UNITED NATIONS

ECONOMIC AND SOCIAL COUNCIL

Distr.
GENERAL

E/ECA/CM.11/38
20 February 1985

Original: ENGLISH

ECONOMIC COMMISSION FOR AFRICA

Sixth meeting of the Technical Preparatory Committee of the Whole

Arusha, United Repbulic of Tanzania, 15-22 April 1985

Item 7 of the provisional agenda*

ECONOMIC COMMISSION FOR AFRICA

Twentieth session of the Commission/ Eleventh meeting of the Conference of Ministers

Arusha, United Republic of Tanzania, 25-29 April 1985

Item 8 of the provisional agenda*

LONG-TERM MEASURES FOR COMBATING DROUGHT AND DESERTIFICATION IN AFRICA

*E/ECA/TPCW.6/1/Rev.1
E/ECA/CM.11/1/Rev.1

M85-602

I. INTRODUCTION

1. The effects of adverse climatic conditions and persistent drought and desertification are increasingly and sharply being felt directly by over 60 per cent of the countries of Africa. The remaining 40 per cent, including those that have hitherto been thought of to enjoy an ambiant equatorial or tropical climate, are at risk of drought conditions and desertification. These severe drought conditions have dangerously hampered the furtherance of those productive activities that ensure balanced social and economic development in the Africa region.

2. Drought is a climatic condition and desertification is a process resulting from that climatic condition. "The word 'drought' has various interpretations: decision-makers, political and otherwise, underestimate its likelihood in and around regions where annual rainfall variability is relatively high. In such arid and semi-arid areas, recurrent droughts are in fact a part of climate and not apart from it and should not be viewed as unexpected events". 1/ Consequently, it has been suggested that the definition of drought should have two components, a physical one and a social one. The physical definition referring to meteorological conditions and the social one denoting the impacts of deteriorations in climatic conditions that are worsened by human and livestock pressures. 2/

3. As concerns the process of desertification, this is "the creation of desert-like conditions, where none had existed before - (as) the result of either the vagaries of weather and climate or the mismanagement of the land or, as in most cases, some combination of both". 3/ It should, therefore, be understood that drought, as defined above, is a constant element in the process of desertification and strategies for mitigating the impacts of one should be closely linked with those mitigating for the other.

4. Drought and desertification, therefore, commonly connote the situation where there is a deficit in rainfall below the needs of those elements of the environment that maintain a balance in the ecology thereby causing a creep of desert conditions. To accommodate the social and economic impacts of drought and desertification, this definition should be expanded to encompass the environmental stress that results in the shortages of economic goods, particularly agriculture-based goods which are consequently affected by shortages of rainfall. The shortages of these economic goods affect pricing levels and costs of living. They have more severe impacts on the poor agriculturalist than on those who may not even have anything to do with agricultural production because they have other sources of income. This second group is consequently well-off financially to accommodate the costs of warding off the problems. As concerns the farmers, how much a household feels the impact of a severe drought will also depend on the size of its resources, either in stored food or livestock.

5. Consequently, the severity of the negative impacts of drought and desertification on the social and economic systems of Africa is influenced by the level of land and water resources management for agricultural and agropastoral purposes. It also depends on the level of alternative non-agricultural incomes available to households, in which case there is a dire need for equitable distribution of income to back up any measures that might be undertaken to mitigate these impacts.

6. In Africa the situation of resource management is made devastatingly worse when it is considered that the majority of the countries directly affected by drought and desertification are among the least developed not only in the world but by African standards. Scarce resources are depleted in the effort to survive, where income-generating activities are brought to the barest minimum. The amount of agricultural production is diminished to the point where it can no longer adequately feed the starving. The activities at national level and those of international organizations, including the organs of the United Nations system, in implementing the United Nations Conference on Desertification's Action Plan to Combat Desertification are being frustrated by the increasing magnitude of the problem.

7. In the spirit and purpose of the Plan of Action to Combat Desertification (1977), the Mar del Plata Plan of Action on Water (1977) and the 1979 Addis Ababa Seminar on Alternative Patterns of Development and Life-styles for the Africa Region and the Regional Food Plan for Africa (1980) have identified, among other things, "climatic conditions and fragility of ecosystems" as one of the "constraints on evolving and implementing alternative patterns of development". 4/ The Heads of State and Government of the Organization of African Unity (OAU) through the Lagos Plan of Action did commit themselves, on behalf of their governments and peoples, to take urgent action to provide the political support necessary to achieve self-reliance in all sectors of development including co-operation in the preservation, protection and improvement of the natural environment. To achieve self-sufficiency in food production and supply, 5/ the governments identified desertification and drought in the Lagos Plan of Action as the priority areas of environmental concern, requiring the promotion of national programmes for the maintenance of the carrying capacity of the arid lands, the establishment of meteorological and hydrological monitoring stations, and the enforcement of strict land management programmes.

