ECONOMIC COMMISSION FOR AFRICA

Scientific Round Table on the Climatic Situation and Drought in Africa

Addis Ababa, 20-23 February 1984

DRAFT REPORT

A. Attendance and Organization of Work

1. The Scientific Round Table Conference on the Climatic Situation and Drought in Africa was opened by Professor Adebayo Adedeji, United Nations Under-Secretary General and Executive Secretary of the Economic Commission for Africa, on Monday, 20 February 1984 at 11 a.m. in Africa Hall, Economic Commission for Africa, Addis Ababa. Opening statements were also made by the following co-sponsors of the conference, namely: the Organization of African Unity (OAU), the United Nations Environment Programme (UNEP), the World Meteorological Organization (WMO), the Food and Agriculture Organization (FAO), the United Nations Sudano-Sahelian Office (UNSO).

2. The Conference was attended by experts from the following state members of the Economic Commission for Africa: Arab Republic of Egypt, Burundi, Congo, Chad, Democratic Republic of the Sudan, Federal Republic of Nigeria, Ivory Coast, Libyan Arab Jamahiriya, Mozambique, Niger, Republic of Djibouti, Republic of Ghana, Republic of Guinea, Republic of Malawi, Republic of Senegal, Republic of Sierra Leone, Republic of Zaire, Rwanda, Sao Tome & Principe, Socialist Ethiopia, United Republic of Cameroon, United Republic of Tanzania, Zimbabwe.

3. The following countries were represented by observers: Canada, Democratic Republic of German, France, Italy, Korea, People's Republic of China, Sweden, Switzerland, United States of America, and USSR.

4. The following United Nations organs, organisations and bodies were represented at the Meeting: UNIDO, UNICEF, UNDRO, UNSO, WMO, FAO, WHO, IBRD, and ILO.

5. The following intergovernmental and non-governmental organizations were represented in an observer capacity: ILCA, LWF, ACARTSOD and Addis Ababa University.

6. The Organisation of African Unity participated at the meeting as one of the co-sponsors of the Scientific Round Table Conference.

7. The following officers were elected to the Bureau:

Chairman: Mr. Mohammed E. Abdalla,
Deputy Director-General of Meteorology, Sudan

First Vice-Chairman: Mr. Boulama Mohammed, Niger

Second Vice-Chairman: Mr. Mohammed K. Akrout, Libyan Arab Jamahiriya

Rapporteur: Mr. Senga Mavounia Mathias,
Ingenieur, Rurale Planification, Congo

B. Agenda

8. The Scientific Round Table Conference adopted the following agenda:

1. Opening of Meeting
2. Election of Officers
3. Adoption of Agenda and Programme of Work
4. Substantive Sessions:
   - 4.1 Review of the climatic situation and drought in the region and their impact on the socio-economic systems in Africa;
   - 4.2 Review of country experiences;
   - 4.3 Consideration of the Draft Programme of Action to alleviate the impact of climatic variability and drought in Africa in the short-medium- and long-terms.
5. Consideration and adoption of report and closure of the meeting.

C. Account of Proceedings

Opening Addresses

9. Professor Adedeji pointed out that 34 African countries were now affected by drought which is now Afirca's most devastating and persistent problem. The current drought has been continious since the Sahel drought of 1968-1972 and it has spread to eastern and southern African countries. In all cases, these drought-stricken countries have experienced a 40-60 percent deficit in rainfall which is even higher in Mauritania (up to 80 percent). The adverse impact of the drought has been serious food scarcity, sharp depletion of livestock, degradation of the environment with depletion of water resources and dislocation of Africa's fragile economies. The drought has reduced pastureland in many African countries by 25 percent, which with animal diseases and poor grazing conditions have caused 20-30 percent livestock mortality in places. The effect on water levels of rivers passing through the Sahel and on large dams has been to prevent the annual enrichment of flood plains, disrupt irrigation and the generation of hydro-electric power supply.

10. The Executive Secretary further stressed that the impacts of the drought is worsened in Africa, since the majority of the countries affected are LDCs who are least equipped to deal with their economic problems, let alone that of drought and its calamity. He mentioned that the recent tour of eight West African countries by the Secretary-General, has convinced the delegation of which he was a member, that the drought has reached crisis point, requiring massive international assistance to curb the shortfall in aid pledged.

11. In conclusion, the Executive Secretary recalled that the adoption of ECA resolution 473 (XVIII) reflected the deep concern of African member States over the worsening drought conditions, accentuated by irregular, unreliable and scarce rainfall pattern. Efforts should be made at this Conference to find a

lasting solution to the problem, in view of the expertise and scholarship of the working documents prepared by inter-agency co-oepration for the Scientific Round Table Conference. He, then, recognized the substantive support and financial assistance given by the co-sponsoring organisations towards the success of the conference. Finally, he appealed to the international community to mobilize resources to assist the drought-stricken African countries to rehabilitate their economies and achieve self-reliant socio-economic development in the spirit of the Lagos Plan of Action and the Final Act.

