preparation of the students for new jobs or examinations, but also the diffusion of research results.

Their educational resources are extremely limited and the refresher training, which is very passive, suffers from a lack of concrete examples such as demonstration farms or districts, trial plots, etc.

### 2.2.3.1 Professional training sessions

The sessions are designed to give agents already in service professional competence in a specialized field.

The duration of the session can be long (1 year), of medium length (40 days), or short and renewable (Sheep production monitors: 1 week twice or three times per year for several years) depending on the level sought.

Some of these sessions, requiring permanent and senior level staff, are organized in structures attached to higher education establishments. Others are organized within temporary structures (Sheep production

monitors/dairy production supervisors E.A. Ellouizia), whose staffing is provided both by the Direction de l'Enseignement Agricole et de la Formation Professionnelle services and by the agency requesting them (e.g. Direction de l'Elevage).

2.2.3.2 Refresher courses

The purpose of these sessions is to update the knowledge acquired by the agents during their initial training.

They are organized at different levels, involving either advanced scientific and technical information for senior staff members or at more traditional levels offering, in the latter case, a review of basic technical knowledge. The sessions are organized mainly by the Service de la Formation Permanente (D.E.A.F.P.), but also by other agencies.

2.2.3.3 Evolution of permanent training activities

Year	1973	1974	1975	1976	1977
Number of sessions	9	17	25	28	in operation
Number of agents involved	302	424	500	500	in operation

2.3 Extension and dissemination of information

The Division de la vulgarisation et de la cooperation de la Mise en valeur (DMV) (Division for extension and cooperation for development) is in charge, through "Centres de travaux" (CT) (Work Centres), of contact with farmers and livestock procedures in all matters concerning assistance and services. However education, training and demonstration activity are only minor compared to service and supply operations such as distribution of seed, fertilizers, rental of machinery, etc. Thus the CT can provide logistic support to demonstration operations, but unless these can be altered profoundly they are not suitable for range management demonstration.

In the communications media sector, regional rural radio broadcasts are organized several times a week and contain news items on agricultural and pastoral activity in the regions concerned. Broadcasts on diffusion of new techniques and introduction of new activities are also programmed by the extension services of the province branches of the Department of Agriculture or the Regional Offices for agricultural development. The Moroccan radio and television stations (R.T.M.) of Fez, Oujda, Marrakech and Agadir have very comprehensive programmes concerning agriculture. Television also offers a weekly agriculture programme.

The establishment of the Centre National d'Etudes et de Recherches sur la Vulgarisation (National Centre for Studies and Research on Rxtension) at Meknes, which will be financed with the assistance of the World Bank (BIRD), will make it possible starting in 1978 to make an analysis of the extension methods employed and evaluation of their impact. As the Centre is equipped with assembly halls and television studies,

it can contribute more intensively and systematically to the introduction of these information methods to inform and train farmers and livestock producers in order to improve their technical level.

#### 2.4 The role of demonstration projects and districts in training and information of livestock producers

Responsibility for the development and management of rangelands is shared by two Departments of the Ministry of Agriculture which can thus undertake trials or demonstrations. These are the Direction des Eaux et Forêts and the Direction de l'Élevage.

Other educational or research bodies have the specialities and technical resources to design, conduct and supervise demonstration districts, even though they have no legal power to administer them. These agencies are the Enseignement supérieur (INAMV, ENA, ENFI) and the Direction de la Recherche Agronomique (DRA) (Agricultural Research Department).

Lastly, a semi-state association such as the Société nationale de développement de l'élevage (National society for livestock production development) or a private company such as "King's Ranch" can make useful contributions to the knowledge of range problems.

##### 2.4.1 La Direction des Eaux et Forêts (DEF)

Traditionally, the DEF has been responsible for regulating forest ranges and public lands and for carrying out range improvement. Its authority also extended to community lands by agreement with the communities benefiting from grazing rights. Since 1969 Eaux et Forêts deals only with the forestry sector defined as "all lands having tree or brush forests and therefore classified as public land".

In the case of Morocco, these lands cover a vast area (5 300 000 ha) and for most of the year support a herd estimated at approximately 700 000 beef cattle, 4 000 000 sheep and 3 000 000 goats, or about 1.3 of Morocco's national herd. The grazing on this area is so heavy that it endangers the forest's regeneration by the damage it causes to young seeds, and it degrades the existing forest by removing branches and buds.

Thus this is not a case of desertification, since the forest areas are usually sub-humid to semi-arid, but one of degradation frequently eroding their plant cover, and of considerable decrease of their production potential.

In these areas grazing rights are customary and the populations are fiercely attached to them. Although the forestry law of 1917 theoretically regulates grazing, it cannot be applied without giving rise to violent protests. That is why demonstration actions have been undertaken by the Direction des Eaux et Forêts with support of the FAO/UNDP project "Parcours forestiers" (forest ranges) in three regions: the Mamora (Rabat-Kenitra), the western Rif foothills (Chaouen) and the Central Atlas (Aïn Leuh).

The Director of Eaux et Forêts himself believes that in spite of an exhaustive socio-economic study and some technical success, such demonstration experiences have not managed to convince the population anywhere. After three years of acceptance and even cooperation, the populations rejected all forest grazing restrictions such as a decreased grazing loads and periods, temporary reserves, application of a grazing map, restrictions which were compensated by substantial forage assistance consisting of fertilizer treatments, introduction of pasture species or planting of forage shrub species.



This half-failure can be partly explained by the particularly difficult ecological conditions of the localities selected (poor sand soils of the Mamora, low water retaining schist of Chaouen), but mainly by the fact that the problem of these populations was not treated as a whole, but was regarded almost exclusively from the standpoint of range protection.

However, the Direction des Eaux et Forêts is engaged in a project for integrated management of the Loukos basin. Proposals of its development were made after socio-economic surveys for units of between 200 and 500 ha. Those proposals include grassland, range and fruit-tree plantation improvements and a group of anti-erosion methods. It would seem that work along this line could be most effectively demonstrated on a land development that has been well planned and, especially, constantly reviewed on the basis of the results obtained. It is seldom possible to conceive an ideal development from the outset; it is by constant control and criticism of results that we can ultimately arrive at an acceptable solution.

At this level education and research institutions can play a leading role. In addition to their technical and administrative executive services they have time to think and design. They should teach future staff members to analyse the situation, to criticize results, to adopt decisions or to change direction when necessary. They are well placed to synthesize the different aspects of development problems. Consequently, it is to be highly recommended that the higher educational institutions should play a greater consultant role in integrated development projects and that the students should participate actively with the competent technical services in the preparation and execution of these projects.

#### 2.4.2 La Direction de l'Elevage

The Direction de l'Elevage deals, in particular, with the improvement and management of the unforested and more arid communal lands. At present it administers three range districts by agreement with the communities:

- the arid area (near Midelt) covers 25 000 ha, in a region receiving an annual rainfall of approximately 300 mm.

Four communities have voluntarily agreed to this range improvement experience undertaken in 1968 with the assistance of USAID. 6 000 ha of alfa grass and white artemisia steppes were replanted successfully with Agropyrum intermedium.

A number of right-holders who agreed to obey the grazing regulations have benefited from this replanting by grazing a small number of sheep on the area. Although the demonstration is successful from the technical standpoint, having considerably increased the number of F.U. (fodder units) produced per hectare, it has not yet proved convincing to the local livestock producers. The replanted soils which are deep and receive run-off water, are the best in the area. Around the replanted zone many livestock producers have ploughed and have sown cereals to "melkise", the common land.

- The second district of Ain Beimathar in the eastern zone covers 20 000 ha but only 300 ha have been replanted, with poor results. This project has had less effect on range improvement than on the establishment of a cooperative and on an even distribution of watering points.

- The El Borouj area in the Settat region covers 14 000 ha of public land comprised in the agrarian reform. At one time this area underwent range improvement by the Eaux et Forêts through planting of windscreens and forage trees.

Unfortunately, in spite of all the proposals advanced and a final paper/thesis by a third cycle student of INAMV, this district has no range management demonstration.

The Direction de l'Elevage plans to establish 11 range improvement areas in 10 provinces during the coming 5 years. This plan seems overly ambitious because of the need for qualified personnel to staff such centres if we wish them to operate efficiently and have real demonstration capability.

Each centre would require an applied works engineer on the spot assisted by three or four technical assistants, and it would be desirable for the engineer (ENA or ENFI) to have acquired his specialization during a long training course. Moreover, several state engineers (INAMV) specialized in range management would be necessary to supervise the proper operation of the centres and the improvement results.

#### 2.4.3 Higher agricultural education

Higher education in agriculture in Morocco has considerable scientific potential in the disciplines related to range management, whether from the standpoint of the ecology of range areas, animal physiology and animal production or that of sociology and economics. Due to the presence and interrelationship of these disciplines, studies and research can be conducted along multidisciplinary lines, which is the only way to grasp this complex group of problems involving both the plant and animal environment and the human beings who live in it and derive their livelihood from it.

The main contribution of higher education consists of preliminary studies of the environment and proposals for management prepared as final papers/theses by INAMV third cycle students, or management plans presented by students of ENFI under the guidance of the scientific staff of those institutions.

