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WATER RESOURCES: PROGRESS IN THE IMPLEMENTATION OF THE MAR DEL PLATA ACTION PLAN

Review of the situation with regard to the development of water resources in the drought-stricken countries of the African region

Report of the Economic Commission for Africa

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WATER RESOURCES: PROGRESS IN THE IMPLEMENTATION OF THE MAR DEL PLATA ACTION PLAN

Review of the situation with regard to the development of water resources in the drought-stricken countries of the African region

Report of the Economic Commission for Africa

SUMMARY

By paragraph 6 of Economic and Social Council resolution 1985/49, the Economic Commission for Africa was requested to undertake a thorough review of the situation with regard to the development of water resources in the drought-stricken countries of the region, with a view to formulating short-term, medium-term and long-term frameworks for action at the national and international levels, and to report thereon to the Committee on Natural Resources at its tenth session.

The report provides an analysis of the situation in the context of a threshold defined by climatic as well as socio-economic and environmental factors, and of the geographical limits of the drought in the African region. It suggests a number of short-term measures, including the formulation of plans with a number of basic components. For the medium-term the report suggests the need for strengthening of national institutional capacities regarding water resources development; formulation or strengthening of soil and water conservation programmes; acceleration of water supply and sanitation programmes; and strengthening of co-ordination of external support activities. For the long-run it stresses the need for implementation of existing frameworks for action, in particular the Mar del Plata Action Plan, the Lagos Plan of Action, and the Cairo Programme of Action for African Co-operation on Environment and Eco-development.

* E/C.7/1987/1.

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INTRODUCTION

1. This report has been prepared pursuant to paragraph 6 of Economic and Social Council resolution 1985/49 of 25 July 1985, by which the Council requested the Economic Commission for Africa "to undertake a thorough review of the situation with regard to the development of water resources in the drought-stricken countries of the region, with a view to formulating short-term, medium-term and long-term frameworks for action at the national and international levels, and to report thereon to the Committee on Natural Resources at its tenth session".

2. At the end of 1984, 20 countries in Africa were designated as abnormally dependent on food aid as a result of persistent drought. It was estimated that out of the 150 million people living in drought-stricken countries, some 30 million were seriously affected and over 10 million had been forced to abandon homes and land in search of food, water and pasture for their herds. 1/

3. The drought in sub-Saharan Africa in the early 1980s was even more severe in many countries than that of 1972-1973. For much of the Sahelian zone, it represented a continuation and intensification of the earlier drought which had caused the collapse of the livestock industry of five countries - Burkina Faso, Chad, Mali, Mauritania and Niger - and severely damaged that of two others - Senegal and the Gambia. 2/ In early 1985, some 6.3 million people were estimated to be in need of food aid in the worst-affected countries, and many displaced people were reported.

4. In Ethiopia, Somalia and the Sudan, the number of people in need of food aid was put at 14 million, and in these three countries the problem was compounded by a large influx of refugees. Elsewhere in East Africa, parts of the drier areas of Kenya and the northern part of the United Republic of Tanzania suffered a rainfall failure. In southern Africa, three consecutive drought years from 1982-1984 affected parts of Botswana, Lesotho, Mozambique and Zimbabwe.

5. By 1 January 1986, the emergency situation remained serious in Angola, Botswana, Ethiopia, Mozambique and the Sudan. 3/ Cape Verde continued to be affected by severe drought but, in the remaining 14 countries, the food situation had improved dramatically as a result of good rains in 1985. The number of severely affected persons was estimated to be 17 million, of whom 3 million were displaced.

6. This total rose to 19.2 million by 1 April 1986. Some 80 per cent of the affected populations were by then in four countries, Angola, Ethiopia, Mozambique and the Sudan. The arrival of ample rains and the harvesting of record crops in some countries during 1985 and 1986 has tended to direct public attention away from the emergency despite the fact that substantial aid is still required. 4/

7. For the period during which rainfall records are available, the recent drought has been unprecedented in duration, intensity, spatial extent and seasonal expressions. 5/ Moreover, it occurred at a time when the drought-striken African States were also suffering from the social and economic crisis affecting the whole

continent. Many countries were unable to cope with management of the emergency situation. In December 1984, the Secretary-General established the Office for Emergency Operations in Africa to support the Governments in co-ordinating and managing their emergency programmes.

8. It was recognized that mobilizing the support for the emergency was inextricably linked with planning for recovery and rehabilitation. Furthermore, the need was stressed to address the deep-rooted economic, social and ecological problems which contributed to the emergency, within the framework of integrated, multisectoral, long-term, national and regional development strategies. 6/

9. Although a holistic approach was universally advocated, in practice the need for food aid, medical aid, logistical support and essential water projects has dominated the emergency phase, and the essential linkages to long-term development have not been easy to forge. The reasons for this are connected, first, with underlying structural weaknesses which affect the national capabilities to deal with a continuing crisis of unforeseen magnitude and, secondly, with the lack of planning strategies for developing the drought-prone areas.

I. DEALING WITH DROUGHT

A. Definition of drought

10. In sub-Saharan Africa, rainfall variability increases as mean annual rainfall decreases. The drier areas, therefore, have the highest temporal and spatial variability. Irregularity in rainfall is commonplace, if not to say normal, and the definition of drought takes on a special significance in planning terms.

11. The pastoralists, for example, have evolved a life-style adapted to centuries of rainfall deficiency of varying severity. They are traditionally semi-nomadic or nomadic, trekking in search of forage and water, and having knowledge of sanctuaries of springs and wells that do not dry up, and of dry-season grazing where rainfall or soil moisture are more reliable. The pacification of formerly hostile areas early in the twentieth century seems to have had a twofold effect. First, cattle numbers increased dramatically, often at the expense of more adaptable camel populations. Secondly, there was an expansion of rainfed agriculture, and with it mixed livestock (chiefly cattle, sheep and goats) and crop farming. This trend seems to have been intensified by the unusually high rainfall levels of the 1950s, particularly in the Sahelian region.

12. Human populations are also known to have increased in the drought-prone areas. Normal population increase for agriculturalists is estimated at 2.5 to 3.0 per cent per year and for the pastoralists at 1.5 to 2.5 per cent per year. 7/ The combined effect of the human and animal pressure on the land has been a direct acceleration of environmental degradation through soil erosion and the removal of vegetation cover. This disturbance of the ecological system sets in train a steady process of desertification, with infiltration decreasing, surface runoff increasing, a lowering of ground-water levels, the drying up of surface water and the loss of topsoil and soil nutrients. An already fragile ecosystem becomes much

more vulnerable to deficiencies in seasonal rainfall and, for this reason, the recent drought has been devastating in its effect on both human and livestock populations.

13. Thus, drought is a rainfall deficiency below a certain threshold which is defined by the type of human occupancy. Under good management the treshold is lowered to allow agricultural activity to take place in areas where it would not normally be expected. Under poor management and high human and animal pressure, the threshold is raised to a point where drought can lead to famine and there is no protection against the vagaries of seasonal rainfall.

