

IN THE LIBYAN ARAB JAMAHIRIYA  
(PAST, PRESENT AND FUTURE)

1. Continuing efforts

As in most countries, particularly those situated in the arid and semi-arid belt, agriculture and animal production in the Libyan Arab Jamahiriya are the economic activities most closely associated with issues of desertification and most affected by the different aspects involved; on the one hand, they are entirely reliant on the fundamental elements of renewed natural resources and land, while on the other hand, the direct effect which they have on the status and productive capacity of these elements can be either positive or negative depending on the combination of a number of economic factors, social influences and environmental conditions and the interaction between them.

On that basis, the country's efforts over the past decades in the field of agriculture and animal production can be viewed as intensive efforts to combat desertification; allocations of over \$15 billion were earmarked for these efforts, mainly to carry out a vast series of agricultural and rural development programmes and activities comprising the reclamation and development of some two million hectares of land and the implementation of 117 agricultural projects, including seven strategic production projects over an area of almost 40,000 hectares, with the aim of reducing the division between production and the growing demand for food from inhabitants, whose numbers were steadily increasing at an annual rate of 3 per cent.

These projects also included the establishment of villages and settled communities based on farming and grazing activities. To that end, 75 settlement projects, comprising 22,000 farms, were set up with the aim of developing rural areas and creating new opportunities for employment offering a satisfactory income and a decent living standard, thus encouraging reverse migration and settlement. Equally, they aimed to ensure a constant increase in the size and diversity of agricultural and animal production.

The development programmes and activities carried out also included significant practical action with a view to maintaining and protecting the environment, safeguarding essential natural resources and improving land productivity. For the most part, this action consisted of extensive measures for the afforestation of some 250,000 hectares of land with different purposes in view, as well as the development of natural pastureland over wide areas covering in excess of 2.5 million hectares, the implementation of intensive soil conservation measures by establishing projects over an area of 192,000 hectares in the mountainous regions in order to combat erosion by water, and the stabilization of moving sand dunes, using oil derivatives and mechanical methods, for conversion into green belts. Water development projects were also established as part of these programmes and activities, including steps for the utilization of surface water; in addition to the construction of thousands of reservoirs and tanks, 16 major dams with an estimated annual storage capacity of 300 million cubic metres were constructed and over 100 million cubic metres are treated annually for reuse in agricultural purposes. Moreover, two nature reserves and five national parks were established in several outstanding environmental regions, covering a substantial area of 134,000 hectares in all.

As a final adjunct, a cohesive and uniform body of laws and legislative acts was passed, together with a number of ancillary and supplementary rules.

In brief, these programmes and activities produced an increase in plant and animal productivity throughout the whole area. Self-sufficiency was also achieved, together with surpluses of most crops. The overall performance of agriculture and animal production was therefore confident in keeping pace with the population growth and the growing demand for food and in providing new employment opportunities, which showed an annual increase of 2.1 per cent. Both activities achieved a production growth rate of 15 per cent and their contribution to the gross national product (GNP) rose to more than 5 per cent each. As such, these efforts were promoted to the level of a singular experiment, in which context the Libyan Arab Jamahiriya was ranked during the 1960s and 1970s as a world pioneer in the field of combating desertification.

## 2. Major challenges

It was inevitable as a concomitant of the improved economic conditions and the rise in population income levels that adverse pressures and influences should emerge to overshadow the progress and direction of the Libyan experiment and prevent the achievement of its intended objectives as desired. Such pressures and influences were a direct repercussion of circumstances imposed by the nature of the era and the requirements and aspirations for development thus demanded. As a result, essential natural resources and land were exposed to various forms of pollution, strain, degradation and waste partly created by a combination of different factors, circumstances and parties and the interaction between them.