#### 2.4.4 La Direction de la Recherche Agronomique (DRA)

Through agricultural research on the Sahara, the Direction de la Recherche Agronomique has studied and established an 800 ha district containing 12 ha of irrigated land in the Haute Moulouya at Talsinnt with a view of demonstration. This district has been the subject of a third cycle thesis.

The DRA has also been very active in the field of forage crop experimentation.

#### 2.4.5 L'Association Nationale pour les Productions Animales (ANPA) (National Association for Animal Production)

This association groups scientists, technicians and professionals and, through its seminars and study days, provides for positive encounters and contacts for promotion of range development.

#### 2.4.6 Semi-state or private organizations

Here we may mention again the three semi-state fattening ranches managed by the National Society for livestock production development (SNDE) which could be used for demonstration, and a private operation, the Ranch Alarouch (King's Ranch).

## 2.5 Conclusions and recommendations

Morocco has excellent agricultural education at the advanced level in which range development is recognized as a speciality. However, in view of Morocco's future needs for pastoralists, it would be desirable to double the number of students specializing in this branch, i.e. 3 to 4 per year instead of 1 to 2 at present.

The training provided abroad (USA) seems to have good results. However, it should not be forgotten that such training must be based on a sound knowledge of both the ecological and sociological conditions in Morocco. Therefore specialization in "pastoralism" should have three phases: mastery of study methods of the Mediterranean environment and analysis of its vegetation in a specialized university; a study period abroad (Mediterranean countries) to learn modern rangeland and herd management methods; and prolonged study in Morocco to test and apply such knowledge and, in particular, and especially to adapt it to Moroccan conditions.

Here is where the UNDP/FAO development projects can have their full value. Such projects, which are not designed as supports to local services or trials, must be able to operate on a sub-regional scale as integrated development projects involving many disciplines. Thus students in range development would have a chance to work as a group and exchange their points of view and results with other specialists. It should be kept in mind that range management is only one aspect of land management.

The applied engineering schools should be associated with these studies, although it would be inadvisable to merge the two levels. On the contrary, the "design" aspect must be developed at INAMV by strengthening the theoretical bases of management starting in the first or second year and by constant exercise of the critical sense and analysis. On the other hand, the applied engineers should not be isolated or considered by-products of INAMV. Their practical training, which is already good, could be improved further or made more alive by participation in the execution of research and trials in the regional development districts.

Range development in Morocco undoubtedly suffers from a certain compartmentalization between the services.

The Direction des Eaux et Forêts, Direction de l'Élevage, Direction de la Mise en Valeur, the Direction de la Recherche Agronomique, the Direction de l'Enseignement Agricole are all directly affected by this problem which causes more competition than collaboration at the expense of results.

However, the participation of specialists in the training (specialized courses, organization and drafting of papers and theses) and of teachers in range research and studies brings this training very close to development problems and avoids compartmentalization.

As they are trained in the same institutional framework, the personnel in the range sector tend increasingly to work together whether they are assigned to teaching, research, livestock production or Eaux et Forêts. The Association Nationale pour les Productions Animales (ANPA) allows for an exchange of view points, reciprocal information and coordination of efforts.

Furthermore, the development of integrated regional development would make it possible to harmonize points of view. Possibly the Ministry of Planning and/or the Ministry for the environment may have an effective role to play in this connection.

The most difficult aspect, contact with the livestock producers, is primarily a problem for sociologists. Education should be capable of playing a role in the evolution of mental attitudes, but if it is to do so it must not be confined to training executive personnel or technical agents. Morocco lacks professional schools closest to the practical level, i.e. school farms, schools for shepherds or herdsmen, schools for adults. Such schools or training centres, which should also be planned regionally, could help to make well designed development operations and cooperative solutions acceptable.

### 3. ALGERIA

#### 3.1 Introduction

Like Morocco, Algeria is a major pastoral country (8 million sheep, 2.5 million goats). While the salient feature in Morocco is its grave problem of forest ranges, Algeria is characterized by large-scale migrations from south to north over high plateaux, the "achâaba".

Every spring the herds which spend winter on the borders of the Sahara return to the north along well established paths, grazing on the steppes as they go, to spend the summer on the stubble fields and fallows of the plains of Sersou and the Constantine region. Every autumn the return journey is made more quickly to their winter quarters south of the Saharan Atlas.

This migration raises highly complex technical and sociological problems. Understandably the solutions proposed to bring about an evolution in Algeria's extensive livestock production structures towards more intensive forms, while safeguarding natural potential and conforming to the requirements of social progress set as a priority by the Algerian Government, are not yet clearly defined or, above all, sufficiently tested.

#### 3.2 Agricultural education in Algeria and the part assigned to the rangeland sector

Higher agricultural education is provided by two institutes:

- 1'Institut National Agronomique at El Harrache (INA), which gives theoretical training for engineers;
- 1'Institut de Technique Agricole at Mostaganem (ITA), which gives training in applied engineering.

At the technical level agricultural education is provided by the intermediate-level agricultural Instituts de Technologie (ITMA) distributed throughout the country.

Lastly, professional training in agriculture is given in the Centre de formation des agents techniques agricoles (CFATA) (Agricultural technical agent training centres).

##### 3.2.1 Higher education

- 3.2.1.1 L'Institut National Agronomique (INA) at El Harrache, under the Ministry of Higher Education which is responsible for universities and research, awards a diploma of agricultural engineer in the so-called "theoretical field" after five years of study, four of them in the common programme plus one year of specialization. Admission, which is limited to holders of the bachelor's degree, is by competitive examination. The programme does not contain a specialization in "pastoralism" but there is an "animal husbandry" section. A general

course in animal husbandry taken by all students in the third year creates awareness of specific livestock production problems in Algeria, particularly those of extensive sheep production. Students specializing in animal husbandry receive a 45-hour course dealing with range management, feeding and herd management.

Every year two or three students submit theses on range management or sheep husbandry subjects.

INA trains yearly classes of about a hundred engineers.

3.2.1.2 L'Institut de Technique Agricole (ITA) at Mostaganem is under the Ministry of Agriculture. It has a high capacity (2 500 students).

After 4 years of study the institute awards a diploma in "applied" agricultural engineering. It offers several specialities such as forest management, land development, Saharan agriculture, and animal production which can contribute to the development of arid regions. However, range management as such is not included as a speciality.

The final year of study is devoted to practical work, frequently in the form of a session in a CAPCS (Coopérative agricole polyvalente communale de service (Multipurpose community service agricultural cooperative)). Some ITA graduate engineers go to complete their training by 2 years of study at Montpellier.

At present ITA is administered by the French technical cooperation service which sends its military cooperation personnel as teachers. The teaching programme suffers somewhat from the cooperators' lack of practical training and it would be advisable to train national teaching staff as soon as possible.

From the time of the school's establishment in 1969 until 1975, 1 283 agricultural engineers have been trained by ITA.

3.2.2 Technical education

Technical education is given by the "instituts de technologie moyens agricoles (ITMA) (intermediate agricultural institutes of technology)", which are the official equivalent of the French agricultural lyceums. They are open to students who have obtained their secondary studies certificate (i.e. after 6 years of elementary studies and 4 of general secondary studies).

After 3 years of studies (more specialized and more practical during the third year) these institutes award a diploma of "agricultural technician", equivalent to the civil service grade of technical assistant.

From 1966 to 1975 3 466 agricultural technicians were trained in the 14 institutes spread throughout the country. However, the country's requirements for technical assistance to staff the Agrarian Revolution are enormous, being estimated at 20 000 between now and 1980.

At present the ITMAs have a reception capacity of 4 500 students and train about 750 technical assistants per year. They are said to specialize according to the natural region where they are located, and therefore they should be able to train technicians oriented appropriately to the main regional agro-ecological systems.

- (b) The associate engineer must be able to implement part or all of a project for range, forage and animal husbandry.

Only one ITMA, the Institute of Djelfa, has assumed an approach clearly directed to pastoralism and management of arid regions. Unfortunately, it has been impossible to evaluate the degree of specialization of this Institute, extension worker in the range sector. He must also be able to work in the range and herd conditions.

### 3.2.3 Professional education and permanent training

Agricultural education at the professional level is provided by the Centres de formation des Agents techniques agricoles (CFATA) (Agricultural technical agent training centres). He may be assigned to make range and animal husbandry inventories;

At present there are 46 centres specializing more or less in: main crops (13); livestock production (10); tree cultivation (9); vegetable crops (6); viticulture (2); mechanization and mechanics (4); accounting (1); and irrigation (1). Thus none of them offers specialization in pastoralism, but some livestock centres concentrate more on sheep production.

Training for technical agents has received support from FAO/UNDP projects, firstly from agricultural training projects ALG/66/508 and ALG/70/530 and later, especially, from project ALG/73/002 (training of staff recruitment agents for the agrarian revolution). As the agrarian revolution was to cover 100 000 farmers on one million hectares, it was urgent to organize the training of technical staff (technical agents) of about 600 CAPCS.

The broad lines of the training programme have been introduced or expanded in the study programme e.g. irrigation, reforestation and development of arid regions.