8. Urged by the 1982-1983 severe drought in their countries and conscious of the spirit and purpose of the Lagos Plan of Action which calls for co-operation and inter-dependent action in solving common problems, the (ECA) Conference of Ministers at its eighteenth session, by resolution 473 (XVIII) called on the scientific and international community to come to their assistance and organize a Scientific Roundtable specifically on the problems of climatic variability and drought in Africa and to propose "measures that can be taken in the short-, medium- and long-term to deal with the problem". 6/

9. In keeping with resolution 473 (XVIII) cited above, as well as the recommendations of the ensuing Scientific Roundtable which were adopted by resolution 499 (XIX) on a Regional Plan of Action to combat the impacts of drought in Africa, the Ministers of Planning, on behalf of their governments and peoples, did pledge to give high priority to drought and desertification programmes through financial resources, manpower and institutional capabilities, individually and collectively, in order to facilitate studies for a better understanding of the problems of climatic variability, so as to enhance advance planning for drought and desertification related problem.

10. In this context, therefore, the paragraphs that follow will (a) highlight the implications of the long-term recommendations of the United Nations Plan of Action to combat desertification as they are applicable to Africa, and in the Regional Plan of Action to combat the impacts of drought in Africa; and (b) show how the application of the existing network of space science and technology in Africa can be made to serve the region more effectively in the long-run to alleviate the problems of drought and desertification.

II. LONG-TERM MEASURES FOR COMBATING DROUGHT AND DESERTIFICATION IN AFRICA

11. Long-term measures for combating drought and desertification should be those programmes that can be integrated into the national planning mechanisms. The recommendations that follow take for granted the fact that short- and medium-term activities recommended in the Plan of Action to Combat Desertification and the Plan of Action on drought in Africa have been taken care of. In this context, there is the need to set up tools of measurement and long-term programme evaluation for reassessing methods of data collection, data analysis and information dissemination, the operation of early warning systems and the general impact of programmes including the impact of human responses to drought and desertification. It is also imperative to develop improved land and water management practices for better agricultural production and agropastoral activities. The details of these integrated activities are presented below and will cover:

(a) Long-term measures for combating drought in Africa;

(b) Long-term measures for combating desertification in Africa;

(c) Application of space science and technology for drought and desertification control in Africa.

A. Combating the impacts of drought in Africa

12. In most African countries today, most of the weather and climate observation infrastructure, particularly at micro-level seem to have been neglected. Consequently, the skills of analysis and use of such data have not been as developed in Africa as they should have been. In order to reactivate and sustain this infrastructure, action should be taken in the following areas:

(a) Climate research applications;

(b) Water resources management;

(c) Agriculture;

(d) Forest resources;

(e) Studies on social and cultural conditions.

(a) Climate research applications

13. Weather and climatic variables greatly determine soil conditions that in turn determine the exuberance of fauna and flora. In short, weather/climatic conditions determine the quality of agricultural and livestock production. There is therefore need to enhance and sustain a network of institutions for the co-ordination of data collection and dissemination by:

(a) Expanding and modernizing existing national meteorological and weather observing stations, irrespective of their size, to cover micro-climatic types;

(b) Enhancing existing climatic data processing facilities;

(c) Updating, where applicable, the inventory of national weather data stations;

(d) Establishing a modality of making available to neighbouring States, and eventually to all member States, data on micro-climatic conditions;

(e) Establishing a timetable for data processing and dissemination;

(f) Allocating roles for national governments, multinational and international agencies for collaboration in cross-country data collection, analysis and dissemination.

(b) Water resources management 7/

14. The importance of ground water as a potential resource is seen from the fact that surface water is only 5 per cent of ground water and the loss in surface water is faster and greater than that of ground water. The balance between waste water and potentially useful water can be demonstrated as follows. When there is precipitation, three things normally happen. First, there is run-off, then there might be seepage into the bedrock and then some of the precipitation evaporates. The rate of each of these processes will determine the level of wastage, in agricultural terms, of the water resources.

