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COMBATING DESERTIFICATION IN AFRICA

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I. INTRODUCTION

A. The Sahelian drought and desertification problems

1. During the last decade, the international community was aroused to the problems of drought management and desertification control by the severity of the five-year Sahelian drought from 1968 to 1973. Over 150,000 people and millions of cattle and other livestock perished in the region. More recently, drought has reappeared in Africa, with increasing intensity since 1978, in the Sudano-Sahelian region, the Ogaden Peninsula as well as in southern Africa near the Kalahari Desert region. This is worsening the problem of desertification control, as the deserts in Africa have been encroaching on useful agricultural land at the rate of 60,000 - 70,000km^2 per year. The creeping desert is choking agricultural land and affecting the livelihood of about 60 million people directly. Globally, about 600 - 700 million people living in semi-arid regions, or about 14 per cent of the world's population, are threatened by drought and desertification every year. 1/

2. As a result ofthe severity of the Sahelian drought in Africa and the massive mobilization of resources by the international and community to alleviate the sufferings of the drought victims, the General Assembly, in resolution 3337(XXIX) of 1974, called for an international conference to plan for a long-term co-ordinated programme to combat desertification. In preparation for that international conference, i.e. the United Nations Conference on Desertification (UNCOD), the ECA Conference of Ministers adopted resolution 264(XII) of February 1975, calling for a technical meeting to be held to seek solutions to the problems of drought and desertification in Africa. Since then, there has been a flurry of activities at the national, regional and international levels aimed at containing the problem and halting the process of desertification. This review paper on combating desertification in Africa will deal with the constraints and the efforts made at all levels so far, the economic considerations, and the need for technical co-operation to solve this long-term problem.

B. Ecological and socio-cultural causes of desertification

3. Because of its present level of underdevelopment, Africa is in a worse position than other regions to combat desertification and drought. The continent has about 50 per cent of dry lands, as compared to Asia (37 per cent), Australia (30 per cent), north America (20 per cent), south America (19 per cent) and Europe (9 per cent). Dry lands comprise:

(i) arid areas in desert fringes with 10-12 dry months and an annual rainfall between 100 mm and 200 mm; and

(ii) semi-arid areas with steppe and spiny shrub vegetation, with annual rainfall between 400 and 600 mm and 8-10 dry months.

1/ Mostafa K. Tolba, "Can Desertification be stopped? Desertification Control Bulletin, Vol.7, No.2, (December 1978), pp.7 - 8.

In Africa, 20.4 per cent of the land is true desert (the Sahara and the Kalahari), which is hyper-arid, but the countries most affected by the desertification process have an almost completely arid or semi-arid climate, and even some countries with a sub-tropical humid climate and open savanna woodlands are now at high risk of desertification because of deforestation.

4. The two main factors contributing towards the desertification process are climatic variability and human population pressure on the carrying capacity of the land. One of the characteristics of arid and semi-arid climates is the occurrence of repetitive drought patterns. Before the great Sahelian drought, there had been earlier droughts around the turn of the last century, then in 1910 and again about 1920. The Sahel had also experienced a series of wet years between 1955 and 1965, which created a green belt right up to the fringe of the Sahara. In examining the role of climate on the desertification process, 2/ a distinction is made between desertization, reflecting a change in climate over thousands of years, and desertification, which covers environmental changes in recent years. The current wave of desertification is too rapid to be attributable to a gradual climatic change. Present indications are that desertification is the encroachment of the desert on arable land in the fragile ecosystems in the desert fringes as a result of land-use mismanagement by human activities.

5. There is some evidence that the climate of the Sahel has been gradually becoming dryer over the past century, promoting desertization. A study by D. Winstanley, 3/ a dry-climate theorist, using climatic data checked against diaries and reports of early explorers as far back as 120 years ago, has shown a 25-45 per cent reduction in rainfall in the Sahel over the period (with a 95 per cent level of confidence). This marked reduction in rainfall may be due to a change in global pressure conditions, causing a climatic shift and preventing equatorial monsoons from reaching so far north in the Sahel today.

6. The pattern of repetitive droughts interspersed with moist periods in the Sudano-Sahelian region is shown by the rainfall pattern. In that region, for instance, there are two rainy seasons, the "little rains" expected around February to March, followed by a short dry season and then the "main rains" from June to about September. The erratic nature of the rainfall pattern is shown by:-

(i) flash floods occurring when the little rains are expected during the short dry season; and

(ii) below-average amounts of rainfall during the main rain period.

The ultimate effect is crop damage; seedlings germinating during the little rains fail to grow because of insufficient rain and those that do grow are swept away by flash floods. Also crops fail to produce the expected harvest because of inadequate main rains as well as low levels in rivers used for irrigation in the

2/ "Dossier: Desertification", The Courier, No. 47 (January/February 1978), pp.28-58.

3/ D. Winstanlers, "The drought that won't go away - The Sahel drought", New Scientist, Vol. 30 (19 October 1978), pp. 166-167.

drier regions. As the average annual rainfall decreases, the water table is lowered and the drought worsens, until very little agriculture is possible. Crop yields decrease, livestock become thin and sickly, the population experiences famine and the people abandon the rural areas in search of food, water and better conditions of life, only to create more problems in the urban areas. Thus the effect of the repetitive drought pattern is to accelerate the desertification process, as is indicated by the world's deserts all creeping forward at the alarming rate of 7 - 8 km per year since the last big drought.

7. The problem of population pressure on the carrying capacity of arid and semi-arid lands seems to be the other side of the same coin. Between drought periods in these regions, population gradually increases, through immigration together with related economic development activities. More intensive agriculture, including irrigation from large rivers, leads to greater crop yields but, depending on the drainage characteristics of the soil, can also lead to a gradual increase in the salt content of the soil, ending up with salinization and waterlogging. Over-population in an agro-pastoral community is reflected in large numbers of cattle and draught animals, which in turn leads to over-grazing of pasture land and subsequent exposure of the soil. Soil erosion and degradation then occur, caused by wind or run-off water at the beginning of the rains before the top soil is adequately wetted.

8. Population pressure in urban-rural settlements in arid and semi-arid regions in Africa also results in an increase in the use of firewood and charcoal both as fuel for cooking and for heating at night (the temperature is over 30°C during the day but falls to about 10-15°C at night). In certain urban areas in the Sudano-Sahelian region, namely Bamako, Dakar, Niamey and Khartoum, it was estimated that savanna woodland vegetation had been depleted of its trees for up to a radius of 70 km during the past decade.

9. Developing countries in the sub-humid zones have also been experiencing serious deforestation problems due to over-exploitation of timber resources to earn much needed foreign exchange and also as a result of the traditional farming practice of shifting cultivation. The situation is worsened when forests on hill slopes are removed for upland farming. Over-farming hill slopes, as a result both of population pressure and traditional custom, leads to so much soil erosion and loss of top soil that the forest fails to regenerate during the ever shorter fallow periods. Eventually, savanna grassland and later on, bare rock patches cover the hillsides. The environmental result of deforestation of mountains and hill slopes, which are generally the watersheds for rivers and streams, is that, during the rainy season flooding with a heavy silt load occurs, while in the dry season the streams are reduced to a trickle with isolated pools and become a potential breeding ground for insect vectors. Also, the water table and the rivers fall far below the level necessary for economic exploitation (irrigation, navigation, domestic supply). Great emphasis is being placed on deforestation, because it eventually leads to desertification when all the trees are gone and drought sets in.

C. Environmental effects of desertification

10. The environmental consequences of the process of desertification are numerous and only a summary can be given here. It has been indicated that the process of desertification is due mainly to human mismanagement of land use in arid and semi-arid areas with fragile ecosystems on the fringe of natural deserts. The first indications of the process of desertification in the field, even without ecological monitoring, are as follows:

(1) The loss of arable land to seasonal cultivation as productivity and crop yields fall off dramatically as the soil becomes sandier and drier, with excessive cultivation and reduced fallowing;

(2) The gradual disappearance (deforestation) of the natural vegetation (scattered shrubs and trees on a grassy carpet) as the vegetation fails to recuperate from intensive firewood cutting for fuel and charcoal production;

(3) The demand on the carrying capacity of the arid and semi-arid land ecosystem as human population increases results in a greater demand for arable land, water and essential services, and the available rangeland fails to support the increased cattle population, leading to soil degradation and failure in vegetation regeneration;

(4) The processes of soil degradation by erosion of top soil, loss of fertility by leaching of minerals, disappearance of water table and available moisture content, loss of physical structure and chemical properties, are accentuated as vegetation cover is removed with increased human and animal pressure on the ecological carrying capacity of the land;

(5) The promotion of irrigated agriculture in arid and semi-arid areas gives rise over the years to the problems of salinity and alkalinization, due to evaporation of water from consistently waterlogged areas with poor drainage conditions;

(6) With the persistence of drought in promoting the desertification process starvation becomes prevalent in the human and animal population, with increased nutritional problems for the young, leading to increased infant mortality rates;

(7) When nomads are encouraged to settle in towns around water holes, so that they can be provided with essential services (food, health, education) for basic needs satisfaction, the ecological balance, kept in equilibrium by the nomadic way of life in the arid, fragile ecosystem, is disturbed. Administrative and regulatory measures are therefore required to maintain the carrying capacity of the land.