12. Mr. Allouane, the representative of the Acting Secretary-General of the Organization of African Unity, called attention to the fact that the gravity and magnitude of the drought problem in Africa has received renewed attention, as evidenced in the recent publicity given to it by the United Nations Secretary General's tour of eight West African countries which are affected by drought. Furthermore, the Heads of State meeting of CILSS which took place recently in Niamey and that of the SADCC in Lusaka, all within a space of a month, give added expression to the problem. He pointed out that the picture that emerged from these meetings give a gloomy view, since the situation poses immense and severe constraint for the socio-economic development process of the affected countries in particular and Africa in general, especially at a time when Africa should be striving to accomplish its socio-economic plans between now and the year 2000. While it had become imperative to solicit funds to help drought affected countries, what was needed as a matter of urgency was finding a permanent solution to the problem of drought. This can only be achieved by embarking on studies, research and strategies that seek to understand, the nature of our climate, its variability and predictability with a view to enabling us prepare for eventualities.

13. He noted that the problem of drought is now beyond the capability of any particular country or institution to solve adequately. In this respect, the co-operation of the international community and institutions is needed. It was within this perspective that OAU was co-operating, and will continue to co-operate with all institutions and international organizations that are working to bring an end to this problem. In this spirit, he said that the OAU had embarked on two projects in co-operation with other international organizations

with a view to combating drought in Africa. The projects are, the Integrated Biological Development of the Fouta Djallon Highlands in Guinea, and the Preparation of an International Hydro-geological Map of Africa. He emphasised that OAU was interested in an Africa free from the ravages of drought, because, drought has serious implications for the socio-economic development of the continent, coupled with the problems of rural migration to the cities which result in the compounding of an already complicated socio-economic and political problem in the urban areas. It was unfortunate that many of the drought-affected areas in the continent belong to the least developed countries. Finally, he expressed the hope that as we approach the year two thousand, we will talk of drought only as an element of historical curiousity, but no more as a menance to our people and to posterity.

14. The Representative of the United Nations Environment Programme, in conveying the wishes of the Executive Director, Dr. Mostafa Tolba, for a successful conference, noted that the current African drought was one of the most devastating environmental disasters of the century in terms of the cost in human lives, social disruption and environmental degradation. He noted that UNEP already had undertaken and further planned, activities within its programme to combat the drought problem and pledged its readiness to support the ECA initiative by making available UNEP's intelectual resources and organizational capability in support of the Plan of Action to combat drought, which was to be agreed by the Meeting.

15. The UNEP representative introduced two senior consultants, Professor James Dooge of Ireland, Chariman of the Scientific Advisory Committee of the World Climate Impact Studies Programme, a programme being implemented by UNEP as part of the WMO World Climate Programme and Dr. Michael Glantz of the United States, and informed delegates that the consultants' specialist advice would be freely available to them during the Conference. In conclusion, he said it was time to come to terms with the reality of drought, its continuing existance and the probability of its recurrence. He urged national, regional and international co-operation in order that the Plan of Action could be successful so that the tragedy of the present could be avoided in the future.

16. The Representative of the Secretary-General of the World Meteorological Organisation, Mr. Degefu, stated that the WMO is a specialized agency of the United Nations which promotes the improvements in weather forecasts and the standardization and dissemination of weather observations taken over the entire globe in 157 Member Nations. The WMO has long been interested in the subject of meteorological droughts and has published several reports over the years. In more recent years, the WMO along with other international organizations has been implementing the World Climate Programmes which has three objectives, namely:

1. To make better use of existing climate data and information, with emphasis on applications in food, water and energy;

2. To improve understanding of climate processes through research; and

3. To detect and warn governments of significant climatic events, both natural and man-made, which can greatly affect human activities.

It is noted that drought is a phenomenon which has direct connections to each of these three objectives.

17. The Representative noted that the ECA resolution 473 (XVIII) calling for the organisation of this Scientific Round Table on Climate and Drought very clearly recognized that the time is appropriate now for a stock-taking of our knowledge about drought and what practical steps can be taken to alleviate this scourge in Africa.

He pointed out that WMO has participated actively in response to this ECA resolution, along with other international organizations to organize two planning meetings, which have been held at the WMO, in Geneva, including the Expert Meeting on Climate and Drought in Africa.

18. Finally, he said that as the President of the WMO Regional Association in Africa he was also keenly aware that drought is now a significant climatic factor in 34 countries in Africa and is the single-most important climatic event in Africa today. As such, the Meteorological Services in African countries and the WMO are deeply involved in the alleviation of drought and he was sure that WMO will do everything possible to cooperate with ECA on this problem.

19. On behalf of Director General of the FAO, Mr. G.F. Popov thanked ECA for the invitation to collaborate with the other orgnisations in seeking a solution to the problem of drought in Africa at this Scientific Round Table Conference. He saw that the effects of drought are diverse and contribute to problems such as reduced plant cover in grazing lands, loss of water and fodder, reduced livestock, lowered agricultural outputs and a fall in the production of agro-based industries which are all activities within FAO related programmes, sub-programmes and projects in the African region.