15. Regulations concerning the quantity of water that can and should be pumped from each well, at any given time, are influenced by the configuration of the impermeable bedrock which in turn determines the rate and level of changes in the water-table. Owing to the tectonic dynamics of the earth's crust, the depth of an aquifer may differ from one region to another. If one region or country has the advantage of being placed on the deeper portion of an aquifer, quantity regulations might help to regulate the rate of fall of the water-table, depending on the rate of recharge. Recharge can be from surface sources or between-well recharge if the deeper wells are not overexploited.

16. Ground water management, therefore, is a tricky issue because the individual property claims of those settled above an aquifer to impose a "territorial" right to the water below and any attempts at recharging another aquifer from theirs, either by controlled pumping or other technical means, usually meets with resistance.

17. The major problem in underground water exploitation for agriculture is that of renewal. In most areas the use of underground water for agricultural or domestic purposes implies that rain-fed agriculture is difficult because surface water resources are not available.

18. Where surface to sub-surface recharge is deficient, there could be a transfer from one aquifer to the other. This transfer could be within the same region of a country, between regions within the same country or across country boundaries where the water table may fall below the depth of some wells in the adjacent area. In any case, negotiations are bound to take place at some level. This is pertinently relevant in countries that are contiguous and where the area from which an aquifer is recharged might be dependent on the goodwill of the country in which the main aquifer lies.

(c) Agriculture

19. The sector that is first hit by drought is the agricultural sector and it is important to develop and systematically maintain information in this sector. This is necessary because agricultural data will provide one of the important elements that can be used to determine the redeployment of resources to alleviate economic stress. To do this, there is the need to sustain and expand national agricultural census networks and facilities in drought-prone areas, to gather data on seasonal variations in the area of land under cultivation, seasonal variations in the quantity of crop production, food security needs for human and livestock populations, seasonal variations in soil conditions and seasonal variations in rural unemployment. Any of these seasonal changes will be extremely helpful in early warning systems which should be maintained.

20. It will also be necessary to enhance studies on livestock population dynamics including genetic variations to develop more resistant breeds of livestock in arid and semi-arid conditions.

21. Governments should maintain national records on the behaviour of agro-based industries under these conditions including employment and production trends, and a cost of living index.

(d) Forest resources

22. Careful management of forest resources can help alleviate drought and its impact and should be a continuous programme. There is, therefore, the need to embark immediately on activities to enhance studies on the genetics of species to develop more resistant ones and continue afforestation activities. Forest reserves should be expanded and alternative sources of energy should be developed to reduce the pressure on forest resources for fuelwood. Legislation should be more vigorously enforced to prevent bush fires and the degradation of resources through poor management.

(e) Studies on social and cultural conditions

23. Social and cultural responses to the stress from drought and desertification can determine how easily or not the impact can be mitigated. It is therefore necessary to understand the population and this calls for the need to:

(a) Enhance or initiate the collection, at local level, data on:

(i) local perceptions of drought conditions and their causes;

(ii) traditional adaptations to drought conditions;

(iii) social and cultural mutations as a result of drought.

(b) Request national research institutions and universities to encourage the collection of such data;

(c) Maintain and update records of population dynamics under drought conditions:

(i) demographic trends; and

(ii) population movements.

24. This should be followed by the establishment of modalities for the exchange of information on population dynamics as a response to drought conditions.

B. Combating the impacts of desertification in Africa 8/

25. It has been pointed out earlier in this paper that "the creation of desert-like conditions where none existed before" results from the mismanagement of the land and that it is usually made worse by persistent drought conditions. 9/ Consequently, strategies for combating or controlling the process of desertification will be an extension of the strategies to combat drought.

26. It is important to bear in mind that desertification is not a problem that is susceptible to quick solutions but one that calls for continuous assessment and long-term planning management at all levels. Because of the interdependent nature of the development process, population change, relevant technologies and biological productivity, it means that the effects of desertification on productive ecosystems can best be ameliorated if programmes are planned and implemented within an interdisciplinary framework. It is also understood that countries affected by desertification or are at risk of being affected are at different stages in their approach and ability to cope with the problem.

27. The issues of environmental management in desertification control include the following:

(a) Land management;

(b) Strengthening science and technology at the national level;

(c) Corrective anti-desertification measures.