11. In the preparation of the World Map of Desertification for the UNCOD meeting,4/ it was agreed that the carrying capacity of the land is its ecological limit in terms of its ability to support a certain human and animal population density. It was estimated that, for arid zones, the limit should be seven inhabitants per km^2 and one animal per 5 ha. For semi-arid zones, the critical limit is 20 inhabitants per km^2 and one animal per ha. For a domestic animal population, it was further assumed that the biomass production of pasture of a hectare in these zones can support the following equivalents: one bovid - ten sheep or goats - two asses - one horse - one camel. However, the productivity of arid/semi-arid land pasture has to take soil, climate and other factors into account, and further research is required in order to confirm this assumption.

12. An attempt is also made here to examine the human population density of the Sudano-Sahelian and other drought-affected countries in Africa, in relation to their degree of aridity (as indicated in Annex I), for purposes of a comparison of their carrying capacity in the arid/semi-arid regions. The most reliable measure of aridity is the climatic aridity index, which was used to determine bioclimatic zones for the World Map of Desertification. The climatic aridity index is the ratio of the average annual precipitation of a place to its total evapotranspiration. The index varies from 0.75 to over 1.0 for humid to wet zones, 0.50 to 0.75 for sub-humid zones, 0.20 to 0.50 for semi-arid zones, 0.03 to 0.20 for arid zones, and is below 0.03 for hyper-arid zones or true deserts. The proportion of arid and semi-arid lands in African countries threatened by desertification has been estimated, presumably by using the above bioclimatic criteria, (see reference in Annex I). Comparison of the average population density with the percentage arid and semi-arid land cover in any of the countries shown in Annex I would indicate that, assuming an ecological carrying capacity of 7-20 inhabitants per km^2 for such fragile ecosystems, about half the countries listed can be threatened because of the limits of the land's capacity for food production under normal circumstances, without allowing for the added effects of drought.

II. SPECIAL ECONOMIC CONSIDERATIONS IN ARID LAND DEVELOPMENT

A. Desertification and the LDC problem in Africa

13. The problem of desertification with its attendant drought which promotes the spread of the desert, is not just that of an environmental degradation process endangering the livelihood, health and way of life of the population in arid and semi-arid regions. Desertification control, therefore, cannot be an isolated activity of assessment and management of the physical environment; it requires a multi-disciplinary approach, with the integration of the various factors involved in socio-economic development into its management policy and planning. The many vivid accounts of the Sahelian drought of 1968 - 1973 always mentioned the heavy toll of human and animal life that resulted from the drought, hunger and famine. There was also mass migration of the rural population to urban areas in search of better conditions and food aid, but this only accentuated the severity of the

4/ FAO, UNESCO and WMO, World Map of Desertification, 1:25 million, A/CONF.74/2

problem. In economic terms, the effects of drought and desertification decimate food and livestock production, deprive farmers and pastoralists of their livelihood, reduce exports of cash crops for much-needed foreign exchange and impose a severe strain on the economic growth of the country affected.

14. Desertification affects three regions of the African continent, namely: the northern Saharan region, the Sudano-Sahelian region, including the Ogaden Peninsula, and the Kalahari Desert area. The table in Annex I gives a list of the countries included within each region; it will be seen that there are five in the first, 19 in the second and seven in the third. This gives a total of 31 African countries whose economies have to bear the burden of desertification control, apart from those imposed by the current world recession in industry, inflationary trends in the money market and the severe energy crisis. Of the 31 African countries affected by drought anddesertification, 17 are least developed countries, made up of 13 out of the 19 Sudano-Sahelian countries and four out of the seven in the Kalahari Desert area. As pointed out in the Substantial New Programme of Action for the 1980s for the LDCs, 5/ these countries experience extreme economic and social difficulties, such as very low income per head, extremely poor agricultural productivity and support mechanism, low level of exploitation of natural resources, high illiteracy rate, malnutrition, hunger and disease, in addition to the geographical, climate-induced and man-made accentuated process of desertification.

15. Since most African countries, including the LDCs, have essentially a rural population (70-80 per cent of the total), the problem of drought and desertification generally has severe adverse effects in Africa, since growth is inhibited and progress in rural development is halted or reversed. It is still the responsibility of the afected African countries to pursue domestic policies giving high priority to overcoming economic poverty and desertification hazards by promoting comprehensive programmes for integrated rural development, with the massive participation of the rural population, especially the women, so as to transform the rural economy. With the support of the international donor community and the expertise of the United Nations system, African governments can draw up integrated programmes for rural development based on the environmental interrelationships between the utilization and management of their natural resources base and the population at large.

16. In any assessment of the state of desertification of a country, it is essential to determine the economic costs and social benefits of the recommended corrective measures arrived at from the environmental impact analysis. Few data are available, in the African situation, on the economic cost of desertification, in terms of loss of agricultural productivity, land-use management and soil degradation, population migration, and the loss of social services provided in the abandoned areas, and of income and livelihood of rural workers, as well as other kinds of costs. Research on these problems is needed, and on the suitability of methods for monitoring the spread of desertification and the impact of national anti-desertification projects on the economy of the country.

5/ Report of the United Nations Conference on the Least Developed Countries, Paris, 1-14 September 1981, (A/CONF.104/22).

B. The natural resources base of the African arid lands

17. As knowledge and information accumulate on the natural resources base of African countries, it becomes increasingly evident that those which are affected by desertification are well endowed with physical resources (minerals, hydrocarbons, underground water), even though they are deficient in biological resources (woodland vegetation, rangelands, agricultural production, living top soil and surface water systems) because of environmental degradation and the fragility of the arid land ecosystem. The main emphasis in combating desertification has been on improving the biological productivity of the arid and semi-arid land ecosystem by promoting reafforestation, rain-fed and irrigation agriculture, stabilizing sand dunes for soil development, developing hydrometeorological networks with the aid of remote sensing techniques for forecasting weather conditions and climate trends, and hydrogeological surveys for harnessing underground water from aquifers.

18. Although the success of anti-desertification programmes in increasing the biological productivity of arid and semi-arid land ecosystems is dependent on a low frequency of drought or other natural disaster, the arid land countries nevertheless produce substantial cash crops for export which enable them to sustain a viable economy during favourable times. For example, a single product formed a substantial part of total exports during 1976-1979 in many Sahelian countries; for groundnuts, the proportion of total exports for the Gambia was 73.3 per cent and for Senegal 37.6 per cent; for cotton, it was 47.0 per cent for Mali, 53.8 per cent for Chad and 31.5 per cent for the Upper Volta. It was reported 6/ that, in Senegal during the uneven rainfall and dry spells of 1979, only 13 per cent of the area normally irrigated received water from the Senegal River and, with a plague of caterpillars at the same time, cereal production was reduced by one third. In the Gambia, 7/ the 1980 budget speech indicated a decline of 20.4 per cent in the GDP and 16.3 per cent in per capita income, as well as a decrease in groundnut exports to 60 per cent as total exports of a result of drought in 1979-1980.

19. In the area of mineral natural resources, ECA has shown that many of the African countries affected by desertification have a wealth of various important minerals. For example, the potential reserves of major minerals, excluding those of less than 40 million tons, in the CILSS Member States, were estimated as follows:8/ Mali: about 511 million tons of iron ore, 565 million tons of bauxite, 150 million tons of lithium ores and 53 million tons of salt; Mauritania: 2,640 million tons of iron ore, 4,000 million tons of gypsum, 1,200 million tons of rare earths ore, 200 million tons of titanium and 45 million tons of gold; Niger: 680 million tons of iron ore, 141.7 million tons of uranium, 50 million tons of gypsum and 40-50 million tons of titanium; Senegal: 2,500 million tons

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6/ "The creeping desert", The Economist (17 May 1980).