20. He stressed that FAO's role includes providing advice and assistance on request to the member countries in Africa. The 22 countries now facing drought problems are receiving special attention. For example, between 1980 and early 1983, FAO's programme development mission to African countries identified more than 800 technical assistance projects with a total value of some US$1,000 million. Among these, about 170 projects totalling US$ 200 million are directly related to food production and food security in general, in the above-mentioned 22 food-deficit countries. These activities include

improvements in rainfed agriculture, soil conservation and combating desertification, integration of livestock with crop production, improving forestry development, strengthening science and technology and involving people in development programmes of land reform.

21. The representative of the United Nations Sudano-Sahelian Office (UNSO) Mr. Ruben Mendez, conveyed the best wishes of Mr. Bertin Borna, Director of UNSO, for the meeting's success. The problems of drought and desertification were the most serious and vexing in Africa today. It was eleven years since UNSO was established in what was thought to be the aftermath of the Great Sahelian Drought of 1968-1973 a drought which is persisting and spreading. UNSO is unique in that it is the only institution in the United Nations system whose mandates are concerned exclusively with drought and desertification. The number of countries assisted by UNSO has grown from 8 to 19, with Ghana and Togo to be added soon. This parallels the spread of drought in Africa.

22. UNSO assists the eight states members of CILSS in their drought-related programmes of recovery and development and all 19 countries of the Sudano-Sahelian region in combating desertification. Assistance includes construction of feeder roads (1700 kms so far) to remote areas; water conservation, management and development; afforestation, range management; sand dune fixation; planning; research, and training and others. UNSO stands ready to continue to provide assistance in the areas of drought and desertification.

SUBSTANTIVE SESSIONS

Review of the Climatic Situation and Drought in Africa (Agenda item 4.1)

23. The representative from the WMO Secretariat presented document E/ECA/SDEHSD/ENV/SRT/84/WP.1 on the Meteorological Aspects of Drought in Africa by stating that it was an overview based largely on the report of the WMO Expert Group Meeting on the Climatic Situation and Drought in Africa (Geneva, 6-7 October 1983).

24. He summarised the document by pointing out that:

(i) The drought in Africa which began in 1968 was not yet ended in 1983, despite near normal rainfalls in the Sahel in 1974 and 1975. The drought which began in the Sahel has in recent years spread to southern Africa and to parts of eastern Africa. However, some countries in both eastern Africa and in western Africa have experienced much less severe conditions.

(ii) The current drought in the Sahel is the most severe in this century, but evidence shows that such extreme droughts have occurred in the historical past. No firm evidence exists that the climate in Africa has changed, which might tend to produce more severe or more frequent droughts.

(iii) The general meteorological causes of drought are well known: the lack of adequate water vapour or the presence of large scale sinking air motions which inhibit cloud development or the absence of organized atmospheric disturbances which produce uplifting, cloud and rain. Any or all of these factors may be operating in Africa. Several hypotheses on the causes of drought in Africa are being tested but the specific quantitative conditions necessary for the onset or cessation of drought in Africa are not yet full understood.

(iv) Mankind may be affecting the local climate in Africa by overgrazing, which changes the heat balance between the earth's surface and the overlying atmosphere, producing downward air motions which promotes drought. Another hypothesis states that drought in Africa may feed upon itself from natural causes related to the vast size of arid lands in Africa and their position relative to moisture sources and atmospheric motions. Or both of these factors may somehow be acting together to prolong the current drought. Further research is required to determine the causes of drought in Africa.

(v) No useful periodicities or trends exist in the climate of Africa which can be used to predict the onset or duration of drought. Although rainfall amounts in the Sub-Sahara have indeed markedly decreased over the past 15 years, there is no certainty that such deficiencies will continue or will cease.

(vi) No known method exists to reliably predict the onset, cessation or recurrence of drought in Africa.

(vii) Rainmaking has not been convincingly demonstrated to be able to alleviate the current drought in Africa.

(viii) Reliable and continuous weather data, which are necessary to detect and warn of droughts, are not readily available in some parts of Africa.

(ix) Drought is a common occurence in many parts of Africa. Economies, in particular the food production system, must be versatile enough to endure droughts.

(x) African countries can take several positive actions to better use existing meteorological information to improve the detection of drought and to help alleviate its effects on agriculture and water management.

25. In conclusion, he brought to the notice of the meeting the recommendations that African nations should:

(i) Establish drought control plans which include measures to better use existing meteorological information to detect drought and to help alleviate its effects on agriculture and water management;

(ii) Ensure that National Meteorological Services have adequate resources to observe and disseminate the necessary weather observations regularly and to provide necessary services to the agricultural sector;

(iii) Not rely on rainmaking to relieve drought;

(iv) Encourage research into the causes and prediction of drought.

Discussions on the Meteorological Aspects of Drought in Africa

26. One representative noted that while this paper contained much good information about the meteorological aspects of drought in Africa, it did not contain practical suggestions on how to combat the drought. The ECA representative replied that WMO paper was prepared in response to the ECA resolution to examine the causes, periodicity and trends of drought in Africa. Later sessions of the meeting were to be devoted to effects of the drought and to propose practical measures to deal with the problem. Further it was noted that the WMO paper did in fact contain several practical measures to be taken in the meteorological community to help nations combat drought.