Project FAO/73/002 provided for training of 15 arid region improvement monitors for 1975 and 20 for 1976. An expert was to have been recruited for this purpose in May 1974 for a duration of 24 months. His task was:

- to inform himself on the different arid region development studies made previously in the country;
- to work out a training programme plan and timetable;
- to prepare practical manuals on basic information and on development of arid regions;
- to describe the overall factors: climate, soils, water resources and plant groups;
- to recommend actions to be undertaken: rangeland management, drilling of wells, improvement of social conditions, combating underemployment, all solutions to be envisaged with the framework of the agrarian revolution;
- to collaborate with the expert on teaching and audio-visual methods;
- to select monitors and personnel for the development of arid regions;
- to establish liaison with institutions.

This expert was never recruited, since there was no one who fitted this ideal agro-ecologist profile. Yet the need to call on such specialists is being felt more keenly than ever.

The same CFATE also provides adult professional training and retraining. For example, the Saida school trains shepherds who are to be responsible for herds belonging to cooperatives or self-managing farms. Other centres are being established or expanded. They have school and boarding buildings, and provide practical studies for adults who will have responsible positions in the self-managing farms or the CAPRA (cooperative farms during the third phase of the agrarian revolution). These courses, which take the form of intermittent sessions lasting from 15 days to one month several times a year, are taught by "specialized" monitors, i.e. who have taken a course in teaching methods. It is doubtful whether the know-how of the educators is equal to their teaching ability.

### 3.3 Extension and dissemination of information

In Algeria agricultural extension and information come mainly under the competence of the Direction de l'Agriculture et de la Révolution Agraire des Wilayas (DARAW) 1/ (Department of Agriculture and Agrarian Revolution of the Wilayas). This is a consequence of the decentralization of administrative power currently under way in Algeria.

Each DARAW has the following technical sub-divisions: Animal production, Forestry, Studies and projects. Extension operates through the Department of Agriculture branch office of Daira. 2/

The organization of refresher courses and seminars is handled by the graduate technicians (ITA) who transmit technical information and data by audio-visual media in the production units, primarily the CAPCS.

On a national scale, an agricultural extension and professional training service under the Direction de l'Education agricole (Department for Agricultural Education) confines its work to communication of information to the press, the radio and TV, but has no field activity.

There also seems to be a national commission for extension whose role was not clearly explained to us.

In conclusion, the decentralization of extension services is certainly favourable to an understanding of regional problems such as that raised by range improvement in arid regions. Nevertheless it was not possible to judge the effectiveness of these services. We wondered whether they lack management models to offer the livestock producers as concrete illustrations of their advice. Certainly they can point to some achievements in cooperative livestock production, but it is to be feared that these examples are not valid for demonstration purposes and that their results are debatable.

### 3.4 Role of demonstration projects and districts in training and information of livestock producers.

The briefness of the mission did not allow for assessing locally the solutions proposed for rangeland management and of results to date. The information and data obtained from the Direction de l'élevage or the Sous-Direction du Pastoralisme are too fragmentary or imprecise to give a real idea of the policy followed in Algeria in the range sector. However, it appears that at present the first concern of the authorities is to group livestock producers in production cooperatives.

Parallel to that system, the cooperatives created on the initiative of ADEP (Association pour le développement de l'élevage et du pastoralisme) (Association for the development of livestock production and pastoralism) are continuing their experiences. Every experience is useful and can provide a lesson provided that the results are analysed frequently with a concern for objectivity so that a future line of conduct can be derived from them.

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1/ Equivalent of a governor's district.

2/ Equivalent of a district.

Probably there is not just one, but several, solutions to the problem of range management in Algeria, depending on the ecological and sociological conditions of the place concerned. Several surveys on range management in its empirical and traditional form have been carried out in different regions by various agencies (ARDES, ACHAABA survey, etc.). Several environmental studies containing soil, vegetation and forage production maps have also been made. But as far as we know there is no objective analysis of the results obtained by the sheep production cooperatives except, possibly, in the form of a final paper/thesis by students at the ITA of Mostaganem.

This argues for a need to strengthen experimentation and control of results in a few cooperatives selected for their representativity of regional conditions and their sound management, and which could be used as places for experimentation and education for INA and ITA and later as demonstration and extension centres.

It may be objected that such a situation already exists and that some cooperatives, like that of Djelfa, fulfill these functions. Of course students in the higher and intermediate technical levels do take courses at these cooperatives and have a chance to confirm the results and eventually to criticize them. However, this does not seem to produce either complete and well structured studies or in practical proposals regarding the choice of a range policy.

### 3.5 Conclusions and recommendations

The shortness of our stay in Algeria and lack of information do not enable us to pass judgement conclusively on the present situation of the range sector in that country, nor to recommend specific action concerning education and information.

Certainly the teaching of range management should be developed both at the university and the technical levels.

The first step would be to establish a department of range management at INA. The department could begin by giving courses in range plant ecology; later it could undertake, with the assistance of students beginning their final thesis, a comprehensive study of the range situation in Algeria.

More than ever, there is a need for a range management meeting the qualifications described in the request for project 73/002. His role could be to organize a department of range management at INA to study the present range situation and to propose a regional agro-pastoral development project.

## 4. TUNISIA

### 4.1 Introduction

Contrary to Morocco and Algeria, Tunisia is not a country of sizeable nomadic herds. However, sheep husbandry in the form of small herds (3.5 million sheep, 660 000 goats) belonging mainly to settled farmers plays a considerable role in the agricultural economy. A large part of the country is arid (less than 400 mm of rainfall south of the Atlas ridge). This region, especially the south, which is vital to the nation because of its population, its mineral wealth and its prospects for industrial development, must defend itself against the threat of desertification.

The Tunisian Government is constantly concerned to promote and encourage any action of its Service or of multi- or bilateral assistance designed to conserve land and water in the sub-desert regions, either directly (earth works, dyke construction) or indirectly (range and agricultural management).



The national report emphasizes rightly that while intensive livestock production has always received special attention, extensive stock raising, and range management in particular, have been virtually neglected until the end of the 1960 decade.

It was only around 1970, especially with the inauguration of the 4th Four-Year Plan (1973-1976) that a programme for action on the rangelands was prepared and put into operation:

- at the research level: establishment of 2 projects:
  - The Southern Range Project (FAO/TUN//69/001),
  - The US/IBP/Desert Biome Project
- at the training level: establishment of the Ecole Supérieure de Pastoralisme (Advanced school for range management) of Médénine
- at the development and extension level: Project WFP/482, with technical support from Project FAO/TUN/525
  - Southern Range Project (FAO/TUN/69/001)
  - Reorganization of land tenure and demarcation of lands suitable for range development. Application of the forestry regime to rangelands.

#### 4.2 Agricultural education in Tunisia and the part assigned to the rangeland sector

The following brief extracts from the national report sum up the present situation:

"Tunisia now has a sizeable agricultural education capacity:

- 4 long-cycle higher education establishments, i.e. Tunis, Sousse and Medjez el Bab, where the Ecole Nationale de Médecine vétérinaire (National School for Veterinary Medicine) is established;
- 7 higher educational establishments offering the short cycle (2 years), including the Ecole Supérieure d'Elevage of Mateur, the Institut sylvo-pastoral (Sylvo-pastoral Institute) of Tabarka and the Ecole Supérieure de Pastoralisme (Advanced School for Range Management) at Médénine;
- 7 agricultural secondary education establishments; the number is to be reduced in the future (baccalauréat level);
- 26 agricultural professional training centres.

These institutions are distributed throughout the country, with the highest concentration in the north, particularly at Tunis.

The following establishments are to give a range study programme:

- the Institut National Agronomique (Tunis);
- the Ecole Supérieure d'Elevage of Mateur (north);
- the Institut sylvo-pastoral of Tabarka (extreme north);
- the Ecole Supérieure d'Elevage et d'Horticulture (Higher school of livestock production and horticulture) of Chott Mariem (centre);
- the Ecole Supérieure de Pastoralisme of Médénine (extreme south)
- all agricultural lyceums (L.A.);
- all agricultural professional training centres (CFPA).

However, with the exception of the Ecole Supérieure de Pastoralisme de Médénine and the Institut sylvo-pastoral of Tabarka, the training programmes deal almost exclusively with intensive livestock production and intensive forage production. Some basic ideas on "European" grasslands are often taught in certain agricultural lyceums. Sheep production is taught, but at a descriptive and incomplete level.

These inadequacies are due mainly to:

- a lack of instructors specialized in the range sector;
- a lack of awareness of range problems on the part of the authorities;
- insufficient studies and research which are the necessary support to sound training, especially at the higher level."

#### 4.2.1 Higher education

##### 4.2.1.1 L'Institut National Agronomique (INAT)

The university studies programme given at the Institut national agronomique of Tunisia has only a short 4 year cycle (Baccalauréat plus 4) leading in all the state services to the grade of applied agricultural engineer. The third cycle which is necessary to obtain the degree of chief engineer, or specialized engineer, must be taken abroad. Thus there is no specialization at INAT. However, the students indicate their orientation towards a certain speciality by their choice of their thesis subject. That is the case, for example, of students who choose sheep production or range improvement as a thesis subject and who, without receiving training as range specialists, participate in seminars and are supervised in their personal work by the professors concerned (animal husbandry, forage production). This year 4 or 6 students are focusing on arid region range improvement problems.