7/ "Drought leads to economic decline," West Africa, (17 November 1980), p.2280.

8/ Present status and main trends in the development of mineral resources in the West Africa subregion (ECA/NRD/MIN.80/1).

of iron ore, 248.5-293.5 million tons of phosphates, 334 million tons of copper and 110.2 million tons of gold; the Upper Volta: 2,061 million tons of gold, 60 million tons of iron ore, 56 million tons of limestone, 50 million tons of marble and 40 million tons of copper. Since no African country has the financial capacity, technological expertise and trained manpower to exploit such vast natural resources, the Regional Conference on Development and Utilization of Mineral Resources in Africa recommended the promotion of inter-African co-operation in the establishment of indigenous multinationals to develop mineral resources from mining exploitation, through extraction to the finished rolled metal products.

20. Similarly, the hydrocarbon potential of Africa 9/ is striking, and especially the estimated reserves of natural gas and oil in the desert-prone African countries. Based on an analysis of the results of a petroleum geological survey of the continent, quantitative estimates have been made of potential gas and oil deposits and the possible rate of development. About 40 basins with petroleum-bearing and possible petroleum-bearing rocks were identified in the continent, of which 19 are now producing oil and gas. Of the 40 basins, a total of 30 are in the arid/semi-arid areas of Africa: 15 basins in the Sahara with reserves or 16,590 million tons of oil and 11,080 million tons of gas; ten basins in the Sudano-Sahelian region with 2,200 million tons of oil and 3,075 million tons of gas; and five basins in the Kalahari Desert region with less than 310 million tons of oil and less than 1,040 million tons of gas.

21. In the assessment of the natural resources base in Africa, it is also worth while to draw attention to the related problem of deforestation in Africa, which is one of the contributing factors to the desertification process. The tropical forest ecosystem is generally considered to be robust, but it maintains a very fragile soil-plant equilibrium, as proved by the disturbances caused by deforestation and forest clearing for agriculture. It is well known that the forest resources of West Africa have been severely damaged as a result of the commercial exploitation of a narrow range of species, based on extraction technologies appropriate to the homogeneous forest stands of temperate countries. Whilst increasing attention is only now being given to the consequences of past policies and practices, entrepreneurs from developed countries have moved in to apply the same policies and practices to the extensive potential of unexploited forests in Central Africa (Central African Republic, Congo, Gabon, the United Republic of Cameroon and Zaire) in order to satisfy the projected needs of the European market for the same limited number of forest tree species. 10/ The impact of deforestation on tropical soil degradation and erosion, on the water cycle and on the global oxygen-carbon dioxide balance, cannot be overstated.

9/ V.I. Visotsky, "Petroleum potential of Africa and prospects for development" (ECA/NRD/MIN.80/INF.2).

10/ European timber trends and prospects, 1950-2000 (Geneva, United Nations Economic Commission for Europe, 1975) (see pp. 172-176).

22. The secretariat is firmly of the view that, unless capabilities are speedily developed at national and multinational levels for exploiting the mineral and petroleum resources of the Sahelian region and other natural resources/raw materials, taking advantage of experience in other countries within and outside the Region, their entry into the economic scene is likely to cause almost as much social and economic chaos as the onset and persistence of drought.

C. The Lagos Plan of Action

23. The characteristics of the African economy, as discussed in the strategy for the economic development of Africa during the 1980s in the Lagos Plan of Action, 11/ are summarized below. It is within this context that the problem of drought and desertification in Africa, accentuated by the LDC status of more than half the countries affected, is examined in this section. The ECA secretariat defines economic growth simply as increases in the physical output of goods and services to meet the needs of the mass of the people. Such physical increases must obviously result from the conversion of raw materials into intermediate products, capital and consumer goods. It is also common knowledge that the raw materials required can only be derived from the national natural resources/raw materials base, supplemented by intra-African trade in those raw materials which form complementary inputs into the production of goods.

24. African economies are usually characterized by extreme specialization in the production of one or two primary products for export. This means, firstly, that the search for, evaluation, extraction of other natural resources/raw materials is neglected, and secondly that the pattern of skills and technology imported or locally developed, of infrastructure, institution building, equipment imported, flows of financial and real resources are determined by this extremely narrow base of natural resources/raw materials exploitation.

25. The extreme dependence on imported factor inputs (i.e., entrepreneurial resources, including consultancy and other support services; manpower for management, production, and marketing; research and development and its institutions; equipment supply, including implements, tools and spare parts; institutions for production and marketing; transport and communications) means that there is a persistent and growing drain of foreign exchange to pay for imports of foreign factor inputs. This drain is unnoticed, because most governments pay little or no attention to the invisibles section of their national accounts and, in any case, tend to rely on aid, technical assistance and debt, rather than on making economies in the imports of services whose volume and unit price escape surveillance.

26. The expectation that development and economic growth, which provides for the diversification of production to meet the needs of expanding populations, for raising their levels of living, for increasing opportunities of employment, for the increased supply of domestic factor inputs relevant to the exploitation of other natural resources/raw materials, for intra-sectoral and inter-sectoral linkages, etc., can be effected through the export of raw cotton, oilseeds, logs, coffee, cocoa, tea, iron ore, bauxite, copper, petroleum, or natural gas, is

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11/ Lagos Plan of Action for the Implementation of the Monrovia Strategy for the Economic Development of Africa, (A/S-11/14, Annex I).

not justifiable on any grounds. Nor is the complementary expectation that the markets of the advanced countries are infinitely capable of absorbing the growing output of individual primary commodities from the whole of the developing world.

27. Experience since independence clearly demonstrates that no amount of aid, technical assistance or debt has led any African country to the point of take-off into self-sustaining and self-reliant development and economic growth.

28. In the light of the foregoing account of the characteristics of the African economy in general, the challenge of development and economic growth, which faces the Saharan-Sudano-Sahelian countries as well as those affected by desertification around the Kalahari Desert area, can be summarized as follows:

(i) These countries must formulate policies aimed at wise management of their physical resources base (minerals, water, hydrocarbons) on which the rehabilitation of the degraded biological resources in the arid land ecosystems depends;

(ii) A diversification of the economy is essential for sustained development and for eliminating the dependence on single cash crop exports which are always under threat of drought;

(iii) In combating desertification, much more emphasis should be placed on indigenous counterparts, at local research institutions, to the foreign experts, supported by the promotion of training programmes at all levels for field workers, in order to develop a cadre of local experts and stretch the capacity of the aid programme;

(iv) A reorientation of the present pattern of development and economic growth in desert-prone areas is required in order to promote entrepreneurial activities for utilizing the natural resources base. This will provide opportunities for increased employment and for raising the standard of living of the people;

(v) As pointed out by the Club du Sahel, desert-prone countries should not depend to so great an extent on technical assistance, aids, grants and loans to combat desertification, but should develop their own local resources and manpower, as well as public participation, for the solution of the problem.

D. Manpower development for desertification control

29. Of all factor inputs relevant to combating desertification, human resources appear to be the most important, followed by technology. So far, too great an emphasis has been placed on the mobilization of financial aid and not enough on real factor inputs and the special conditions in the Sahel. It appears as if the Sahel has been the subject of experiments of a somewhat benevolent academic research character, with local participation as an extra dimension thrown in rather belatedly. The problems of the Sahel cannot be realistically and successfully treated other than through the understanding and initiatives of

the Sahelian peoples themselves. Not very much can come out of the $US6,800 million budget already allocated or committed for aid to the Sahel programme outlined in the study of financing the Plan of Action, 12/ if effective methods of mass participation, with the support of environmental education programmes, are not worked out and implemented.

30. One would have expected that the first priority in the implementation of the Plan of Action to Combat Desertification, in the Sudano-Sahelian region in particular, would be the building up of specialized capabilities in manpower production and institutions at the national and multinational levels. Recommendation 2 and its interpretation in the above Plan of Action stresses the need to develop national capabilities (training) for land-use planning in a whole range of scientific and managerial disciplines when such specialized manpower is not locally available. It also requests (paragraph 25 (a)(iv) the preparation of all types of thematic maps for the inventory and assessment of land, water, plant and animal resources for preventive and monitoring programmes. This is reinforced by several other recommendations, for example No. 18 on capabilities for developing science and technology for the rational utilization of natural resources, No. 19 on control of deforestation and development of renewable sources of energy and No. 20 on priority for environmental education and training.