14. Seen in this light, the management of drought becomes a function of four interrelated courses of action:

(a) The adaptation of farming and livestock systems to climatic conditions;

(b) The production and storage of agricultural surpluses to enable communities to deal with at least one crop failure;

(c) The conservation and rational utilization of water resources;

(d) The restoration of ecological equilibrium.

15. This assumes that if drought can be managed, it will not lead to famine. Unfortunately, there is much evidence to show that other factors are more important in producing famine. These are political, economic and social factors which prevent the majority of the rural poor from releasing themselves from their dependence on unreliable, seasonal rainfall.

B. Geographical limits

16. The areas covered by this report are the tropical and subtropical zones receiving summer rainfall both north and south of the Equator. They exclude the northern and southern African areas of winter rainfall where the climate controls are different. Generally speaking, the former are the areas where the main rainfall-producing mechanism is the seasonal movement of the Inter-Tropical Convergency Zone; the latter are areas dominated by mid-latitude westerlies.

17. The movement of low pressure zones north and south of the Equator, following the sun, gives rise to seasonal rainfall over much of sub-Saharan Africa. The well-marked phenomenon, however, is neither regular nor reliable. Two thirds of Africa receives more than half its annual rainfall in only three months. This rainfall is very variable on daily, monthly, annual and decadal time scales. From the point of view of rainfed crop production and pastoral activities, there must be sufficient soil moisture over the growing period to sustain plant growth. Even when annual rainfall is equal to or above the long-term average, its distribution over the growing season may be such that crops fail or their yields are low.

18. Droughts occurring in these tropical regions are likely to have wide geographical distribution. Thus, there are often correlations between Sahelian droughts and those in the analogous regions bordering the southern subtropical desert area of the Kalahari. Connections between the Sahelian zone and the dry areas of eastern Africa are not so clearly marked. This may be due, however, to a lack of data in and around the Horn of Africa which prevents the making of analyses similar to those carried out in the Sahel and in southern Africa.

19. The areas at risk of seasonal drought are the areas marginal to rain-fed agriculture and pastoral regions. The extent of the drought-prone areas can be seen from figure I, which is based on work done by the Food and Agriculture Organization of the United Nations (FAO) on the length of the growing season and the effects of rainfall variability and moisture stress on major crops in sub-Saharan Africa. 8/ In the zone marked "rain-fed agriculture", there is a high risk of yield reduction or crop failure due to variability in seasonal rainfall, even under good management.

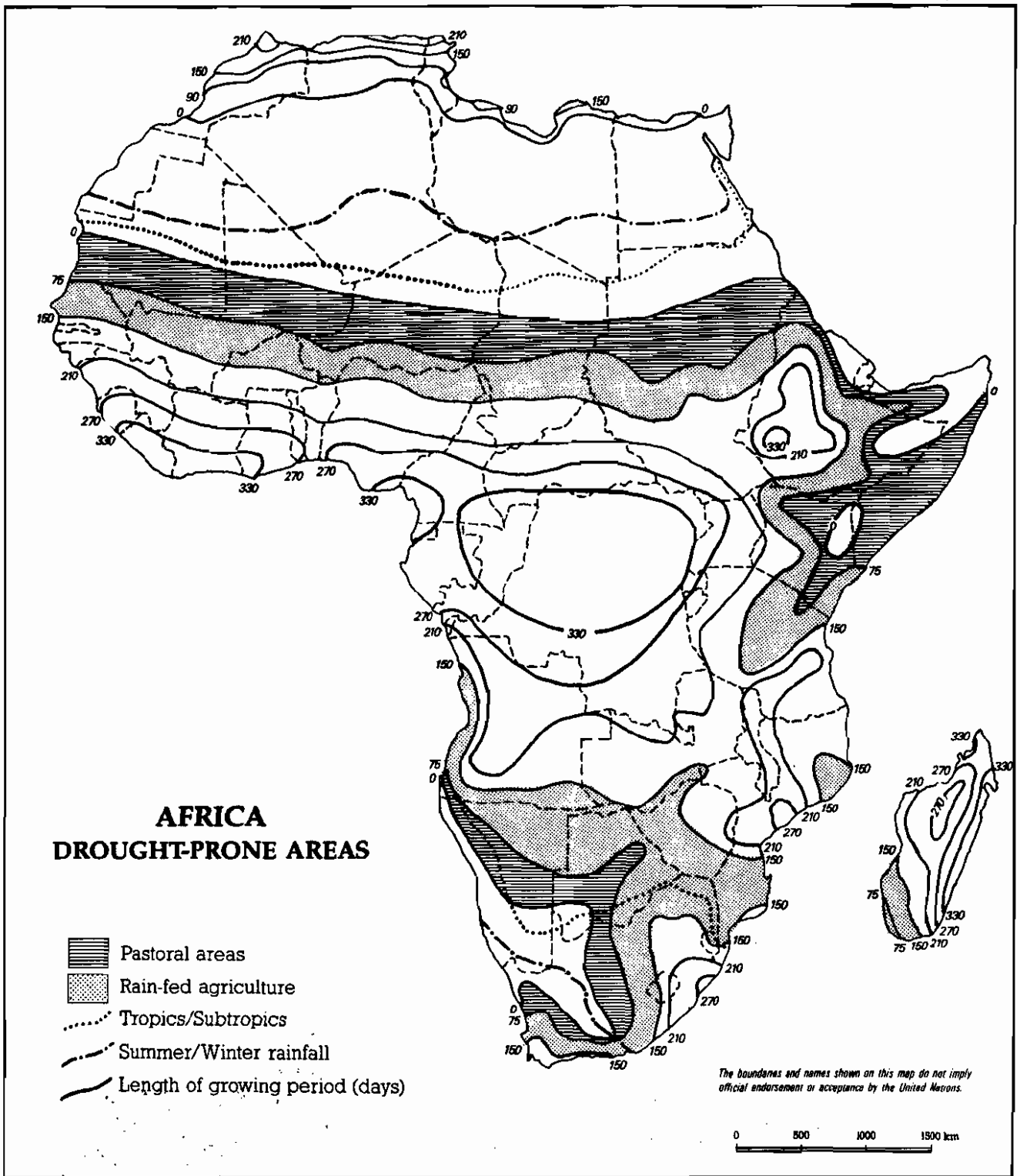
20. The pastoral regions include parts of the area of rain-fed agriculture and the drier areas down to the extent of the 100 mm isohyets, as can be seen from the livestock distribution map (fig. II). Some 17 million people base their livelihood on animal production in sub-Saharan Africa. It is estimated that 50 per cent of the livestock of that region occur in areas where there is a shortage of water and forage at some time in the year (approximately 175 million head). 2/

21. Within both these areas the ecological systems are fragile and easily upset by man's activities. Thus, in figure III, taken from the Desertification Map of the World produced by UNEP in 1977, 9/ it can be seen that the areas with very high risk of desertification due either to human or animal pressure coincide with large parts of the drought-prone zone.