27. Another representative pointed out that his country had suffered greatly in 1981-83 from drought. Then in December 1983 - January 1984 intense rains had caused floods and deaths in Mozambique and neighbouring countries. In 1978, Mozambique had large hail from thunderstorms which had not been experienced there previously. In response, the Secretariat noted that the December 1983-January 1984 rains were caused by a tropical storm which came ashore from the ocean, an event which occurs occasionnally. The dry conditions from the previous drought period had impacted the soil so excessively that rapid run off of this rainstorm produced flooding and deaths. The rainstorm from a tropical storm is in contrast to the usual rains in Mozambique which are caused by the Intertropical Convergence Zone as it moves north and south with the seasons. The large hailstones no doubt came from an exceptionnally severe thunderstorm.

28. Another representative noted that although it was specifically mentioned in the document, the Ivory Coast has indeed suffered much from drought even if other countries in both West Africa and East Africa have had less severe conditions. In reply it was noted that not all African countries had been explicitly named which had suffered from drought, because at latest count 34 countries were suffering from drought. Thus, the fact that the Ivory Coast was not named as drought-stricken certainly did not imply that they had not suffered from drought.

29. Another representative noted that, despite the fact that the Congo is normally a tropical country with plentiful rains, the dry season which normally lasts for 2-3 months had extended to 5-6 months in 1983, causing considerable shock to their citizens. The WMO representative agreed that wet tropical countries can indeed suffer from droughts, the criterion being, extended periods of below normal rainfall.

30. An ECA Representative asked whether it was possible to deduce return periods of droughts from the procedures used in hydrology to deduce return periods. Professor James Douge, an eminent hydrologist and the Chairman of the UNEP Scientific Advisory Board explained that the procedure used to deduce return periods in hydrology was not suitable to make predictions on when droughts would occur or how they would last or when they might recur.

31. One Representative then noted that, while it was not feasible to predict droughts, very useful information on soil moisture and hence crop yields could be given to planners and to farmers. He strongly advocated high quality weather observations be taken at an adequate number of locations, and that these data be disseminated rapidly so that they may be processed to give practical results immediately. Specifically, he advocated that these recommendations should appear in the final conference papers. The WMO representative concurred entirely and noted that practical recommendations in the paper coincided with those from the WMO Director-General.

32. Another Representative noted that the Senegal national meteorological service worked in interdisciplinary teams to provide weather and climate information about drought to all users. He asked whether droughts could be predicted. The WMO representative replied that the WMO Group of Experts on Drought in Africa had concluded in October 1983 that droughts cannot be predicted accurately, neither through physical reasoning, computer models, nor from statistical evidence.

33. A few representatives agreed that very useful information can be provided to planners and farmers using existing data and techniques. They cited the example of the AGRHYMET Centre in Niamey which serves the CILSS countries in West Africa and they noted the importance of man-made effects, such as over-grazing, upon drought and desertification.

34. Finally, one of the experts from UNEP summarized the discussion by pointing out that, there appeared to be a polarization taking place from the remarks of several of the participants. That polarization was between the importance of science versus the importance of policy in understanding and coping with drought.

Which had more affect on dealing with drought? The polarization was not a strong one but is one that often occurs in meetings bringing scientists and policymakers together. Yet, with respect to combatting the impacts of droughts on society, economy and ecology, the polarization is a false one. To cope with drought society needs both the scientific input as well as an understanding of the policies that unknowingly may be making worse the societal impacts of drought. For example, having more or better meteorological information does not mean that it will be properly used or for that matter used at all. On the other hand, the absence of such information does not mean that nothing can be done to minimize the impacts of a particular drought (or of droughts in general). Both the understanding of the science and the understanding of the policy aspects of drought situations are needed.

35. He said that if for example, some of these hypotheses in the WMO working peper that have suggested a linkage between overgrazing and the perpetuation of drought conditions (eg. overgrazing denudes the land surface which increases albedo (reflectivity) which leads to a cooling at the surface which leads to subsidence which inhibits cloud formation), then the options for policymakers become clearer (even if not easier) —— reduce overgrazing. As another example, if the occurrence of one year of drought has a good chance (say, 2 out of 3) of being followed by a second year of drought, then policymakers will have to take preventive strategies to prepare for the possible drought in the next season. Even if that drought does not materialize, those cautionary measures will seem worthwhile. Finally, if the El Nino event thousands of miles from the African continent taking place along the western coast of South America should prove to have some connection with African continent-wide droughts, then perhaps, being able to forecast El Nino events will provide national leaders in Africa with some months of advanced warning about the possibility of drought in their land. In sum, the science of drought is important. Knowledge that may be derived from research efforts today, won't help us with this particular drought situation but it will certainly help us with the next one that is sure to recur sometime in the future. Policymakers for their part can help assure that the right information will be collected so that we can eventually come to understand droughts and their impacts better.