31. These recommendations on manpower development and on science and technology for the implementation of the Plan of Action to Combat Desertification have already identified the areas of training and specialization where a concerted effort is required by the Sahelian and other countries affected by desertification in Africa. First of all, there is the need to train graduates orientated towards the application of science and technology for combating desertification, for example, in the construction of small earth dams, irrigation canal systems, and deep-bore wells, and for mineral exploration and exploitation. Then, middle-level manpower should be developed for the maintenance of water pumps, wells, and solar energy installations, and for promoting extension services in arid land agriculture, sand stabilization techniques, and shelter belts, to name only a few. The infrastructural support for promoting research into the mechanism of the desertification process, and for the assessment, continuous monitoring and implementation of the results of scientific research on the problem, can then be strengthened when the trained local manpower is available and national Governments have assigned a high priority to the problem and to the provision of financial resources for scientific equipment, laboratories and institutions for environmental training and management.

32. The solution of the problem of controlling the Sahelian desertification process is a long-term exercise demanding an integrated approach to development. To put an effective end to the loss of, and to recapture the agrobiological resources of the Sahel, will take one or two generations of tireless and innovative work, supported by a permanent national manpower and institutional capability to deal with the problems. To implement a plan of action or a programme which is reasonably expected to last for decades, and at the same time to ignore the entrepreneurial aspects and the questions of local manpower, institutional and other capabilities tailored to the needs to be met and the problems to be solved, is nothing short of courting disaster.

12/ Report to the General Assembly - Financing the United Nations Plan of Action to Combat Desertification (A/35/396) (see paras. 107-135).

33. The ability of the desert-prone countries of Africa to develop their manpower potential to combat desertification is indicated by an examination of UNESCO education statistics (1978-1979). Except for the Saharan and southern African desert-prone countries, which have 40-70 per cent of children in primary and secondary schools (aged 6-18 years), figures for school attendance in the Sudano-Sahelian region vary from 10 to 30 per cent. This, in addition to the low population densities, indicates a very small potential for developing middle-level manpower. In addition, the percentage of the GNP devoted to education has a mean range of 2.3 - 5.9 per cent (see Annex I). The vastness of most of the countries, added to the harsh ecological conditions, tend to negate human efforts at desertification control. Even though the financial situation of these countries, as with all developing countries, is worsened by inflation and the oil crisis, manpower development should be made a major priority in order to build up the infrastructural support machinery and capabilities to exploit the potential physical resources base buried in the creeping desert sands, and to ensure sustained investment to combat desertification at the national level.

III. COMBATING DESERTIFICATION AND DROUGHT UNDER INTER-GOVERNMENTAL AND UNITED NATIONS AUSPICES

A. Inter-governmental Regional Co-operation of the Sahel

34. It is difficult to discuss desertification control without dealing with drought, which accentuates the process. It should be noted that the African governments in the Sahel region most affected by the severe drought of 1968-1973 established an intergovernmental body, the Comité Inter-Etats pour la Lutte contre la Sécheresse dans le Sahel (CILSS) in 1973. CILSS consists of eight Member states, namely Cape Verde, Chad, the Gambia, Mali, Mauritania, Niger, Senegal, and the Upper Volta, and it was formed to strengthen regional co-operation in rehabilitating the drought-stricken economy of its member States. It has a technical secretariat based in Ouagadougou, the Upper Volta.

35. The main objectives of CILSS have been to promote the overall development of its member States through programmes for food and animal production, reafforestation, road networks for marketing and drought relief, and the building of an infrastructure to reduce the vulnerability of the economy to the vagaries of the climate. In order to finance the implementation of their development programmes to rehabilitate the economy, the CILSS member States formed a loose association with OECD donor countries, known as the Club du Sahel, in 1976. At first, efforts were concentrated on afforestation programmes to halt deforestation and soil erosion. Now, the programme covers major sectors of development, including water resources, fisheries improvement, livestock and agricultural production, crop production, and research and training.

36. To promote research and training for desertification control, the Institut du Sahel was established in 1977 as a specialized agency of CILSS. It co-ordinates research in the Sahel region, carries out scientific and technical research relating to CILSS's recovery and rehabilitation programme, promotes the adaptation of technologies, builds up a data base for the implementation of useful scientific findings under TCDC, and is developing a training programme for researchers, technicians and extension workers for desertification control.

37. At a recent meeting between the Club du Sahel and the Kuwait Fund for Arab Economic Development, held in Kuwait on 16-17 November 1980, an assessment was made of progress in financing the Sahelian Development Strategy, adopted in 1974 to achieve self-sufficiency in food and a self-sustaining economic and social development by the year 2000. The performance report 13/ identified the following constraints on achieving the goals set:

(i) Some countries in the Sahel are not doing enough through their own efforts or with overseas aid to make themselves self-sufficient in food;

(ii) Recourse to food imports and food aid has taken on a permanent character;

(iii) Wheat yields in the area have been falling, indicating that the land is being over-exploited and could deteriorate further, beyond repair;

(iv) The amount of land under irrigation has hardly increased at all, as new irrigated projects have barely compensated for losses due to the deterioration of old projects;

(v) The fisheries potential had not been developed, in 1979, for the benefit of the Sahel population any more than it had in 1975;

(vi) Deforestation is continuing and accelerating, with the disappearance of trees in the Sahel;

(vii) The fall in cereals production was not due to the drought alone but was also the result of farmers not being given sufficient incentives by governments to produce more.

38. The Club du Sahel also pointed out that the above deficiencies in the implementation of projects in CILSS member States over the period 1975-1979 are to be viewed in the light of the fact that international donor aid has increased two and a half times, from $755 million in 1974 to $1,700 million in 1979, with a total commitment of $6,800 million during the period.

39. Another inter-governmental body which has taken an interest in combating drought and desertification in Africa, is the Organization of African Unity (OAU). The Standing Committee on Drought, Desertification and Natural Disasters of the OAU Council of Ministers adopted an Inter-African Programme of Action on the control of Drought, Desertification and other Natural Disasters in June 1979.

13/ West Africa, Nos. 3304 and 3305 (17 and 24 November 1980).

The OAU Council of Ministers accepted the recommendation of the Standing Committee to seek United Nations support for the implementation of two projects, namely:

(i) development of a hydrogeological map of Africa and

(ii) integrated biological development and rehabilition of the Fouta Djallon Mountains.

A memorandum of understanding between OAU and UNEP on these matters has now been concluded.

B. United Nations Sudano-Sahelian Office

40. The United Nations General Assembly responded to the severe Sahelian drought of 1968-1973 by the establishment of the United Nations Sudano-Sahelian Office (UNSO), with a regional office at Ouagadougou, in 1973. UNSO's role then was to co-ordinate development activities relating to the rehabilitation of the drought-stricken countries in the Sahel region with a view to mitigating the effects of future droughts, achieving self-sufficiency in their staple foods and promoting socio-economic development in the region. UNSO's first mandate dealt with drought-related medium-term and long-term recovery and rehabilitation programmes in the eight member States of CILSS.

41. Following the United Nations Conference on Desertification, UNSO became a joint venture of UNDP and UNEP, as recommended in UNEP Governing Council decision 6/11B of 24 May 1978 and UNDP Governing Council decision 25/10 of 27 June 1978. Under its revised mandate, UNSO was responsible for co-ordinating the implementation of the Plan of Action to Combat Desertification in the 15 (now 19) countries in the Sudano-Sahelian zone. These 19 countries, which include the eight member States of CILSS, are as follows: Benin, Cape Verde, Chad, Djibouti, Ethiopia, the Gambia, Guinea, Guinea-Bissau, Kenya, Mali, Mauritania, the Niger, Nigeria, Senegal, Somalia, the Sudan, Uganda, the United Republic of Cameroon and the Upper Volta.

42. Based on the foregoing, the main functions of UNSO, which overlap in places, can be summarized as follows:

(i) Co-ordination of the activities of the United Nations system relating to drought and desertification control in the Sudano-Sahelian countries;

(ii) Establishment and maintenance of close and effective working relationships with the CILSS member States and the rest of the Sudano-Sahelian countries, with the active co-operation of the UNDP Resident Representative in the country concerned;

(iii) Mobilization of the necessary resources for the implementation of priority drought-related recovery and rehabilitation projects identified by the Sudano-Sahelian countries.