22. The quasi-cyclic nature of wetter-than-average and drier-than-average conditions, together with increasing population pressure in the areas of rain-fed agriculture has led to an expansion of agricultural activity into marginal areas during wetter phases. This is accompanied by a corresponding increase in numbers of livestock in the predominantly pastoral areas. So, in the Western Sahel, there was a fivefold increase in cattle during the 25 years preceding the 1968 drought, and Mali witnessed an 80 per cent increase in rain-fed crop production between 1952 and 1975. 7/ Not only did these increases cause an intensification of environmental degradation, but also the areas were much more prone to drought when the inevitable swing to drier conditions began in 1968.

23. The continental extent of rainfall anomalies and the coupling of abnormal conditions in the Sahel with abnormal conditions in the semi-arid regions of southern Africa are confirmed by numerous analyses. 10/ The implication of this is that the effects of serious droughts are likely to be felt by a large number of countries at the same time. Unless these countries can become less dependent on emergency food aid, the organizational and logistic problems of reaching so many people will lessen the impact of internal and external aid and lead to widespread deaths from the resulting famine.

Figure I.



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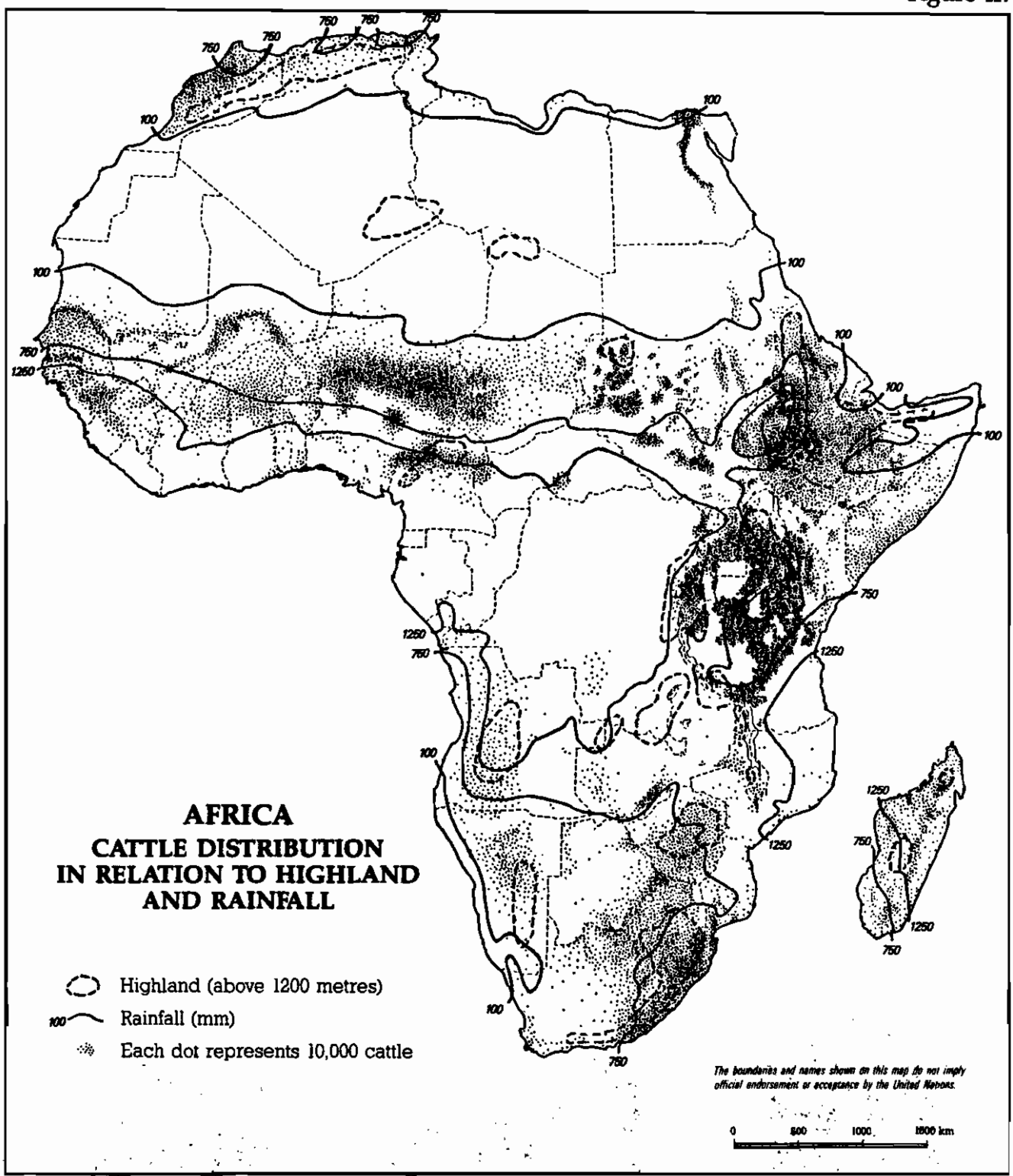
Source: Food and Agriculture Organization of the United Nations (1978)

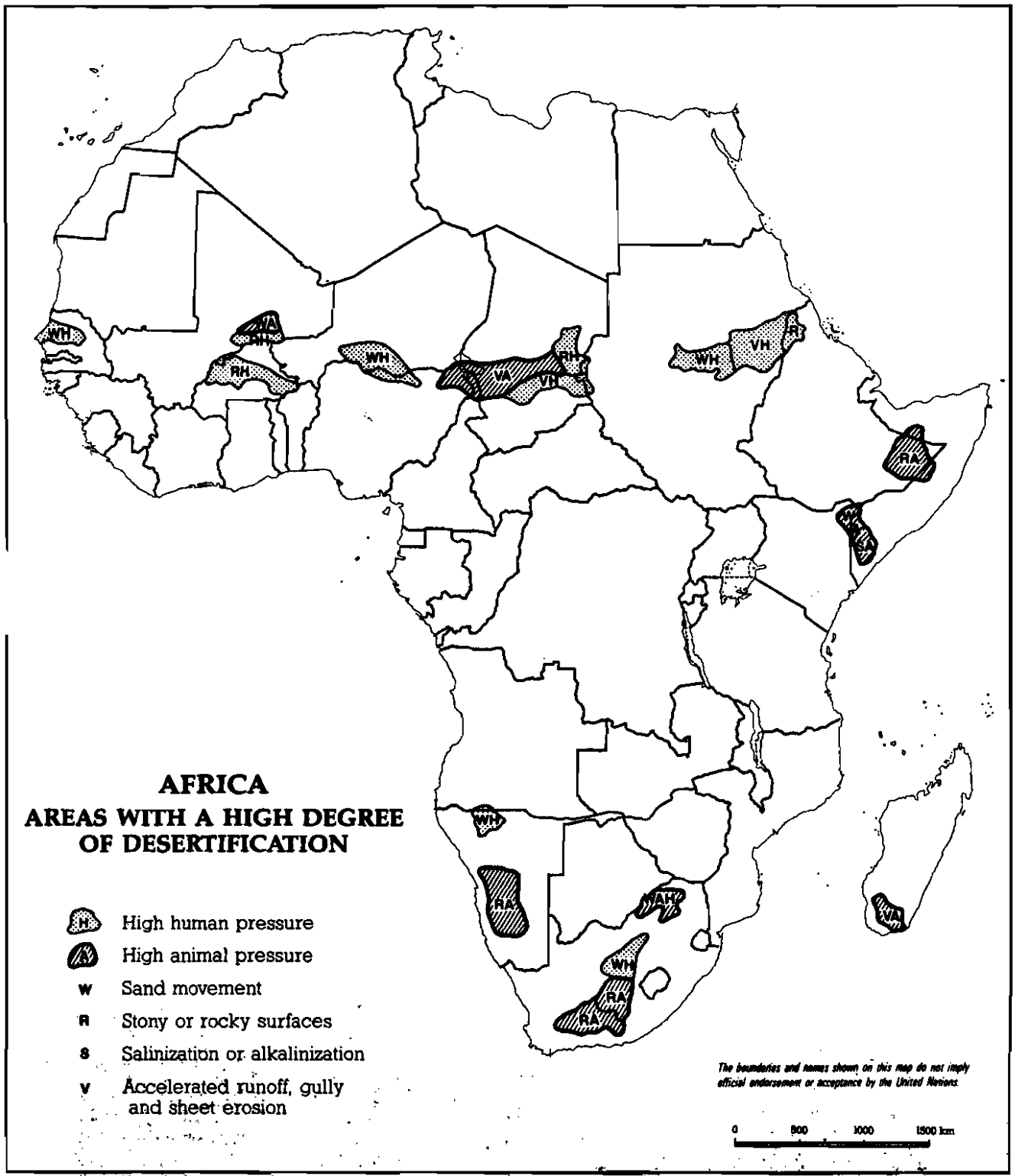
Figure II.