SUBSTANTIVE SESSIONS

Review of the impact of and responses to drought on the socio-economic systems in Africa (item 4.1 continued):

36. The representative of the ECA Secretariat introduced document E/ECA/SDEHSD/ENV/SRT/84/WP.2 by pointing out that the paper dealt with the following topics:

(a) direct impact of drought on the African socio-economic systems;

(b) responses to the impacts of drought; and

(c) researchable areas for possible strategies to mitigate the impacts of drought.

37. He said that since the meeting will be dealing at length in the next session with the question of how to mitigate the impacts of drought, he will concentrate on the presentation of (a) and (b) above. He stressed that severe droughts, such as is being experienced now in several parts in Africa, usually lead to serious dislocations and a combination of negative impacts which usually feed on themselves and tend to act as a vicious cycle. Direct impacts may, however, be readily classified into the following which are dealt with separately in the ensuing paragraphs:

a. (i) economic impacts;

b. (ii) Social impacts; and

c. (iii) impacts on the ecology and environment.

a.(i) Economic Impacts

1. Impacts on Agriculture, Food Production and Animal Resources

38. He pointed out that drought exerts extreme pressure on the vegetation and leads to a depletion of arable and pastoral land. Because of the magnitude of this sector in the African economies and the fact that the African populations is predominantely engaged within this sector, the consignes both for the economy and the population are grave.

Food and agricultural production has been deteriorating over the past two decades in Africa. Per capita food production has been falling throughout the 1970's in Africa at a time when the rate of population growth has been steadily growing. Recent droughts have further jeopardized the current food situation.

39. He stressed that 24 African countries affected by the drought have suffered a shortfall of 3.3 million tons in cereal production compared to 1981. The following serve as examples of shortfalls at the country level:

(i) Mauritania: in 1983 crop production dropped to 40,000 tons compared to a normal level of about 100,000 tons

(ii) Zimbabwe: maize production was one million tons in 1983 as compared to 1.8 million tons in 1982.

(iii) Swaziland: 1983 maize production was about 40 percent of the normal.

(iv) Sao Tome and Principe: Cocoa production was reduced by 25 percent.

(v) Ghana: General food shortages are estimated at 50 percent.

(vi) Guinea: 25 - 30 percent less production in maize, rice and groundnuts.

(vii) Central African Republic: Food crops and other crops were reduced by 20 - 30 percent.

(viii) Ethiopia: shortfalls of 150,000 metric tons are recorded in 1983.

40. He stressed that livestock also plays an important role in the economies of African countries and sharp depletions in the size of herds have been recorded in many countries, for example:

(i) Upper Volta: it is estimated that 80 percent of the cattle stock is threatened and might have to be slaughtered.

(ii) Zimbabwe: 30 percent already lost.

(iii) Benin: 20 percent lost.

(iv) Mozambique: 100,000 died already and 1,500 die every month.

(v) Lesotho: 58,000 deaths have been reported.

41. Export earnings and government revenues have fallen drastically as a result which has necessitated a curtailment of public services, essential imports and development programmes. In addition, governments have resorted to extensive external borrowing and a rise in the debt servicing ratio. Other effects are manifested in:

(i) increased imports of food;

(ii) enlarged deficits in the balance of payments;

(iii) lower rates of saving and investment;

(iv) increased employment and underemployment; and

(v) a lower rate of growth of the economy.

2. Impacts on Energy and Industry

42. Drought has led to severe deficits in streamflow and lower water table which has in several instances affected hydro-electric power output. An example of this is Akosomboa hydro-electric power plant on the Volta Lake. As a result of a fall of the water level to 10 feet below the minimum level required for effective operation, power shortages have taken place. Industrial production is adversely affected leading to emergence of excess industrial capacities and also to an increased level of petroleum imports which exerts further pressure on valuable foreign exchange resources.

Agro-based industries have also been adversely affected as a result of the shortage of agricultural raw materials.

a.(ii) Social Impacts

43. He noted that famine, malnutrition, human diseases, increased mortality, collapse of the traditional pastoral systems and family structure and rural/urban migration are the major social impacts of drought. The document has given details of the incidence of such impacts.

44. Evidence also exists to the effect that the poor, small farmers, the rural landless and the urban unemployment are harder hit than any other groups by the drought. Drought can thus lead to a worsening of the poverty problem in Africa and to the emergency and/or intensification of other undesirable social and human problems. Estimates now have it that a significant proportion of 150 million people will be threatened by hunger and malnutrition unless concerted and urgent action is taken.

45. He said that the impacts of drought have been particularly serious for the following reasons:

(i) Drought is taking place at a time when the economic situation has been seriously deteriorating in Africa as evident from the following examples:

1. Average per capita income for the low income countries of Africa is less than what it was 15 years ago.
2. The terms of trade of African developing countries declined by more than 50 percent between 1977 - 1981.
3. Debt servicing obligations of sub-Saharan African countries have increased by 25 percent in 1982 and is projected to increase by 60 percent in 1983.
4. It is estimated that the ratio of debt service to export earnings for low income African countries increased from 8.8 percent in 1980 to 28.3 percent in 1982.