(a) Land management

28. Long-term land use management planning systems should be strengthened. This should be based on systematic information on the dynamics of the ecology of the areas affected or most likely to be affected by desertification. This should be done by a multi-disciplinary approach and with the participation of local rural communities encompassing the whole process of regional planning. Land use policies and plans should be based on locally available resources and should apply to the sectors to include:

(a) Crop production;

(b) Livestock;

(c) Game ranching;

(d) Forests;

(e) Biosphere reserves;

(f) Mining;

(g) Industry;

(h) Roads;

(i) Urbanization and housing;

(j) Recreation.

29. To achieve the implementation of a successful land use planning policy, it will be necessary to increase the general public awareness of the problem of desertification through mass environmental education. This should be backed up by the development of manpower and institutions in land use planning.

(b) Strengthening science and technology at the national level

30. The lack of adequate scientific and technological capabilities in many African countries affected by desertification constitutes a serious handicap to successful implementation of desertification control measures. This makes it difficult to develop local capabilities for combating desertification or adapt those from other areas with similar experiences.

31. It will therefore be imperative to strengthen national institutions concerned with the development or adaptation of improved scientific and technological capabilities and assist in the transfer of relevant technologies taking into account local, social, cultural and economic factors.

32. Close monitoring should be maintained of the changes in tastes, values and life-styles that are most likely to affect strategies in combating desertification, particularly in the areas of the technology for exploiting the resources of the areas. In this respect, there is the need to develop those areas of consumption that will encourage the development of national or local resources to reduce dependence on externalities.

(c) Corrective anti-desertification measures

33. Corrective measures in combating desertification refer to those activities that are geared towards the assessment, management and/or regeneration of the natural resources that are responsible for the maintenance of the ecological balance in arid and semi-arid zones. The areas for corrective measures would include water resources management, weather and climatic early warning systems, range management, soil and agricultural management, population movements. These areas of management should form the basis of an integrated development planning process in the arid and semi-arid lands of Africa.

34. Since water is the base of all life, its management is crucial in the struggle against desertification. As was earlier indicated in the case for drought, long-term measures must be taken to ensure that water needs are met by:

(a) Implementing the recommendations of the Mar del Plata Plan of Action, particularly those pertaining to measures relating to drylands and drought-prone areas that are subject to desertification;

(b) Strengthening national institutions responsible for water resources development, co-ordination of responsibilities for water resource data collection and related national data bank, ground water resource surveys and development of criteria for assessing ecological water needs and water budgets;

(c) Enhancing environmentally sound techniques for the exploitation of ground water resources;

(d) Revegetation or reforestation, as the case may be, of watersheds and drainage basins to reduce water and soil loss through erosion, evaporation and eutrophication;

(e) Developing legislation for the management of national hydrological systems.

35. Due to weather and climate variability, early warning systems can provide useful information on impending drought conditions and necessary measures taken to protect the environment against the possible stress, particularly on water

resources. There is therefore the need to strengthen weather data collecting and monitoring infrastructure as a back-up for water resource management structures.

36. Overgrazing, one of the main causes of desertification, arises because of the limited area of rangelands or overstocking or excessive use of water points or a combination of all. There is therefore the need to embark on resources to improve rangelands by:

(a) Regeneration of rangelands;

(b) Developing complementary feed for livestock;

(c) Strengthening research into improved pastures and livestock breeds for arid areas.

37. Soil management for agricultural purpose should be enhanced by improving irrigated farming systems through appropriate cropping system to avoid soil salinization, alkalinization and water-logging. Research facilities in agricultural research institutions should be strengthened to better cope with the situation. To further improve the quality of the soil, fast-yielding varieties of leguminous crops like peas should be introduced. These would provide feed for human as well as animal populations.

38. The monitoring of human conditions in areas prone to desertification is needed to provide baseline information on serious deviations from the local environmental support systems to enable the early initiation of desertification control measures. Information should therefore be maintained on:

(a) Population dynamics;

(b) Human and environmental health;

(c) Food production variations in relation to population changes;

(d) The dynamics of settlement patterns; and

(e) Changes in social and cultural patterns.

39. These are some of the measures that should be maintained and updated in an integrated manner, on a long-term basis in the efforts to combat desertification.

C. Application of space science and technology to combat the social and economic impact of drought and desertification in Africa

40. The application of space science and technology has been greatly responsible for the generation of the level of development in the economically more advanced countries of the world today. Crisis have been avoided or minimized by the use of these tools in collecting, analysing and disseminating information particularly in the areas of communications, remote sensing and meteorology for resource and environmental management.