CART-M-86-59
3430.2x

Source: United Nations Environment Programme (1977)

Figure III.



Source: International Livestock Centre for Africa (1983)

C. Frequency of droughts

24. Recent studies identify two features which may or may not be connected. The first is the general decline in Sahelian rainfall over the past 30 years. The second is the abnormal severity and persistence of the recent drought. It is known, for example, that drought is a recurrent phenomenon and similar droughts in Africa have occurred in the 1940s, the 1910s and in the early nineteenth and mid-eighteenth centuries. 5/ There is no clear evidence of definite periodicities. which could be used for predictive purposes, and there is speculation that the downward trend in rainfall may continue, relieved by periods of wetter-than-average rainfall.

25. Elsewhere in sub-Saharan Africa, the long-term trend in rainfall is not so clear. In the bi-modal rainfall areas of eastern and southern tropical Africa, a deficiency in one rainy season may be masked by an abundance in another, making annual totals a poor tool for analysis. Even sophisticated agrometeorological models, predicting soil moisture deficits from daily rainfall data, are dependent on estimating how much rainfall can infiltrate into the soil moisture store. Years of poor land husbandry, soil erosion, removal of vegetation cover and destruction of soil structure change the balance between surface run-off and infiltration. The implication is that similar drought periods are certain to occur in the future and it is highly probable that the drought-prone areas will be more vulnerable to even more soil moisture deficits unless effective soil and water conservation measures are implemented over large areas.

26. It is not possible to predict or forecast the occurrence of major droughts at the present state of knowledge. Since the measures proposed for short-, medium- and long-term are beneficial to the environment and promise less dependence on the vagaries of rainfall, however, they are sound both from the point of view of preparedness for recurrent drought and as preliminary measures to counter the effects of possible climatic change. Should a decline in rainfall persist, it will be equivalent to a shift of isohyets towards the Equator with a corresponding latitudinal change in land use. The implication of this tendency in terms of population migration and increasing pressure on agricultural land are very serious indeed. It is important to verify this trend by improved data collection and analysis over the next few years.

II. FRAMEWORKS FOR ACTION

27. Given the above consideration, it can be seen that water development, although a central issue, is only one facet of the problem of providing basic needs to the affected population and of preserving a potentially productive ecology. Rebuilding the economy to give a more stable basis for development is the ultimate objective, but it requires many more inputs than can be dealt with here. In the short- and medium-term, water conservation and water management are the key to the recovery phase, i.e. reducing vulnerability to drought and placing agriculture and livestock development on a sounder ecological footing. In the long-term, the successful economic development of the drought-prone areas to sustain a much increased population requires concerted action over a broad area of intervention, and only the water-related aspects are within the terms of reference of this report.

28. In the field of water development, the mere drilling of a borehole may satisfy immediate needs. Keeping that water supply operating, ensuring that ground-water yields do not diminish and preventing human and animal concentrations beyond the carrying capacity of the land around the borehole, however, are matters that must involve the local communities. The will to be responsible for the long-term management of water supplies comes from participation and a sense of ownership. The means of management stem from a belief in the future within the community, the acceptance of the "technology" to maintain the resource and the raising of the standard of living to allow an investment in the future.

29. The critical transition from relief of suffering to providing a means of self-reliance requires a thorough knowledge of the resource base and a realistic programme for gradual change. There are no short-cut solutions for the majority of the rural population. Large-scale irrigation, inter-basin water transfers and high-technology desert irrigation can solve the problem of famine and food aid dependence, but these are high-cost solutions and cannot be realistically advocated at a time of world economic depression. In addition, the record of large-scale modern irrigation in sub-Saharan Africa is not good. Capital costs are about double those in other continents and numerous planning, management and maintenance constraints have not allowed the formal irrigation schemes to fulfil their potential. 11/

30. On the other hand, it can be argued that small-scale development aimed at the bulk of food producers, including pastoralists, will have the greatest impact and lead to the greatest long-term benefits. This needs to be demonstrated practically to evaluate the impact of the approach on food production and to bring about a change in orientation of national and external funding policies.

A. Short term

31. The wide geographical extent and severity of the recent drought were such that, at the peak of the crisis in early 1985, 30 to 35 million people were affected in 20 countries. Because many of the affected were destitute and had lost completely their means of livelihood, short-term frameworks for action clearly must include emergency measures to save life, and then immediate post-emergency measures when some steps towards recovery can be taken.

32. At the emergency stage, water, food, shelter and medical care are the basic requirements. For the most part, water development activities involve the provision of reliable and safe water supplies with facilities to operate and maintain the water supplies in the face of sustained, heavy usage. Unlike food supplies which may pose severe logistics problems, water supplies are usually provided on site, but the rapidly growing number of displaced people in the temporary shelters may overwhelm an existing supply and require the development of supplementary sources. In extreme cases, it will be necessary to transport water by means of water bowsers. In Mauritania, for example, five towns were partially dependent on trucked water for survival at the height of the emergency.

33. Away from the temporary shelters, water supplies may need to be augmented by tapping deep ground water or by the chemical treatment of polluted surface water which might otherwise be unfit to drink. Starving or undernourished people drinking polluted water will rapidly fall prey to water-related diseases which may spread rapidly to reach epidemic proportions. Effective medical and supplementary feeding programmes also need plentiful supplies of clean water.