Some INAT engineers have acquired more complete specialization in range management through two years of additional study abroad. Two engineers have received a DEA (Diplome d'étude approfondie) (Intensive Study Diploma) in animal husbandry at the Institut Agronomique of Montpellier. Another has submitted a third cycle thesis in plant ecology at Montpellier. Lastly, two engineers have received a Master of Science in range management in the United States and a third is continuing his studies there. Altogether, Tunisia has only six engineers specialized in the field of range management of arid regions.

##### 4.2.1.2 Higher technical education

Higher technical education is more specialized. Open to all holders of the bachelor's degree (whether in agriculture or not), it consists of two years of specialized study permitting entry to the government administration with a grade of assistant engineer. It is given in the following schools:

- Chott Mariem (horticulture, rural engineering, economics);
- Mateur (livestock production);
- Moghrane (management, economics);
- Medjez el Bab (mechanics, rural engineering);
- Tunis (technology, the food industry);
- Tabarka (watercourses and forests);
- Médénine (arid regions).

The Ecole des Eaux et Forêts at Tabarka has a "range development" orientation which is not followed every year but which has trained some staff officers possessing good basic information on pastoralism in sub-humid forest regions for the Direction des Eaux et Forêts.

Finally, the very recently established Institut des régions arides at Médénine, and the technical school associated with it deserve special attention. This Institute, created by the law of 7 January 1976 and having civil status and financial autonomy, is responsible for conducting all studies and research, experimentation and action in the arid region range improvement and development field as well as the combat against desertification.

In fact, the law confers on this Institute a broad mission of research, education, information, orientation of development plans, and of "creating mass awareness of rational utilization of natural resources in the range sector". Its first act was to rapidly create a technical school at Médénine for training the personnel necessary to its operation.

In view of the importance and originality of this school, we considered it useful to reproduce in extenso the paragraphs its Director wrote on it in the national report.

"L'Ecole Supérieure de Pastoralisme - Médénine, giving 2 years of higher studies, and training 12 to 20 technicians per year.

The establishment of this institution will complete the efforts undertaken in the research and demonstration field (Project UNDP/UNESCO/FAO/TUN/69/001, pilot project for agropastoral development).

There were several favourable conditions for such an initiative:

- in the south there is a team of experienced researchers and technicians, a team which is and will continue to be strengthened not only by staffing with high level Tunisian personnel but also with international experts;
- at present in the centre and south of the country there are range, forage and animal husbandry improvement districts constituting supports for supervised works. Furthermore it is planned to have the Institut des régions arides purchase some pilot farms representative of arid region agriculture.

#### Senior range management technician type profile

The associate range management engineer will work in the field in a team responsible for management studies, or in a laboratory with a research team.

##### 1. In the field

- (a) He will be responsible for technical administration of collective, state (pilot farms, agro-combinat) or semi-state (cooperative) rangelands. In that capacity he will be responsible for herd management, supervision of range utilization and preparation of seasonal and yearly programmes. He must be able to propose to his superiors or to boards of administration changes in exploitation models based on technical and economic data.

- (b) The associate engineer must be able to implement part or all of a project for range, forage and animal husbandry development (operation of a development works site).
- (c) He must be able to carry out effectively the job of extension worker in the range sector. He must also be able to evaluate range and herd conditions.

2. In a study team

- (a) He may be assigned to make range and animal husbandry inventories;
- (b) He must be able to carry out socio-economic surveys;
- (c) and to provide for preparation and interpretation of maps and aerophotos.

3. In a research laboratory

He may be assigned:

- (a) to make soil, climate, plant and animal measurements;
- (b) to conduct trials.

Training programme

The broad lines of the training programme have been laid down by a group of teachers and researchers at a meeting held for that purpose at INAT on 7 September 1976.

- first year: Basic studies (theoretical and practical)
- second year: Supplementary course: seminars, practical sessions in the field.

1. Basic studies programme (theoretical and practical)

The study programme given from 3.9.1977 to 10.1.1978 totalled 594 course hours and 146 hours of practical work (Table I).

In addition, a study tour was organized to visit the main projects in the livestock production and pasture field, which include:

Livestock and forage production in the north:

- Sejnane project
- Agro-combinat of Pretissa;

Livestock and pasture production in the centre:

- Enfida agro-combinat;

Livestock production, rangeland and forage plants in the south:

- Jelna agro-combinat (Sidi Bouzid)
- Chaâl agro-combinat (Sfax).

2. Supplementary course

The objectives of the seminars are to enable the future technicians to learn to become documented on a subject related to their activity. The students complete their basic study programme inasmuch as the short duration of the studies cannot cover all disciplines or subjects.

The seminar themes are presented by the students before a jury composed of instructors-researchers, farmers' representatives, and technicians of the regional agricultural services. All the students take part in all the discussions.

The training sessions are designed to prepare technicians to assume their technical and social responsibilities in the best conditions possible. Trainees are incorporated in the research projects, development projects and pilot farms. In fact, the most satisfactory recruitment and staffing conditions are found in these structures."

TABLE I

Study programme taught to the first year class

(3 January 1977 - 10 January 1978)

<u>Disciplines</u>	<u>Number of hours</u>	
	<u>Courses</u>	<u>Pr.W. 1/</u>
Animal husbandry	72	47
Veterinary hygiene	45	5
Zoology	7	-
Hydrology	20	24
Geology/Hydro-geology	40	-
Soil science	24	28
Plant biology	22	8
Bio-climatology	30	-
Plant ecology	(33 ( 8 (15	(10 ( 6 (10
Plant physiology	15	-
Botany/Systematics	22	-
Pasture improvement	13	-
Statistics	28	-
Rural economics	(15 (12 (30	- - -
Rural sociology	(10 ( 6	- -
Forage crops	9	-
CES/Reforestation	24	-

1/ Pr.W. = practical work

(cont.d)

<u>Disciplines</u>	<u>Number of hours</u>	
	<u>Courses</u>	<u>Pr.W</u>
Cereal cultivation/agricultural credit	19	-
Farm equipment	18	-
Plant ecology and range management	6	-
Plant physiology and range management	6	-
Range conditions and grasslands management	4	-
Herd operation and range management	11	-
Use of saline waters	17	-
Communication and extension techniques	13	-
TOTAL:	594	146

#### 4.2.2 Elementary technical studies programme

Technical education is given in eight agricultural technical lycées, one of them for girls. The requirement for admission is three years of general secondary education. The studies have a duration of 4 years. The last year is devoted to practical work, at least in the technical branch, for the students aspiring to posts as technical associates in agriculture.

The scientific branch prepares for the agricultural baccalauréat and qualifies students for admission to the higher technical studies programme (Baccalauréat plus 2).

The agricultural lycées are more or less specialized according to their location. The lycée at the Sidi Bouzid is the only one oriented to dry farming and extensive livestock production.

#### 4.2.3 Professional education and permanent training

At the professional level the vocational training centres are open to young people who have their elementary studies certificate. There are one or two centres for vocational training in agriculture (CFPA) in each governorate. The courses have a duration of two years. 80 percent of the time is devoted to practical work and 20 percent to general training. Each school has a farm where the students learn the regional specialities in particular. Thus the CFPA of the governorates of the Centre and South Tunisia include dry-farming crops (mainly tree and olive cultivation) and sheep production in their programmes. The students, who are between 12 and 17 years old, are generally farmers' or livestock producers' children who will carry on their parents' occupation. In that way this education directly affects a class of agricultural operators.

Training and refresher courses for adults who do not necessarily have an elementary studies certificate are also given by these schools. These courses are necessary when new techniques are introduced (irrigated areas, vegetable crops). Therefore the CFPA are an important structure for the dissemination of information in rural areas.

4.2.4 Proposal for a training system, presented by the national report

"(a) Principles

Although the result of a year's experience is quite positive on the whole, there are still many gaps and greater efforts are needed if "training" action is to be effective.

- Until now training of range specialists has involved only one technical level, that of associate engineers (2 years of higher studies). A technician of this type cannot be adequately operational if the technicians he must supervise (technical assistants, technical agents) have no training in range management and if his superiors (engineers) are not even aware of range problems. Therefore action along these lines is essential.
- The training has not involved shepherds. Even in state (research institutes, schools, agricultural lyceums, professional training centres, agro-combinats, pilot farms) and semi-state (cooperatives) areas there is no shepherd coming from a training establishment, and those now employed are elderly, so there will be problems in replacing them.

The training methods and resources are not always suitable or adequate; whatever the educational level, training of range specialists should be conducted in the field as much as possible.

The training of herdsmen and range specialists can not be independent of range development policy and improvement. Therefore before the Ecole Supérieure de Pastoralisme was established we tried to estimate the requirements of Tunisian agriculture for this class of specialists:

Institut des Régions Arides .....	31
Institut des Recherches forestières .....	3
Direction des Forêts (Research and administration) .....	90
Office de l'Elevage et des Pâturages .....	20
Office des Terres Domaniales .....	6
Sous-Direction de la Production Animale .....	18
(on a basis of 2 per CRDA and 2 at the central level), or a total of 168 senior range technicians.	