43. To discharge its responsibilities, UNSO assists member States in planning and formulating projects and programmes identified, approved and given the necessary priority by governments in the Sudano-Sahelian region. UNSO also manages a United Nations Trust Fund for Sudano-Sahelian Activities, which provides resources from voluntary contributions for the implementation of national projects not funded under bilateral or multilateral agreements.

C. The United Nations system

44. The United Nations Environment Programme (UNEP) has global responsibility for combating desertification and its related environmental problems. In pursuance of General Assembly resolution 3337(XXIX) of December 1974, UNEP organized the United Nations Conference on Desertification (UNCOD) in Nairobi, Kenya, in September 1977. UNCOD formulated a Plan of Action to Combat Desertification (PACD), which continued 28 recommendations for action at the international, regional and national levels. The Plan was endorsed by the UNEP Governing Council and approved by General Assembly resolution 32/172 of 19 December 1977. The Plan established the following institutional arrangements within the United Nations system to assist in combating desertification:

(i) A Desertification Unit at UNEP Headquarters;

(ii) An Inter-Agency Working Group on Desertification (IAWGD), meeting approximately quarterly, to report to the Administrative Committee on Coordination (ACC); and

(iii) A Consultative Group on Desertification Control (DESCON) to mobilize funding from donor agencies for projects.

45. According to the report 14/ of the Secretary-General to the General Assembly, the functions of the UNEP Desertification Unit are: to co-ordinate activities relating to the implementation of the Plan of Action to Combat Desertification (PACD), to develop the environment programme dealing with arid and semi-arid ecosystems, and to serve as the secretariat for IAWGD and DESCON. The main functions of the Inter-Agency Working Group on Desertification (IAWGD), as approved by the Administrative Committee on Coordination (ACC), are:

(i) to provide a forum for the integration of United Nations activities, including field operational projects, in co-operation with DESCON;

(ii) to organize thematic joint programming on desertification;

(iii) to review progress by individual organizations within the United Nations system in the implementation of PACD;

(iv) to identify and formulate projects for co-operative action based on the recommendations of PACD;

(v) to prepare the draft annual report on the status of implementation of PACD for consideration by the Designated Officials on Environmental Matters (DOEMs) for ACC to submit to the Governing Council of UNEP and then to the General Assembly; and

14/ Implementation of the Plan of Action to Combat Desertification; Development and international economic co-operation (A/35/411).

(vi) to assist the regional commissions in the implementation of operative paragraph 6 of General Assembly resolution 32/172, which requests them to undertake follow-up action to implement the Plan of Action.

The Consultative Group on Desertification Control (DESCON) consists of United Nations co-sponsors, plus 20 States and financial institutions as donor members, and another 21 States as observers associated with the group. DESCON considers national and regional projects prepared and submitted by UNSO and global projects for UNEP on desertification control for funding through a declaration of support and the mobilization of the required resources by the DESCON group.

46. The framework for designing, planning and implementing programmes for combating desertification within the United Nations system since UNCOD has been based on the Plan of Action with its 28 recommendations. Of these, 22 are directed towards national and regional action, indicating that the ultimate responsibility for desertification control must rest with the member States in the affected areas. In order to assess the present situation and examine the causes and constraints hindering progress in the effort to combat desertification, it is worth while recapitulating the main priority areas of the recommendations made in the Plan of Action to Combat Desertification (PACD):

(i) Evaluation of desertification and improvement of land management, desertification monitoring, development of national capabilities for natural resources management and the promotion of public awareness on desertification control;

(ii) Assessment of the effects on the ecology of arid lands of the combination of industrialization, agriculture and urbanization, and the use of advanced technology in certain implementation measures to combat desertification;

(iii) Corrective anti-desertification measures in the use of resources - water, rangelands, soils, irrigation and rain-fed agriculture, wildlife, drought-resistant species;

(iv) Analysis and evaluation of social, economic and political factors affecting desertification, demographic policies for nomad resettlement and the meeting of basic needs, and the use of social indicators in agricultural planning and as a warning system for disasters;

(v) Measures against the risk of the effects of drought, including insurance against the loss of crops, cattle and means of livelihood;

(vi) Strengthening of the scientific and technological capabilities of the developing countries to combat desertification in the areas of natural resources use (fuelwood and alternative sources of energy) and the creation of national machineries for the co-ordination of activities; and

(vii) Integration of anti-desertification programmes into national development plans.

D. Constraints on combating desertification

47. The implementation of the UNCOD/PACD recommendations at the national and regional levels has been the responsibility of governments, which generally seek the advice and support of the United Nations system. For successful implementation of national programmes to combat desertification, countries must have suitable infrastructural support machinery, adequate trained manpower and the scientific and technological capabilities to benefit from technical co-operation. However, since most of the African countries affected by desertification are LDCs, they can hardly provide the manpower or afford the resources and technology to implement most of the recommendations. These countries have a low population density, a harsh environment and a low investment in education, generally between 1.5 and 5.9 per cent of GNP. These conditions indicate that the possibilities of producing the required manpower and of providing the training needed for a national, self-reliant effort to combat desertification are very small.

48. Since ECA organized the regional preparatory conference in Africa for UNCOD in 1976 it has been promoting regional co-operation by assisting the member States of the Commission in implementing programmes to combat desertification in collaboration with other United Nations organizations. In view of the multifarious activities that have to be carried out in order to contain the problem and the massive financial aid needed to support those activities, ECA organized an inter-divisional meeting in December 1980 to assess the situation. Some of the constraints identified that hinder any improvement in conditions in the Sahel are as follows:

(i) The uncertainty of the climate in the Sahel for arid land agricultural activities;

(ii) The lack of finance to implement national projects due to inflation and the current oil crisis in the 31 developing countries in Africa affected, 17 of which belong to the Least Developed Country category;

(iii) The lack of sufficient co-ordination of activities between inter-governmental organizations (CILSS), the United Nations organizations active in the area, and other organizations, such as the Sahel Institute and national universities in the region, in the conduct of research on the Sahelian problem and in realistic training programmes for indigenous middle-level manpower development;

(iv) The need for a systems approach to the Sahel problem so that integrated planning can be carried out; this will incorporate a human settlements policy for the settlement of the nomadic population as a basis for soil and water resources management for self-sufficiency in food production;

(v) The need for a network of feeder roads, a transport system for goods and services, and a communications system, to improve the quality of life in the Sahel;

(vi) The lack of long-term planning in exploiting the vast potential of mineral wealth (phosphates, iron, oil, diamonds, uranium, sulphur, gold, manganese) (see section II) to provide the necessary capital for systematic agricultural development;

(vii) The need for governments to provide incentives to promote sedentary settlements, to alter the lifestyles of the nomadic population through environmental education, and to achieve self-sufficiency in food production;

(viii) The need to arouse the political will of the governments involved to tackle the Sahelian problem as a group through CILSS, to strengthen the technical capabilities of CILSS to implement long-term projects, and to promote regional co-operation and training to maximize the output from international aid.

49. It should be noted that, in spite of the efforts of the international aid community and of OECD through the Club du Sahel and CILSS, and those of the United Nations system through UNSO, UNDP and UNEP and the various specialized agencies, drought conditions still prevail in Africa and, in fact, are spreading from the Sudano-Sahelian countries and the Ogaden Peninsula to countries in southern Africa Angola, Lesotho, Malawi, the United Republic of Tanzania, and Zimbabwe. As a result, the UNDP Governing Council passed resolution 80/36 on assistance to drought-stricken countries in Africa, appealing to the international community for massive emergency assistance and rehabilitation programmes, and for investments, especially in water control and harvesting in the basins of the major rivers and and lakes in the Sahel and other arid parts of Africa. UNDP also gave notice of its intention to launch an action plan for the protection of the African environment against drought and desertification during the 1982-1986 programming cycle.

50. The Administrative Committee on Co-ordination (ACC), reporting to the eighth session of the Governing Council of UNEP in April 1980, pointed out the following major constraints on the full implementation of the Plan of Action to Combat Desertification:

(i) The failure of governments affected by desertification risks to prepare a national plan, to include control measures in their national development planning, and to assign a high priority to it, because of conflicting demands for scarce financial and human resources;

(ii) The failure effectively to pool the efforts and resources of United Nations bodies and agencies for a multi-disciplinary approach to combating desertification;

(iii) The failure to lead extension agents and farmers/pastoralists how to use the existing wealth of known technology for desertification control, so as to ensure an integrated multidisciplinary approach involving socio-cultural and other dimensions;

(iv) The acute shortage of external sources of financing to assist the efforts of the United Nations to implement the Plan of Action; and

(v) The lack of adequate human resources to implement PACD at the national level, as shown by the shortage of project managers who have undergone multidisciplinary training; the lack of the scientific machinery for monitoring and assessing the desertification process, for making an inventory of arid land resources depletion and for the application of corrective anti-desertification measures.