The current environmental limitations are attributable to the elements of the desert climate, which played a substantial role in determining land uses and in forming the sensitive water balance rarely achieved in most areas owing to the fluctuating rainfall averages and seasonal rainfall variations, the quantity of water available annually being estimated at about four billion cubic metres. Under the effect of these limitations, the various drought factors produced specific chemical properties and soil which is naturally and characteristically fragile. The agricultural land base was therefore limited to not more than 2 per cent of the country's total area. Moreover, these factors had implications for the composition and distribution of the natural plant cover, which produces enough to satisfy only a modest 35 per cent of animal food requirements.

### Desertified areas and areas under threat of desertification: percentage of desertified areas overall according to degree of desertification

Slight desertification (per cent)	Moderate desertification (per cent)	Intense desertification (per cent)	Extremely intense desertification (per cent)
0.5	28.3	48.4	22.8

Source: "Environmental effects of agricultural development", Arab Organization for Agricultural Development, 1991.

With a view to stemming the food gap and keeping pace with the increasing demand for food and proper employment opportunities, more intensive farming was carried out in some areas and wider areas of marginal land were also cultivated, demanding the use of considerable water resources, as well as the introduction of a greater number of technical methods and external inputs. Additional pressures were therefore exerted on essential natural resources and land, as a result of which the processes of desertification multiplied and accelerated, as clearly indicated by the fact that the underground water in some of the main reservoirs under consistently heavy drainage started to run dry and turn increasingly saline. An annual deficiency was thus produced between the natural water supply and the quantities exploited; it is estimated, for instance, that over one billion cubic metres are annually taken from the reservoir on the Jafara plain, where the farming activity uses up a share equivalent to almost 80 per cent of the total consumption. Moreover, the plant cover is diminishing, woodlands are being turned to agricultural uses at an average of 2,500 hectares per year, the soil is constantly losing its fertility and over 1.5 million hectares of farming and grazing land are being increasingly eroded due to the widening and excessive use of technical methods and agricultural machinery and the fact that cultivation has extended to include marginal land with annual rainfall averages of between 100 and 150 millimetres. In addition, the land is now overgrazed due to the sixfold growth in the number of animals during the last half of the century, wildlife has diminished in both amount and diversity, and over 25 per cent of highly fertile land has been consumed by the creeping expansion of urban areas, where the average population growth now stands at 8 per cent as opposed to 1 per cent in rural areas, continuing to pose the major challenge for the future of farming and grazing activities at a time when demand persistently outpaces production.

Proportion of arable land to tractors

Year	1960	1965	1970	1975	1980	1985
Hectares per tractor	885	776	694	155	148	76

Source: World Conference on Agrarian Reform and Rural Development, 1990, Food and Agriculture Organization of the United Nations.

Projected impact of urban expansion on agricultural land in the year 2000

Category of land	Urban land area and its projected share in hectares of agricultural land according to category in the year 2000	
Category 1	1 350	(46.8 per cent)
Category 2	27 800	(15.6 per cent)
Category 3	30 300	( 4.2 per cent)
Category 4	9 450	( 2.4 per cent)
Category 5	19 000	( 1.1 per cent)
Total urban land area	97 900	

Source: "Environmental perspective to the year 2000", National Scientific Research Organization, Technical Centre for Environment Protection, 1992.

Despite the various pressures are imposed on the base of natural resources and land, affecting their productivity, it is nevertheless possible to curtail them through rapid and radical solutions based essentially on legal regulation and rationalization, which are also likely to alleviate the severity of the present environmental limitations. The potential for intensifying agriculture and animal production and increasing their productivity is encouraging in areas where the environmental factors and conditions are good. Increasing rates of desertification, however, are being experienced in many areas, as demonstrated by the degradation and depletion of natural resources, the shortage and poor quality of water, the reduction of agricultural land, the fall in its productivity and the continuing rural exodus to urban areas as a result of the lack of potential, resources and sufficient investment in rural areas. These issues will continue inexorably to impose themselves in the face of the population growth, the growing food demand and the trends in the workforce, and are significant in that land and water are the two basic resources, as well as the mainstay of agriculture and animal production, both now and in the future.