41. It is important to note that space science and technology application has been given a very important place in the work programme of United Nations and its specialized agencies. At United Nations Headquarters the Outer Space Affairs Division includes an information service and supports the activities of the Technical and Political Committee on Outer Space. Within the Department of Technical Co-operation for Development, remote sensing is used to provide inputs to the work programme of the Natural Resources Division. FAO has a very strong remote sensing centre that provide remotely sensed information inputs to its field projects and carries out training activities for member States. UNDRO also has a remote sensing unit that provides information for disaster prevention, monitoring, warning and assessment. WMO, UNESCO, UNEP and ITU all depend on space technology application in their work programmes for weather and climate research (WMO), earth science research activities (UNESCO), the global environmental monitoring programme-GEMS (UNEP), and the overall co-ordination of telecommunication activities (ITU).

42. Remote sensing, telecommunications and meteorology applications are areas where the increased use of space science and technology has been responsible for the accelerated development of the economically more advanced countries of the world. In Africa these are also the areas where the increased use of available space technology will provide possible solutions to alleviate most of the social and economic development problems that now plague the region. Space technology is used in:

(a) Remote sensing not only for mineral resource development but for advanced research into soil and water resources, particularly ground water, that could be exploited to increase food and agropastoral production in arid and semi-arid areas;

(b) Meteorological data collection to backstop the use of the remotely sensed information on impending drought;

(c) Telecommunications to disseminate the information on combating drought and desertification to the primary users in the rural areas.

43. Unfortunately, the application of space science and technology has not received the priority concern in Africa that it has received elsewhere, the pretext being that of costs and trained manpower. One of the results has been the present crisis through which Africa is now passing and which has been greatly due to the inadequacy of data and/or information for monitoring of climatic changes and agricultural performance as well as for monitoring the different sectors of resource mobilization for development planning. Even where the information exists, its diffusion, even within national boundaries, is virtually impossible.

44. One argument that explains the present inadequacy, in Africa, of up-to-date data, and of interstate communication of existing information has been that during the colonial period information was collected to enable the colonial metropolises to fully exploit the resources of Africa for their development. With the attainment of independence came a disinterest, in the former colonies, in data collection and the data collecting infrastructure was allowed to become obsolete. African countries still have to turn to the former colonial masters for information about themselves and are given secondary information.

45. Space science and technology has greatly assisted the former colonial metropolises in maintaining the situation of this imposed dependence of Africa for information. They have done so by establishing and financing an array of ground-receiving stations linked to satellites which were clearly indentical with the former colonial spheres of influence. Local manpower was also trained on this basis. Access to space-generated information from local ground stations has now to be obtained through secondary sources outside Africa. This has been particularly true of the highly priced remote sensing programme sponsored by ECA.

46. What is obvious is that Africa will remain under the stress of drought, desertification, famine, disease and underdevelopment if it continues to maintain the same arrangements whereby it receives information about the causes of crisis from secondary sources. In this connection. African countries should reinforce the use of space science and technology in:

(a) Remote sensing;

(b) Telecommunications;

(c) Meteorological applications.

(a) The application of the remote sensing programme in Africa for drought and desertification control

47. The establishment of an African Remote Sensing Programme by the secretariat of the Economic Commission for Africa was unanimously approved by ECA member States in resolution 280 (XII) of the ECA Conference of Ministers in February 1972. Following an expert study and two intergovernmental meetings on the programme, it was decided to establish:

(a) Five training and users assistance centres to be located at Kinshasa, Cairo, Ile-Ife, Ouagadougou and Nairobi;

(b) Three ground receiving and processing stations to be located at Kinshasa, Ouagadougou and Nairobi;

(c) The secretariat of the African Remote Sensing Council which is charged with the co-ordination of the programme.

48. After 12 years of the preparatory phase for the implementation of the programme, the results so far achieved are as follows:

(a) Two centres (Ouagadougou and Nairobi) rendering services at the sub-regional level in a satisfactorily manner; the Centre in Nairobi trained about 230 people in the applications of remote sensing to hydrology, forestry, cartography, agriculture, geology, regional planning and weather forecasting and undertook several thematic mapping projects;

(b) The regional centre at Ouagadougou trained about 260 people and undertook also valuable pilot projects in six countries in the West African subregion; the Nairobi and Ouagadougou centres have been adequately equipped for rendering services in training and users assistance facilities but they are still without equipment for digital analysis; the two centres need adequate photolaboratory equipment for image reproduction, enhancement, mosaicking and which could satisfactorily meet the needs of member States;

(c) The secretariat of the African Remote Sensing Council with its headquarters in Bamako, Mali, has been functioning since July 1981 but without adequate professional staff or the appropriate administrative infrastructure to support a programme like this.