The study programme of the human sciences disciplines should be strengthened. A refresher training action is necessary even for range technicians .

(b) Training of range specialists

The formula adopted for the Ecole Supérieure de Pastoralisme can be maintained. However, it is desirable that the training should not be confined to the range sector alone, but should rather open on other sectors of agricultural activity in arid regions. In fact, the new development strategy adopted by both the technical services and in the framework of rural development programmes, consists of integrating and harmonizing the two main agricultural production systems, i.e. the extensive agro-pastoral system and the intensive one of the irrigated areas.

The first year of study should be reserved for basic training with increasing importance given to practical work, seminars and field tours. The second year will be entirely devoted to practical sessions in the field and seminars.

Integration of training with research and development should be strengthened and the Ecole Supérieure de Pastoralisme should be linked with the Institut des Régions Arides (IRA).

So far as high level specialists are concerned, strengthening of the present formula will be sufficient. The structures having personnel needs (institutes, bureaux, etc.) communicate them according to their programmes, and the specialized bodies like the Institut des Régions Arides will undertake the respective training in collaboration with university structures in Tunisia (Faculty of Sciences), or abroad (Montpellier, France; United States, etc.) and in the framework of existing projects like the Southern Range Project or the US/IBP Biome Desert Project.

(c) Training of shepherds

Until now professional training (skilled labour) has only been contemplated in the form of traditional school education where the young pupil is cut off from his "natural" environment and is out of his element for 2 years successively. Furthermore, as we mentioned previously, the training is still polyvalent and therefore no shepherds have been really trained.

To remedy this shortcoming we propose the following scheme:

- To continue the training of young people in order to progressively bring new blood to the present active shepherd population. However the specialization must be sufficiently thorough and the training method must be appropriate; for example, it should be local training that does not substantially alter the young peoples' way of life and which enables them to discover the technical bases of their trade in practical terms. If young people are to be encouraged to opt for professional range training, their working conditions, in particular, must have fewer constraints and the job must be more remunerative. This would require integrated range management plans (increased productivity) and would lend further weight to the value of integrating of training and development.
- Launching of a "training action" with the present shepherds. This would not be a traditional extension action, but rather the technical and human recruitment of shepherds, most of whom have sufficient know-how and experience and do not object to technical progress. Such an effort, although more costly and difficult initially, will produce results after a few years. "Extensionist-instructors" should likewise have sound training enabling them to become easily integrated in the pastoral environment so that they can do their job as monitors properly.

In this respect the human sciences are of major importance.

The number of shepherds to be trained will depend on the number of herds, their size and their structure, i.e. large, small, or collective herds.

At present training projects can only be contemplated for collective and large herds (more than 50 head). Assuming that technically a shepherd can easily manage a herd consisting of 50 to 200 females, it may be estimated that in the arid regions (on a basis of 800 000 female sheep and 400 000 female goats) of Tunisia at least 10 000 shepherds would have to be trained. For a



ten-year programme, this would mean training 1 000 shepherds per year, an overly ambitious objective in terms of the present available resources.

#### 4.3 Extension and dissemination of information

The technical aspect of extension and dissemination of information still comes within the competence of several technical services such as the PAVA (plant production) and the OEP (Office de l'Élevage et des Pâturages), etc.

However there is an Extension Sub-Division within the Direction de l'Enseignement, de la Recherche et de la Formation des Cadres (DERFC) (Department of Education, Research and Staff Training). It has no personnel in the field because its activity is confined to preparing messages for dissemination by the technical assistance of the various services concerned.

Documents, whether written, visual or for radio broadcasts are prepared at the request of the farmers or livestock producers themselves through channels of their groups, but most often at the request of the administration.

Some agencies provide their extension materials themselves, as does project WFP/525 concerning livestock feed and production.

The 3 000 technicians of the Ministry of Agriculture who work in the field do disseminate technical advice, but they have neither the resources or the powers to really provide rural leadership. According to the Acting Director of the Extension Service, range management would require a corps of specialized extension agents including at least one extensionist per "Onda" (administrative division above the local Extension representative) who could reach the livestock producers in their groups, i.e. public lands bureau cooperatives, cooperatives of the Centre Tunisien service, Union nationale des agriculteurs /National farmers' union/ (professional association), the neo-Destour party, administrative councils of community lands, joint interest groups (in the irrigated demonstration districts).

Lastly, it should be recalled that the functions of l'Institut des Régions Arides include collaboration with the present agencies and coordination of all actions related to range management in arid regions.

The organization of scientific and technical seminars and meetings in the range sector shall be entrusted to l'Institut des Régions Arides, which will request the participation of other research and training organizations concerned, action (e.g. Bureaux) and extension agencies and services (including professional groups) and, eventually, of specialized international or inter-governmental programmes. The seminars will be designed:

- to permit or create circulation of information between researchers and extensionists, and between the latter and the livestock producers;
- to contribute to re-training of technicians of the regional services who generally work far from documentation centres;
- to assist or facilitate the formulation of development projects;
- to permit the establishment of a balance and the evaluation of actions undertaken in the region;
- to permit encounters in the field and at round tables of technicians from two or more governorates of a single large region."

#### 4.4 Projects in execution and their role in training and information

In Tunisia, even more than in the other countries of North Africa, the ecological range environment has been carefully studied.

Maps of vegetation, evaluation of the biomass, floristic evolution, etc. are available for large areas of the South and some localities of central Tunisia.

In those areas, which are well known from an ecological standpoint, concrete proposals for management have been advanced, frequently after sociological surveys have been conducted.

Here again complex sociological and legal problems of collective land development and management arise. Frequently it has been possible to work around the problem by creating the demonstration district on former public lands administered by OTD and establishing an exploitation cooperative. Certainly the results are not readily applicable to communal lands, but the districts developed in this way do have a real demonstration value provided they are administered correctly. However it is generally agreed that very few of them are managed satisfactorily.

One of the reasons mentioned is the lack of qualified personnel to administer the districts, which ties in with the problem of education. But this would seem to be due mostly to the lack of motivated people to provide the management of such cooperatives artificially created on public lands and grouping agricultural workers.

As for the livestock districts on community lands, they have little value as models due to the lack of political and administrative structures among livestock producers who see the establishment and administration of these districts as a state initiative which does not concern them.

There are plenty of community land administration councils, but so far their role has been primarily to limit these community lands and turn them over to private ownership as much as possible. Moreover these administrative councils have hardly any real authority and they remain under the control of the Ministry of the Interior.

No initiative has emerged yet to enable them to assume real responsibility for community administration. The law of August 1974 on the demarcation, management and development of community and public rangelands does not assign any function to the administrative council and makes rangelands entirely subject to the forestry regulation laws.

In the light of these conditions and in view of the present resources, how can the livestock producers be reached? By maintaining and improving the management of the existing districts which, from the technical standpoint, constitute excellent means of arousing their awareness and, at the same time, by working through the service cooperatives to influence the members' livestock production methods and practices.

There are now half a dozen range improvement districts planned and set up by projects TUN/69/001 and TUN/71/525. Only the Sbeitla district covering 430 hectares of public lands, which is under the Public Lands Office and has the status of a cooperative production unit is really useful for demonstration purposes at present.

This district has a good director and a well trained livestock production agent. Demonstration days were organized there in 1975 and 1976. Every week in January about 200 participants, composed of livestock producers and technicians, sometimes coming from a considerable distance (Gafsa, Gabès) assembled for 3 or 4 days. The lectures and demonstrations were conducted by FAO experts and, for the lectures in Arabic, by their national counterparts.

The livestock producers asked many relevant questions clearly showing their interest in the demonstration. The district is still regularly receiving visits of small groups of livestock producers.

The other livestock districts on public lands like Chenini, Chaan, El Adala, Hadj Kassem, organized as UCPs 1/, and others on community lands all suffer from poor

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1/ UCP = Unité coopérative de production (Cooperative production unit).

administration, lack of firmness in their management, frequent changes of technical personnel and their lack of training, and the absence of supervision or guidelines from the services concerned. Livestock producers visit them only infrequently and intermittently.

We may also mention the sylvo-pastoral district of Chouchra in the Sedjenane sub-humid region, set up by the Direction des Eaux et Forêts, which can constitute an interesting experience in establishment of seeded grasslands to compensate for limitation of grazing rights on forest rangeland.

The Ousseltia Centre under INRAT would deserve more dynamic management so that it could become an education and demonstration centre conveniently located in a major livestock production region.

The cooperatives established in central Tunisia during the WFP/485 project conduct considerable extension action in the feed and supplementary feed sector. WFP/482 also distributed 65 000 tons of concentrated feed at cost price until the project ended in 1974. South of the mountain ridge the use of concentrated feed supplements had been little known. Now it has become a habit and it is distributed properly and spontaneously, which cannot fail to have positive effects on the lambing rate and lamb weight. It remains to be seen whether range utilization has benefited from this practice.

According to the national report, this increasingly widespread use of feed supplements (concentrates, dry fodders, etc.) is really due less to an extension effort than to the improvement of supply circuits (Cereals Office storehouses) and above all to the rise of living standards and particularly of "non-livestock" income which provides livestock producers with resources to meet feed shortages on rangelands.