### 3. Major factors

Future estimates and forecasts indicate that, in the year 2025, the number of inhabitants in the Libyan Arab Jamahiriya will exceed 10 million, more than 90 per cent of whom will inhabit urban areas, including 70 per cent in the major towns. On the one hand, this predicted rise in population will exact the more rapid achievement of a steady increase in agricultural and animal production, while on the other, it will lead to urban expansion at the expense of farming land, with a loss of over 45 per cent of highly fertile land. These same estimates and forecasts also indicate that, in 2025, over 60 per cent of today's inhabitants will still be alive and feeling the extent of the problems endangering these natural resources and threatening the land on which they are to depend for their future food production and supply. Their economic and social interactions will therefore play an essentially valuable and highly influential role in determining the overall framework for the future of agriculture and animal production and in mapping the outline for their productivity over the next century.

In view of this predicted increase in population numbers and the current trends in the workforce, and with reference to the susceptibility of the natural resources and the limited area of agricultural land, the accomplishment of the main objectives of sustainable development, including food security and the satisfaction of its requirements in such a way as to sustain "the material and economic ability of all individuals to obtain food at all times", will demand the pursuit of development methods that seek to comply with three key factors which are both interrelated and conflicting at the same time:

1. The first factor is the demand for food. The currently prevailing approach is both rational and sound, prescribing as it does that the available resources and land - whether already farmed or with farming potential - are essentially limited. Consequently, they should be used in the most ideal and integral way to produce food with a view to meeting essential human needs, which are now

beginning to increase as a result of the natural growth in population numbers and the improvement in living standards.

2. The second factor is related to workforce trends, since the availability of employment opportunities that provide an adequate income sufficient to guarantee a decent standard of living for the inhabitants of rural areas who rely on farming and grazing activities will become an issue in itself in the future, given the rising flood of job-seekers measured against the susceptibility of resources and the limited amount of land, as well as against the rapid development and spread of the technologies in use.

3. The third factor is concerned with determining the opportunities available for the utilization of resources and land. The susceptibility and limited amount of resources and land constitute major obstacles. In order to guarantee achievement of the objectives and requirements of sustainable development, it is therefore essential to provide more equal opportunities for the utilization of those natural resources and land so as to guarantee the food supply for the increasing numbers of inhabitants and provide them with employment, especially in the case of those living in the most vulnerable areas.

Growth in wheat requirements to the year 2000

Year	Number of inhabitants (thousands)	Wheat production (thousand tons)	Amount Food consumed (thousand tons)	Percentage gap (thousand tons)	Percentage of self-sufficiency
1990	4 202	185	682	427	27 per cent
1995	5 112	185	830	645	22 per cent
2000	6 220	185	1 010	825	18 per cent

Source: "Wheat and barley: Facts and figures", Salih Al-Hamali, Sasi Harraqa et al, Agricultural Research Centre, 1992.

Total workforce and agricultural workforce

Year	Total workforce (thousands)	Agricultural workforce (thousands)	Percentage
1974	531	122	23
1980	723	156	21
1987	1 023	151	15
1988	1 059	153	14
1995	1 094	154	14
1996	1 224	219	15

Source: Arab Agricultural Development Organization (series of volumes on agricultural statistics).

1. Variety of choice

Under the present situation, farming and grazing activities are unable to perform in full their functions of providing the main food commodities (wheat, meat and dairy products). In addition, agriculture and animal production are essentially activities with the potential to achieve increasing and sustainable growth on the basis of the natural resources and land available at the present time, provided that the systems and types of production used are consistent with their natural renewal. Observance of the three above considerations will inevitably require the implementation of an integrated and cohesive series of development activities that are primarily geared towards combating desertification by applying methods of management and conservation which match the natural conditions and environmental characteristics of each area. Fitting investments should also be made in the fields of infrastructure, ancillary and supplementary activities and other services with a view to expanding the options open to inhabitants so that they are not forced to harm their resources and land. The route employed should be to enhance the efficiency and uses of such resources and land by applying various systems and types of production, manufacturing and marketing which make it possible to carry out practical measures and arrangements that have the conservation of resources and land as their mainstay in the equation of satisfying the human needs of both present and future generations so as to strengthen the social and economic significance of the future role of farming and grazing activities.