IV. TECHNICAL CO-OPERATION IN COMBATING DESERTIFICATION AT THE NATIONAL, REGIONAL AND INTERNATIONAL LEVELS

A. Integrated approach to combating desertification

51. In the discussion of the socio-cultural causes and environmental impact of the desertification process, it was pointed out that the problem of desertification control should be approached in a multidisciplinary manner. This was reinforced by an examination of the natural resources bases of the countries affected by desertification.

52. At the same time that the Administrative Committee on Coordination was reporting to the Governing Council of UNEP at its eighth session (1980) on the constraints on the full implementation of the UNCOD Plan of Action to Combat Desertification, it recommended the following priority areas of activity to strengthen the co-operative efforts of the United Nations system in the field of desertification control:

(i) The collection of information for the assessment and monitoring of desertification and evaluating its impact on people and environment, including its economic, social and demographic consequences: this requires the establishment of national or regional systems for monitoring natural resources and human conditions;

(ii) The application of available scientific knowledge and technologies to land-use planning and resource management in areas affected by desertification, including the implementation of protective and corrective measures against desertification. Moreover, in the light of the programmes of the United Nations system in the field of desertification, special attention, in order to fill gaps, should be given to:

(a) water resources assessment, development and conservation;

(b) rangeland assessment, development and conservation, with special reference to various aspects of livestock production and wildlife management and utilization;

(c) management of rain-fed and irrigated agricultural lands;

(d) conservation of natural ecosystems;

(e) afforestation;

(f) stabilization of moving sands; and

(g) development and use of alternative sources of energy;

(iii) The strengthening of national and regional capabilities in science and technology so as to enable developing countries to take full advantage of scientific knowledge and socio-economic insight in the planning and management of campaigns against desertification;

(iv) The promotion of national and regional research programmes aimed at filling gaps in scientific knowledge and introducing technological innovations related to combating desertification;

(v) The promotion of national and international programmes for training, education and information related to desertification and land-use management in areas prone to desertification;

(vi) The strengthening of popular participation in desertification control schemes.

B. Desertification control activities at the national level

53. It was pointed out, when the mandate of the United Nations Sudano-Sahelian Office (UNSO) was being examined earlier, that it is UNSO's responsibility to assist member States in the region to plan and execute priority projects to combat desertification, as approved by governments. UNSO generally seeks funding for national projects from bilateral and multilateral sources, if they cannot be funded under the United Trust Fund that UNSO manages. In addition, these projects are carried out by the government ministry responsible, with the technical assistance and advice of the United Nations specialized agencies.

54. Under its original mandate for the development of drought-related medium-term and long-term recovery and rehabilitation programmes in the eight Sahelian countries, UNSO is implementing the priority projects approved at the Conference of Heads of State members of CILSS in Banjul, the Gambia, in December 1977, according to the report of the Secretary-General, 15/ as summarized below (regional projects are dealt with later):

(i) In Cape Verde, UNSO is engaged in developing feeder roads and inter-island marine transport, through the national Public Works Department. It is also assisting the Government in surface water control to prevent soil erosion and in underground water development in several of the islands;

15/ Implementation of the medium-term and long-term recovery and rehabilitation programme in the Sudano-Sahelian region; special economic and disaster relief assistance (A/36/208).

(ii) In Chad, the political situation over the past 13 years has caused a massive destruction of property and damage to the economic system, hence the need for a rehabilitation and recovery programme in addition to that required for anti-desertification control, as soon as conditions have improved;

(iii) In the Gambia, road-building equipment and maintenance costs for 180km of feeder roads have been provided by UNSO. With DTCD, UNDP and UNICEF, UNSO is supporting the development of underground water resources by drilling deep-bore wells and supplying spare parts for maintenance of the water pumps. It is also supporting the Government on a project on alternatives for fuelwood use in a World Bank Energy Master Plan for the country over the next decade;

(iv) In Mali, UNSO assists the Government in seeking finance for the construction and maintenance of 528 km of feeder roads, of which 450km has been completed; with FAO, UNSO is providing vaccines and medicines with supporting cold store facilities for a livestock protection project; a tree plantation project is also being undertaken;

(v) In Mauritania, the feeder road construction and development project is financed by UNSO/UNDCF and the Government for a 60km stretch; other desertification control projects being carried out by the Government with UNSO and bilateral support are: large-scale grain storage facilities (with ADB) maintenance of 36 deep-bore wells and 28 pumping stations; a seed multiplication centre (with FAO); a sand dune fixation project, and the maintenance and construction of earth dams;

(vi) In the Niger, joint financing by UNSO/UNCDF and the Government for the construction and maintenance of 140 km of feeder roads has been agreed; also, with ILO, a central workshop and training unit for the manufacture of agricultural tools and equipment has been completed. Other projects in which UNSO is collaborating directly with the Government are: the construction of a 15km irrigation canal for the cultivation of a 2,700ha site; the establishment of green belts around Niamey and eight other urban centres; soil anti-erosion work, and removal of silt from barrages and irrigation channels;

(vii) In Senegal, UNSO is co-operating with the Government in the construction and maintenance of 61km of feeder roads; with UNDP/WHO to develop an integrated system of water supply for the northern littoral area; in the management and recharge of aquifers; in the regeneration and reforestation of the Casamance Forest, financed by the sale of timber from degenerating trees and charcoal produced in the Forest; other projects being developed are fisheries in the Lakes of Guiers and sand dune fixation;

(viii) In the Upper Volta, UNSO and the Government, through bilateral sources, have financed the construction and maintenance of 100km of feeder roads; other projects being financed with UNSO's assistance are the development of underground water resources, the establishment of village forest plots (with local participation) and of Acacia senegal plantations for integrated rural development.

55. Under its revised mandate, UNSO has undertaken planning and programming missions to 14 of the 19 countries in the Sudano-Sahelian region during 1979-1980. During the missions, the causes and effects of the desertification problem in the country are examined and a review is undertaken of ongoing desertification activities, as well as of institutional arrangements made in the country to implement desertification control projects. The summary of UNSO activities given below is taken from the most recent report to the General Assembly on the implementation of the Plan of Action to Combat Desertification in the Sudano-Sahelian region. 16/ UNSO has 118 priority projects, identified by the Governments in the Sudano-Sahelian region, requiring an investment of $US644 million, of which UNSO has secured $US401 million from the Trust Fund and from bilateral and multilateral sources. These national projects are executed jointly by the governments concerned and the United Nations specialized agencies, as indicated below:

(i) Range and livestock management:

- Project executed by the Ethiopian Government on the rehabilitation of forests and agricultural rangeland; resettlement scheme to combat desertification;
- CILSS project for the protection of rangelands in south eastern Mauritania;
- UNESCO training project on rangeland management techniques in Dakar.

(ii) Forestry:

- Project executed by the Government of the Niger for a green belt around Niamey, with projections for eight other towns;
- Village afforestation scheme in the Upper Volta.

(iii) Water resources management:

- Cape Verde: United Nations ongoing project for surface and ground water exploration;
- Mauritania: UNDP/OPE executed project on the construction of small earth dams for the conservation and optimum utilization of surface water.

16/ Implementation in the Sudano-Sahelian Region of the Plan of Action to Combat Desertification. Development and international economic co-operation: Environment (A/35/1-4).

- Senegal: new project on the conservation and management of ground-water resources as follow-up to a completed pilot project on the artificial recharge of selected acquifers.

(iv) Stabilization of moving sand dunes;

- Mauritania: UNDP/OPE study and identification of major sand dunes and possible means of fixation;
- Somalia: Government-executed project to stabilize coastal sand dunes moving inland on a broad front.

(v) Policy planning, co-ordination and monitoring:

- Kenya: UNESCO project on strengthening institutional and desertification programming machineries in the Government;
- Similar projects are being executed in Somalia by FAO, in the Sudan by UNESCO and in Mauritania by UNDP/OPE.

(vi) Development of alternative sources of energy and supplementary livelihood systems:

- The Sudan: programme for replanting Acacia senegal as a drought-resistant cash crop for gum arabic and for soil stabilization; also establishment of multipurpose fuelwood plantation around Khartoum;
- The Gambia: the World Bank is preparing an integrated energy master plan;
- Mali: preparatory mission for industrial plan to manufacture solar energy pumps, cooking stoves and water heaters.