34. Prolonged drought, as experienced in the Sudan-Sahelian zone, results in falls in surface and ground-water levels, which may affect the larger populations of displaced persons. In this situation, as in the temporary shelters, the provision of safe water supplies and sanitary facilities are essential to prevent the spread of disease. The need for adequate water supplies for hygiene is as great as that for drinking water, since many of the killing or seriously incapacitating diseases are water-related. Furthermore, the distribution of relief food will not have its maximum positive effect while diseases are burning up the energy supplied by food.

35. The mobilization of human and material resources to provide emergency water supplied over wide areas nearly always requires a degree of management and co-ordination that can be a challenge for most government departments charged with responsibility for water affairs in developing countries. To a certain extent, those countries which have made most progress towards serving the rural population with safe water supplies will be better able to cope with drought. The countries with less than 10 per cent of the rural population served are unlikely to have either the capacity or the resources to mount an effective relief campaign unaided, and they require external support.

36. One of the most effective ways of achieving co-ordination and improving management of all the emergency services is to create an agency with overall responsibility for relief operations which can also act as a focal point for multilateral, bilateral and non-governmental organization support. An example of this is the Ethiopian Relief and Rehabilitation Commission (RRC) which was created in 1984 to intensify the response to the 1972-1974 drought and to prepare long-term rehabilitation programmes. The scale of the 1984-1985 disaster in Ethiopia, however, necessitated additional assistance to the RRC, and the United Nations Office for Emergency Operations in Ethiopia was created in November of 1984 to provide a focal point for the United Nations relief effort and an efficient liaison system with the RRC.

37. The example of Ethiopia has been followed in the Sudan with the establishment of a Relief and Rehabilitation Commission and an early warning system. The Office of Emergency Operations in Africa (OEOA) has also developed the African Emergency Response System, a computer-based system to provide information on an evolving emergency situation. This in-country system will be under the office of the UNDP Resident Co-ordinator to facilitate the preparation and documentation of information required to mobilize resources and to deliver relief aid.

38. The need for a co-ordinating mechanism during the emergency phase has been demonstrated but the exact form and organizational structure will obviously depend on individual country needs. In the United States, severe droughts frequently plague large portions of the nation. In response to the mid-1970s drought, several

States developed contingency plans to provide an effective and systematic means of assessing and responding to water shortages resulting from droughts. 12/ To provide the assessment and response capability, State drought plans should include five basic objectives:

(a) Information collection, analysis and dissemination;

(b) Establishment of criteria for the initiation and cessation of various State and federal assessment and response activities;

(c) Design of organizational structures to ensure information flow between the various levels of government and the definition of duties and responsibilities of all involved agencies;

(d) Preparation and up-dating of an inventory of State and federal agency responsibilites in assessing and responding to drought emergencies;

(e) Improvement of assessing the impact of drought, especially in agriculture.

39. In sub-Saharan Africa, a number of additional measures have to be included in a drought plan in order to allow effective mobilization of resources in the shortest possible time. It is assumed that no developing country can afford to keep manpower and resources on stand-by and it will be necessary to redeploy drilling and construction teams from their normal programmes to the drought-striken regions. As far as possible, some strategic stores of essential spare parts, tools and equipment should be built up. Since the procurement and supply of these is a major constraint in normal water resources development programmes, it will be difficult to stockpile such items. In that case, the drought plan should contain contingency measures to acquire and assemble the necessary materials in the shortest possible time. With regard to equipment and spare parts, it is absolutely essential to keep up-to-date inventories of all installed equipment to assist with standardization within regions and with ease of maintenance.

40. The following list gives the components of a drought plan for the emergency phase. If such a plan exists and the teams and equipment can be quickly mobilized, it should be very much easier for the external aid agencies to strengthen and accelerate the emergency programme.

Drought emergency plan components

Information

Rainfall data collection, processing and dissemination
Early warning systems, agrometeorological models on a real time basis
River flow, ground-water levels
Geological and hydrogeological mapping and geophysical prospecting
Topographical maps, aerial photographs, satellite imagery
Inventories of existing water supplies and types of equipment with locational maps

Equipment

Drilling rigs, casing, pipework, tools and accessories
Water pumps, generators, spare parts
Tools and mobile workshops
Construction materials (cement, timber, concrete ring moulds, reinforcing steel etc).
Experienced manpower
Vehicles, fuel and lubricants
Radio communications system
Water bowsers, storage tanks, pipes and taps

Organization

Relief co-ordinating office (co-ordinating and liaison)
Water Resources Task Force (planning and monitoring of water operations)
Procurement and Supplies Unit (including logistics)
Construction brigades
Operation and maintenance units
Sanitation units (to link up with medical services)

B. Medium term

41. In 1986, the ministers responsible for foreign affairs and for economic development and planning submitted to the United Nations General Assembly at its special session on Africa's economic and social crisis a priority programme for economic recovery. This programme focused on specific priorities to pave the way for national and collective self-reliance and self-sustained growth, and the development of the African economies.

42. The proposals were incorporated in the United Nations Programme of Action for African Economic Recovery and Development 1986-1990, adopted by the General Assembly by its resolution S-13/2 of 1 June 1986. The central themes are the rehabilitation of the food and agriculture sectors, the fight against drought and desertification, investment in human resources, the role of women in development and follow-up mechanisms.

43. In the context of water resources development, a number of measures are identified in the programmes that will facilitate the transition from an emergency phase to the point at which long-term development strategies can be implemented. These apply particularly to agricultural development and the fight against drought and desertification.

44. Since the Programme of Action reflects national priorities and the concerns of the international community, it now forms the adopted framework for action in the medium term. With specific regard to the drought-stricken countries, however, the following additional observations are made to underline and to expand on the themes of the priority programme.

1. Strengthening national capabilities

(a) Policy

45. The starting point for any move to combat drought is a national policy directive acknowledging the high priority which must be afforded to water resources development in the drought-prone areas and authorizing action to be taken to strengthen the national organizations in whom water resources development is vested.

46. An analysis of the country's ability to react to a drought situation or its performance in coping with a recent crisis will help to identify deficiencies. Because of the ubiquitous nature of water as a component of social and economic development, its importance tends to be neglected. While the impact of improved water supplies, the economic importance of hydropower, the potential of irrigated agriculture, the interdependence of pastoral activities and water supplies, the value of rivers and lakes for transportation, and the need for water in industrial processes is recognized, there is a greater need to view water development as a primary common denominator in the development arena, or as the key to halting environmental degradation.

47. Consequently, the cohesion of policy for water management, conservation and utilization is weak. Piecemeal project implementation takes the place of comprehensive programming for the water sector. Where water is mentioned in national policy statements, it is often in connection with a single sector like agriculture, health or rural development. The case for the integrated economic development of drought-prone areas based on the rational management, conservation and utilization of water resources is not being convincingly put across to the policy-makers. This must be a priority objective in the post-emergency phase.

(b) Institutional reform

48. In recent years, a number of countries have taken steps to recognize the public water sector and to combine the fragmented units with subsectoral responsibilities like urban water supply, rural water supply, ground-water development, hydrology, hydrometeorology and pollution control. While this has led to better co-ordination in many respects, it has proved difficult to provide an efficient and comprehensive public service in the face of manpower deficiencies, shortages of equipment and spare parts and the weakness of coherent strategies for the sector as a whole.