2. Project of the twentieth century

In order to achieve these aims, it was crucial to explore means of balancing the relationship between the basic elements of civilization (human beings, water, arable land), which have an uneven geographical distribution, and subsequently use them in combination to attain the objectives and requirements of sustainable development with a view to achieving food security, as well as providing adequate and additional employment opportunities, protecting the environment and preserving renewed natural resources. This strategy was embodied in the implementation of one of this century's most important and greatest projects in the fields of environment and development worldwide, namely the Great Man-made River Project, being a practical step which inescapably aspired to achieve progress and prosperity by transforming agriculture from a subsistence activity into an economic activity pursued with a view to the enjoyment of well-being by the present and future generations.

3. Popular administration and participation

Popular awareness of desertification issues and the need to preserve and protect natural resources and land will endure as a major strategic pillar with a view to achieving the objectives and requirements of sustainable development. Consequently, identifying the obstacles to farming and grazing will continue to be a matter of importance, as will demonstrating the desired benefits and advantages of programmes and activities aimed at safeguarding resources and land, developing their uses and exploitation methods and explaining these to the inhabitants of the various regions. In that connection, however, success will only be achieved by means of an effective and decisive management that first and

foremost shows concern for and takes into account the social and economic circumstances of the inhabitants.

With its complete grasp and profound awareness of all such combined interactions and influences, this brand of management can successfully generate the positive and active participation of the inhabitants concerned, which begins with a sound diagnosis, continues through the stage of formulating and implementing the measures and arrangements needed to reduce the serious obstacles and pressures to which the fundamental elements of resources and land in general are exposed, and ends with appropriate development and investment activities. Inhabitants will consequently serve as a highly effective and influential element in the ultimate success of the national programme to combat desertification.

#### 4. Investment of human capital

On a different note, with a view to alleviating the severe limitations of resources and land and reducing the pressures on them in order to provide conditions and means conducive to achieving the objectives of sustainable development, it is essential to employ techniques appropriate to the environmental conditions of each area through the use of training programmes which are essentially based on constant assessment and comparison of the available options. This will consequently ensure the effective and careful participation of inhabitants who are capable of the creation and innovation which comes of developing their own skills, their mental aptitudes and their management abilities, thereby reducing risk, enhancing efficiency and raising performance levels.

#### 5. Key technical arrangements

Research and development plays a positive and effective role, beginning with more additional research and studies in order to clarify the issues which need to be resolved, and continuing with the pursuit of more scientific and technical knowledge about the different regions with a view to determining the agricultural, manufacturing and marketing methods most appropriate for each. This may be achieved by exploring the optimum use of the available resources and land through an integrated body of conservation and development measures matched to the natural and environmental conditions in each individual region so as to ensure that the systems are linked to achieve the model production limit, as reflected in continuous and growing economic revenues.

#### 6. Establishment of legal principles

There will be a pressing and constant need to develop laws and legislative enactments to serve as an appropriate framework for the efforts made to combat desertification and achieve the objectives and requirements of sustainable development. The promulgation of such laws, legislative enactments, regulations and controls in this field will, however, be insufficient in itself, as it is also crucial to supervise their implementation, monitoring and follow-up. To that end, the various inspection, protection and monitoring agencies require guidance concerning the significance and size of the different effects of desertification and its causes, as well as the potential role which they can play in alleviating the severe limitations and the ensuing pressures. Predictions of occasional spells of drought and shortages of natural resources in the affected

areas are therefore required, as are adequate facilities and services for the inhabitants of such regions. Temporary and compensatory measures should also be taken to provide supplies of food and fodder.