49. It has been emphasized in the preceeding paragraphs that, as of now, Africa has a space technology network that can be exploited to the full benefit of member States in an effort to mitigate the impact of drought and control the process of desertification. Unfortunately, accessibility to the networks, ground stations and satellites has been compartmentalized by agencies outside Africa into "spheres of influence" so tight that their operations have hardly been to the benefit of the immediate developmental needs of the continent. Consequently, any attempt to review the situation has to be done with extreme courage and firmness because the issues involved are as sensitive and delicate as those that existed during the period of political decolonization of the region. The approach must therefore be bold so as to acquire the self-reliance and self-sustenance that will make for negotiable co-operation rather than the imposed dependence that now exists.

50. The suggestion is that the present African Regional Remote Sensing Council or a similar machinery (board) should be located where it will have direct benefit from ECA's secretariat and administrative facilities and will be the central policy organ in order to reduce costs. Membership of the board would be from each MULPOC subregion, chosen during the meetings of the MULPOC policy organs. The Executive Secretary of ECA and the Secretary-General of OAU or their representatives, as well as the Directors of the Centres should also be on the Board.

51. The board's mandate will be to:

(a) Orient the activities of the centres on a two-year basis and based on prevailing environmental conditions;

(b) Develop modalities to ensure the active participation of member States in terms of regular contribution to the budget of the centres and develop protocols for harmonizing the present incompatibilities in the remote sensing system;

(c) With the assistance of ECA raise resources from regional and international, multinational and bilateral sources for the upkeep of the programme;

(d) Submit annual reports to the ECA Conference of Ministers and the OAU summit on:

(i) current state of the programme;

(ii) areas of immediate concern demanding policy decisions at the highest level; and

(iii) propositions for future activities.

52. The existing centres at Ile-Ife, Ouagadougou, Nairobi and Cairo, and the proposed African regional centre for advanced meteorology should be enhanced to better carry out their present duties as they concern drought and desertification control. At the moment the centres face a serious manpower problem not because the local African trained manpower cannot be found but because there are no resources to recruit them. The enhancement of these centres should include:

(a) Strengthening the satellite tracking and data collection facilities;

(b) Reallocation of tracking roles depending on nature of the information to be acquired;

(c) Re-organizing the communication networks to cope with the demands of the remote sensing activities and include computer compatible systems linking all the centres;

(d) Expansion to include a ground water resources and environment monitoring section at each centre that will prepare reports on the behaviour of water resources in each MULPOC region.

53. To enhance the operational aspect of the remote sensing programme, the activities of the proposed Regional African Satellite Communications System should be integrated into those of the remote sensing programme. To this end, there should be greater compatibility between which is more flexible than it is now.

(b) Application of satellite communications in Africa for drought and desertification control

54. African, as well as other developing countries are faced with urgent requirement to develop and expand their national communication networks which are the basis for accelerated development. For the most part, the efforts have been based on an attempt to use conventional terrestrial links which have proved to be an extensive and expensive process and which, in some cases, because of mountains, rivers, forests, deserts or simply by very long distances, were virtually impossible.

55. To supplement and improve communication services at national, regional and international levels, most African countries are members of the International Telecommunications Satellite Organization (INTELSAT) and operate satellite earth stations for international traffic. Some utilize space capacity on INTELSAT satellite which is leased to them on a pre-emptive basis should that capacity be required in the international system for their domestic communications needs.

56. Recognizing the need for Africa to further explore the potential applications of space technology in the various fields such as communications, navigation, remote sensing, meteorology and other geo-sciences, a Regional African Satellite Communication System is being planned. The system shall be used along with other existing or planned systems not only to improve intra-African communication services but to extend services beyond the urban cities to the lot of 80 per cent of Africans living in the rural areas. A detailed feasibility study has been designed to:

(a) Define telecommunication and broadcasting services requirements particularly for the benefit of rural and isolated areas of each participating country up to the year 2000;

(b) Ascertain the interest of African nations to realize and eventually utilize the proposed systems;

(c) Justify the basic technical and economic feasibility of the overall technical concept to be used;

(d) Prepare a comprehensive study that gives the basic technical and economic viability of a regional communication satellite which will cover the African continent and provide efficient and economic telecommunication and broadcasting facilities to rural and remote areas, as well as provide service to certain interurban and intra-African routes;

(e) Investigate the qualities, size and units and environmental conditions of Africa so as to prepare guidelines and specifications for the initiation of research and manufacture of appropriate equipment for the ground segment of the system which may be proposed.