C. Desertification control activities at the regional level

56. Regional projects implemented within Africa in relation to UNCOD's Plan of Action to Combat Desertification are carried out under the auspices of UNSO/CILSS, OAU, ECA, UNEP Desertification Unit/UNSO, and the United Nations specialized agencies; their regional activities are summarized individually below.

57. UNSO/CILSS regional projects: the following regional projects are being implemented by UNSO under its original mandate of drought recovery and rehabilitation in the eight member States of CILSS, generally with the collaboration of the United Nations specialized agencies, as indicated:

(i) Construction, improvement and maintenance of all-weather feeder roads: reasibility studies on 3,400 km of feeder roads in Cape Verde, Chad, the Gambia, Mali, Mauritani, the Niger, Senegal, and the Upper Volta, which were started in 1977, have been completed at an estimated project cost of $US141 million. In January 1981, $US92 million had been secured and 955 km of feeder roads are now in use. UNSO's development of the transport sector in the Sahel contributes to the objectives of the Transport and Communication Decade in Africa, for which ECA is the lead agency;

(ii) Strengthening of agro-meteorological and hydrological services: WMO and UNDP have established a regional centre for such services in Niamey and plan to establish a corresponding regional communications and observation network and training programme. ECA's Water Resources Unit in the Natural Resources Division has a similar programme element, for which co-operation is necessary. WMO has submitted to UNEP for consideration a related project on the assessment of meteorological effects on Sahelian pastoral ecosystems. An FAO/ECA project proposal for the use of remote sensing in Sahelian agriculture is related to this project;

(iii) A joint ILO-UNSO project on rural artisan training, with the establishment of small-scale industries as an alternative source of employment in rural areas, has been instituted in Nigeria and the Upper Volta. This is a vocational training programme to develop skills among rural populations in arid and semi-arid regions, and thus to improve farming and irrigation practices;

(iv) Institute of the Sahel: the architectural plans for the headquarters at Bamako are now being executed. Funds have also been provided by UNSO for the organization and implementation of a post-graduate training programme in management and conservation of pasture lands for senior veterinarians by the Institute in collaboration with UNESCO. UNSO is also making plans with the Institute for a department of ecology and renewable energy sources;

(v) Transnational projects under the heading of management of livestock and rangelands in the Sudano-Sahelian region (SOLAR) and the Sahel green belt, were elaborated by UNSO. Several project proposals under this heading were prepared and submitted to DESCON for funding.

58. OAU regional project: in response to General Assembly resolution 34/185, the OAU project on the restoration and improvement of the Fouta Djallon Massif, approved by OAU Council of Ministers resolution 756(XXXIII), was considered by the UNEP Governing Council at its eighth session and incorporation into the environment programme by its decision 8/17 of 29 April 1980. UNSO assumed responsibility for implementing the OAU project and organized an inter-agency mission in May/June 1980 to the Fouta Djallon Massif with FAO, UNESCO, OAU, UNSO and with the support of the Government of Guinea. Follow-up on this pilot project awaits the report of the mission.

59. Economic Commission for Africa: this is the regional commission responsible for the socio-economic well-being of the 31 member States affected by desertification and drought in Africa. It will be remembered that eight of these member States are already covered by CILSS/OECD Club du Sahel, and are also included in the 19 countries of the Sudano-Sahelian region covered by UNSO. There are no formal United Nations programmes of work for desertification control in the member States in the Kalahari Desert region, although the UNEP Desertification Unit has undertaken global planning and programming missions to several countries including some in this area (Botswana, Lesotho, Malawi and the United Republic of Tanzania) between 1979 and 1981. Recently, United States Aid for International Development (USAID) has established a desertification programme in Africa covering this area, under its Environmental Training and Management Programme for Africa (ETMA).

60. ECA has made the following provisions in its work programme 17/ for 1982-1983 to implement the Plan of Action to Combat Desertification, subject to funding of the projects:

(i) Environment programme (ECA/ECU)

- Joint ECA/UNSO/UNEP/ETMA regional seminar/workshop on combating desertification in Africa, to be held in October 1982, with an inter-agency mission to the Kalahari Desert area funded by the Swedish International Development Agency (SIDA);
- Study of problems of deforestation and soil degradation resulting from population pressure for fuelwood energy sources and the effects of providing non-conventional energy sources on traditional lifestyles;
- Study of problems connected with underground water resources exploration and exploitation for agricultural irrigation in arid and semi-arid areas.

(ii) Natural Resources Division - water resources programme

- Planning and development of hydrometeorological networks and related services in Africa; WMO/ECA project; commenced in July 1980;
- Land and water resources survey for irrigation in Africa - phase I; (implemented between January 1980 and June 1980; further phases will be taken up during 1981 and 1985);
- Seminar and study tour on problems of water resources development in arid zones; partially implemented in July 1981.
- Studies of national capabilities in groundwater resources assessment, evaluation and utilization in arid zones in Africa and preparation of hydrogeological maps (1981-1985);
- Establishment of multinational water resources development institutes in the East and West African Subregions.

(iii) Natural Resources Division - remote sensing programme

ECA/FAO project proposal in the spirit of TCDC:

- For FAO to provide a technical expert to harmonize the instrumentation being supplied by the USA and Canada to the three remote sensing centres established by ECA at Ife, Nairobi and Ougadougou;
- To develop manpower training for technicians to man the remote sensing centres; and
- To provide reports, for drought monitoring purposes, at nine-day intervals, from the two NASA satellites orbiting the Sudano-Sahelian region, on environmental changes and on soil/water conditions in the region.

17/ ECA Programme of Work and Priorities for 1982-1983 (E/CN.14/790).

(iv) Natural Resources Division - energy programme

- Establishment of demonstration centres for solar, wind, biogas energy production and utilization, installation of solar pumps at water holes visited by nomads and installation of small biogas units;
- Establishment of solar energy centres at Bamako and Niamey, to be followed by similar centres in Mauritania, Senegal and the Upper Volta;
- Establishment of a regional training centre for solar energy technology.

(v) Natural Resources Division - science and technology programme

- Survey of manpower needs in some specific areas in the field of science and technology (combating desertification is suggested as a future area of activity);
- Development of technologies relevant to the problems and needs of rural populations (this can be applied to arid and semi-arid regions).

(vi) Joint ECA/FAO Agriculture Division - agriculture and food programme

- Report to member States on the food and agriculture potential of the ECOWAS subregion, including agro-processing (1982-1983);
- Report to member States on changes in agrarian structures and land tenure policies in Africa, with special emphasis on pastoral and nomadic populations (1982-1983);
- Preparation of regional reports for the Global Information and Early Warning System on Food and Agriculture, as well as on drought surveillance;
- Post-harvest food losses and encroachment on arable land by urbanization in Africa: inter-agency seminar held in April 1982 at ECA with FAO, IFAD and UNEP.

61. UNEP Desertification Unit with UNSO: this Unit has undertaken a revision and refinement of the project proposals for the six transnational projects on desertification control, approved by UNCOD. This was done in co-operation with the governments concerned and the United Nations specialized agencies. Two of the six projects concerned are in the Africa region, namely:

(i) the north African green belt; and

(ii) the major regional aquifer in north-east Africa.

To recapitulate, the north African green belt concept envisages a mosaic of land-use practices and anti-desertification measures, such as rangeland, sand-dune stabilization with drought-resistant species of trees, shrubs and grasses, irrigated agriculture, wind breaks, and so on, as appropriate, to form a green belt across country to prevent the spread of the creeping desert sands. Under this heading, five projects (two each in the Libyan Arab Jamahiriya and Tunisia, and one in Egypt)

have been finalized and submitted to the Consultative Group for Desertification Control (DESCON), where they received declarations of support. Similarly, two national projects (one in Egypt and one in the Sudan) on the major regional aquifer in north-east Africa were formulated and submitted to DESCON. Both projects received a declaration of support from the Group.

62. United Nations specialized agencies: it will be remembered that, in the previous sections on regional co-operation, the activities of the United Nations specialized agencies in collaboration with UNSO/CILSS and Sudano-Sahelian governments have been described as appropriate. Two regional projects organized by UNESCO-MAB and by FAO, respectively, with UNEP support, call for mention here, namely:

(i) The UNEP/UNESCO-MAB 3 integrated project on arid lands (IPAL) is being implemented in Kenya and Tunisia. 18/ The project investigates the ecological and sociological interactions between man and grazing lands in arid andsemi-arid zones. It also deals with integrated methods of the improvement of rain-fed agriculture and pasture land;

(ii) The UNEP/FAO project on ecological management of arid and semi-arid rangelands (EMASAR) is being implemented in Botswana, Kenya, Senegal, the Sudan and the United Republic of Tanzania, using ecological monitoring methodology developed by GEMS (Global Environmental Monitoring System) at UNEP, for the management of bioproductive pastoral systems.