49. A persistent difficulty is found in creating proper links between the water sector and critical sectors like agriculture and rural development in general. The weak interfaces between water and irrigation and water and livestock development are good examples of this, but health, urban development, hydropower and transportation could also be cited as areas where conflicting priorities exert pressure on overburdened public sector institutions. Since this problem is not confined only to the water sector, Governments must strive to create an efficient mechanism whereby policies and priorities can be translated into feasible plans and programmes while, at the same time, the constraints can be communicated from the technical departments to the decision-makers. Only in this way can a balanced

strategy be formulated and implemented without the delays, cost over-runs, system breakdowns and costly mistakes which are common at present.

(c) Human resources development

50. One of the frequently identified constraints is the lack of experienced trained manpower at various levels from managerial to professional and technical. Not only is in-service training poorly developed, but career development, incentives and motivation, mobility, and conditions of service have not kept pace with expectations, bearing in mind the inflationary spiral, the demands on the public sector and the attractions of the private sector as an employer.

51. Low financial rewards have traditionally been offset in the public service by security of tenure and fringe benefits like government housing and pensions. Nowadays, with even more dependence upon an efficient and far-sighted civil service to meet the challenge of development, a steady "brain-drain" and loss of ideals characterize the situation in many countries. Unless this trend can be reversed by an overhaul of the civil service, it is hard to see how the best use can be made of existing human resources let alone expand to meet the needs of the 1990s.

(d) Planning mechanisms

52. Probably the most important aspect of managing the transition from emergency to long-term programmes lies in improving planning mechanisms. Not only is there a need to strengthen national planning capabilities but also a more flexible approach to both macro- and micro-economics is often called for. In many aspects of water resources development, "neoclassical" economics, incorporating modern economic analysis, can be followed with a degree of success. Many developing countries in Africa, however, need a more "structuralist" approach to take into account the high proportion of social and indirect economic benefits accruing from rural development.

53. The weakest area is that of sector analysis; that is the examination and assessment of the resources, needs, problems and opportunities in the water sector. Sector analysis is an essential preliminary to national development planning, to ensure that the needs and constraints of the water sector are fully taken into account. Because of its technical and multidisciplinary nature, there are shortages of experienced manpower, with a consequent shortfall in the necessary information and data required for effective and co-ordinated government intervention.

54. Realistic sectoral master planning is, in fact, programmed spending and must of necessity be preceded by comprehensive sectoral analysis and national development planning. A good deal of iteration is required until a balanced sectoral plan fits the budget available to the sector. It also involves the preparation of scenarios which reflect the consequences of budgetary policy decisions. In this way, decision-makers can be kept informed of the effects of financial allocations to the sector and adjustments can be made if the sectoral plan does not meet political expectations.

55. In most countries, the building up of planning units to perform sectoral analysis is essential. In the drought-stricken countries, it is perhaps the only way in which deficiencies can be rectified before the next drought strikes.

(e) Monitoring and evaluation

56. Another function of the sectoral planning units is to monitor and to evaluate current projects and programmes. In order to give guidance to the central planning authority at national level on the allocation of resources, to identify problem areas and to review periodically changing circumstances and their effect on development strategies, the sectoral planning units must continually up-date the sectoral analyses and form the essential bridge between macro-economic planning at national level and micro-economic or project planning.

(f) Water resources assessment and climatic research

57. A recent study concludes that "although many of the meteorological features associated with drought are now well documented, the underlying cases of both the present drought and earlier droughts are unknown". 5/

58. The consequence of this uncertainty in planning terms, is that there is no reliable means of forecasting the onset of future droughts. Furthermore, on balance it appears that dry conditions are more likely to occur in the future.

59. There is no doubt that this prognosis can only be changed by urgent attention to the basic data collection networks, which have declined in recent years, and to further research into the cause of African droughts. The success of any research is bound up to a certain extent in the quality and quantity of data available. There is an urgent need to resolve the question of whether Africa is confronted by a climatic fluctuation or by climatic change. There is an even greater need to apply existing knowledge in improving forecasting or early warning systems. Such early warning systems, however, will rely heavily on the accurate collection, rapid processing and efficient dissemination of environmental data.

2. Soil and water conservation

(a) Arresting environmental degradation

60. One of the major areas where programme support is needed is that of arresting environmental degradation, within the overall concept of soil and water conservation. Because of its long-term nature and the fact that comprehensive schemes have to be established to have a major impact, it is difficult to attract external support for such open-ended programmes.

61. Numerous localized projects have taken place at national level throughout sub-Saharan Africa. Two subregional intergovernmental organizations, the Permanent Inter-State Committee on Drought Control in the Sahel (CILSS) and the Inter-governmental Authority for Drought and Development (IGADD), are co-ordinating national programmes into cohesive subregional programmes. Both organizations need

substantial support to continue and intensify their efforts. This needs to be accompanied by a corresponding strengthening of national agencies charged with environmental protection.

(b) Reafforestation

62. Major programmes are needed in the area of reafforestation. These cannot be systematic replanting exercises over an area as large as the drought-affected zone. In critical recharge areas of river catchments, maximizing infiltration by preserving, protecting and expanding forest cover is an essential prerequisite for any water-based development downstream, and can be best accomplished by government intervention. Elsewhere, dune fixation, shelter-belts, woodlots for firewood and local protection of deep slopes are activities suited to community participation and can be integrated with rural development or agricultural projects.

63. The provision of technical services, seedlings and public information campaigns requires a sustained effort over a number of years combined with a parallel programme to provide alternative sources of energy, to develop new multi-use forest management strategies and to stimulate agro-forestry.

64. The progressive loss of woody vegetation and the decline in fuelwood availability have far-reaching consequences for future ground- and surface-water utilization and for problems of climatic change. It cannot be over-emphasized that this is one of the central issues facing the drought-prone countries and the solution to these problems should be a focus of the medium-term measures.

(c) Water management

65. Management of water resources implies the conservation or protection of the resource coupled with its rational utilization. Since water is a scarce commodity in the drought-prone countries, it is almost always used carefully and valued highly. Water management in the sense of limiting wasteful run-off, encouraging ground-water recharge and preventing salinization, however, is less widely practiced than in areas of Asia, for example, and the mastery of African rivers from source to mouth is largely unknown.

66. The concept of management of individual river or lake basin units has been adopted at both national and international levels. The existence of the international river and lake basin organizations and the national river basin authorities all bear witness to an acceptance of the need to manage such resources in an integrated manner. Most of these organizations face severe financial and human resources constraints, however, and many international rivers and lake basins lack basic organizational frameworks or even agreements to co-operate in the use of shared resources.

67. As a preliminary step to long-term development, a strengthening of existing organizations is called for and, in some cases, a demonstration is needed that such organizations lead to concrete development for the common good. This will help to convince Member States of their intrinsic value and encourage the prompt payment of financial contributions. The creation of new organizations require a more careful

study and assessment of the economomic benefits accruing from joint development of shared resources.