57. The proposed feasibility study on the Regional African Satellite Communication System to be undertaken in collaboration with other United Nations specialized agencies, OAU and African intergovernmental organizations is expected to throw fresh light on the importance of the use of space communications technology for social and economic development. The feasibility study will lead in the very near future to the implementation of a modern integrated and high capacity communication network tailored to the growing needs of Africa.

58. As was observed above, most African countries are members of INTELSAT and operate satellite earth stations for domestic communications between a number of different points, especially in rural communities which can be very profitable in the early warning system of drought-prone areas and activities in desertification control. The existing systems - both terrestrial and communication satellites - do not cater for the needs and requirements of rural communities and even between cities where they do not exist, it is only an inefficient and slow system. One reason is that current operational communication satellite systems are not optimally designed for domestic use. They require substantial investment to provide for cost-effective national communication services which will become cost beneficial in the long-run.

59. But it is not recognized that the utilization of an efficient and well-developed satellite communications network is a stimulus for rapid development through the use of this modern technology in the fight against desertification. Provision of efficient and effective communications servicing all communities would help solve such social development problems as hinted to above in reducing particularly rural exodus and rural unemployment, two problems that are rampant during drought periods and which are aggravated as desertification increases.

(c) Meteorological applications 10/

60. The application of space science and technology to the collection of climatic and meteorological data in Africa is presently being handled by the World Meteorological Organization, the Food and Agriculture Organization as well as civil aviation authorities. Data is collected on an hourly or daily basis but the stations are located mostly in the urban areas or the main airports.

61. In the area of meteorology too, the infrastructure is divided into "spheres of influence" as in the case of telecommunications. The francophone countries rely on the Agence pour la securité de la navigation aérienne en Afrique et à Madagascar (ASECNA) for meteorological information while the anglophone countries strive to cater for themselves individually or within civil aviation agreements. Fortunately, ECA has been given the responsibility to co-ordinate with the World Meteorological Organization (WMO) to establish an advanced centre of meteorological applications for development and activities have been initiated.

62. Through ECA resolution 499 (XIX), the African member States categorically accepted the primary responsibility to implement the Regional Plan of Action to combat the adverse impacts of drought on the continent. Three specific measures were highlighted, namely to:

(a) Adopt appropriate measures, including increased allocation of financial resources, and enhancement of manpower and institutional capabilities within the framework of the Regional Plan of Action, to better predict and combat the adverse impacts of drought;

(b) Rehabilitate their drought-stricken economies in a co-ordinated and integrated manner; and

(c) Design and enforce other appropriate policies for the implementation of the Regional Plan of Action in its entirety.

63. As a result, ECA resolution 528 (XIX) of May 1984 was adopted calling for the creation of an advanced centre for meteorology in Africa; ECA and WMO are presently carrying out a feasibility study on its establishment. The proposed centre will train middle and higher level scientists in meteorological applications and will also be equipped with ground facilities to handle meteorological data collection and dissemination through satellite communication and computerized services for ECA member States.

64. The proposed centre to be called the African Centre of Meteorological Applications for Development (ACMAD) will carry out the following activities:

(a) Establish a meteorological watch system over the continent of Africa to alert countries on significant meteorological phenomena, such as drought, floods, tropical storms and rainy seasons, which may have a profound effect on the economy and life of the people;

(b) Conduct applied research in meteorology to better understand the climate and atmospheric processes which produce drought, floods, tropical storms, rainy seasons and other atmospheric events. In particular, determine the meteorological process over tropical and subtropical parts of the continent to classify the climate and define the major weather systems which make up the total climate. As required, produce or update maps of the monthly, seasonal and annual climate, both mean values and measures of variability;

(c) Issue daily weather forecasts and bulletins of recent past weather for all of Africa, using modern technology such as computers and satellites. Initially the forecasts will be for short periods (up to two days) and medium periods (up to 10 days) and later on for seasons and annual climate variations as skill develops for these extended period predictions;

(d) Develop improved methods to apply meteorology to critical human activities such as food production, water resource management, and renewable energy (water, solar and wind);

(e) Initiate an integrated programme of applied research in meteorology throughout institutions in Africa and facilitate the publication of the results of this research by African scientists;

(f) Collaborate with other centres outside of Africa to jointly study meteorological problems and applications of importance to Africa;

(g) Facilitate education, training and experience in meteorological research and applications for African scientists. In addition, AMIRA should offer opportunities for workshops, seminar and refresher courses for senior scientists and technical personnel working in areas related to meteorology and its impact on agriculture, land-use practices, water resources and energy development;

(h) Develop a regional network with mass media throughout Africa of dissemination of information on meteorological events and their impacts on national economics and life of the people;

(i) Act as a depository library in Africa for meteorological reference material.