D. Desertification control activities at the international level

63. It has already been pointed out that UNEP, in discharging its global responsibility for implementing UNCOD's Plan of Action to Combat Desertification, has established various institutional machineries to serve at the international level. These are the Inter-Agency Working Group on Desertification Control (IAWGD) and the Consultative Group on Desertification Control (DESCON), whose functions have been discussed earlier. IAWGD's activities in combating desertification, co-ordinated by its secretariat, the UNEP Desertification Unit, are as follows:-

(i) In 1980, IWAGD completed a Compendium of Desertification Activities, covering organizations and bodies both inside and outside the United Nations system, as a means of preventing duplication of effort and of identifying gaps. A second revision is now being prepared for consideration by the UNEP Governing Council at its special session in May 1982;

(ii) IAWGD has prepared a work plan and programme for the general assessment of the implementation of the Plan of Action to Combat Desertification from 1977 to 1984, as requested by UNEP Governing Council decision 9/22A, as a stock-taking exercise. This function is already incorporated in the UNEP Programme on Desertification and on Arid and Semi-arid Land Ecosystems in the medium-term plan for 1982-1983. The current status and trends of desertification would be assessed through country

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18/ MAB: Man and the Biosphere Programme.

questionnaires designed to obtain factual data on areas actually desertified or threatened with desertification, on current trends in food production losses, and on socio-economic consequences. There would also be a regional assessment of the Sudano-Sahelian region, as well as case studies of the lessons learnt in particular countries. The exercise will also include the preparation of a desertification assessment map by FAO, a review of measures undertaken since UNCOD, an evaluation of the effectiveness of the implementation of PACD, and a review and updating of technology and climatic data for the application of existing knowledge to understanding the desertification process;

(iii) IAWGD is also developing a global programme of scientific and technological training and research to combat desertification, in response to General Assembly resolution 35/73. The main objective of this programme is to enable national governments to develop autonomous scientific and technological capabilities, including indigenous manpower, to monitor and assess the desertification process and apply the most appropriate existing corrective measures of land-use planning and management. This will require a survey and inventory of existing national and regional institutions and their activities in carrying out research work and training programmes on the control of desertification. Science and technology programmes and training will have to be developed within a regional setting for purposes of technical co-operation;

(iv) An activity related to those previously mentioned on training and research, is the preparation of teaching and management manuals, as requested in UNCOD's Plan of Action. IAWGD has already approved the preparation of two such manuals in the series, namely: "Arid land forestry" and "Water resources assessment in arid and semi-arid areas".

E. Funding anti-desertification activities

64. It should be noted that the bulk of the financial support for implementing the Plan of Action to Combat Desertification (about $US6,800 million) comes from donor countries of the developed industrial world on a bilateral basis. The funds provided by the United Nations system can be considered as seed money to enable feasibility studies to be carried out for the mobilization of resources for the larger, long-term projects, such as the Senegal Basin Development Scheme (OMVS) and the Liptako - Gourma Scheme. The seed money of around $US5-20 million in the United Nations Trust Fund for Sudano-Sahelian activities is provided by donor countries of DESCON, UNEP, UNDP, WFC, the United Nations Fund for Population Activities (UNFPA) and by the United Nations Capital Development Fund (UNCDF), and various extra-budgetary sources of the United Nations specialized agencies (UNESCO, FAO, WMO, UNIDO), who co-sponsor DESCON in the implementation of desertification control projects.

V. CONCLUSIONS

65. It is the responsibility of the United Nations system and the governments of the member States, with the support of other interested inter-governmental bodies and donor countries, to ensure that the pace of activities aimed at implementing the Plan of Action is accelerated in order to provide a substantial output in terms of positive results and successes in controlling the desertification process by the end of the first seven-year review period (1977-1984). ECA therefore urges its member States to increase their efforts to overcome all the constraints on combating desertification, as identified by ECA itself, the Administrative Committee on Co-ordination (ACC) and the Club du Sahel, in spite of formidable economic problems, such as the debilitating effect of LDC conditions on manpower development and on the national capability to exploit the vast natural resources identified in the arid regions in Africa. The Inter-Agency Working Group on Desertification has now taken very positive steps towards a global research programme, together with supporting training programmes to develop the manpower capabilities required for this long-term effort to combat desertification. It will not be long, given the necessary national infrastructural support and regional co-operation, before the results of this approach become evident.

ANNEX I

COMPARATIVE TABLE OF POPULATION DENSITY, PERCENTAGE ARIDITY AND MANPOWER POTENTIAL IN AFRICAN COUNTRIES AFFECTED BY DROUGHT AND DESERTIFICATION

Region and Country	Land area a/ (thousands of km²)	Population Total a/ (Millions)	Population Average density per km²	Proportion of arid lands b/ (percentage)	Proportion of semi-arid lands b/ (percentage)	Total proportion of land b/ (percentage)	Proportion of school children (6-18yrs.) c/ (percentage)	Proportion of GNP to education 1976/77 c/ (percentage)	LDC status 1980
North African									
Algeria	2,382	18.2	7.6	85	10	95	59	7.6	-
Egypt	1,001	38.9	38.9	100	0	100	59	5.4	-
The Libyan Arab Jamahiriya	1,760	2.9	1.6	60	30	90	113	4.3	-
Morocco	447	19.5	43.6	35	45	80	39	6.5	-
Tunisia	164	6.2	37.8	75	15	90	59	5.0	-
Sudano-Sahelian									
Benin	113	3.4	30.1	-	-	-	32	5.0	LDC
Cape Verde	4.0	0.31	77.5	30	50	80	-	1.5	LDC
Chad	1,284	4.4	3.4	50	35	85	22	2.4	LDC
Djibouti	22.0	0.11	5.0	100	0	100	-	3.2	-
Ethiopia	1,222	30.9	25.3	20	50	70	14	2.3	LDC
The Gambia	11.3	0.55	48.7	-	-	-	26	3.1	LDC
Guinea	246	5.3	21.5	-	-	-	22	5.9	LDC
Guinea-Bissau	36.1	0.54	15.0	-	-	-	70	5.5	LDC
Kenya	583	15.3	26.2	20	55	75	69	5.7	-
Mali	1,240	6.8	5.5	60	35	95	19	4.7	LDC
Mauritania	1,031	1.6	1.6	100	0	100	13	4.1	-
The Niger	1,267	5.2	4 1	70	30	100	12	3.2	LDC
Nigeria	924	82.6	89.4	0	20	20	29	4.3	-
Senegal	197	5.5	27.9	25	70	95	29	3.0	-
The Sudan	2,506	17.9	7.1	50	40	90	29	5.5	LDC
Somalia	638	3.8	5.9	60	40	100	28	4.8	LDC
Uganda	236	12.8	54.2	-	-	-	35	3.2	LDC
The Upper Volta	274	5.6	24.4	0	90	90	9	2.2	LDC
The United Republic of Cameroon	475	8.2	17.3	0	10	10	70	4.6	-

a/ World Development Report, 1981, Washington, D.C., World Bank, (except for Cape Verde, the Gambia, Guinea-Bissau, Djibouti and Namibia). (From ST/ECA/SER.A/1 Population Dynamics, Fertility and Mortality in Africa, UNECA, 1979).

b/ Patricia Paylove and J. Richard Greenwell, "Arid and semi-arid countries of the world, Arid Land Newsletter, No.10, pp 1 -13.

c/ UNESCO Education Statistics (1978-1979)(Paris, UNESCO, 1980).

Kalahari Desert									
Angola	1,247	6.9	5.5	10	15	25	44	2.3	-
Botswana	6.3	0.31	128.6	25	60	85	70	9.2	LDC
Lesotho	30	1.3	43.3	0	5	5	79	3.6	LDC
Malawi	118	5.8	49.2	-	-	-	46	2.0	LDC
Namibia	824.3	0.76	0,92	50	40	90	-	-	-
The United Republic of Tanzania	945	18.0	19.0	0	25	25	43	4.4	LDC
Zimbabwe	391	7.1	18.2	0	5	5	54	3.5	-