More recently, on the basis of the work of project FAO/TUN/69/001 (Southern Range Project), the Direction des Forêts has tried to set up a range management and improvement project in the framework of action to combat desertification. The project is located in the Douiret area (100 000 hectares under study in the Foum-Tatahouine region). Another area, Oglet Merteba (20 000 hectares) on community lands has also been examined by the Southern Range Project and 5 000 hectares are already set up.

Execution of the Oglet Merteba Project, formerly under the Office de l'Elevage et des Pâturages, has been entrusted to the Institut des Régions Arides since January 1, 1978. In the light of the competence of this Institute, there are now well founded hopes for the sound management and success of this project.

#### 4.5 Conclusions and recommendations

Tunisia has taken the fortunate initiative of establishing an Institut des Régions Arides whose first task is to train high level technicians. This is a source of satisfaction and it is to be hoped that neighbouring countries, or those subject to similar ecological conditions will benefit from this study programme.

However some reservations may be in order:

- Training of senior technicians (associate engineers, first cycle) was given priority in the hope that they, in turn, could train technical assistants and skilled workers.

However it would seem that a range sector chain might also have been established at the Institut National Agronomique at Tunis, which could work in close collaboration with the Institut des Régions Arides. At present the courses at the range management school of Médénine all have regular instructors, but it will certainly be necessary to provide for eventual replacements and especially for strengthening of the teaching staff.

The participation, or even integration of a department of range management at the Institut des Régions Arides would strengthen the ties between research, higher education and practical work.

Moreover it is to be feared that the activity of the Institut des Régions Arides is not coordinated sufficiently with that of other services of the Ministry of Agriculture concerned with range development, i.e. the Direction des Eaux et Forêts, the Office de l'Elevage et des Pâturages, the Office des Terres Domaniales, the Institut de la Recherche Agronomique and the Institut National Agronomique de Tunisie.

Finally, although not provided for under the law, the field of action of the Institut des Régions Arides extends to the 300 mm (approx.) isohyet. It would be advisable for the Institut not to confine its activity to the area around its headquarters at Médénine and the equally sub-desert regions of the south, but to contemplate dealing with the considerable problem of extensive livestock production in steppe regions and the progressive degradation of the arid to sub-arid grasslands.

## 5. LIBYA

### 5.1 Introduction

Libya's livestock herd numbering just over 3 million sheep and 1 million goats grazes mainly on arid and semi-desert ranges (with the exception of Djebel Lakhdar). The problem of desert encroachment appears here in its full magnitude, not because overgrazing is more acute than elsewhere but due to the weakness of the environment, the uncertainty of rainfall, and especially the constant threat of invasion by the Nubian sand dunes from the interior.

From the socio-economic standpoint the Libyan government's concern is two fold: to gradually settle the semi-nomadic populations in order to provide them with education, health care and other services and, at the same time, to become as independent as possible of food imports, especially cereals and meat.

Libya has considerable financial resources enabling it to call upon technical agents from the neighbouring Arab countries until it has qualified national technicians.

### 5.2 Agricultural education in Libya and the part assigned to the rangeland sector

#### 5.2.1 Higher education

The Faculty of Agriculture of Tripoli, established in 1967, is part of the University of Tripoli. It admits students possessing the High School Certificate in Science, and also those having diplomas from Agriculture High Schools, provided their grades average more than 65 percent. It awards a degree of Bachelor of Science after 4 years of study. Specialization begins in the third year, but there is no speciality in range management. However a considerable part of the speciality "animal production" is devoted to sheep production (4 hours/week) and range management (2 hours/week) during the fourth year. Out of approximately 100 diplomas awarded each year, about 20 are for specialization in "animal production".

During 1977-78, eight students will take the speciality "animal production" at the Faculty of Agriculture of Tripoli, which gives elements of "Range Management".

A Faculty of Agriculture has recently been created at Benghazi, but it does not seem to include studies in range management so far.

#### 5.2.2 Technical and professional education - refresher courses

Secondary technical education is closely linked to the activities of the Agricultural Research Centre. The centre has its main headquarters at Tripoli, but it also has 4 regional centres all with a secondary level school of agriculture taught by the research personnel. These 4 centres and schools are located at Tripoli (outskirts), El Marj, Misarata and Sebha (newly established).

Each school is designed to receive a large number of students (400 to 500) who at the time of entrance must possess their preparatory studies certificate (3 years after elementary school).

The studies have a duration of 4 years and the schools award about 125 certificates per year.

To these centres should be added an older school, the Ecole Secondaire d'Agriculture (agricultural secondary school) of Gherian mainly oriented to dry farming, and those of El Ewalia, near Benghazi.

None of these schools is specifically oriented to range management, but all of them prepare their students for extensive sheep production.

During the past 5 years these schools have helped to give advanced courses having a duration of 2 to 3 weeks to about 5 000 already employed people.

Lastly we may mention the Forest Guard Training Centre at El Hasham, which trains 20 to 25 forest wardens per year who, in this arid country, act mostly as range wardens.

### 5.3 Extension and regional development

In Libya extension and dissemination of information can not be dissociated from regional development programmes.

Libya's development is being executed on a regional basis with the object of distributing it throughout the country. Five development regions have been selected: the Gefara plain, the Djebel Lakhadar, the Gulf of Syrte and the central wadis, the eastern oasis area, and the Fezzan.

Each region's development is under the responsibility of an "authority" whose mission it is to develop the region through a number of projects determined by their location (district) or their objectives.

Each "authority" is headed by a chairman, the chief responsible for development, assisted by the project managers, and together they constitute the council of the "authority".

The Council of Development is the decision-making body, which, under the chairmanship of the Minister of Development and consisting of the five presidents of the "authorities", representatives of five ministries (Agriculture, Social Affairs, Water, Planning, Housing) and a representative of the university, chooses the orientation to be given to the development.

This ensures coordination between the activities.

For the development of the coastal areas the Council of Development, on the basis of economic studies on water table utilization, relies on semi-intensive sheep production with forage crops or fodder reserves with or without supplementary irrigation. The range improvement districts should therefore consist of a complex of non-irrigated farms having rotating cereal and dry farming forage crops and of partly or wholly irrigated farms producing forage for fattening young lambs and for the establishment of forage reserves.

These projects are still in the initial stage of execution. Trials of legume forage crops to replace fallows (annual legume-wheat rotation) conducted by Australian bilateral cooperation are currently underway, as well as planting of forage reserves based on cactus, atriplex, acacia, etc. Furthermore real range improvement action has recently been started for the Gefara Plain through project FAO/LIB/10 and another project, FAO/LIB/11, is planned for the Syrte area.

The future assignees of the farms to be established are livestock producers or farmers of the region who voluntarily apply as candidates and who, after selection, are hired as workers by the "authority". They are employed in land improvement and construction of the farms and this work is considered as professional training. Most of them are hired in the preliminary phase as tractor drivers or earthworks equipment mechanics, and it is intended that they should gradually learn all the aspects of their future occupation as farmers.

With a view to demonstration and training, Mr. Ben Ramadan, Director of the Gefara Authority, considers that a few of the best farms should be chosen to become pilot farms for both management and technical demonstrations, i.e. crop methods, selected seed trials, fertilizers, rational range exploitation, etc.

The future technical officer staff requirements for the Council of Land Reclamation and Development are considerable. At present 254 university graduates and 183 technicians, most of them foreigners, are employed in it but there is no range specialist. In the future about 40 cooperatives will be established in the Gefara Authority alone, and it is planned to have each of them headed by a Bachelor of Science assisted by two technicians.

Yet in 1977 only two future range management officers were acquiring specialization in this field:

- a student employed in the Service des Forêts, Pâturages et Ressources Naturelles (Forestry, Grasslands and Natural Resources Service), who spent two years studying for a Master of Science degree in Range Management at Wyoming State University in the United States;
- a research assistant of the ARC was going to the United States to work for a Master of Science degree.

#### 5.4 Conclusions and recommendations

The principle of regional development in Libya is excellent, but too few young graduates, or even students are actually taking part in these projects. However they will have a chance to carry out real practical land management exercises in them.

Closer relations should be established between the University (Faculties of Agriculture of Tripoli and Benghazi), the Agricultural Research Centre and the different "authorities" of the Council of Development, so that the young Bachelors of Science selected could come in contact with Libyan problems before going abroad to obtain a Master of Science degree. Secondly it is necessary to train one to two range specialists per year.

The projects in execution have ambitious objectives, but it is far from certain that they can be attained, at least in their present form. However, the FAO/LIB/10 and LIB/11 projects should have good results thanks to their current and planned demonstrations.

The Agricultural Research Centre, previously supported by a FAO/UNDP project, should have its actions strengthened in sectors like that of development of arid lands.

The University or the Agricultural Research Centre might study better integration of oasis agriculture in the national economy. Some young graduates who would like to specialize in range management might deal with this specifically Libyan problem.

Full attention should be given to desertification problems (here we can really speak of the problem of "desert resurgence").

Here too, young graduates should be associated with this project, which could take the form of a regional institute for combating desertification. Some proposals to that end have already been made by the Libyan authorities and FAO. They are certainly worth considering.