65. The above discussion highlights the fact that Africa is not using, or being allowed to use fully, space science and technology to plan for social and economic development. There is a dire need to restructure related programmes. The reasons for this are fundamental. Presently, Africa is going through a crisis situation arising from the impacts of drought and desertification which could have been

minimized if the existing space science and technology applications infrastructure had been fully utilized to gain access to primary data to be able to derive indications of the impending natural catastrophes. To increase accessibility, it will be necessary to develop small earth stations that are adaptable to rural areas as well.

III. SUMMARY AND RECOMMENDATIONS

66. This paper emphasizes that drought which denotes the deterioration in the amount and seasonal distribution of annual rainfall, is closely related to the process of desertification. In arid and semi-arid regions, droughts are a part of climatic variability and should not therefore be viewed as unexpected events in the manner in which they are being treated in Africa today. Desertification, which results from a combination of drought, human and livestock population pressure as well as the mismanagement of land resources, is a difficult and very slow process to reverse once it is allowed to begin. Consequently, strategies aimed at preventing or controlling desertification and those for mitigating the devastating impacts of drought and desertification must be intersectorally integrated. The strategies must not only be sporadic short-term emergency measures but sustained long-term programmes.

67. The long-term measures proposed in this paper for combating the impacts of drought and desertification in Africa are in the framework of national short-term programmes that have been or are being implemented. Three areas are therefore treated, namely:

(a) Long-term measures for combating drought in Africa through the management of climate data, water resources, agriculture, forest resources as well as social and cultural conditions;

(b) Long-term measures for combating desertification in Africa through land resource management, strengthening related national science and technology institutions; and

(c) Application of space science and technology for drought and desertification control through remote sensing, communications and meteorology applications.

RECOMMENDATIONS

68. From the propositions in this paper, five recommendations are being suggested, namely:

(a) That there should be a single national machinery, at the highest decision-making level, responsible for the co-ordination of integrated programme activities for combating the impacts of drought and desertification;

(b) That there should be integrated planning, implementation and management, at the national level, of a programme to combat the impacts of drought and desertification in the countries affected;

(c) That there should be development of national manpower and institutional capabilities in the areas of:

(i) desertification control techniques and land management in arid zones;

(ii) the application of space science and technology particularly in remote sensing, communications and meteorology;

(iii) exchange of experts and common use of institutional facilities;

(d) That there should be a sustained national network for related information dissemination networks to enable the diffusion of research results and experiences to rural communities and, as need arises, between member States;

(e) Evaluation as an integral part of the programme planning and implementation process to be able to measure performance in the different sectors as a result of the application of the strategies recommended in this paper.

FOOT-NOTES

1/ Glantz M.H. and Kata R.W. (1977): "When is a drought a drought?" Nature, Vol. 267, pp. 192-193.

2/ Ibid., p. 192.

3/ Ibid.; p. 192 also UNEP/GC/95/Add. 1, 2, 3, 4 "United Nations Conference on Desertification, 29 August - 9 September, 1977: Round-up, Plan of Action and Resolution".

4/ E/CN.14/14/SAP/3: Report of the seminar on alternative patterns of development and life-styles for the Africa region (1979), para. 22, p. 9.

5/ ECA/ECO/9(XIV)Rev.2: Lagos Plan of Action for the Implementation of the Monrovia Strategy for the economic development of Africa (OAU, 1980) - Preamble.

6/ E/ECA/CM.9/30: Economic Commission for Africa: Annual Report 1 May 1982 - 2 May 1983, Supplement. No 13, p. 94 operative, para. 1.

7/ See document ECA/MULPOC/NIA/VIII of 23 January 1985 "Report on environmental problems of underground water exploitation in the West African MULPOC subregion".

8/ This section is an adaptation of the recommendations contained in UNEP/GC.95/Add. 1, 2, 3, 4, op. cit., p. 7.

9/ See paragraph 3 above.

10/ Based also on the Report of the joint ECA/WMO inter-agency meeting on a feasibility study for an African Institute for Meteorological Research and Applications, Geneva, 30 November 1984, annexes 5 and 6.