(ii) The majority of the drought-stricken countries are among Africa's Least Developed Countries. So, unfortunately one is forced to conclude that the severe drought has contributed to the deeping economic and social crisis in our continent.

(a) Impacts on the ecology and environment

46. The representative from the ECA secretariat further pointed out that:

(i) Drought leads to a reduction in the vegetation cover thus exposing the soil to forces of erosion, particularly wind erosion.

In this regard it is estimated that the usable extent of pastoral area in the arid and semi-arid regions of Africa have been reduced by 25 percent since the onset of drought in 1968.

(ii) Drought leads to acute water shortages needed for agriculture production, human consumption, animal husabndry and hydro-electric power generation with serious implications for all those aspects.

(b) Responses to the impacts of drought

47. On responses to drought, he pointed out that traditionally, the populations have tried to avert the impacts of drought by various methods such as selling cattle, loaning cattle, seeking alternative employment, food sharing and by migration, particularly from rural to urban areas. He noted that harmful human responses to drought have exacerbated the impacts of drought. He further pointed out that overgrazing, deep bore holes and growing of high water use crops in drought-prone areas, deforestation for fuelwood, have further upset the balance between human/animal resources and physical resources and accelerated the desertification process. Positive responses in the traditional lifestyles that are favourable, should be strengthened.

48. During the discussion that followed, many participants expressed their satisfaction with the content of the paper in setting out clearly the present impacts of drought in Africa. However, there were a few sectors that needed greater emphasis. They include:

(a) drought resulting from lack of re-afforestation after exploitation for fuel wood and timber;

(b) drought resulting from reduced vegetation through bush fires;

(c) livestock management under drought conditions - destocking;

(d) impacts of drought on the fishing industry;

(e) general reduction of the purchasing power of the income of population affected.

49. The representative of the ILO also pointed out that one of the problems that made the impact of drought more serious was that 40 - 80 percent of development programmes in Africa are based on technical assistance such that when there are sudden hazards like drought, resource re-deployment becomes difficult. The representative of FAO secretariat pointed out that the impacts of drought on fisheries especially from inland lakes, flood plains of large rivers and streams while volume of water decrease drastically during severe drought, has been overlooked and must also appear in the draft plan of action. The representative of the ECA secretariat clarified the differences between drought impact in semi-arid countries and those in the wet tropical zone. In the former case, he said that deforestation due to fuelwood supply was the problem whilst in the forested region there was always a surplus of firewood. Deforestation which has reduced the forested areas of most wet tropical countries from at 40 - 50 per cent some decades ago to single-digit percent now-a-days was due mainly to large scale timber exploitation as what is taking place now in the Ivory Coast, Liberia and the Congo.

50. Sudan: In the Sudan drought is caused by the yearly variation of rainfall below the normal, the destruction of ground cover vegetation, the spread of dry farming a cultivation and by the reduction of the volume of water available from rivers. The analysis of the five year rainfall recording for the year 1979-1983 shows a general decline of the mean annual rainfall compared to the normals of 1951-1090. The decrease is remarkable in northern and northwestern Sudan. The collection of data from synoptic stations is done by SSB transceivers and telephones. Rainfall data is collected by mail at the end of each month. Assistance is needed by providing more SSB transceivers and a micro fish equipment to preserve the huge records of available data. More contacts and cooperation is needed between the meteorological Department and the different fields of agriculture especially in the field of research so as to implement the early warning system. The Khartoum appeal for combating desertification as put forward by the Socialist Inter-Africa in response to President Nimeiry appeal few months ago should be highly oconsidered.

51. Niger: The delegate from Niger in presenting his country's experience stated that climatic data on the country is collected in four categories namely, usual meteorological data from fourteen stations; agro-meteorological data from seven stations; climatological data comprising temperatures air, humidity, evaporation rainfall and in certain cases wind eithteen stations; and rainfall data is collected from one hundred and eighty stations. The data is then sent to the Directorate of National Meteorology for analysis and daily bulletins are diffused through mass media. He said that drought was not a new phenomenon in Niger which has known several severe spells this century. The impacts have been made more serious by population increase and reduced agricultural production. Measures that have been taken to cope with the situation have included the setting up of a monitoring committees in seven administrative districts, for agro-pastoral activities, the adoption of a policy to increase animal herds by 50 percent in ten years, water and management for intensive agriculture.

52. Nigeria: The delegate from Nigeria stated that his country lies across climatic zones from the equatorial in the south to the Sahelian in the north. The northern part has been experiencing spells of drought but the 1983 spell was more severe than 1973 one. The recent one has caused high loss of human lives and livestock populations. He said that his country took a series of measures to mitigate the impacts and those include systematic aforestation programmes as well as lake and river basin development.