## 6. EGYPT

### 6.1 Introduction

Egypt's agriculture is based mainly on irrigation. Intensive agriculture is concentrated in 3.5 percent of the national territory, in the Nile valley and the delta. The rest of the country is desert. The eastern desert and Sinai account for 28 percent, the western desert for 68 percent.

However the coastal part of the western desert is not wholly lacking in potential. In spite of very low rainfall - between 100 and 150 mm - its coastal strip contains lands that could be cultivated without irrigation as they receive run-off waters. In some places supplementary irrigation can be obtained through wells or through distribution of wadi flood waters.

About 652 000 sheep and goats graze on this coastal strip of about 500 km in length and 20 to 30 km in width.

To the east, the Sinai offers many rangelands which could undoubtedly be improved by management of run-off waters.

The Egyptian Government is justifiably concerned mainly to maintain and increase the fertility of irrigated lands and to solve salinity and drainage problems. Therefore range development of non-irrigated areas is not an immediate priority; nevertheless its potential is not neglected, since the Institut du Désert (Institute for the Desert) and the Universities of Cairo and Alexandria continue to conduct productive research activity in collaboration with international or foreign scientific organizations (Unesco, FAO, University of Utah).

### 6.2 Agricultural education in Egypt and the part assigned to the rangeland sector

Agricultural education in Egypt is given at two levels:

- higher level, in the faculties of agriculture;
- technical level, in agricultural secondary schools.

#### 6.2.1 Higher education

12 faculties of agriculture within the universities award a Bachelor of Science degree after 4 years of study. They are distributed throughout the country as follows: 3 in Cairo (Cairo, Aïn Shams, and El Azhar), 1 in Alexandria, 5 in the delta (Kafz El Sheikh, Mansoura, Tanta, Moshtabar and Ismaïlia), and 3 in Upper Egypt (Farum, Menya and Assiut).

4 of these faculties (Cairo, El Azhar, Alexandria and Assiut) go beyond the B.Sc. and award M.Sc. and Ph.D. degrees.

The studies for the B.Sc. degree have a duration of 4 years. The first 2 years are devoted to general courses.

Many options are offered starting in the second year, followed by a large number of specializations in the third and fourth years, but they do not include Range Management.

The "Animal Production" specialization is considerable, and the few specialists in range management available in Egypt receive that training first before going to specialize elsewhere, generally in the United States.

In the "crops" department of the University of Aïn Shams, some courses deal with forage production, ecology and range improvement. Specialization in



these branches can be acquired by taking a M.Sc. or a Ph.D. degree. The national report mentions some subjects of theses presented dealing with the ecology of plants in sub-desert ranges, their physiology, etc. in the western coastal desert.

Some specialists acquired their speciality by an M.Sc. research paper or a Ph.D. thesis prepared with the support and advice of the Desert Institute or the Department of Plant Ecology of the University of Cairo (Prof. Kassas) or the University of Alexandria (Prof. Ayyad).

The Faculties of Sciences of these Universities award students in botanical sciences M.Sc. and Ph.D. degrees in plant ecology. This training is equivalent to a specialization in range management.

The courses given include plant ecology, phyto-sociology, plant geography, study of Mediterranean ecosystems, plant physiology, genetics, statistics, etc.

Prof. Kassas told us he regretted that ecology and the study of vegetation do not constitute a basic course in the Faculty of Agriculture. He has proposed a reform of the study programme along those lines. In the meantime, graduates wishing to acquire a knowledge of arid and sub-desert environments can take the course at the University of Alexandria.

The number of students enrolled at the Faculties and Colleges of Agriculture is very large (about 25 000), and consequently so is the number of degrees awarded. Therefore the problem in Egypt is not that of finding graduates able and willing to specialize in range management, but rather to give them the opportunity, after specialization, to fully exercise their profession.

#### 6.2.2 Technical studies programme

More than 32 000 students take courses given in about fifty secondary schools of agriculture. The course programme is unified and exclusively oriented to general agriculture. Half the time is devoted to practical work.

The secondary schools admit students possessing an intermediate studies certificate. Studies in these schools have a duration of three years.

The programme includes basic cultural (languages, sociology) and scientific (biology, chemistry, etc.) courses and technical courses, some of them on development of arid regions, but they have no specialization.

10 000 to 12 000 diplomas are awarded each year.

#### 6.2.3 Professional education

This programme covers only certain fields where the need for skilled workers is particularly felt, such as horticulture, agricultural mechanization and rural engineering.

### 6.3 Permanent training, refresher training and extension

#### 6.3.1 The Ministry of Agriculture provides two types of professional training under the supervision and coordination of the "Selection and Training Directorate":

- (a) training before entry in service,
- (b) in-service or refresher training.

The trainees come from all levels, from university graduates to manual workers. The content and duration of the courses are established by specialists in different fields of agriculture, for example, mechanization, livestock production, forage production, extension, plant protection, horticulture, etc.

However there are no courses specifically devoted to range management.

The courses have an average duration of 6 weeks and are held in the research station of the Ministry of Agriculture and in experimental farms where lodging and teaching facilities are provided.

About 200 university graduates, 300 graduates of schools of agriculture and 6 000 skilled workers are being trained at present.

6.3.2 The Egyptian International Centre for Agriculture is administered by the Agricultural Foreign Relations Department of the Ministry of Agriculture. Each year this Centre organizes four series of courses of five months' duration in the following fields:

- Agricultural services (February/June); development, cooperatives, credit, economics, and statistics.
- Plant production and protection (February/June): study of soils, major crop plants, horticulture, plant protection, food technology.
- Animal production and health (July/November): cattle, sheep, etc. production, nutrition, disease prevention, parasitology, etc.
- Drainage and irrigation. Land improvement.

3 000 trainees are now taking these courses.

6.3.3 International Centre for Rural Development

The training centre of the Mariut region (30 km south of Alexandria) was established with the support of the FAO/UNDP/74/006 project to train the administrative and technical personnel for the "Egyptian Authority for the Cultivation and Development of Newly Reclaimed Lands". The training is addressed to technicians at different levels, i.e. managers of cooperative farms, inspectors, extension agents, mechanics, skilled workers, agricultural engineers, etc.

The courses cover many fields of agriculture: cooperatives, mechanization, livestock feed, etc., but range improvement is not taught. However this centre, appropriately located in the border area between irrigated and sub-desert regions, could provide the infrastructure necessary for a centre to retrain technical staff members who are to work in arid regions. It could also formulate a policy for improvement and utilization of the western coastal area which could be integrated better in the development of new irrigated regions. Forage production for combatting drought, fattening of lambs, etc. could help to improve the ranges of the North-Western Coastal Region.

6.4 Development projects and their role in training and information

At present there are no longer any range development projects in execution in Egypt, except for an ecological study of Mediterranean sub-desert regions. However it may be useful to mention, citing data from the national report, efforts in the past to improve the Western Coastal Desert rangelands.

#### 6.4.1 Ras el Hekma range improvement project

As a result of an agreement between Egypt and the United States, an experimental station was established in 1952 at Ras el Hekma. Range development, replanting, floodwater distribution, etc. trials were undertaken on about 25 000 feddans (10 000 ha.). The project made it possible to acquire a sound knowledge of a coastal sub-desert environment, to study the performance of local and introduced plant species, and, especially, to train some university-level range specialists. However it was a failure in regard to education of the local populations which refused to accept any restriction on their grazing rights.

#### 6.4.2 FAO/UNDP project "Pre-Investment Survey of the North-Western Coastal Zone"

From 1965 to 1969 the Egyptian Government received FAO/UNDP assistance to conduct a pre-investment study in the western coastal region.

Studies were carried out in climatology, soil science, development of surface and underground water resources, animal production, range improvement, agriculture, horticulture, fruit tree cultivation, silviculture, and water and soil conservation.

The conclusion emerging from this project was that the development of this region should continue to focus on range management and sheep production, at the same time maintaining some dry or irrigated crop cultivation wherever possible.

The recommendations included, among others:

- a long-term programme to effect the transition from traditional extensive and uncontrolled grazing to livestock production integrated with irrigated agriculture involving the establishment of forage reserves and fattening of lambs on seeded pastures.
- an urgent programme for establishment of grazing districts, improvement stations for rangelands and herds, rural wool sale and classification units, dairy goat production farms, etc.

#### 6.4.3 FAO/UNDP project for animal and plant production in the Western Coastal Region (EGY/71/588)

This project is a follow up to the preceding one, its purpose being to develop and regenerate 16 000 to 24 000 hectares of rangelands and to create a livestock production cooperative on them.

The pilot sector selected is located near Marsa-Matrouch.

Unfortunately these projects for the development of the coastal area seem to have had very little impact, at least so far as range development is concerned. At present the livestock producers of the area continue to practice extensive unorganized livestock production and supplement the feed for their herds with forage purchased in the delta.

It is impossible to judge to what extent the range vegetation of the coast, already degrades at the time of the projects mentioned previously, will withstand overgrazing. The local populations, who resist all constraints in any case, have not been recruited and educated sufficiently to accept a grazing control system.