(d) Livestock management

68. The problem of providing water for livestock in the pastoral regions remains unresolved. Indiscriminate drilling of boreholes has been cited as a factor in desertification, by encouraging the survival of livestock numbers beyond the carrying capacity of the land in the vicinity of the waterpoints. On the other hand, water supply is a major constraint to livestock production and it can be used as a livestock management tool. 13/

69. Questions of ownership, equity, management and maintenance make this issue extremely complex. There is an urgent need for more research which could lead to the formulation of better policies and development programmes than in the past. It is accepted that some traditional pastoral systems have achieved a well-balanced ecological adaptation to their environment which can be easily disrupted by water development programmes. 13/ The productivity of such systems relies on the rapid powers of recuperation of traditional stock and on an increase in animal numbers rather than on high individual performance. Under these circumstances, policies for livestock management and water supplies have to be carefully adapted to individual circumstances, which underlines the need for a continuous dialogue between planners in the water development and livestock fields.

3. Acceleration of water and sanitation programmes

(a) Health benefits

70. More than half-way through the International Drinking Water Supply and Sanitation Decade (1981-1990), nearly three quarters of the rural population in sub-Saharan Africa still have no access to clean and reliable sources of drinking water and less than 20 per cent have sanitary excreta disposal systems. At the same time, up to 80 percent of all endemic disability is caused by water-related diseases. 14/ The bare facts mask the progress which has been made, both in supplying services to the rural areas and in developing more appropriate technologies. Nevertheless, the task remains huge and there are few signs of increasing resources being made available to measurably change the situation before the end of the decade.

71. There is a need for more work on quantifying the health benefits of water and sanitation projects to make them attractive to both Government and external funding agencies. The advent of more reliable hand-pumps and the success of many community-based schemes gives some cause for optimism about the future. There is a danger that the importance of providing simple basic needs may be lost in the current emphasis on food production and economic integration. The impact of the recent drought, however, should serve as a timely reminder that the lack of reliable water supplies increases the vulnerability of millions of people to the failure of rainfall.

(b) Cost aspects

72. There has been much emphasis on reducing the costs of rural water supplies in view of the large numbers remaining to be served. Equally, it has been pointed out that initial capital costs are not the most important aspect and that ease of maintenance and reliability are more central issues. Operation and maintenance costs can often exceed capital costs in the long-run and the frequency of breakdowns in the rural areas justifies using more expensive but reliable systems, particularly if external assistance can be assured for capital costs but not for recurrent costs.

73. Cost recovery in rural water-supply programmes is a desirable goal. It is not clear whether full or partial recovery of costs can be attained, especially where government policy dictates that water should not be charged for in rural situations or where there is a danger of reversion to polluted traditional sources in order to reduce payments for water. Governments find it particularly difficult to charge for services they cannot deliver. Unless the efficiency of operation and maintenance systems is drastically improved, the costs of revenue collection may well exceed the amounts received in the remoter rural areas.

74. Whether a Government is going to adopt a policy of partial cost recovery or seek to cross-subsidize rural projects from more cost-effective urban schemes is an issue which must be faced during the period of medium-term measures. It is an issue which should be fully discussed during sectoral analysis and viable options should be presented to Government for policy decisions to be made. Where the problem cannot be resolved, pilot schemes using different options can be implemented in order to find equitable and profitable solutions to suit different social and economic circumstances.

4. Co-ordinating external support

(a) Priority assessment with Government

75. Largely because of the lack of sectoral analyses, the assistance from external support agencies has also been fragmented, piecemeal and unco-ordinated. With over 90 such external support agencies active in the water resources field, 15/ many government departments have been hard pressed to provide the necessary counterpart services, constrained by a staff complement which is not keeping pace with the expanding intervention by external agencies.

76. To help to co-ordinate external support, UNDP round tables and World Bank-led consultative groups have attempted to establish a mechanism at national level for effective policy dialogue and aid co-ordination. The Development Assistance Committee meeting in September 1985 16/ highlighted the importance of:

(a) Information exchange and collaborative action among donors and with recipients;

(b) Constructive, continuous dialogue and co-operation;

(c) Mutual understanding of constraints, of both donor and recipient, that may inhibit effective use of aid and joint efforts to resolve implementation problems;

(d) Consistency between donor aid policies and programmes, and the recipient's development objectives and goals;

(e) Greater complementarity among donor programmes and avoidance of unproductive competition;

(f) Strengthened recipient institutional capacity and management;

(g) Improved recipient government capacity to manage donor co-ordination.

77. The alleviation of major problems such as cost recovery, the effect of tied-aid on operation and maintenance efficiency, sectoral strategy and human resources development will certainly be assisted by greater co-ordination between external support agencies and an effective dialogue with Government to establish mutual agreement on priorities and a combined strategy for effective action.

(b) Rationalizing sector strategy

78. A joint, in-depth analysis of the major issues facing the sector is an important goal of improved co-ordination. Where the planning mechanisms need strengthening, increased donor attention is called for, including technical support, until recipient governments are able to build up their capability to undertake such sector analyses and their periodic review.

79. It is equally important, however, to ensure that flexibility is maintained in any sector plans or strategies. A too rigid adherence to the agreed investment priorities and financing strategies may be counterproductive, bearing in mind the inherent difficulties in comprehensive sector analysis and the constantly fluctuating physical and economic conditions.

(c) Review of funding strategy

80. After thirty years of project implementation in Africa, the disappointing results suggest that some radical re-thinking might be necessary in order to reverse the downward spiral in sub-Saharan Africa and to prepare for future natural disasters. The project concept, incorporating economic analysis, is a valuable tool for managing resources in both centrally-planned and market economies. For many aspects of water resources development, i.e. hydropower, irrigation and urban water supply, it is an indispensable tool for deciding on priorities and for evaluating the relative merits of projects competing for limited resources.

81. For other subsectors, however, such as rural water supply, soil and water conservation, sanitation, research and analysis and water resources assessment, the social, unquantifiable and indirect economic benefits are high, and the services are not market-oriented. A large degree of government intervention and subsidy may be necessary for reasons of equity and social necessity. The lack of data and

difficulty in applying economic analysis to low financial return projects should not lead to their being ranked as low priority, but it frequently does.

82. In drought-prone countries of sub-Saharan Africa, the high cost of emergency food aid often exceeds what would have been required to strengthen national capabilities and to increase drought preparedness. It is easier to dispense food surpluses on humanitarian grounds than to provide comprehensive programme support for food self-sufficiency on a longer time base. If the wealthier nations wish to help the drought-prone countries with their long-term objectives, however, there must be a considerable element of programme support in addition to short-term project assistance.

C. Long term

1. Existing frameworks for action

(a) The Mar del Plata Action Plan

83. The most comprehensive outline of action to be taken by developing countries to accelerate water resources development is contained in the Mar del Plata Action Plan adopted by the United Nations Water Conference of 1977. 17/ It is not a plan in the sense of a phased programme, and it was left to each developing country to design its own strategy on the basis of natural, subregion and regional priorities and the resources, both human and financial, available to implement the numerous recommendations and resolutions.