53. Guinea: The delegate from Guinea said that drought in his country is accentuated human activity that disrupts the forest ecosystems and poor land management. As concerns data collection, the nation meteorological service handles this through a nation-wide network of stations. At the same time, hydrological services and other research stations carry out the same activity of data collection. He stated that the impacts of drought have been a marked decrease in animal and agricultural production. To mitigate the impacts different traditional methods are being used. These include seed and crop management and crop diversification

54. Congo: The delegate from Congo presented the climatic situation in his country emphasising that although the country was in the heart of the equatorial belt, it is beginning to experience drought conditions. The situation might not be as bad as in the other countries but it is beginning to manifest. Data collection for monitoring these condition is carried out by two organization, office des Recherches Scientifiques et Techniques d'Outre Mer (ORSTOM) and the Agence pour la Sécurité de la Navigation Aérienne (ASECNA).

55. Rwanda: The delegate from Rwanda presented a brief geographical description of the relief and climate of his country highlighting the climatic variation and the fact that agricultural production is based on the seasonal variations of this continental mountain type of climate. Meteorological data is collected by the national meteorological service in close collaboration with the aeronautical services. Data is also collected by the hydrological services.

56. Tanzania: The delegate from Tanzania stated that his country is one of those with very low rainfall and the impacts have been the same as in other drought stricken areas. To cope with the situation the government initiated programmes aimed at increasing food production and conserving the environment. These included villagization of the population and a Task Force was set up to develop policies that would replace ad hoc measures by more permanent ones. Water conservation and re-afforestation programmes were also initiated.

57. Ethiopia: The delegate from Ethiopia stated that in his country climate is intimately related to the physigraphic situation which, in turn, is strongly related to the geology of the country. The country is dominated by a high plateau of cool temperature and high rainfall while the peripheral lowlands are hot and dry. The analyses of the climatic data of different parts of the country indicate that major droughts have a nation-wide effect and the recurrence interval is roughly 7-10 years. Population reacts to droughts by taking measures to cope up with shortage of rain through various means such as Construction of ponds, Development of springs, irrigation practices, stone mulching of farm areas, terracing practices, developing alternate early maturing crops and adaptation to lower water consumption. Moreover, people have developed a culture of taking security measures in case of failure of harvest such as storing grain for harsher days and by migrating when situations become unbearable. Finally he said that both the state and the public put in a lot of effort to alleviate the situation through the provision of relief aid and rehabilitation works (30,000 people already settled) and preparation of long-term strategy such as laying out of the necessary infrastructure including raising of mass consciousness and mobilisation for rural development works such as road building, afforestation, terracing, bunding etc. Furthermore, the Government has established institutions like:

Relief and Rehabilitation Commission
Land Use Planning and Regulatory Department
Ethiopian Highlands Reclamation Study
Soil and Water Conservation Department
Forestry and Wildlife Conservation and Development Authority
National Meteorological Service Agency
Water Resources Development Authority etc.

to enable understanding of situations and for long term remedial actions.

58. Ivory Coast: The participant from the Ivory Coast stated that the current drought situation in his country has resulted in reduced agricultural production of both subsistence and cash crops. It has also affected the production of energy from the hydro-electric dams. To cope with the situation the Government has taken measures by encouraging re-afforestation and restricting the export of timber.

Sierra Leone

59. The delegate from Sierra Leone stated that his country does not suffer from severe drought although there have been significant deficits lately.

Djibouti

60. The delegate from Djibouti emphasized that drought which is virtually permanent in his country. The government has had the policy of adapting a series of measures to alleviate its impacts. These have included development of rangelands and water management for this purpose, subsidized irrigation works under the auspices of the National Drought and Disaster Relief Office, and restricted the use of heavy machinery in agriculture. With the help of wind breaks, they have been trying to create favourable micro-climatic condition for livestock and agriculture. Tree cutting has also been formidden to safeguard the little forest resources that still exist and tree nurseries have been set up for re-afforestation.

Togo

61. The delegate from Togo stated that the reality of the problem of drought has been that floods have become rare for many decades and desertification has become, aparent in the country. The number of years with adequate rainfall are increasingly giving way to dry years, even down to the coastal region. Climatic data through a fairly dense network of meteorological and climatic stations and two agro-meteorological station. He stated that traditional methods to combat the impact of drought have been to identify resistant plant and crop varieties and try to cultivate them; the intensive use valley bottom and lower inter fleuve, for agriculture.

Burundi

62. The delegate from Burundi presented the situation in his country stating that his country has climatic characteristics similar to the Sahel zone of Africa. The major problem has been that of water conservation due to the seasonal irregularity of rainfall. For some time now the government has taken measure to control soil ericion which one of the countries major problems in soil degradation.

Activities of the United Nations and other Organizations (Agenda item 4.2 cont.)

63. World Meteorological Organization (WMO): The Representative of the WMO pointed out that his organisation had an approved plan of action on meteorological and hydrological aspects of combating desertification since 1978 but many of the activities relate to the assessment of drought and the alleviation of its impacts. WMO with the co-operation of World Weather Watch (WWW) assists national meteorological services in the collection of basic weather data through observation networks in the country. He brought the attention of the meeting to two reports on hydrological activities carried out in the Sahel in relation to drought impact on agriculture, the work of the WMO Commission for agricultural meteorology (mainly in drought-prone areas), the GGRHYMET programme in the CILSS countries, and the possibility of extending this programme to eastern and southern Africa, and the WMO training seminars held under the auspices of the World Climate Programme. Finally, he pointed to the studies WMO had launched to increase knowledge on the causes and predictability of drought and the role of the World Climate Programme in assisting ECA to organize this Scientific Round Table Conference.