Nevertheless these projects have not been useless. They have left some improvements in the field of herd feeding and health, fruit tree cultivation, organization of cooperatives, etc. A few engineers and technicians have benefited by some practical training and study fellowships abroad. The basis for pastoral groundwork has been laid for range projects; very little would be needed to implement them.

#### 6.4.4 The SAMDENE Project (University of Alexandria)

This project, entitled "System Analysis of Mediterranean Desert Ecosystems of Northern Egypt", is being executed by the University of Alexandria with the support of the U.S. Environmental Protection Agency. Its purpose is to collect information and data on a Mediterranean desert ecosystem and to construct a model taking into account exchanges of energy and matter. Two enclosed districts of 8 hectares at Burg el Arab and Omayed have been under observation since 1974.

Parallel to the project's scientific aspect, it has a clearly educational role at least at the university level.

#### 6.5 Conclusions and recommendations

The number of agricultural students and graduates with degrees at all levels in Egypt is impressive. The number of specializations is also very high. Why, then, are there so few range specialists? Why do Egyptian range experts, who are excellent, exercise their profession abroad? Because the Egyptian Government has given priority to the development of irrigated agriculture of the Nile valley and abandoned (it is to be hoped only temporarily) the problem of the development of arid regions.

However, important though the problems of irrigation may be, the future development of those sub-desert regions which constitute the North Western Coastal Region and the Sinai should be contemplated seriously. These two areas are potential industrial development regions (presence of fossil fuels) and could conceivably have an agro-pastoral type of development linked to the Nile irrigated areas.

The Institute of the Desert is already contemplating surface water management projects in certain localities of the Sinai region. This project deserves to receive full support from the international organizations and to be developed into a broader agro-pastoral project for management of the non-irrigated regions of the Sinai.

The establishment of development plans and the strengthening of regional agricultural services in these areas will create vocations. There will be a need not only for range specialists, but also specialists in soil and water conservation, hydrogeologists, soil scientists, etc.

The Institute of the Desert, in close collaboration with the Faculties of Agriculture and Faculties of Sciences, is ideally qualified to participate in all these projects and to provide research and training at the university level.

As for technical and professional training, it is precisely defined by the conclusions and recommendations presented in the national report:

- it is proposed that the Mariut Research and Training Centre training programme be revised with a view to introducing a global programme on different aspects of range development. This centre, located on the border of the Western Mediterranean area, possesses the infrastructure necessary to a multi-disciplinary training centre. The Institute has specialists in range management, animal production, and in soil and water conservation. The programme could be established by the Institute of the Desert in collaboration with the other organizations concerned, such as the International Rural Development Centre and the Egyptian International Centre for Agriculture. International aid, assistance and cooperation should be sought through them.

## 7. GENERAL CONCLUSIONS AND RECOMMENDATIONS

### 7.1 Education

#### 7.1.1 Higher Education

No faculty of agriculture in the countries visited has a sufficiently large department of range management to give the study programme the place it deserves in pastoral countries.

Range management is taught everywhere as a particular and secondary aspect of extensive sheep production and therefore it is included in the animal husbandry courses. At best it is regarded as an application of plant ecology, which is undoubtedly an accurate concept but one which reduces it to its most elementary theoretical bases.

Therefore it would seem desirable to have environmental sciences, i.e. geomorphology, soil science, phyto-sociology, or soil-vegetation relationships taught from the second or third year during specialization in range management so that a minimum of time can be devoted to reviewing these basic subjects necessary to the training of any agricultural engineer.

As for the animal husbandry aspect and in particular, animal nutrition, it seems to be taught to all agronomists in general animal husbandry courses during the third or fourth year.

Until departments of range management can be established, a small number of students could be trained in foreign universities. Such training could take the form of a third cycle, or a fifth year specialization, or a doctorate, or by simply obtaining a M.Sc. degree. However it is desirable that the student should go abroad with some knowledge of the range environment of his own country and of the problems arising in it. That is why departments of range management should be created as quickly as possible. Even with limited resources, and although they may not provide complete training, the main task of each department would be to "present the problems" and to guide students in their local work, when they return from abroad.

The departments of range management should also establish close scientific contact with foreign universities where future specialists in range management would be trained.

As we mentioned earlier in the case of Morocco, the specialization should be organized in three phases :

- the first would consist of acquiring knowledge of the environment and national range problems and the selection of a final thesis subject;
- the second, devoted to acquiring methods and techniques, would include one or two training sessions in foreign universities until the departments of range management could be fully organized;
- the third phase, after the students' return to the country, would consist of application of these techniques either in scientific research or rangeland region management plans.

These third cycle final papers or doctorate theses would then be guided by the departments of range management and would be prepared within the framework of either the research centre or the development project.

It is important that the young graduates be brought into direct contact with reality and that they assume responsibilities in the study and design of projects. All too often the work is cut off from reality and practice. The role of the professor of range management would be to maintain close liaison between education, research and the development organizations.

### 7.1.2 Technical education

#### (a) Higher technical study programme

Only one of the countries visited (Tunisia) has organized higher technical studies oriented to range management and the development of arid regions. The ENFI of Rabat also gives graduate technicians in forestry training as range specialists. Generally speaking, university trained technicians have not specialized, and where there is specialization the large number of students and the shortage of resources available to them makes such specialization mainly one of book-learning.

It would be advisable to have decentralization and specialization according to natural regions.

The higher technical institutes and colleges of agriculture should collaborate actively in the execution of regional projects and associate their final year students in this work.

Such institutions should also become regional research stations which would conduct local experiments on forage crop methods, species or varieties to be introduced, etc.

#### (b) Intermediate technical studies

The intermediate technical study programmes (agricultural lycée level) generally suffer from a marked lack of resources for education, i. e. well equipped school farms and especially experienced teachers and demonstrators.

In the training of monitors, the efforts are too often limited to learning teaching methods (classes in educational theory) instead of providing the material resources to teach those methods and to recruit technicians with experience.

### 7.1.3 Professional education

Genuine professional education should be addressed directly to livestock producers and farmers rather than designed to train future staff officers of the Ministry of Agriculture. Starting with the elementary school, children should be given some ideas on the environment where they live and should gradually be made aware that it is up to them to manage that environment appropriately.

The schools for shepherds should be increased. The students in them would learn not only to care for animals but also to exploit ranges appropriately, and supplement them at the right time.

Therefore the professional agricultural schools should be linked to a range management district or a small pilot region. They should have resources for demonstrations and should constitute a centre of education for adults as well as for adolescents. Training, extension and demonstration would thus be combined in the same centre and would benefit from the presence of competent people.

The international organizations should give their full technical and financial support to such agricultural training centres to enable them to give the populations real practical training.

The government authorities, for their part, should encourage real training instructors, in other words those who have the authority and know-how, to assume the guidance of these centres and to teach in them by providing them with decent living conditions in these often difficult regions and by granting them financial advantages.

## 7.2 Role of development projects in training, information and demonstration in the range management sector

How can development projects play a role in training executive cadres and in what other ways can they reach the populations most directly and effectively?

In training senior cadres the counterpart is logically expected to succeed the expert, will accompany the latter everywhere, will work with him and will be initiated in all the respective techniques.

Too often the real situation is different. Frequently no counterpart is appointed, and in some cases there are few possibilities of finding one. Sometimes it is the expert himself who prefers to work alone "in order not to lose time", and who therefore neglects his role as an instructor. The opposite also occurs: several counterparts work successively with an expert without taking serious interest in the project and are ultimately appointed elsewhere.

Therefore the post of counterpart should once more be given all the importance it deserves. The counterpart should derive the maximum intellectual benefit from his training period in the project. His merits should be recognized and recompensed by conferring a permanent position on him corresponding to his abilities and his speciality.

Therefore it would be advisable to reserve such posts for engineers attending a third cycle programme or a year of specialization or even, in more scientific fields, for candidates for the doctorate.

Obviously this presupposes much closer cooperation than exists at present between the university (Faculty of Agriculture), Agriculture Research, and the different technical departments of the Ministry of Agriculture.

The role of the project manager or senior consultant would be, among others, to keep such cooperation active. However at present a project all too often supports a technical department and passively undergoes the compartmentalization or even disputes that exist between departments. Naturally we end by questioning the project concept itself. What form should projects take in order to convey to the pastoral populations the force of persuasion they lack so greatly? If the pastoral populations are but little affected by projects now that is no reason to relax the effort, quite the contrary; but the intensiveness of the action should take precedence over its size. Projects should be implanted more firmly in a particular region, less dispersed geographically according to technical demands, or on the basis of doing favours to departments.

Actually it seems that the best results are obtained in the most regionally-based projects which apply "integrated management". Those are the projects in which different actions can be coordinated most easily and most rationally. Projects for the development or management of small regions are also those where, through demonstration, we can invite the local population to participate in development action.

And that is the conclusion of this report: we cannot hope for the slightest success in a range development plan if the population does not participate spontaneously in the action undertaken.

If the population is to be motivated and involved, it must be responsible for decisions at the regional level, and not experience them passively or accept them with false enthusiasm.



**VARYSTAMPA**  
VIA MONTE DEL GALLO, 20/F  
TEL. 630.674

M-67

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