84. Nevertheless, it forms an invaluable guide for planners and managers in carrying out sectoral analyses and in formulating future strategies. The review of progress in the implementation of the recommendations also provides a tool for the comparison of performance and indicates particular problems being faced by individual countries or regions. 18/

(b) The Lagos Plan of Action

85. At the second extraordinary session of the Assembly of the Heads of State and Government of the Organization of African Unity, held at Lagos from 28 to 29 April 1980, the Plan of Action and the Final Act of Lagos were adopted. The aim of the plan was to restructure the economic base of the continent by means of a far-reaching regional approach founded primarily on collective self-reliance. 19/

86. Regarding water resources, in line with the Mar del Plata Action Plan, recommendations were made in the fields of: (a) institutional strengthening; (b) formulation of national water plans; (c) project identification, preparation and implementation; and (d) subregional and regional co-operation.

87. To a degree, these recommendations have been followed by many countries, but the accelerating social and economic crisis and the low level of external funding for the water sector in the early 1980s have prevented substantial progress being made. Added to which, the widespread droughts have concentrated resources on short-term measures to the detriment of long-term development.

(c) The Cairo Programme for African Co-operation on Environment and Eco-development

88. At the First African Ministerial Conference on the Environment, held at Cairo from 16 to 18 December 1985, it was decided to strengthen co-operation between African Governments in economic, technical and scientific activities, with the prime objective of halting and revising the degradation of the environment in order to satisfy the food and energy needs of the peoples of the continent. 20/

89. The framework for action was formulated within three major fields: (a) the organization of regional co-operation in respect of environment and eco-development; (b) the establishment of regional technical co-operation networks on environment and development; and (c) a number of priority subregional activities.

90. In relation to the United Nations Programme of Action for Economic Recovery and Development, the Cairo Programme sees environmental rehabilitation and improvement as essential pre-conditions for effective social and economic development. There is a broad measure of agreement between the two programmes but the Cairo Programme is more detailed with regard to methodologies and mechanisms to be employed in the translation of its proposals into concrete action and it does emphasize more the paramount role of environmental problems in the development of natural resources in Africa.

91. Many of the priority subregional activities can be classified as medium-term but, given the nature of environmental problems, activities such as ecological rehabilitation, reafforestation and regional co-operation must perforce be considered as long term. The development of phased programmes by each of the established committees (deserts and arid lands, river and lake basins, forests and seas) will help to refine the consensus on agreed priorities into a medium- and a long-term plan. The Second Ministerial Conference is scheduled to take place in June 1987 and the emerging strategy will be further elaborated and finalized.

2. General aspects of long-term planning

92. At this point in time, with African countries embarking upon the most comprehensive, multi-sectoral, medium-term programme ever undertaken, to rectify many of the basic problems of social and economic development, it is clear that a long-term strategy will depend to a very large extent on the progress with and success of the medium-term measures.

93. Long-term planning, in practical terms, is necessary to (a) forecast the effects of present actions; (b) assess the effects of various trends on present policies; and (c) prepare contingency plans to take into account changing circumstances. An essential part of this concerns monitoring and evaluating the evolving situation and keeping decision-makers abreast of developments. It also includes the application of research or innovations to current and future programmes.

94. Taking an example from rural water supply, some of the essentials of long-term planning will involve assessing the rate of progress in installing new supplies compared with population growth trends, forecasting the operation and maintenance situation, projecting the financial position of the rural water supply agency with respect to income and expenditure, analysing the manpower situation, calculating the costs of renewal of capital items and presenting various options to the central planning authority for the next planning cycle. In order to justify expansions of programmes, different scenarios will have to be drawn up to project the effects of different courses of action.

95. The degree to which long-term planning can be carried out depends, first, on the feasibility of the framework for action in relation to the resources available and, secondly, on the accuracy of financial forecasts for the future. There must be a constant dialogue between sectoral planners and the central planning authority and the formulation of good national development plans will be a function of the efficiency of the interactive process between the two planning levels.

96. In view of these considerations, it is recommended that the Governments of drought-stricken countries should focus attention on strengthening the planning mechanisms rather than drawing up additional indicative plans which may have little basis in reality. If strong planning units at sectoral and national level can be established, the essential translation of the existing long-term frameworks for action into future programmes will take place according to national and subregional priorities. It will also ensure that progress with medium-term activities can be built upon and deficiencies can be rectified as part of a rational planning continuum.

97. In order to prepare for future planning (or programming) cycles, certain feasibility studies should be undertaken in the medium-term and due attention must be paid to research and basic information networks. Equally, human resources development needs to be given priority in the medium-term in order to yield fruit in the 1990s.

III. CONCLUSIONS

98. This report has attempted to review the situation with regard to the development of water resources in the drought-stricken countries of Africa, with a view to formulating short-term, medium-term and long-term frameworks for action at the national and international levels.

99. With the arrival of wetter-than-average conditions in 1985 and 1986, the drought can be assumed to have broken. Unfortunately, the famine in many countries is still apparent and the aftermath of nearly twenty years of drier-than-average conditions can be seen in widespread environmental degradation.

100. Many lessons have been learned from the emergency situation, which will greatly assist in improving the state of preparedness of vulnerable countries and in enabling the international community to respond more quickly to future disasters.

101. Undoubtedly, the medium-term measures as elaborated in the United Nations Programme of Action for African Economic Recovery and Development, and as expanded with reference to water resources development in this report, hold the key to future progress. It remains for the African countries, assisted by the international community, to implement these measures as quickly and effectively as possible.

102. In the long term, the existing frameworks for action give sufficient indication of the future direction and major objectives. This report ventures to suggest that long-term planning will be greatly facilitated by increased attention to improving the planning mechanisms in the drought-stricken countries. If this is done, long-term planning will, to a large extent, take care of itself and, more important, it will be able to take into account the rate of progress with the medium-term measures as a tool for forecasting ten years ahead.

103. To this end, a major contribution to water resources development in the drought-prone countries can be made by the international community in assisting the Governments to improve their planning capabilities and mechanisms, and by strengthening national programmes for medium-term and long-term water resources development.

104. Many of the recommendations contained in the present report concern action at the national level, because the strengthening of the national capabilities and the implementation of national programmes is a first priority. On the other hand, the importance of subregional, regional and global programmes of action should not be forgotten. At the subregional level, increasing food production and the fight against drought and desertification can best be effective by groups of countries co-ordinating their efforts toward common objectives. The support of the international river and lake basin organizations and the interregional organizations such as CILSS and IGADD have already been mentioned.

105. At the regional level, the formulation of common policies and priorities in the Lagos Plan of Action and in the United Nations Programme of Action for African Economic Recovery and Development adopted by the General Assembly by its resolution S-13/2, will also assist in focusing on major problems and encouraging external support for such activities. Given the seriousness of the problems of drought and desertification, regional co-ordination is called for, including the exchange of information, experience and technology such as the establishment of "green belts" and water supplies for arid and semi-arid areas. After all, drought and desertification do not respect national boundaries.

106. Finally, at the international and global levels, the consequences of widespread environmental degradation in Africa may have a global dimension in its effect on general circulation and on the earth's energy balance. For this reason, the international community should have a particular interest in the plight of Africa and in supporting efforts to rectify the present environmental trends.

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