64. United Nations Environment Programme (UNEP): The Representative of UNEP indicated that many of the UNEP ongoing programmes well related to drought, for example; 1. Outer limits (climate); 2. Combating desertification; 3. Water; 4. Soils; 5. Energy; 6. Human settlements, and 7. Global environmental monitoring system (GEMS). These programmes dealt mainly with the impacts of drought on food systems and agriculture, the problem of global warning of the atmosphere by excess carbon dioxide and developing methodologies for the World Climate Impact Studies which is being implemented with the collaboration of WMO and SCOPE (Sceintific Committee on Problems of the Environment) and ICSU (International Committee of Scientific Unions).

65. International Labour Organization (ILO): The Representative of the ILO pointed out that the activities of his organizations on drought cover three areas, namely: 1. Technical assistance through the labour Intensive Public Works programme to provide basic infrastructure as feeder roads, wind energy, small dams in the rural areas by making use of the surplus manpower normally

found in drought-stricken areas; 2. Building construction and applied technilogy, and vocational trainign in the maintenance of meteorological equipment and agricultural machinery; and 3. promoting the development of co-operative marketing organization in the amorphous population normally constituting rural communities in Africa.

66. Food and Agriculture Organization (FAO): The Representative of the FAO pointed out the activities of his organizations relating to drought were as follows: 1. Drought Relief Operations channeled through a special office under FAO's technical co-operation programme; 2. Food and feed security and early warning systems which latter has now been established in Ethiopia, Somalia, Tanzania and Zambia; 3. Water conservation and irrigation programme linked with training programmes; 4. Improvement in agricultural production using technology packages; and training of extension workers; 5. special section forestry and rural energy programmes in drylands, directed towards the firewood problem, soil conservation; shelter belts and windbreaks; 6. Grazing lands and livestock production management; 7. Fisheries resources to alleviate famine with special emphasis on agriculture; 8. Reduction in post harvest food losses during storage and transportation to markets particularly in drought-prone areas, and 9. Better land use planning in drylands for improved production.

67. United Nations Disaster Relief Organization (UNDRO): The Representative stated that UNDRO's centred around two responsibilities, namely: 1. Mobilising and co-ordinating international disaster energency relief to disaster sticken countries and 2. Promoting disaster prevention and preparedness. UNDRO has close co-operation with the FAO and WFP (World Food Programme) for the exchange of information on relief aid and food deficits in terms of drought and other disasters. UNDRO also assists other specialized agencies in the task of emergency relief and co-operation is maintained through the United Nations Inter-agency Task Force on Drought Problems in Africa established in January 1984 by the General Assembly.

68. World Health Organization (WHO): The Representative of the WHO pointed out the following activities of the organization relating to drought, namely: 1. Training in nutrition and promotion of primary health care; 2. Communicable disease programme with immunization and epidemiological surveilance; 3. Mental health programme with emphasis on the effects of drought as indicated by population migration, hunger and famine, depression and fatalism, and; 4. Promotion of environmental health programme linked to the International Drinking Water Supply and Sanitation Decade (1980-1990) and also to the control of environmental hazards and food safety from toxic chemicals in co-operation with UNEP.

69. Organization of African Unitye (OAU): The Representative of the OAU pointed out the role of the OAU in strengthening inter-State unity for combating the impacts of drought and desertification; through its standing expert Committee on drought and other natural disasters established as such in 1979. Previously, in 1974, the OAU had established the above as an Ad-hoc Committee to investigate the geo-climatic factors for drought occurrence and had also established an emergency Relief Fund for drought and natural disasters. Then in 1978, the Ad-hoc Committee adopted a Plan of Action containing a series of scientific and technical studies but due to limited resources, the OAU has only embarked on two projects with the co-operation of the United Nations system. The two ongoing projects on drought are: 1. Integrated Biological Development of the Fouta Djallon Highlands in Guinea which involves UNDP, UNSO, FAO and UNSCO, and 2. Preparation of an International Hydro-geological Map of Africa, Future activities relating to drought will deal with 1. Co-operation in implementing and monitoring of food and agriculture based on the Lagos Plan of Action and 2. Forestry development in Africa envolving the setting up of an office in Libreville, Gabon to monitor deforestation and afforestation projects in member States.

70. Italy: The observer from Italy gave a resume of his country's bilateral programme to the Sahelian countries on food supply and agricultural development. This special programme covers five sectors, namely: 1. The improvement of millet and sorghum output in 200,000 hectares of land adjacent to rivers; 2. Irrigation for cereals and horticulture in 20,000 hectares; 3. Livestock improvement in 3.5 million hectare of pastureland; 4. Afforestation around villages up to 400 hectare per annum and 5. Construction of storage facilities for 118,000 metric tons of cereals. He concluded by stating that the Italian government had ear-marked 700 billion liras (US$400 million) for the implementation of the special programme for the Sahel over a period of five to seven years.